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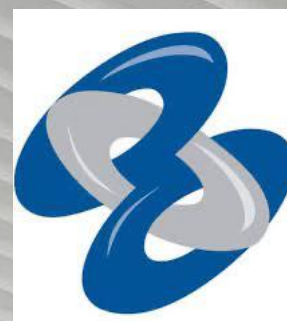
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107<sup>th</sup> International Scientific Conference on Economic and Social Development  
**Economic and Social Survival in Global Changes**

Book of Proceedings

**Editors:**

Nicholas Recker, Jelena Pavicic Vukicevic, Davor Perkovic

Zagreb, 16-17 February, 2024

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## MONETARY AGGREGATES IN THE EUROSISTEM – ARE THEY STILL IMPORTANT AND WHAT DO THEY SHOW?

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### ABSTRACT

*This paper examines the contributions to the monetary aggregates of the euro area member states Germany, Slovenia and Croatia and their share in the total aggregates, the interaction of the aggregates of large and small members of the Eurosystem, and the levels of liquidity, monetization and velocity of money in these members. Multiple regression analysis models were used to examine the influence of the German structure of monetary aggregates on the monetary aggregates of Slovenia and Croatia through M1 and M3 aggregates. The results show that there is a positive statistical relationship between the largest items of the German structure M1 and M3 as the largest stakeholder, on the trend of the total aggregates of Slovenia and Croatia. However, this impact, measured by the financial effect of nominal changes in aggregates in Slovenia and Croatia, cannot be considered particularly large. The level of liquidity (M1/M3) shows that the smaller members imitate the liquidity at the level of the ECB more poorly than the largest member. All three members differ in terms of monetization (M1/GDP), as well as in the velocity of money (GDP/M1), although in all three countries there is a trend of increasing monetization and decreasing velocity of money. As a scientific contribution of the research, the existence of the relative heterogeneity of the eurozone with its sub-currency areas is emphasized, with regard to different sizes of contributions, the interaction of contributions of large and small members, as well as indicators based on aggregates that members of the Eurosystem do not yet renounce in the hope of finding a better metric in forecasting price levels based on statistics provided by aggregates.*

**Keywords:** monetary aggregates, euro system, euro area, Germany, Slovenia, Croatia

### 1. INTRODUCTION

Monetary or money aggregates are the total amount of money circulating in the economy, which is classified into groups according to the degree of liquidity. In other words, cash in circulation and overnight deposits (transaction accounts, savings deposits) are included in the narrowest monetary aggregate M1 (money supply), when two-year deposits are added to aggregate M1, the broader monetary aggregate M2 is obtained, and when adding shares in money funds and issued securities with an original maturity of up to (including) two years, the broadest monetary aggregate M3 is obtained. In nature, monetary aggregates represent monetary liabilities of monetary financial institutions (banks) towards other residents, excluding the central government (CNB, 2023). It can be said that this is how monetary statistics at the national central banks function and are kept at the global level. Nevertheless, this process of classification of monetary aggregates, counting since the 50s of the last century, has undergone numerous changes, and groups of aggregates arose from the circumstances of the development of national money markets and banking in general. Some national banks had broader classifications of aggregates, so they managed M3, M4 or M1a subgroups, as the Croatian National Bank used to manage. In the process of adjusting the development of the money market, banking and membership in the EU, in February 2015, the CNB audited all monetary aggregates so that the data were harmonized with the statistical standard ESA 2010 (European System of Accounts 2010). ESA 2010 revised and updated the common standards, classifications and accounting rules for Member States when drawing up their national accounts and transferring their data to Eurostat.

Thus, from November 2015, the CNB started publishing monetary aggregates according to the definition of the European Central Bank - ECB (data series from December 2010), which are published in the CNB Bulletin in Table A1 - Monetary and credit aggregates (CNB, 2023). Standardization of definitions and procedures for the trend of the "harmonized" money supply in the euro area was a special challenge for the ECB. Given that the Maastricht Treaty gave the ECB significant powers in the field of statistics, the reporting institutions (national central banks) were to define, collect and classify all monetary data in the same way in the future. Since the money supply is of particular importance as an intermediate goal of monetary policy, the "correct" calculation of the money supply and its classification should provide the best possible insight into the trend of the money supply and the price level. Although in some member countries of the European Monetary Union there was no close correlation between money supply and prices, for historical reasons the concept of "money supply" or monetary aggregates prevailed due to the German Bundesbank (Dening, 1998). Thus, it is an unwritten rule that the M1 monetary aggregate is linked with the movement of GDP growth (due to the credit activity of banks towards the private sector from which the money supply M1 is created) or that the M3 aggregate is connected with the trend of the inflation level (because as the broadest aggregate it includes all the financial potential that can serve to increase demand and put pressure on prices). Monetary aggregates have played a key role in harmonizing the strategy of the ECB's monetary policy, which is based on two pillars. One pillar is based on the economic analysis of price risks in the short term, and second pillar is based on the monetary analysis of risks for price stability in the medium and long term (ECB, 2003).

## 2. LITERATURE REVIEW

The role of money in the analysis of monetary policy has changed significantly in recent years. In the early years of the European Monetary Union, for example, the ECB placed great emphasis on the role of monetary aggregates for its analysis of monetary policy. The ECB even published a benchmark for money growth to explain its interest rate decisions (Brill, Nautz, Sieckmann, 2020). On this basis, the rate of 4.5% was determined as the target value of the growth of the monetary aggregate M3 on an annual basis.<sup>1</sup> However, it turned out that the reference growth rates of M3 exceeded the target value by about 2.5 percentage points, while at the same time inflation did not accelerate at all, thus bringing into question the justification of monetary aggregates in the ECB's strategy (Dreger Wolters, 2010). So it could be concluded - if the connection between money and prices has become unstable, the growth of the money supply is not a well-designed tool for analyzing future inflation prospects and supporting political decisions. Similar conclusions are reached by Gerlach and Svensson (2003), Carstensen (2004), Greiber and Lemke (2005), Gerlach (2004), Neumann and Greiber (2004) use their components in their research instead of monetary aggregates as original variables. Thus, the widely used monetary aggregates M1 and M2 that simply add up their components imply that different monetary assets (components) are treated as perfect substitutes. That is why Billi et al. (2020) and Brill et al. (2020) claim that simply added aggregates (M1 or M2) do not take into account the different degrees of liquidity provided by its components. It has gotten to the point where money seems to have lost its relevance for predicting, let alone explaining, inflation. In the review of the ECB's monetary policy strategy for 2021 (ECB, 2021), there is indeed a reference to a "weakening of the empirical link between monetary aggregates and inflation". And the economic and monetary pillar of the ECB's strategy disappeared, transformed into an "integrated analytical framework that brings together two analyses: economic analysis and monetary and financial analysis" (Cadamuro, Papadia 2021).

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<sup>1</sup> The benchmark of 4.5% is in turn derived by adding and shortening of a target inflation rate of 2%, real growth between 2% and 2.5% and a decline in the velocity of M3 by 0.5% to 1.0% per year. The reference value for M3 clearly came from the experience of the Bundesbank, but was also consistent with the approaches of the Banque de France and the Banca d'Italia.



In fact, since the mid-2000s, it has been indirectly recognized - that the direct use of monetary aggregates for monetary policy is not possible. Good counterparts to monetary aggregates had to be found. One of those who stratified the role and power of monetary aggregates on multiple levels (apart from economic growth and inflation) is the former president of the ECB, Jean-Claude Trichet (2008). He then stated that they help with reliable statistics of the new members of the euro area, with financial imbalances and economic analysis. This will later be called macroprudential policy that combines financial and monetary stability. Now, a new "holistic assessment of monetary data" to better understand economic developments and inflation forecasts (Cadamuro, Papadia 2021), is gaining other supporters such as the former member of the ECB's Executive Board, Otmar Issing, who accepts the more general proposition that money deserves a prominent but changing role in monetary policy (Issing, 2006; Stark, 2008). Moreover, Issing places the meaning of credit development (bank loans) before monetary trends. Research and views roughly conclude with the following: attributing great importance to monetary aggregates helps to move from high and unstable inflation to low and stable inflation, but when a new level of lower inflation is reached, money would turn from a very important variable into a mere important variable. Thus, Bordo (2008) summarizes his position in the assertion that money is important for inflation in unstable conditions characterized by high rates of money growth and/or inflation. De Grauwe and Polan (2005) empirically showed that a strong relationship between inflation and money appears only in countries with high inflation or hyperinflation, while in the case of inflation lower than 10%, the relationship is weak or absent. Based on this, as early as 2005, the ECB was advised not to take money growth as a useful signal of inflationary conditions. Recently, however, monetary aggregates have seen quite a resurgence in importance, as a surprising resurgence of inflation has gone hand in hand with an increase in the money supply in a number of countries that have been prominent in economic debates (Congdon (2022), Issing (2021), Goodhart (2021), King (2021). One recent look at the link between money supply and inflation was given by the influential Claudio Borio as head of the key monetary-economic department of the Bank for International Settlements (BIS, Basel) during 2021-2023. In the paper, Borio et. al. (2023) investigate the signaling value of monetary aggregates for inflation with the aim of providing a firmer basis for understanding the current episode of inflation that is still unfolding. The BIS and Borio point to previous studies that provide evidence that the link between money growth and inflation is strong in a period when inflation is high, while the relationship is weak in a period when inflation is low (e.g. Laidler (2002), De Grauwe and Polan (2005), Sargent and Surico (2011), Gertler and Hofmann (2018)). Additionally, Borio et al. (2023) point out that in a high-inflation regime, price jumps become more similar and synchronized, acting as a kind of coordinating device for agents' decisions, which in turn increases the likelihood of wage-price spirals. Borio emphasizes that there is indeed evidence that money growth and inflation have recently been closely linked. For example, across countries there is a statistically and economically significant positive correlation between the growth of surplus money in 2020 and average inflation in 2021 and 2022. Somewhat mockingly, Borio points out that in all countries there is a statistically and economically significant positive relationship between high money growth in 2020 and the failure of professional forecasters on the trend of inflation rates in 2021 and 2022. That is, the underestimation of inflation was greater in those countries that recorded a greater growth of surplus money during the pandemic. Given that in the current episode the source of the increase in the money supply has varied greatly between countries, Borio pythically concludes that time will tell - has the neglect of monetary aggregates gone too far? Moreover, some of the authors from the BIS in their works argue for the greater importance of monitoring the purchasing manager's index than monitoring the money supply when it comes to economic growth. Thus in the BIS, in their research, Erik et al. (2019) maintain that Purchasing managers' indices (PMI) have found a place in the global conjunctural analysis and three-month GDP forecast, serving

as reliable simultaneous indicators of real economic activity. And while it seems that the positions of the monetary authorities (ECB) and the global monetary authority (BIS) regarding the role and significance of monetary aggregates in monetary policy are uncertain, less coherent and increasingly divergent, new messages are arriving. The ECB, however, sends a clearer message through ECB Executive Board member Isabel Schanabel. Namely, in her speech at the conference in Regensburg in September 2023, the member of the Executive Board pointed out, among other things: "In two and a half years after the outbreak of the pandemic, the sum of money in circulation and overnight bank deposits in the euro area, which is called M1, increased by more than 30%. In the same period, inflation accelerated from 1.2% to 9.1%. It peaked at 10.6% in October 2022. My overall conclusion is that money growth remains important, and is most important in volatile environments when adverse shocks from rising costs risk pushing inflation away from the central bank's target... As such, the growth of money may have been the grease that moved the wheels of inflation... All in all, although a separate monetary pillar is no longer essential for the conduct of monetary policy, money deserves a firm place in the analyzes of central banks." Anyway, central banks do not give up monitoring the trend of monetary aggregates despite doubts about the usefulness of data series for prognostic purposes. In view of all the above compared to monetary aggregates, the subject of this research is the monetary aggregates of the Eurosystem at the level of the ECB, the German Bundesbank (DB), the Bank of Slovenia (BS) and the Croatian National Bank (CNB) in the period from 2015Q1 to 2023Q1. Namely, in the Eurosystem, the so-called "contributions" to the monetary aggregates of the member countries, and they are not equal in volume or share of the member countries, nor in their components. Precisely for this reason, this research does not necessarily link and investigate monetary aggregates related to economic growth and inflation, but emphasizes the interactions between the heterogeneous economies of the member countries of the euro area through the prism of monetary aggregates. The interaction of the components of the monetary aggregates of the largest euro area stakeholder with the total aggregates of the two smallest stakeholders is analyzed and investigated. Then, in connection with the monetary aggregates, the monetization and velocity of money among these members of the euro area are analyzed and compared. The objectives of the research are achieved through three levels of analysis: a) analysis of the contribution to the monetary aggregates of the euro area of individual member countries and their share in the total aggregates; b) calculation of the liquidity level of the money market and the impact of the German structure of monetary aggregates on the aggregates of small members of the monetary union; c) analysis of the impact of the size of monetary aggregates on the level of monetization of the economy and the velocity of money in three members of the monetary union.

### **3. MEMBERS' CONTRIBUTIONS TO EURO AREA MONETARY AGGREGATES**

Nominally, there are no monetary aggregates of individual member countries of the euro area, but there are "contributions" of member countries (Germany, Slovenia, Croatia...) to the monetary aggregates of the euro area. The concept of residency is unique to the euro area. Due to consolidation within the sector of monetary financial institutions (MFIs) at the level of euro area countries, it may happen that aggregate M3 is smaller than M2 (CNB, 2023, Bulletin 284, Year XXIX, July 2023). Although the statistical coverage of the structure of each monetary aggregate is harmonized (e.g. cash in circulation within M1 is distributed according to the capital key)<sup>2</sup>, there is no real uniformity by capital key in the aggregates, both in terms of share and size, and also in terms of the dynamics of the growth rate of contributions according to the maturity of deposits domestic residents and residents from the euro area at the M2 level.

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<sup>2</sup> The capital key of the ECB: The item "Cash in circulation" is calculated on the basis of the Capital Share Mechanism, which foresees the division of the total amount of banknotes issued in the euro area between the national central banks of the euro area with regard to their share in the capital of the ECB (Germany 21.4394%, Slovenia 0.3916%, Croatia 0.6595%).

The same is true at the level of aggregate M3, which is conditioned by differences in the development of the financial market of the member countries and the offer of financial instruments. This statistically conditionally called "harmonized heterogeneity" also brings national differences in indicators related to monetary aggregates such as: a) liquidity of the monetary system M1/M3; b) monetization of the economy M1/GDP or M2/GDP; c) velocity of money GDP/M1 or GDP/M2. In addition (although not necessarily related to this topic) monetary mismatches imply variations in relative costs in favor of northern countries and to the detriment of southern countries. The case of the euro area is interesting because it illustrates in a very striking way the failure of market forces in the relations of overvalued (southern) members of the euro area often affected by high unemployment with undervalued (northern-core) members of the euro area (Mazier and Petit 2013). The monetary aggregates of the euro area are part of the overall dynamics of relations between member countries, where only five countries (Germany, France, Italy, Spain and the Netherlands) participate in the creation of the money supply with a share of about 80%, and only 20% is accounted for by the other 15 member countries.

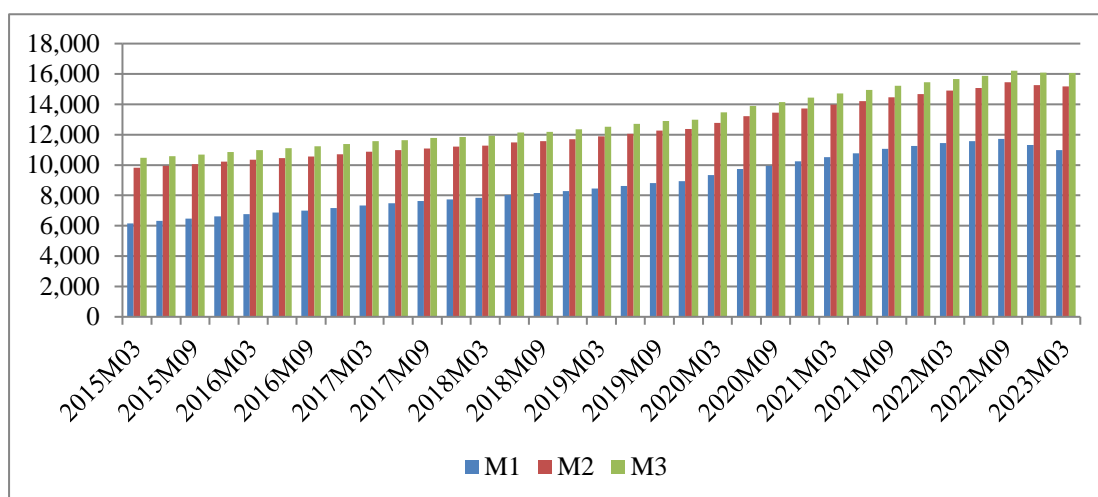


Figure 1: Monetary aggregates of the ECB 2015Q1-2023Q1, in billions of EUR  
(Source: European Central Bank - Statistical Data Warehouse)

Over 33 quarters (2015-2023), ECB statistics show that monetary aggregates have increased significantly, with a more pronounced growth since the first quarter of 2020. Monetary aggregate M1 in the period 2015Q1-2023Q1 increased from 6.2 trillion EUR to 11 trillion or by 77%, aggregate M2 increased by 9.8 to 15.2 trillion EUR or by 55%, while the broadest aggregate as the total money supply increased from 10.5 to 16.1 trillion EUR or by 53%. The average annual growth rate of the money supply (M1) was 10%. A three-month comparison of the trend of monetary aggregates (2015-2023) among selected members such as Germany, Slovenia and Croatia shows in nature the true dimensions of the economic power, importance and impact of the members on EU cash flows. At the end of the first quarter of 2023, the German contribution to M1 was 2,769 billion euros, while the Slovenian contribution was 32.8 billion and the Croatian contribution was 52.5 billion euros. The fact that Germany's contribution to aggregate M1 was as much as 84 times greater than Slovenia's and 53 times greater than Croatia's speaks volumes for the heterogeneity of the euro area. The largest share at the end of the first quarter of 2023 in the money supply M1 of the euro area belongs to Germany (25%), while two small members such as Slovenia (0.30%) and Croatia (0.48%) together have less than 1% of the money supply (see next figure).

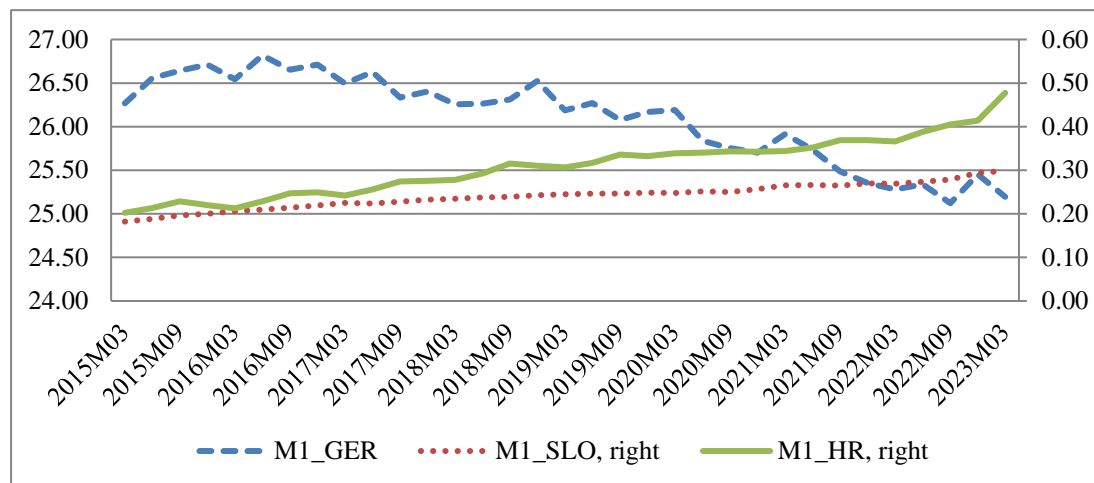


Figure 2: Share in the total M1 aggregate of Germany, Slovenia and Croatia, %  
(Source: processing by the author according to the European Central Bank - Statistical Data Warehouse)

The situation is very similar with the largest aggregate M3, where Germany participates with 24%, while Slovenia with 0.23% and Croatia with 0.39% barely exceed half a percentage point together.

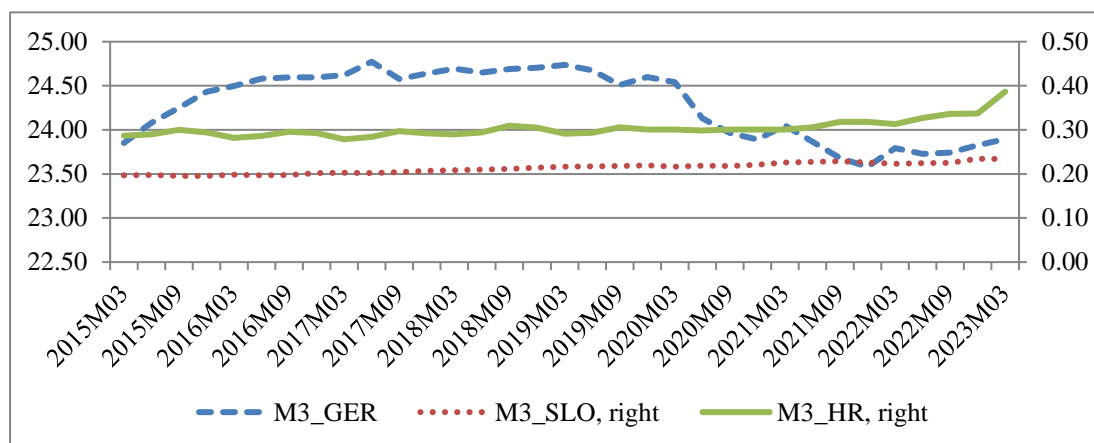


Figure 3: Share in the total M3 aggregate of Germany, Slovenia and Croatia, %  
(Source: processing by the author according to the European Central Bank - Statistical Data Warehouse)

#### 4. LIQUIDITY LEVELS AND THE IMPACT OF THE GERMAN AGGREGATE STRUCTURE

The volume of liquid assets held by economic entities is usually measured as the ratio between the national money supply M1 and the broadest monetary aggregate M3 and shows the economy's liquidity coefficient. Applying the same analogy to national "contributions" to monetary aggregates in the euro area, liquidity coefficients were calculated for member countries (Germany, Slovenia, Croatia) and the total euro area. Figure 4 shows that at the level of the euro area in the period 2015Q1-2023Q1, liquidity moves in the channel between 60 and 70 percent. At the same time, it can be seen that Germany's liquidity is at a slightly higher level and fully imitates the total liquidity at the level of the ECB (the strong correlation coefficient is positive and amounts to 0.986). Furthermore, the liquidities of Slovenia and Croatia (HR) are at similar levels starting only from 2020 and move in the channel from 80 to even 90 percent.

Otherwise, the correlation coefficient of Slovenia's liquidity with the level of the ECB 2015Q1-2023Q1 is +0.959, and Croatia +0.977. However, before 2019/20, Croatia had significantly (twice) lower levels of liquidity, which can be attributed to the then independent monetary policy outside the euro system.

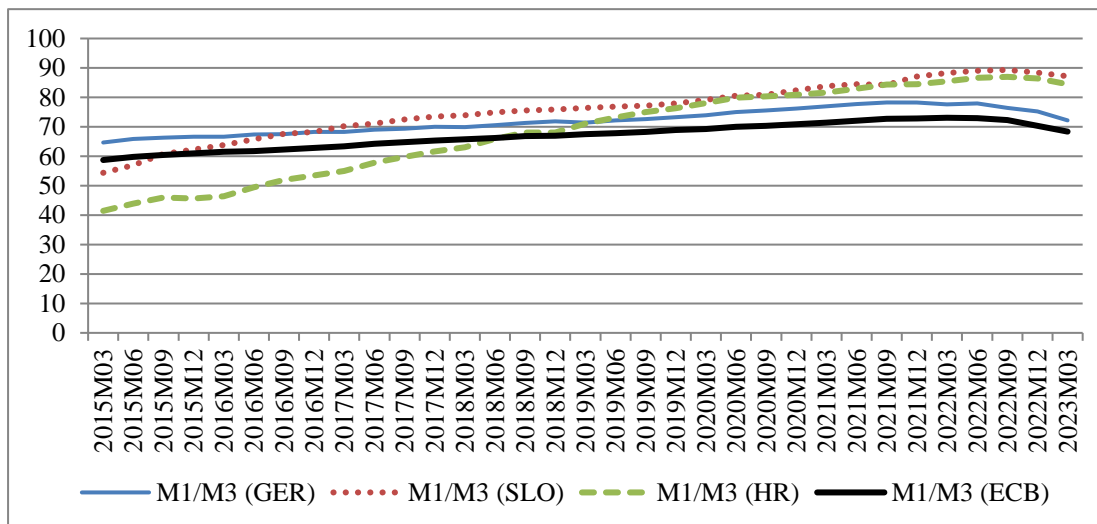


Figure 4: Liquidity ratios M1/M3, 2015Q1-2023Q1, %

(Source: author's calculation according to the European Central Bank - Statistical Data Warehouse)

The degree of "warming" of the money market measured in this way, based on the share of the money supply M1 in the broadest monetary aggregate M3, can be extended by analyzing the impact of the structure of the monetary aggregates of the largest member of the euro area, Germany, on other member countries (Figure 5). Thus, on a consolidated basis (report of monetary financial institutions-MFI), it would be possible to obtain a partial insight into the internal relations and interaction of the "individual contributions" of heterogeneous economies of the same monetary area.

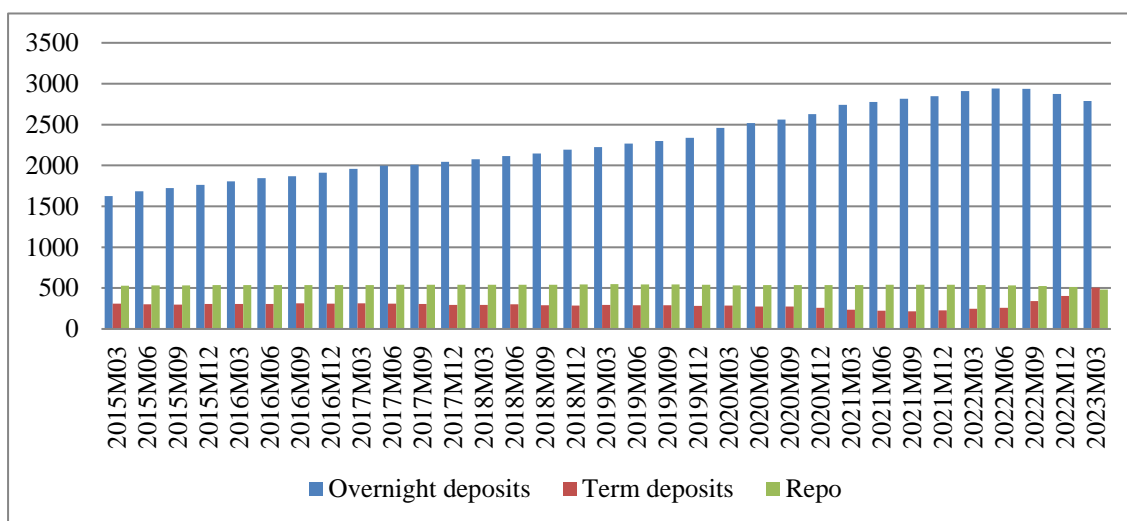


Figure 5: Components of German monetary aggregates, in billions of EUR

(Source: [https://www.bundesbank.de/dynamic/action/en/statistics/time-series-databases/time-series-databases/759784/759784?listId=www\\_ssb\\_b4\\_mi\\_komponenten](https://www.bundesbank.de/dynamic/action/en/statistics/time-series-databases/time-series-databases/759784/759784?listId=www_ssb_b4_mi_komponenten))

At the end of the first quarter of 2023, the largest share in the structure of German monetary aggregates is held by overnight deposits with 2,786 billion euros, followed by term deposits with 505.8 billion euros and repo contracts with 482.6 billion euros. Thus, the total monetary aggregate M3 in the same quarter amounts to EUR 3,838 billion, in which overnight deposits (of the economy and households) dominate with 74%. The modeling is based on the assumption that Germany, as the country with the largest individual share in the monetary aggregates with its structure of the aggregates, has an impact on the level of Slovenian and Croatian contributions to the M1 and M3 aggregates. The analysis would show the direction and strength of the relationship between the largest member of the Eurosystem on liquidity, i.e. economic growth measured through aggregate M1 and the impact on potential price growth measured through aggregate M3 in small members of the euro area such as Slovenia and Croatia. In other words, it is examined whether the German contribution to the monetary aggregates is related to the Slovenian and Croatian contributions to the monetary aggregates of the euro area. Empirical models and specifications are set at aggregate levels M1 and M3, and the general linear regression model (Šošić, 2004) of the basic set for  $n$  values reads:  $Y_i = a + b_1x_1 + \dots + b_nx_n + e$ , where:  $Y$  is dependent (endogenous variable M1 and M3 in Slovenia and Croatia),  $X$  1-3 are independent (exogenous variables of the German structure of monetary aggregates: overnight deposits (*Dep\_overnight*), term deposits with a maturity of up to two years (*Dep\_term*) and repo contracts with a notice period of up to 3 months (*Repo*), and the unknown parameter, while  $e$  is a random variable (relationship error). According to the previous one, the specifications of the two groups of models that determine the impact of the German structure of monetary aggregates in the period 2015Q1-2023Q1 (33 observations) on the Slovenian (*slo*) and Croatian (*hr*) aggregates M1 and M3 are:

$$\text{Group M1: } M1_{slo} = a + b1 \text{ Dep\_overnight} + b2 \text{ Dep\_term} + b3 \text{ Repo} + e$$

$$M1_{hr} = a + b1 \text{ Dep\_overnight} + b2 \text{ Dep\_term} + b3 \text{ Repo} + e$$

$$\text{Group M3: } M3_{slo} = a + b1 \text{ Dep\_overnight} + b2 \text{ Dep\_term} + b3 \text{ Repo} + e$$

$$M3_{hr} = a + b1 \text{ Dep\_overnight} + b2 \text{ Dep\_term} + b3 \text{ Repo} + e$$

The following results were obtained for the monetary aggregate M1.

Variable	Parameter	Sig.	R	R Square	F Change	VIF	Durbin-Watson	ARIMA
Slovenia								
Constant	-22,793	,005	,999	,997	3608,930	-	1,229	(0,1,0)
Dep_overnight	,016	<,001				1,756		
Dep_term	,016	<,001				4,274		
Repo	,005	,703				4,655		
Croatia								
Constant	,379	,987	,995	,991	1050,053	-	1,207	(0,0,1)
Dep_overnight	,026	<,001				1,756		
Dep_term	,029	,001				4,274		
Repo	-,076	,056				4,655		

Table 1: Impact of German aggregate structure on Slovenian and Croatian aggregate M1  
(Source: processing by the author, software support SPSS)

Table 1 shows the results of Group M1 obtained by examining the relationship between variables using a multiple linear regression model (processing in SPSS). Also, the VIF indicator (Variance Inflation Factor) is presented in order to draw conclusions about multicollinearity, as well as regression statistics with the D-W indicator in order to determine the autocorrelation of

relationship errors. Considering that the autocorrelation indicator in the D-W model is below 2.50, an additional analysis was performed using the ARIMA model (autoregressive integrated moving average). According to the obtained results, it can be said that the model has relatively good statistical characteristics without multicollinearity (VIF less than 5) with defined hyperparameters  $p$ ,  $d$  and  $q$  in the ARIMA framework. It turned out that German repo contracts are not a significant variable (at the 5% level) for either Slovenian or Croatian aggregate M1. On the other hand, German overnight deposits and term deposits are positively correlated with Slovenian and Croatian money supply M1. For example, each increase in overnight deposits in Germany by EUR 1 billion (ceteris paribus) raises M1 in Slovenia by EUR 16 million, and in Croatia by EUR 26 million. This result and impact is on the trail of the previously mentioned ratios between the sizes of the contribution to the M1 aggregate among these countries and points to the relative sub-currency dimension of the Eurosystem. The following results were obtained for the monetary aggregate M3.

Variable	Parameter	Sig.	R	R Square	F Change	VIF	Durbin-Watson	ARIMA
Slovenia								
Constant	17,634	,123	,996	,991	1110,915	-	1,291	(1,0,0)
Dep_overnight	,013	<,001				1,756		
Dep_term	,007	,062				4,274		
Repo	-,039	,039				4,655		
Croatia								
Constant	95,369	<,001	,990	,980	471,924	-	1,182	(1,1,1)
Dep_overnight	,017	<,001				1,756		
Dep_term	,016	,067				4,274		
Repo	-,184	<,001				4,655		

*Table 2: Impact of German aggregate structure on Slovenian and Croatian aggregate M3  
(Source: processing by the author, software support SPSS)*

As in the previous case, Table 2 shows the results of Group M3, and the model was shown to have relatively good statistical characteristics. In short, it has been shown here that all three key variables of the component of the German aggregates are significant at the 5% level for the trend of the Slovenian and Croatian largest aggregate M3. Thus, in the case of Slovenia and Croatia, German overnight deposits and term deposits have a positive impact on the trend of M3, while repo transactions have a negative correlation with the total M3 aggregate in Slovenia and Croatia. For example, every increase in overnight deposits in Germany by 1 billion euros on average increases M3 in Slovenia by 13 million and in Croatia by 17 million euros. Furthermore, an increase of EUR 1 billion in repo contracts in Germany on average reduces M3 in Slovenia by EUR 39 million, and in Croatia by EUR 184 million. This kind of impact of repo contracts, which participate in the German structure of total aggregates with about 13%, should be taken with a relative reserve. Apart from the fact that repo contracts in aggregate M1 are insignificant for Slovenia and Croatia (at the 5% significance level), repo operations on the open market can be part of bank transactions of domestic banks and German banks that are members of the Eurosystem. Additionally, as previously pointed out, due to consolidation within the sector of monetary financial institutions (MFIs) at the level of the euro area countries, it may happen that the M3 aggregate as the broadest is smaller than the narrower M2 aggregate. In this part of the analysis, the statistical results showed the size, direction and strength of the relationship between the structure of the German monetary aggregates and the Slovenian and Croatian aggregates. One could get the impression that the statistical result of the impact measured with a few million euros is not particularly important.



It should be noted here that the German contribution to the money supply M1 (overnight deposits), which reflect the credit-deposit activity of German banks, is the most important, as it participates with around 74% in the total German aggregates, as well as term deposits, which participate with around 13% in the total aggregates. They not only have a positive effect but also signal the expected trends (with the amount and sign of the parameters) in the overall economic and financial relations of the member countries. Additionally, the liquidity coefficients (Figure 4) show that "small" and "large" euro area shareholders differ in terms of liquidity, but also euro area members may differ in terms of the level of monetization of the economy (due to different levels of real sectors or GDP) and velocity of money, which once again confirms the single euro area as an alliance of sub-currency areas with a single federal bank, the ECB.

## 5. MONETIZATION AND VELOCITY OF MONEY

One of the measures of monetization of the national economy is the ratio of one monetary aggregate to GDP. In the profession and science, there are no firm opinions about which monetary aggregate best represents the level of monetization of the economy M1/GDP or M2/GDP. For the purpose of this research the indicator M1/GDP was chosen precisely because it is the first aggregate in which monetary multiplication is reflected after M0. In addition, M1 generates its size from the lending activity of banks to the private sector and can influence components of GDP such as personal or investment consumption. Starting from the previous one, in the observed period 2015Q1-2023Q1, the level of monetization of the German, Slovenian and Croatian (HR) economies is best seen in the following figure.

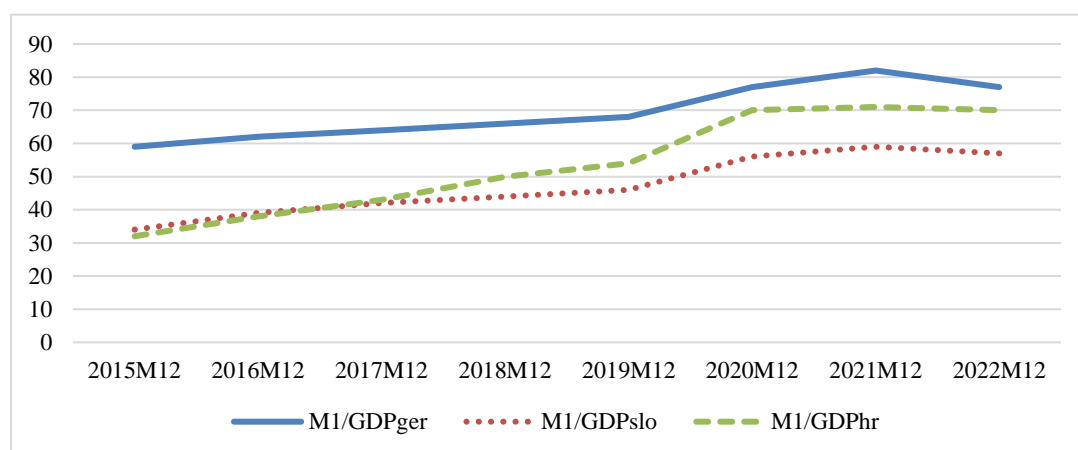


Figure 6: Monetization of the economies of Germany, Slovenia and Croatia, 2015-2022  
(Source: processing by the author)

Germany's level of monetization (M1/GDP) increased from 59% at the end of 2015 to 77% at the end of 2022. In the same period, the level of monetization in Slovenia increased from 34% to 56%, and in Croatia from 32% to 70%. Indicators for all three countries point to a relatively higher growth of money supply M1 (numerator) compared to GDP (denominator). Also, according to the figure, it can be concluded that this growth in the largest member of the Eurosystem was somewhat slower, because the 17 percentage points of growth of the indicator means that the growth of the money supply M1 had a relatively greater response in the growth of GDP, while this is not the case in Slovenia, and especially in Croatia, where the growth of the indicator of 38 percentage points indicates that the growth of the money supply did not follow the adequate growth of the real sector, i.e. GDP. By analyzing the inverse indicator of monetization, an indicator of the velocity of money or GDP/M1 is obtained.



In other words, this indicator tells how many times a year one unit of money is reversed (spent) in the economy or how much one unit of money supply creates a unit of GDP as a newly created value. The figure below shows the speed of money circulation in Germany, Slovenia and Croatia. In the period from 2015-2022. in Germany it fell from 1.69 to 1.30 or by 23%. In the same period, in Slovenia it fell from 2.93 to 1.77 or by 40%, while in Croatia it fell from 3.14 to 1.43 or by 54%.

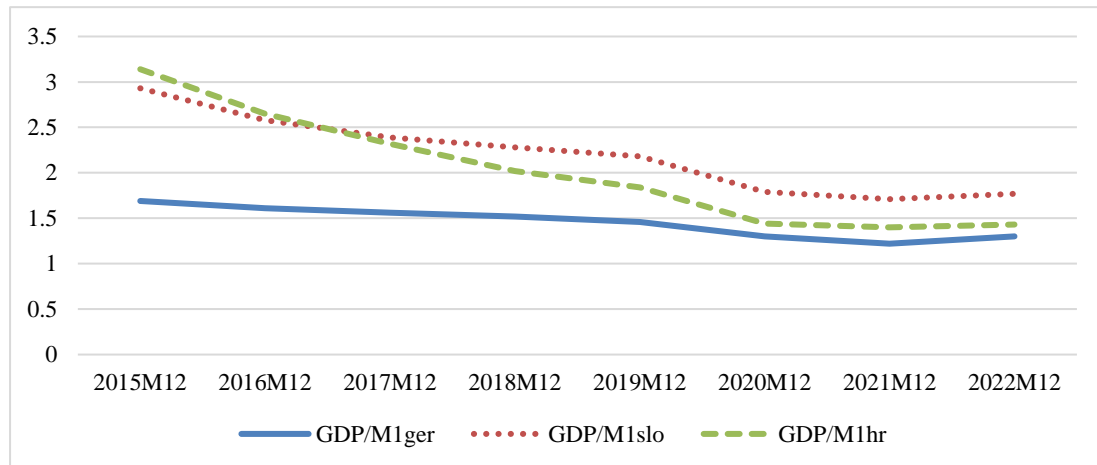


Figure 7: Velocity of money in Germany, Slovenia and Croatia, 2015-2022  
(Source: processing by the author)

In all three members of the Eurozone, the velocity of money is decreasing, and this indicates that more and more money is needed to maintain economic growth, despite the fact that this money was even created (printed) in "organized" auctions by the political authorities and the central bank (the so-called non-standard measures such as programs: Asset Purchase Program (APP) or Public Sector Purchase Program (PSPP) and others). It was an unprecedented fiscal capture of monetary policy with the hope of preserving economic growth and avoiding inflation. Nevertheless, the pandemic with interrupted supply chains, energy price shocks, especially since the beginning of 2022, forced analysts to link the strong money supply and price growth. The previous figure shows a slight reversal of the downward trend in the velocity of money in all three countries from the end of 2022, and inflation from the massive money supply is actually starting to contribute to this, which forces consumers to consume faster and more, which contributes to the growth of the velocity of money and new, higher price levels. Thus, inflation is confirmed to be a monetary phenomenon that is fed by the supply of money with a higher number of transactions, and price bubbles of assets (real estate and securities) from earlier, in the new inflationary environment, limit economic growth, even in the case of the largest member of the euro area. Additionally, among the member countries of the monetary union, due to different business and financial cycles, different levels of general income and regulatory-administrative reasons, the single currency acquires a new distinguishing dimension - inflation rates are quite different. All this, the euro area confirms again and again as a set of heterogeneous sub-currency areas.

## 6. CONCLUSION

The role of the money supply in the analysis of monetary policy in recent years has caused conflicting views not only among analysts but also among central banks themselves as bearers of monetary statistics. The initial views on monetary aggregates as a good tool for analyzing future expectations of economic growth (M1) and inflation (M3) have undergone changes.

On the one hand, analysts were more inclined to investigate the significance and role of aggregate components rather than the sum of individual aggregates, while central banks such as the ECB even took strategic positions (2021) on "weakening the empirical link between monetary aggregates and inflation". The so-called gained weight integrated analyzes that included economic, monetary and financial dimensions forming a new common name - macroprudential policy. Nevertheless, the monetary aggregates have experienced quite a revival of role and importance (especially during 2022/23), with the emphasis that the analysis of the movement of the monetary aggregates helps in the transition from high and unstable inflation to low and stable in-flation. Moreover, the ECB is returning to the "old settings", which is reflected in the official views of the representatives of the Governing Council that - the money supply deserves a firm place in the analyzes of central banks. The goal of this research was achieved through three levels of analysis results:

- a) The analysis of the contribution of individual member countries to the monetary aggregates of the euro area and their share in the total aggregates shows that the German contribution to the M1 aggregate was as much as 84 times greater than that of Slovenia and 53 times that of Croatia, which in this analysis is the first indicator of the heterogeneity of the euro area. At the end of the first quarter of 2023, the share of Germany in the M1 money supply of the euro area is 25%, while two small members such as Slovenia and Croatia together have less than 1% of the money supply.
- b) Calculations of the liquidity level of the money market and the power of impact of the German structure of monetary aggregates on the aggregates of small members of the monetary union have shown in the developed regression models that the components of the German aggregate M1 such as overnight deposits and term deposits (except repo contracts which are not significant) are in a positive correlation with the total contribution of the Slovenian and Croatian money supply M1. However, this statistical connection does not show significant nominally higher amounts and the spillover of the power of the structure of the German aggregate to the Slovenian and Croatian aggregates. Also, in aggregate M3, there is a positive statistical relationship between the impact of German components and total Slovenian and Croatian contributions (with the exception of repo contracts, which in both countries have a negative sign of the parameter). But even that is without major nominal financial effects shown in the parameters. Here, too, everything points to the existence of relatively isolated sub-currency parts of the Eurosystem.
- c) Analysis of the influence of the size of monetary aggregates on the level of monetization of the economy and the speed of money circulation in the three members of the monetary union showed that the indicators in all three countries point to a relatively higher growth of the money supply M1 compared to GDP. The growth of M1 in the largest member of the Eurosystem was slightly slower, which indicates that the growth of the money supply M1 had a relatively greater response to the growth of GDP, while this is not the case in Slovenia, and especially in Croatia, where the growth of the indicator of 38 percentage points indicates that the growth of the money supply mass was not accompanied by adequate growth of the real sector, i.e. GDP. On the other hand (in the inverse GDP/M1 indicator), this meant that the smallest decline in the speed of money circulation was in Germany, while the declines were significantly greater in Slovenia (-40%) and Croatia (-54%). All this, the euro area confirms again and again as a set of heterogeneous sub-currency areas.

All in all, while on the one hand, analysts are looking for new tools to measure the level of heating of the money market, and the monetary authorities, as unique holders of the authority to manage the supply and price of money, regularly use the statistics of monetary aggregates in predicting future inflationary or economic trends. Acknowledging that monetary aggregates are important when inflation is high, and unimportant when inflation is low, only confirms that in

this case the ECB will not give up recording the trend of the "contributions" of each member of the euro area, no matter how unimportant these contributions are. The limitations of this work are found in relatively small number of research periods with a uniform presentation of all aggregates, and especially the contribution components of the monetary aggregates of all members of the euro area. Also, the number of existing research on the role and significance of monetary aggregates in the past decade is relatively limited due to low levels of inflation. This form of research can be extended precisely to the area of interactions of business and financial cycles of individual members of the euro area with the movement of monetary aggregates (including sum or components). In addition, this can be connected with the dynamics of private sector lending, loan defaults, market risks and regulatory requirements of banks with regard to the business and financial cycle of individual members of the euro area. Different inflation rates in the euro area (even if they are not connected to the trend of the money supply) point to the existence of differences in cycles, incomes and regulations and consequently to sub-currency national areas that have a mutual central bank. Finally, the different growth rates of the contribution of the monetary aggregates of individual member countries in the "unique concept of residency" can affect the different levels of liquidity of the member economies which, on the other hand, are exposed to the unique instruments (key interest rates) of the ECB's monetary policy, which can be an additional branch of research. Research similar to the results of this research can be a stimulus and serve not only regulatory bodies, but also economic policy holders (especially small members of the euro area), considering all the social and financial heterogeneity of the euro area.

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## THE AGE OF POST-GLOBALISM: RISKS AND OPPORTUNITIES

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### **ABSTRACT**

*We live in a time of global international, geopolitical, economic, technological, and social changes that bring us a whole series of open questions to which we do not have answers and, likely, we will not have them shortly. Such an environment is a source of permanent insecurity. History teaches us that in such times, very destructive scenarios are possible that bring into question the existence of civilizations as we know them today. On the other, optimistic side, if the existing civilizations will survive, we are facing a new shuffling of the cards of power in which, as always, there will be winners and losers in this transition. Can we somehow prepare for it and actively contribute to be on the winning side, this is the main subject of interest in this work.*

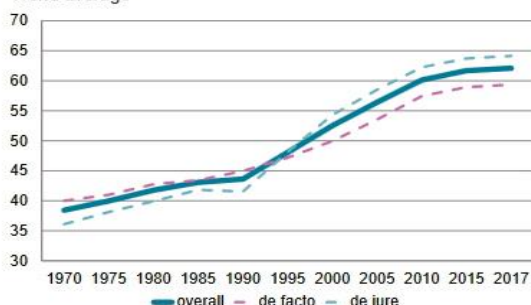
**Keywords:** *post-globalism, risks, opportunities, new era*

### **1. INTRODUCTION**

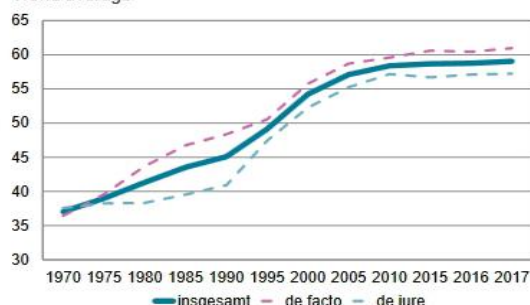
Globalization is a term that entered the academic and then wider public discourse in the second half of the 20th century. Different authors indicate a different, more specific time when globalization began to be written and talked about more. So political science professor Manfred Steger states in his book simply titled Globalization that in popular and scientific literature the concept of globalization began to appear frequently in the sixties of the last century, and this term was used to describe a series of social processes that transform the entire human reality into a state of globality (Steger, 2005). On the other hand, sociologist Christopher Chase Dunn believes that the use of the term globalization in its today's generally accepted understanding can only be placed in the eighties of the last century, and he supports his position with the rapid development of computer and digital technologies, which is illustrated by the fact that the first version of the Windows operating system (1.0) of the multinational technology giant Microsoft, launched in 1985. While there is a scientific consensus about the time of the emergence of modern globalization processes (with a difference in which decade) when trying to define what globalization is, such a consensus cannot be achieved. At the same time, the different definitions of this term do not at all mean that they repel each other, but quite the opposite. Different authors in their analyses certainly emphasize only the different fundamental elements of the existing globalization processes. Sociologist Roland Robertson, in his book Globalization: Social Theory and Global Culture, points out that globalization is "a process of compression of the world and intensification of awareness of the world as a whole" (Robertson, 1992). Sociologist Malcom Waters in his book with the very innovative name Globalization says that globalization is "a social process in which geographic restrictions on social and cultural events disappear" (Waters, 1995). Philip D. McMichael, a sociologist from Australia who approaches the topic of globalization from a higher economic position in his work Development and Social Change emphasizes that globalization is "integration based on projects carried out according to the rules of the market" (McMichael, 2021). In the economic context, globalization was also objected to by the world-famous investor George Soros, who in his book On Globalization asserted that the fundamental feature of globalization is "the development of financial markets, the growth of transnational corporations and their growing dominance over national economies" (Soros, 2002). Many authors speak directly negatively about globalization. So the Indian activist and writer Jain Neeraj in his book Globalization or Recolonization? says that globalization "is nothing but recolonization in a new guise" (Neeraj, 2001).

On the other hand, Nobel laureate in economics and former employee of the World Bank, Joseph Stiglitz, in his book *Globalization and the Doubts It Causes*, states as the main reason why he wrote that book in the first place "that he saw first-hand the disastrous effect of globalization on developing countries, especially on the poor inhabitants of those countries" (Stiglitz, 2004). It is noticeable, therefore, that the idea of globalization can be approached from different, and even conflicting, points of view, without being wrong. Empirical evidence that there is something we could call globalization processes dates back to the beginning of the 2000s when efforts were first made to conceptualize what globalization is, and then attempts were made to measure this phenomenon. One such attempt originated within the KOF of the Swiss Economic Institute (ETH Zurich), which designed the so-called KOF globalization index, which measures how globalized certain countries are according to predetermined parameters. A separate measuring instrument was created (designed by the German economist Axel Dreher), which consists of three measuring dimensions: economic, political, and social (Dreher, 2008). With a gap of 20 years since this measuring instrument was created, we notice that it does not contain a dimension that has become more and more important in recent times, namely the dimension of environmental impact. Currently, the KOF globalization index is calculated for 196 countries of the world, and 1970 is taken as the starting (base) year of measurement. From chart no. 1 we see that the average value of globalization connectivity at the world level, as well as at the level of each of the three main measured components, grew significantly in the period 1990-2010, and from then until the beginning of the 2020s it maintained the existing level, so that in for the last three years, this index has mostly stagnated (the graph shows the values of the index until 2017).

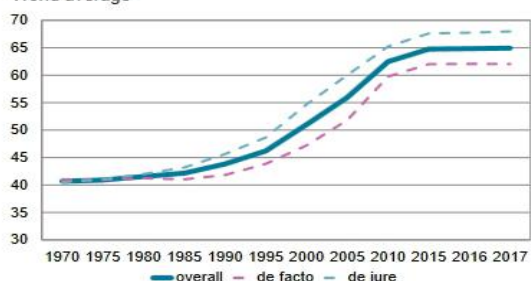
Graph 1  
KOF Globalisation Index  
World average



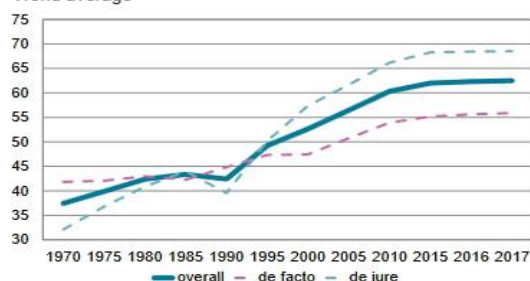
Graph 2  
KOF Globalisation Index, Economic Globalisation  
World average



Graph 3  
KOF Globalisation Index, Social Globalisation  
World average



Graph 4  
KOF Globalisation Index, Political Globalisation  
World average



Graph 1: KOF GLOBALIZATION INDEX

(Source: [https://ethz.ch/content/dam/ethz/special-interest/dual/kofdam/documents/Medienmitteilungen/Globalisierungsindex/Grafikblatt\\_KOF\\_Globalisation\\_Index\\_2019\\_en.pdf](https://ethz.ch/content/dam/ethz/special-interest/dual/kofdam/documents/Medienmitteilungen/Globalisierungsindex/Grafikblatt_KOF_Globalisation_Index_2019_en.pdf))

In table No. 1 presents comparative data on the ten most globalized and ten least globalized countries in the world according to the KOF globalization index for 2022.

2022 KOF Globalisation Index					
Rankings for the year 2022					
Rank	Country	Globalisation Index, overall	Rank	Country	Globalisation Index, overall
1	Switzerland	91	187	Bhutan	41
2	Netherlands	90	188	Chad	40
3	Belgium	90	189	Burundi	40
4	Sweden	89	190	Solomon Islands	40
5	United Kingdom	89	191	Comoros	39
6	Germany	88	192	Central African Republic	39
7	Austria	88	193	West Bank and Gaza	38
8	Denmark	88	194	Afghanistan	38
9	Finland	87	195	Somalia	31
10	France	87	196	Eritrea	31

*Table 1: RANKING OF THE 10 MOST AND 10 LEAST GLOBALIZED COUNTRIES IN THE WORLD ACCORDING TO THE KOF GLOBALIZATION INDEX IN 2022*

*(Source: <https://kof.ethz.ch/en/forecasts-and-indicators/indicators/kof-globalisation-index.html>)*

In the period from 2017 to the present day (the end of 2023), a whole series of social, economic, political and geopolitical changes took place (the global pandemic and very clumsy response to it, wars in Ukraine and Israel, organized attempts to reduce the role of the dollar in the world economy, especially within the BRICS countries and others) which all leads to significant international polarization, and which, as a direct consequence, has a weakening of trust in the globalization processes, which further weakens them. As an alternative, a new world order is offered, which would be based on the idea of multipolarity and the ever-increasing distribution of power among several international actors. Therefore, if globalization represented the centralization of power in all spheres of life, we are currently witnessing exactly the opposite tendencies. Ultimately, this is exactly what the KOF globalization index shows as the direction in which contemporary globalization is moving. In the desire to vividly describe the current international environment, many authors will use a very similar comparison and will say that we are in already seen historical circumstances of the collapse of the power of the prevailing hegemonic power, where they mean the weakening of the influence of the global "West" (USA and EU) which is compared to the time of the fall of the Roman Empire. The conditions that led to this are numerous and it may be impossible to determine one of them as predominant, but the collapse of the then "world order" during the time of ancient Rome was certainly influenced by:

- 1) invasions of numerous other peoples (barbarians) on the Roman borders, i.e. limes (today we call it population migrations)
- 2) the increasing military costs of maintaining the Empire's borders with the confrontation with newcomers (today it is a request for an increase in investment in NATO infrastructure of a minimum of 2% of the budget of the national member states and an increasingly clear clash with geopolitical competitors such as China or the BRICS countries in general)



- 3) lack of resources as a result of the decreasing flow of wealth due to the conquest of foreign territories and the expansion of the empire (today, the equivalent would be the end of the colonial era)
- 4) increased social stratification within the Empire (today this is represented by the creation of a few super-rich and the mass of those who can be considered losers in the transition processes)
- 5) the weaknesses of the Empire's political system (today democracies as a political order are referred to in the context of increasingly pronounced bureaucratization and the impossibility of making quick and strong political decisions)
- 6) complete moral decadence and the decline of ethical standards in all spheres of human life in the Empire (today this refers to numerous processes that lead to the disintegration of family structures and values, a colorful and conflicting attitude towards life, human sexuality, death and the identity of people, which often expressed through the concept of the so-called cancellation culture - cancel culture).

From this only partial list, we see the basic idea of this comparison, and it manifests itself in showing that there are numerous similarities between the time of the fall of the Roman Empire and the modern era. And in that, despite the more than obvious differences between those two historical times, there is a lot of truth.

## 2. POST-GLOBALISM AS A RISK

The appearance of the concept of post-globalism, which is entering the contemporary discourse more and more often, points us to the fact that the world is facing a new stage in the development of global relations and international economic interaction, the consequences of which are still completely unknown today and the direction in which the world can go will be the result of the actions of actors who will participate in these processes. This means that it is impossible to unequivocally determine or overlook what will happen in the time ahead, and it is even less possible to make a value judgment about it in the sense of determining whether what awaits us (unknown) is inherently good or bad. In this sense, the title of this work is confirmed, which simultaneously talks about the risks, but also the potential opportunities that the era of post-globalism can bring with it. It is a fact, which history so unquestionably teaches us, that all major (revolutionary) social changes so far have caused economic, political, geopolitical, economic, and social shocks that often ended in open and even military conflict. This is more of a rule than an exception. Even more, according to Prof. Ph.D. Damir Mladić, who refers to the works of Graham Allison from 2017, the situation in which the hegemon (today it is the USA) and the challenger (today is primarily China) are on a collision course is called *Thucydides' trap*. He emphasizes the following point: "Thucydides' trap refers to the natural, inevitable turmoil that occurs when a rising power threatens to displace the ruling power. It can happen in any area. But its consequences are most dangerous in international affairs." (Mladić, 2021., according to Allison. 2017). There is a tendency towards war in situations where the existing hegemon wants to maintain his position as the hegemon, and the rising power wants what it considers its right. Throughout history, such situations in most cases ended in war - but not always - 12 out of 16 situations of tension between the hegemon and the challenger ended in war (Mladić, 2021). In this sense, thanks to the exceptional progress of human technology, especially military technology, we can state that such a global conflict could destroy not a single human civilization but humans (*homo sapiens*) as a biological species, along with all the other damages that would be caused to the Earth as a living being. planet. Unfortunately, such a scenario is possible, and the only thing that can be said about it is that it causes human and scientific chills, whose further explanation is unnecessary. It is quite well described by the thought that says that we do not know if, how, and when the Third World War will come, but if

it does, the only thing we can know for sure is that the Fourth World War will again be fought with a bow and arrow. It is better not to even think in that direction. If we stay at the level of every day changes that post-globalism brings with it, which could be interpreted as risky, they could be divided into several fundamental groups. At the same time, it is significant that we can use the same division if we want to talk about the opportunities that post-globalism potentially brings with it. We will make exactly this and such a division in the continuation of this work.

- a) **Economic level** - the era of post-globalism brings with it a new, higher level of economic uncertainty because world trade is facing a new wave of economic policies that were targeted during globalization, such as national protectionism (in the form of the reintroduction of tariffs and trade barriers), trade wars, the breaking of known global supply chains and the relocation of global production from third world countries to countries that create production innovations, regardless of the level of production costs in these countries. All of this directly leads, at least in the short and medium term, to a decrease in international economic cooperation, a decrease in economic growth, and a loss of jobs.
- b) **Geopolitical level** - the era of post-globalism brings with it a new, higher level of geopolitical insecurity, in which nationalist policies are re-strengthened, as a result of which the focus of interest returns to territorial disputes that have never been fully resolved, trade and military agreements are terminated and a new round is started arms races, which all become a source of tension and potential conflicts between the nations of the world. That it is not only an imaginary potential for unwanted scenarios is clearly shown by the fact that currently, at various levels of intensity, there are as many as 53 armed conflicts in the world. The reduction of the will for international cooperation on the political level the complete abolition of known forms of multilateralism in international relations and the creation of a completely new multilateral environment in which, under the auspices of a new redistribution of world power, the countries of the world compete with each other for the establishment of new hegemonic relations, brings the world to the brink of serious geopolitical escalations that can create serious global threats. In such circumstances, it is illusory to expect that international actors will have the ability to deal with existing global world problems, but new ones will only accumulate.
- c) **Social level** - the era of post-globalism brings with it a whole series of serious social challenges which, with the use of modern technologies, are mainly related to the transformation of working conditions and increasing levels of social inequality between people, which directly lead to the disenfranchisement of a large part of the population and their existential threats.
- d) **Political level (in a broader sense)** - the era of post-globalism brings with it a whole series of new circumstances in the implementation of various policies in numerous segments of human life, such as: environmental, climate, humanitarian, and migrant issues, then the international legal order, energy transformation, the fight against corruption and discrimination at the national and international level, and numerous other challenges.

From what has been described, we can see that post-globalism has a direct impact on absolutely all aspects of human activity and that the transformation we are currently in is of tectonic significance. We know that a time of great change with a vague and approximate vision of what the future will look like causes fear and mistrust that can result in hasty activities that have the potential to call into question all the successes that humanity has achieved so far. Nevertheless, the time of such great changes also brings with it potential sources for future favorable scenarios

and progress. Therefore, when describing these opportunities, we will use the same division above to show that the fact of the world's position is at a turning point and an opportunity for improvement. If it can be reached.

### 3. POST-GLOBALISM AS AN OPPORTUNITY

Post-globalism as a new paradigm of the changing world implies a kind of return to the national, local, and autonomous, all of which, from the perspective of individual countries, can also bring with it potential advantages that will shape the world in a new way. One of the main advantages of post-globalism is the greater autonomy of states and communities. Globalization has often led to a loss of control over economic and political decisions, as international corporations and institutions, thanks to their economic power and influence, have become more powerful than individual states. Post-globalism promotes greater independence of states by allowing them to make independent decisions about their internal policies, trade and economy. That this is so can also be read from the unrealized expectations that the international sanctions (mainly from Western countries) imposed on the Russian Federation due to its invasion of Ukraine will bring that country to its knees and decimate it economically. It turned out, however, that the absence of a significant part of international trade with Russia and the loss of numerous Western products on that market forced Russia to turn to its production forces and find new trading partners on the international scene. Although not completely, because it is impossible to substitute all products, Russia has adapted to this quite well, and new business ventures have flourished in Russia itself, which was evident from the exceptional increase in the number of newly registered Russian companies that started domestic production of numerous missing goods. All this gave the Russian domestic economy a new flywheel, which representatives of the Russian authorities (mainly those close to Russian President Vladimir Putin, including himself) rightly portrayed as Russian economic success. In a multipolar and technologically developed world, the old globalization paradigm in which everyone is interdependent is becoming less and less attractive. Self-sufficiency in production and giving back to local forces thus becomes a new ideal that brings with it completely new economic, political, geopolitical and social relations on the international scene. In such a world, the political imposition of economic sanctions becomes a completely inadequate and senseless behavior that can result in the exact opposite effect of the desired one. However, it should be emphasized that "self-sufficiency" understood in this way should not be confused with the term autarky, which also denotes a state of self-sufficiency, but which is allegedly (and which is a completely false assumption) achieved by refusing to participate in any international exchanges. In the following, according to the previously described taxonomy, we will offer some potential advantages that may come with the establishment of post-globalism.

- a) **Economic level** - despite the risks, post-globalism can also bring with it opportunities for restructuring national economic policies. Countries can diversify their economies to reduce dependence on global markets. Increasing investment in innovation and technological progress can improve competitiveness and create new jobs. A combination of regional trade agreements and bilateral relations can also enable greater autonomy in trade management, which together can contribute to additional economic balance and the development of national economies. Post-globalism can promote a fairer distribution of wealth. Globalization is often associated with a growing gap between the rich and the poor. Post-globalism places greater emphasis on the advancement of social justice and balance in the economy.
- b) **Geopolitical level** - post-globalism can contribute to the creation of new geopolitical structures, especially in the segment of regional cooperation (such as the creation of BRICS

blocs or the African Free Trade Area - AfCFTA), which potentially reduces tensions between member states and ensures stability within regions. Although existing multilateralism is under pressure, the creation of new and different relations between international actors represents the potential for new creative diplomatic models and techniques. An example of this was the recent Chinese mediation in the agreement on cooperation between international rivals Saudi Arabia and Iran, which until recently was not even an option. At the same time, it is extremely important to succeed in maintaining a dialogue between the great powers, which is crucial for preventing major conflicts.

- c) **Social level** - post-globalism potentially brings with it the opportunity to confront issues of social inequality. Increased awareness of these problems can stimulate changes in social policies. Creating new jobs in local communities increasing minimum wages, investing in education and ensuring better working conditions can reduce social inequality and help build fairer societies.
- d) **Political level (in a broader sense)** – post-globalism potentially brings with it the opportunity to establish a new flywheel to promote cultural diversity and preserve traditions, which preserves the unique identities of communities. This is especially important in the linguistic, confessional, and generally ethnographic sense. In addition, post-globalism can improve political stability. Post-globalism enables countries to deal with internal economic and political challenges, which can contribute to a more stable environment. Another potential advantage of post-globalism is greater environmental responsibility. Globalization has often encouraged economic models that adversely affect the environment, such as long supply chains and overuse of resources. Post-globalism promotes more sustainable practices and encourages communities to be more responsible towards nature which contributes to sustainable development.

From everything that has been said so far, it becomes quite clear that the world is at a major turning point, which is the result of the weakening of the existing power structures and the attempt to establish a new equilibrium between the old powerful and those who are trying to take over that role. So far, history has taught us that times of such transition are mostly dangerous because the probability of conflict between old and new geopolitical powers is extremely high. Therefore, globalization and post-globalism represent two key paradigms that define the contemporary world. While globalization developed for many years as the prevailing model of the world order, at the beginning of the XXI. century, a growing trend of complex social changes began to be noticed. Everything interesting and attractive in the era of globalization began to be questioned, and the existing cracks in such a system became more and more obvious. Free trade, opening borders, faster communication and global connectivity are not enough in themselves to make their existence permanently attractive to people around the world. All of this had to be given a deeper meaning, which, it seems, did not succeed because only a few used the benefits of such a system. Or, if we want to be completely honest, maybe numerous, but not numerous enough for such a system to survive permanently. In such circumstances, it is perhaps natural that different and even opposite efforts have appeared, which we call the age of post-globalism under one name. There is no guarantee that this new system will satisfy those who are looking for change, but it is quite natural to try to end unfavorable conditions and try something new and different. It is also true that in some of its segments, this new is outlined as already known, because traditional values, international closures and economic contractions are already seen scenarios that can be a prelude to increasingly significant conflicts between members of different cultural, religious, national or other groups of people in the world.

Such an environment naturally encourages fear and intolerance towards others and the different, and it is not only a psychological response to the state of increased insecurity but also a consequence of the easily measurable increased frequency of criminal, terrorist and/or military threats, which we unfortunately witness every day. It turns out that one of the main aporias between globalization and post-globalism is precisely the relationship between two fundamental and often opposing concepts - freedom and security. Globalization has promoted freedom as its main driving force, primarily through the free flow of people, capital, goods and information, which is also considered the main freedom of the European Union, as a globally unique supranational association of European countries. In addition, immediately after the Second World War, American President Franklin Delano Roosevelt tried to define the path to a better tomorrow's world and he did so by saying that people's happiness is manifested in the possession of four fundamental freedoms: freedom of speech and religion, and freedom from hunger and fear. These freedoms, he believed, could be achieved by promoting and exporting the American lifestyle around the world. In principle, such actions were intended to enable the growth of the economy and the exchange of cultures and ideas. Of course, many others saw in such activities only the expansion of American economic and geopolitical interests, which was unacceptable to them. All of this created a fertile ground for the emergence of the already mentioned challenges that appeared over time, resulting in post-globalism appearing as the answer, advocating greater control over borders and limiting the free flow of people, goods, capital and services to greater security. It seems that we are facing a time when, on a kind of vividly described see-saw between freedom and security, the preponderance will go in favor of security, with a predictable and historically tested set of measures that will be used to try to reach that supposed security. When we have already mentioned American President Roosevelt, it is quite appropriate to cite a quote from one of Roosevelt's predecessors, American President Benjamin Franklin, who, among other things, became famous for his thoughts:

"He who gives up his freedom for security,  
he doesn't deserve either of those two."

And so, the world found itself at an already seen turning point that has the potential to bring a lot of evil to people. But also, a lot of good, if the activities before us are thoughtful, measured and benevolent. In the manner of the best rhetoricians, advocates of post-globalism will offer a whole set of measures that they believe should be re-articulated and used more and more precisely against globalization. Given such a kind of list of them, we will notice that there is nothing essentially bad in them. Rather, they all have their valuable logic that any reasonable person could ultimately support. These measures could be: stimulation of local production and consumption, crushing relief for domestic producers, introduction of new protective tariffs, regulation of trade and application of fairer trade conditions in such a way as to limit the arbitrariness of large international corporations, stimulation of environmentally acceptable forms of exploitation of limited natural resources and domestic workforce, education about local identity and self-sustainability, encouraging reduced dependence on other people's products and services, encouraging international cooperation on, compared to the existing, quite different and more equal relations between international actors, regulating migration and harmonizing them with the needs and desired effects that are sought to be achieved at the local (national) level, the encouragement of the national armed forces with the aim of deterring possible military threats as well as active defense in case such a threat occurs, education about the traditional value system and numerous others. Anyone who reads such a list of measures, depending on their ideological profile, will recognize in it either commendable measures or the dangers that can arise from them. Long ago, the German philosopher Friedrich Hegel asserted: "Truth is the whole."

In other words, a priori taking the position that such measures are good or bad in themselves is a particular idea that cannot bring much good. This is exactly the reason why the topic of globalization and post-globalism is still an open topic for us, where it is very difficult, and perhaps impossible, to make a final judgment.

#### 4. CONCLUSION

In the conclusion of this paper on globalization and post-globalism, it is necessary to emphasize the complexity of these phenomena and the need for careful reflection on the direction the world takes in the future. Globalization, although it has brought numerous advantages such as faster exchange of information, technological progress and increased economic integration, has also brought with it several challenges such as: imbalance in the distribution of natural and economic resources, loss of cultural diversity, economic and especially social inequality, and few a class of people who have seized enormous power by exploiting the global trade system. On the other hand, post-globalism represents an attempt to face these challenges, emphasizing the importance of local autonomy, sustainability and justice. At least that's what its proponents claim. It is important to point out that post-globalism does not mean the complete rejection of global cooperation, but its transformation towards fairer and more sustainable models, which includes the implementation of policies that stimulate local economies, the preservation of cultural heritage and the sustainable management of resources. It seems clear that the future of globalization is in the hands of world leaders from all segments of human life (politics, culture, industry, art, innovation, etc.). Cooperation at the international level and reaching a global consensus on sustainable approaches are key steps toward building a world where global connectivity combines with respect for local needs and identities. Globalization and post-globalism are not necessarily opposed but represent two sides of the same coin. Understanding their complexity helps us shape a future that combines the best elements of both approaches, creating a world that is just, sustainable and connected globally and locally.

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# TECHNOLOGICAL AND GEOPOLITICAL ASPECTS OF ARTIFICIAL INTELLIGENCE

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## **ABSTRACT**

*This paper comprehensively explores the multifaceted landscape of artificial intelligence (AI), emphasizing its integration with technologies, companies, cloud platforms, and chip production. AI applications find relevance in diverse contexts, ranging from cloud computing to chip manufacturing facilities (FABs), involving technologies like machine learning, deep learning, natural language processing, computer vision, robotics, and generative models. Major industry players such as Amazon, Microsoft, and Google play pivotal roles in supporting AI development through their cloud platforms. The political dimensions of AI, particularly chip export regulations, are discussed, exemplified by the Netherlands embargoing chip exports to China. The paper highlights the global ramifications of such decisions, especially considering the vital role chips play in AI development. In the U.S., the CHIPS Act seeks to promote domestic chip production for strategic technological control. A geopolitical perspective is presented, emphasizing Taiwan's significance, particularly TSMC, in chip manufacturing and its impact on U.S.-China relations. The intertwining of political, technological, and geopolitical factors is emphasized, underlining the importance of understanding these dynamics in the management of AI in contemporary society. The narrative shifts towards the prevalence of disinformation in the digital age, where advanced technologies are exploited to manipulate information, posing a threat to democracy. The paper advocates for a systematic approach to information verification and the adoption of preventive measures in the cybersecurity domain. The paper reports on a survey conducted at the University of Applied Sciences in Zagreb, exploring perceptions of disinformation frequency, information verification practices, and responses to cyber threats. Findings reveal significant correlations between disinformation frequency perception and information verification, along with differences in experiences and perceptions between university and high school students. In conclusion, the paper underscores the need for standardized learning outcomes in courses covering information and communication technologies and disinformation, aiming to cultivate consistent competencies globally. This approach ensures the quality of information and public discourse, crucial in navigating the challenges posed by AI and disinformation in the contemporary digital landscape.*

**Keywords:** *Artificial intelligence, digital society, social networks, disinformation, education*

## **1. INTRODUCTION**

AI is interconnected with a broad spectrum of elements, including diverse technologies, companies, cloud platforms, and the production of computer chips. The paper specifically highlights the importance of AI applications in a range of scenarios, extending from the realm of cloud computing to the facilities where computer chips are manufactured (FABs). Within these contexts, the utilization of technologies like machine learning, deep learning, natural language processing, computer vision, robotics, and generative models is discussed. These technologies play a crucial role in shaping and enhancing AI applications. Additionally, the involvement of major industry leaders such as Amazon, Microsoft, and Google is underscored. These companies are portrayed as key contributors, playing pivotal roles in advancing the development of AI applications, particularly through their significant contributions to cloud

computing platforms. In essence, the paper delves into the comprehensive landscape of AI, elucidating its intricate connections with diverse sectors and technologies while highlighting the influential roles played by major industry players in fostering AI development. When considering the field of artificial intelligence, I would highlight four key aspects: manufacturing companies, products, technologies and policies. In this research, we intend to explain, expand and explore each of these aspects in detail. Producer companies refer to organizations engaged in the development, research and application of artificial intelligence. This aspect includes both large technology companies such as Google, Microsoft and Facebook, as well as smaller startups and research institutions that contribute to the development of AI systems. Their key role in shaping and promoting AI technology will be explored in detail. AI products include specific products and services that use artificial intelligence. Examples include smartphones with voice assistants, autonomous vehicles, AI-based data analytics tools, chatbots, and various other applications that are ubiquitous in today's digital world. Technologies refer to the methods and technologies that enable the development of artificial intelligence, including machine learning, deep learning, natural language processing, computer vision, robotics, and other disciplines. In particular, the latest techniques in deep learning that enable precise understanding of text and speech and applications in areas such as chatbots, predictive search and generating document summaries are explored. Finally, the policy aspect encompasses regulations, ethical guidelines, and policy decisions that affect the use of artificial intelligence. The need to enact policies and laws that balance innovation and protection of individual rights, especially in the areas of privacy and security, is emphasized. It also explores how policies can influence AI research funding and support. Manufacturing companies play a key role in the development, research and implementation of artificial intelligence (AI). Large technology companies such as Google, Microsoft and Facebook have significant resources and experts for the development of AI systems. Their products and services often use AI technologies to improve their products, such as search engines, smart assistants, autonomous vehicles and many other applications. As can be seen from numerous examples, many smaller startups also play an important role as they often bring innovative ideas and technological solutions in the AI field. They often work on specific problems or applications of AI technologies and can experiment with new approaches more quickly. Research institutions also play an important role because they conduct basic research that often leads to new discoveries in the AI field. Their cooperation with academic institutions also contributes to the spread of knowledge and understanding of AI. Artificial intelligence technologies encompass a wide range of tools, techniques and methods that enable the development and advancement of artificial intelligence (AI). New technologies are key to creating advanced AI systems and applications, and here are some of the most important technologies and methods in the context of artificial intelligence. Machine learning (ML), as a branch of artificial intelligence, deals with the development of algorithms and models that enable computers to learn from data and draw conclusions. This includes supervised learning, unsupervised learning and reinforcement learning and various models such as decision trees, neural networks and support vector machines (SVM). Deep learning is a sub-branch of machine learning that focuses on neural networks with multiple layers. This technique has shown outstanding results in image processing, natural language processing, voice recognition and other tasks. Deep learning enables models to automatically extract features from data. Natural Language Processing (NLP) deals with the understanding, interpretation and generation of human language by computers. This is a key technology for the development of chatbots, machine translation, sentiment analysis and many other applications that use text data. Computer vision is one that allows computers to analyze and interpret visual information, such as images and videos. It is a key technology for autonomous vehicles, object recognition, medical image analysis and many other applications. Robotics is one that combines various technologies, including machine learning and computer vision, to enable robots to



interact with their environment and perform various tasks. Robots are used in manufacturing, medicine, research and many other sectors. Natural intelligence and deep understanding are technologies that aim to create AI systems that not only solve tasks, but also deeply understand the context and feelings of people. This may include developing systems for emotional intelligence, simulating human thinking, and other advanced concepts. Generative models, such as GANs (Generative Adversarial Networks) and VAEs (Variational Autoencoders), enable the creation of new data, images and texts. They are essential for content generation, artificial creativity and other creative applications. The development of new technologies and methods within these disciplines is crucial for the advancement of artificial intelligence. Constant research and innovation enable AI systems to be more advanced, more accurate and more useful in different sectors, from healthcare and transportation to entertainment and finance. The political aspects of artificial intelligence, with a particular focus on chip exports and policy decisions affecting the industry, here are some key points we can draw from researching open source.

## **2. DUTCH EMBARGO ON CHIP EXPORTS TO CHINA**

The Netherlands has decided to introduce an embargo, that is, an export ban, which prevents the company ASML, which is located in the Netherlands and specializes in the production of high-tech devices for making chips, from exporting its products to China. This decision has a wide range of implications and context that is important to understand. ASML is one of the world's leading companies in the production of chip manufacturing equipment. Their devices enable the creation of extremely small and complex chips, which is key to progress in the semiconductor industry. ASML's products are essential to the creation of modern chips, including those used in smartphones, computers, electronics and artificial intelligence. The embargo is a political decision, which was taken by the Netherlands in order to impose a ban on the export of ASML's products to China. It has a political background. The United States, among others, lobbied for this ban. The main reason for this is concern about technological transfer and possible military use of high-tech chips by China. The US wants to limit China's technological progress in this sector in order to maintain its technological advantage. Modern chips are key to progress in the field of artificial intelligence. Large artificial intelligence models, such as those used for deep learning, require large amounts of computing power provided by high-tech chips. Therefore, chips have become a fundamental element in AI development, and limiting access to these chips can slow progress in the field. The imposition of an embargo on chip exports to China by the Netherlands has global implications for the chip industry and technological competition between countries. This is just one example in the wider context of the trade and technological tension between different countries and regions.

## **3. CHIPS ACT**

Some countries have even regulated the area of chip production by law, so one such example is the CHIPS act (Creating Helpful Incentives to Produce Semiconductors for America's Knowledge-based Economy Act), which is an American law passed in 2022 with the aim of promoting and strengthening chip production within of the United States of America. This law is essential to the domestic technological and economic infrastructure, and also has deep connections with the development of artificial intelligence and other advanced technologies. The following are several key aspects of the CHIPS Act. Reducing Dependence on Foreign Companies, so the CHIPS Act is aimed at reducing the US's dependence on foreign companies to supply chips, especially companies like Taiwan's TSMC, Intel and Samsung. Dependence on foreign chip suppliers poses a risk to national security and economic stability, especially in the event of supply disruptions or geopolitical disputes.

Strengthening domestic production, as the law encourages investments in domestic production of chips and technologies related to semiconductors. This includes encouraging the construction of new factories and research centers in the US to increase production and innovation in this sector. Ensuring control over key technologies, as the CHIPS Act recognizes the importance of chips to the development of a wide range of advanced technologies, including artificial intelligence. Modern chips are the foundation for the computing power needed to train and execute complex AI models. Control over the production of these chips increases US autonomy in developing technologies and maintaining a competitive advantage. Support for technological progress, provided through the CHIPS Act, so that the US seeks to encourage research and development of semiconductor technologies and encourage collaboration between government, industry and academia to achieve innovative advances in this sector. Geopolitical context, as this law comes at a time of increased competition between the US, China and other countries in the technology sectors. Control over chip production has deeper geopolitical implications and can affect the economic and political dynamics between these powers. Given the growing importance of artificial intelligence and other advanced technologies, the CHIPS Act represents a critical step to ensure the technological independence of the United States and support innovation in these critical sectors.

#### **4. TAIWAN**

Taiwan and the Taiwan Semiconductor Manufacturing Company (TSMC) play a key role in the global chip industry and play a significant role in the region's complex geopolitical context, so here's how it all ties together. Over the years, Taiwan has established itself as a key player in global chip manufacturing. TSMC, founded in 1987, has become the largest manufacturer of semiconductor chips in the world. Their advanced technology and production capacity make them indispensable for many technological giants. Taiwan often interprets its dominance in chip production as a guarantee of Western support against China. In the context of increasing tensions between China and the United States of America, Taiwan sees its role as crucial to maintaining stability in the region, given the strategic importance of chip technology. The Taiwanese government retains a significant ownership stake in TSMC. This is significant because it indicates a deep connection between the political sphere and the technology industry in Taiwan. Taiwan's government considers TSMC to be crucial to the country's national interests and development. In the geopolitical context, Taiwan has a complex relationship with China. China considers Taiwan its territory and seeks to unify the island with the mainland, while Taiwan insists on its independence. Therefore, any political or economic connection between Taiwan and other countries, especially the United States of America, has deep geopolitical significance and may cause tensions between China and those countries. In this whole context, Taiwan and TSMC play a key role in preserving the balance of power and technical independence, not only for Taiwan, but also for the global technology industry. Their role in the production of chips has a significant impact on the development of artificial intelligence, digital devices and other technological innovations around the world. Nancy Pelosi's visit to Taiwan in August 2022 (then Speaker of the US House of Representatives) has profound political implications and is an important event in the context of US-Taiwan relations and global chip and technology politics. The following are several aspects that explain why this visit was significant. Nancy Pelosi's visit to Taiwan can be interpreted as a political gesture of US support for Taiwan in the context of chip production. Taiwan is home to TSMC, which is one of the world's largest chip manufacturers. Given the importance of chips in modern technology, support for Taiwan can be interpreted as support for preserving the technological independence and strategic capabilities of the US.

The CHIPS act is a law aimed at encouraging the domestic production of chips in the USA, and was in the process of being passed at that time. Nancy Pelosi's visit to Taiwan could be seen as an attempt to strengthen diplomatic ties between the US and Taiwan in the context of the aforementioned law, which should facilitate cooperation between the two countries in the technology sector. The geopolitical dimension of the visit is not negligible, as Taiwan is a sensitive topic in relations between the US and China. China considers Taiwan as its territory and is constantly trying to achieve international isolation of Taiwan. The visit of a high-ranking American official to Taiwan can be interpreted as a political gesture by which the US shows its support for Taiwan in light of the ongoing tensions between the two countries. The technological component of the visit is also important since the background of the visit is a technological aspect, especially related to chip manufacturing, this trip was also an opportunity for dialogue on technological cooperation between the US and Taiwan, including supporting the development of technologies such as chips needed for artificial intelligence. Ultimately, Nancy Pelosi's visit to Taiwan in August 2022 has much wider implications than a simple diplomatic visit. It signals the importance of chip technology, technological independence and the complex geopolitical relationship between the US, China and Taiwan in the context of increasing competition in the technology sector. Chinese experts conducted systematic research and the results of NARDL (non-linear autoregressive distributed lag) show an asymmetric relationship between AI, GPR (geopolitical risk) and NRM (natural resource market) in the short term and in the long term. A positive (negative) shock to AI, according to the findings, lowers (increases) the rent of natural resources and therefore improves the natural resource market. Similarly, a positive (negative) shock to the GPR increases (decreases) natural resource rents and enables the exploitation of natural resource markets. The study suggests that in addition to concentrating on extenics application, the Chinese government needs to strengthen and reform its strategies for regulating spatial impacts in order to optimize its market for natural resources (Aihong Li, 2023). This information illustrates the complexity of geopolitical and economic relations in the context of artificial intelligence and chip manufacturing technology. Political decisions regarding these aspects can have a profound impact on the development and use of artificial intelligence in different parts of the world. Artificial intelligence therefore has a deep and comprehensive impact on our society as well, and understanding all these aspects is crucial for it.

## **5. DISINFORMATION & AI**

Disinformation in the context of the digital age, poses a multifaceted social challenge as it involves the deliberate alteration of information for the purpose of deceiving people. It is important to distinguish modern disinformation from fake news, which is often conflated with it. Fake news encompasses a broader spectrum, including unintentional inaccuracies and disinformation in news reporting, whereas disinformation takes various forms, all sharing the common trait of disseminating misleading or inappropriate content with the intention to manipulate perceptions and convince the public of falsehoods. Today, those who engage in disinformation not only create fabricated information and disseminate it, reminiscent of historical propaganda and disinformation campaigns, but they also leverage advanced technologies and artificial intelligence methods to rapidly manipulate text, voice, images, and videos. In 2018, a group of experts, under the leadership of Madeleine de Cock Buning, prepared a report for the European Commission with the aim of advising on political initiatives to combat fake news and online disinformation. The report defines disinformation as any form of false, inaccurate, or misleading information intentionally crafted, presented, and promoted to harm the public or for profit. It is worth noting that this definition does not encompass issues arising from the creation and dissemination of illegal online content such as defamation, hate speech, and incitement to violence.

Iosifidis and Nicoli's in-depth analysis supports the idea that disinformation is a pervasive means of spreading authoritarian ideas and poses a serious threat to democracy from various angles, a view also shared in Langmie's book. Meanwhile, Corbu, Bârgăoanu, Durach, and Udrea argue that ideologically driven information is particularly harmful due to its easy spread within echo chambers and filter bubbles. In 1992, Berliner foresaw the inevitability of changes and reforms in educational content during the era of disinformation. He believed that reforms in the American education system at that time were rooted in disinformation about the Japanese education system. He also contended that major corporations and the elite were actively promoting a campaign of disinformation that portrayed the American school system as a failure. The intersection of disinformation and artificial intelligence (AI) represents a complex and evolving challenge in the contemporary digital landscape. Disinformation refers to the intentional spread of false or misleading information with the aim of deceiving or manipulating public opinion. AI, on the other hand, encompasses technologies that simulate human intelligence, including machine learning, natural language processing, and computer vision.

AI's Role in Disinformation:

- **Automated Dissemination:** AI-powered tools can automate the creation and dissemination of disinformation at an unprecedented scale. Bots and algorithms can rapidly generate and spread misleading content on social media platforms.
- **Deepfakes:** AI-driven deepfake technology enables the creation of hyper-realistic fake videos or audio recordings, making it challenging to distinguish between authentic and manipulated content.
- **Targeted Messaging:** AI algorithms can analyze vast amounts of user data to tailor disinformation campaigns, ensuring that deceptive content reaches specific demographics, amplifying its impact.

Mitigating Disinformation with AI:

- **Content Analysis:** AI can be employed to analyze large datasets and identify patterns indicative of disinformation. Natural Language Processing (NLP) algorithms can assess the language used and contextual clues to flag potentially misleading content.
- **Bot Detection:** AI algorithms can help identify and counteract the influence of automated bots spreading disinformation on social media platforms. This involves analyzing user behavior, posting patterns, and network connections.
- **Deepfake Detection:** AI tools designed for deepfake detection use advanced algorithms to scrutinize multimedia content and identify signs of manipulation, helping to curb the spread of fabricated media.

Challenges and Ethical Considerations:

- **Adversarial AI:** Those disseminating disinformation may use AI to evade detection, leading to an ongoing cat-and-mouse game between the developers of detection tools and those creating deceptive content.
- **Privacy Concerns:** The use of AI for disinformation detection raises privacy concerns, as it often involves analyzing large amounts of user data. Striking a balance between effective detection and privacy protection is crucial.
- **Regulation and Accountability:** Establishing regulations and ethical guidelines for the use of AI in combating disinformation is essential. Ensuring accountability for the misuse of AI technologies is a key aspect of managing this complex issue.

In summary, the intertwining of disinformation and AI presents both challenges and opportunities.

While AI can be a powerful tool in detecting and mitigating disinformation, addressing ethical considerations and staying ahead of evolving tactics are crucial for effective management. The manipulation of information on social networks and other media is carried out by a variety of actors, including bots, troll factories, click generators, fake followers, automated journalism, and targeted advertising based on data. To facilitate the rapid spread of disinformation, it is often disseminated through numerous sources, with bots playing a significant role. These are computer programs that do not require specialized knowledge for their programming. When used for malicious purposes, bots can quickly create a false perception of the information's veracity and exploit this distorted perception to achieve harmful objectives. In today's society, chat bots, or automated chat programs, are prevalent across various sectors, and their popularity is notably growing in education. Disinformation comes in different categories and poses varying levels of threat. Whether disinformation consists of entirely fabricated content, partially true content with manipulated images or misleading headlines, fake sources, deceptive context, or concealed advertisements, its level of threat is not solely determined by its form. The level of threat is linked to the malevolent intentions of the disinformation creator or the entity propagating the disinformation. Particularly noteworthy is the rise of synthetic media generated through artificial intelligence techniques, which include natural language processing and neural voice cloning. Such media have the potential to enable significant manipulation if they are not identified as sources of disinformation. Additionally, disinformation created using these methods should be considered in the context of content manipulation and within echo chambers, which are environments where content is amplified through repetition, thus forming interest groups. In the realm of journalism, investigators, law enforcement agencies, scientists, educators, or any individual using media, a coordinated strategy is essential to combat all forms of disinformation. This is because it cannot be expected that all segments of society will independently adopt a critical approach, discern intent, and verify the accuracy of content. When it comes to public media services and their role in countering disinformation, Horowitz, Cushion, Dragomir, Gutiérrez Manjón, and Pantti emphasize three key dimensions: contextual, content, and services, along with commentary. Each of these dimensions should be addressed separately. Given that disinformation poses a significant threat to democracy, the development of appropriate educational content is necessary. This assertion finds support in numerous previous studies that have underscored the severity of these threats, particularly concerning young people. For instance, Howard, Neudert, Prakash, and Vosloo point out that disinformation, disseminated through human actions, bots, and paid organized groups like troll factories, is used for malicious purposes such as gaining political influence, financial gain, approval of ideas, and popularity. Particular attention must be given to social networks and platforms that play a crucial role in spreading disinformation, prompting discussions about platform regulation. The importance of self-regulation and encouraging these platforms to be more accountable in addressing disinformation is growing. Given the above, this research paper poses a question about the perceptions, attitudes, and behaviors of the younger population, who typically possess higher digital and media literacy, regarding internet disinformation. The primary objective is to gauge the extent to which they recognize and are informed about disinformation and to identify habits that reduce vulnerability to disinformation manipulation. The study also aims to detect any differences in these aspects based on the respondents' level of education. The ultimate goal is to coordinate an appropriate educational program with the necessary learning outcomes through international institutional collaboration. This underscores the significance of addressing the disinformation issue in the digital age. The specific research questions are as follows: Is there a correlation between the perception of how often disinformation occurs and the verification of information accuracy? Is there a link between the frequency of social media use and the verification of information accuracy? Are there differences in the perceptions of two distinct groups of respondents (university students and

high school students, including those enrolled in courses) concerning their experiences with cyber threats and their views on the influence of disinformation's strength? To address these questions, the study utilizes survey, comparative, and descriptive methods, along with correlation analysis. The techniques employed in this study include the survey method, comparative method, descriptive method, and correlation analysis. The collected data were analyzed using the statistical software SPSS version 25.0. The research hypothesis posited that a statistically significant relationship exists between the perception of how often disinformation occurs and the verification of information accuracy. Additionally, it hypothesized a statistically significant distinction between the groups of high school students and university students concerning their encounters with cyber threats and their perceptions of the influence of disinformation.

## **6. METHOD**

### **6.1. Participants and procedure**

The research was conducted on a sample of 651 respondents, where the sample consisted of 243 (38%) women and 405 (62%) men. The appropriate sample consisted of university students at the Polytechnic of Criminology and Public Security and high school students attending the "Josip Jović" Police School at the "Prvi Croatian Redarstvenik" Police Academy, including participants of the course for obtaining a high school qualification for the police profession. Most respondents, 467 (72 %) were aged 17 to 27, while 157 (24 %) were aged 28 to 37. The least respondents, 27 of them (4%) were older than 37 years. In terms of employment, 581 (89 %) respondents are also employed in the Ministry of Internal Affairs of the Republic of Croatia, and the majority of respondents in the group of students, 185 (67 %), attend part-time studies. The average grade of the previous class or study year of all respondents was 4.09. The majority of respondents, 225 of them (34%) lived in towns with a population of 2,001 to 10,000. This is followed by respondents, 179 of them (27%) from towns with 10,001 to 100,000 inhabitants. There were 172 (26%) from towns with up to 2,000 inhabitants, while the least number of respondents, 76 (12%), were from towns with more than 100,000 inhabitants. The largest number of respondents from the group of students, who stated English as a foreign language, stated that they knew it at the B2 level, while the most respondents from the group of high school students stated that they knew it at the B1 level. The research was conducted at the Polytechnic of Criminology and Public Security in March and April 2023 and is part of Erasmus + KA220-HED - Cooperation partnerships in higher education (2022/2025) and represents one of the tasks within the Erasmus+ project "Cooperation on to the development of a joint curriculum on the fight against hybrid threats - HYBRIDIC". The implementation of the research was preceded by a positive opinion of the Ethics Committee of the Polytechnic of Criminology and Public Security and the Education Agency. The participants, with informed consent, filled out the questionnaire in online form, as part of regular classes at the Polytechnic of Criminology and Public Security and at the "Josip Jović" Police School. The creation of the questionnaire and its implementation were carried out by members of the project team, one of whom is a psychologist.

### **6.2. Instruments**

For the purposes of this research, 3 questionnaires were constructed: socio-demographic data, attitudes and beliefs about disinformation and behavior on the Internet. The socio-demographic questionnaire consisted of 11 questions that asked: age, gender, occupation, years of service, type of work in the Ministry of Interior, year of study, grade point average, place of residence and level of knowledge of the English language. The Attitudes and Beliefs about Disinformation questionnaire consisted of 42 items that were divided into 4 subscales: impact of disinformation, purpose of creating and disseminating disinformation, recognition of

disinformation and frequency of disinformation in the media. On the first two scales, participants answered the questions using a 5-point scale (1-totally disagree, 5-totally agree). In the third subscale, participants answered the question "In your opinion, what percentage of information, in different media, media areas and different social networks, is disinformation?" using a scale of 0-100%. The calculated reliability of the internal consistency type is acceptable and for the scale the influence of disinformation is Cronbach  $\alpha = 0.854$ , for the scale the purpose of creating and spreading disinformation is Cronbach  $\alpha = 0.723$ , for the scale recognizing disinformation is Cronbach  $\alpha = 0.660$  and for the scale the frequency of disinformation in the media is Cronbach  $\alpha = 0.938$ . The Internet Behavior questionnaire consisted of 38 items that were divided into 4 subscales: security protection, protection from disinformation, negative experiences on the Internet, use of social networks and Internet portals. On the security protection and disinformation protection scales, participants answered questions using a 5-point scale (1 – never, 5 – almost always) and the particles consisted of recommended behaviors/methods for security protection (e.g. "I regularly change passwords") and protection against disinformation on the Internet (e.g. "When I come across some information, news, content on the Internet: I check the credibility of the author of the content"). The scale of negative experiences on the Internet consisted of a list of items corresponding to different methods of cyberattacks (e.g. "Have you been the target (victim) of a cyberattack via: virus, identity theft, card fraud", etc.) to which participants answered using a scale of 4 degrees (1 - never, 4 - often). The use of social networks and Internet portals scale consisted of multiple-choice questions that examine the use of different social networks and Internet portals, the frequency of their use using a 5-point scale (1 – I do not use every day, 5 – more than 10 times a day) and daily the time spent on them using a scale of 5 degrees (1 – up to 15 minutes, 5 – more than 2 hours). The calculated reliability of all subscales is acceptable and for the scale protection of security is Cronbach  $\alpha = 0.825$ , for the scale protection from disinformation Cronbach  $\alpha = 0.861$ , for the scale negative experiences on the Internet Cronbach  $\alpha = 0.865$ , for the scale use of social networks and Internet portals Cronbach  $\alpha = 0.735$ .

## 7. RESULTS AND DISCUSSION

Regarding the variable Checking the truth and authenticity of information, in the group of students, none of the social-demographic variables correlates significantly with it, however, as shown in table 1, it significantly positively correlates with the probability of using security protection methods ( $r=0.410$ ,  $p<0.01$ ).

*Table 1: Correlation between verifying the veracity of information, likelihood of using security protection methods, and experiences of cyberattacks*

		Victim/target of a cyber attack COMP	Probability of using a security protection method COMP	Checking the truth of the information COMP
Victim/target of a cyber attack COMP	Pearson Correlation	1	-.199**	-.063
	Sig. (2-tailed)		.001	.294
	N	278	278	278
Probability of using a security protection method COMP	Pearson Correlation	-.199**	1	.410**
	Sig. (2-tailed)	.001		.000
	N	278	278	278
Checking the truth of the information COMP	Pearson Correlation	-.063	.410**	1
	Sig. (2-tailed)	.294	.000	
	N	278	278	278

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Student participants who are more likely to use methods to verify the truth and authenticity of information are also more likely to use methods to protect security.

Furthermore, negative experiences with security on the Internet are negatively significantly related to the probability of using security protection methods ( $r=-0.199$ ,  $p<0.01$ ), which means that people who are more likely to use security protection methods have fewer negative experiences with cyberattacks on the Internet. Negative experiences with cyberattacks on the Internet are not associated with the likelihood of using methods to verify the truth and authenticity of information. Regarding the variable Informed about disinformation and the variable related to the perception of other people's information about disinformation, the results in Table 2 show that verifying the truth of the information is positively significantly related to being informed about disinformation ( $r=0.354$ ,  $p<0.01$ ), which shows that student participants, who they believe that they are more informed about disinformation, they are more likely to use methods of verifying the truth of the information.

*Table 2: Correlation between being informed about disinformation, verifying the veracity of information, and the perception of others being informed about disinformation*

		I am aware of the disinformation COMP	People are informed about disinformation COMP	Checking the truth of the information COMP
I am aware of the disinformation COMP	Pearson Correlation	1	.035	.354**
	Sig. (2-tailed)		.562	.000
	N	278	278	278
People are informed about disinformation COMP	Pearson Correlation	.035	1	-.037
	Sig. (2-tailed)	.562		.535
	N	278	278	278
Checking the truth of the information COMP	Pearson Correlation	.354**	-.037	1
	Sig. (2-tailed)	.000	.535	
	N	278	278	278

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Checking the veracity of information is positively and significantly related to the perception of the frequency of disinformation in the media ( $r=0.181$ ,  $p<0.01$ ) and on social networks ( $r=0.253$ ,  $p<0.01$ ). Participating students who believe that there is more disinformation in the media and on social networks are more likely to use methods of verifying the veracity of information. As expected, the perception of the frequency of disinformation in the media and on social networks is positively and significantly correlated ( $r=0.547$ ,  $p<0.01$ ), which is shown in Table 3.

*Table 3: Correlation between verifying the veracity of information and the perception of the frequency of disinformation in the media and on social networks*

		The frequency of disinformation in the media COMP	Frequency of disinformation on social networks COMP	Checking the truth of the information COMP
The frequency of disinformation in the media COMP	Pearson Correlation	1	.547**	.181**
	Sig. (2-tailed)		.000	.002
	N	278	278	278
Frequency of disinformation on social networks COMP	Pearson Correlation	.547**	1	.253**
	Sig. (2-tailed)	.000		.000
	N	278	278	278
Checking the truth of the information COMP	Pearson Correlation	.181**	.253**	1
	Sig. (2-tailed)	.002	.000	



The results presented in Table 4 show that none of the variables of the frequency and amount of use of social networks and internet portals among the group of students correlates with the variable of checking the veracity of information.

*Table 4: Correlation of the frequency and amount of use of social networks and internet portals with the variable of verifying the truth of information*

		How often do you go to social networks?	How much time do you spend a day on social networks?	How often do you visit internet portals?	How much time do you spend daily on internet portals?	How often do you share content on social networks?	How often do you post your own content on social media?	Checking the truth of the information COMP
How often do you go to social networks?	r	1	.955**	.138*	.121*	-.078	-.136*	.074
	Sig.		.000	.021	.044	.196	.023	.217
	N	278	278	278	278	278	278	278
How much time do you spend a day on social networks?	r	.955**	1	.220**	.195**	-.073	-.133*	.071
	Sig.	.000		.000	.001	.223	.027	.237
	N	278	278	278	278	278	278	278
How often do you visit internet portals?	r	.138*	.220**	1	.913**	.174**	.137*	-.052
	Sig.	.021	.000		.000	.004	.022	.389
	N	278	278	278	278	278	278	278
How much time do you spend daily on internet portals?	r	.121*	.195**	.913**	1	.202**	.113	-.037
	Sig.	.044	.001	.000		.001	.060	.542
	N	278	278	278	278	278	278	278
How often do you share content on social networks?	r	-.078	-.073	.174**	.202**	1	.522**	-.040
	Sig.	.196	.223	.004	.001		.000	.505
	N	278	278	278	278	278	278	278
32. How often do you post your own content on social media?	r	-.136*	-.133*	.137*	.113	.522**	1	-.081
	Sig.	.023	.027	.022	.060	.000		.180
	N	278	278	278	278	278	278	278
Checking the truth of the information COMP	r	.074	.071	-.052	-.037	-.040	-.081	1
	Sig.	.217	.237	.389	.542	.505	.180	
	N	278	278	278	278	278	278	278

When comparing the two groups of participants, the group of students and the group of high school students with included participants of the police officer course, the statistical analysis of the sample comparison shows that there is no statistically significant difference between the samples in terms of the perception of the frequency of disinformation in the media ( $t=1.0$ ,  $p=0.318$ ) which is shown in table 5. There is also no statistically significant difference between the sample groups with regard to the perception of the frequency of disinformation by type of media area ( $t=0.148$ ,  $p=0.882$ ), which is shown in table 6.

*Table 5: Comparison of sample groups regarding the perception of the frequency of disinformation in the media*

**Group Statistics**

	high school students - students	N	Mean	Std. Deviation	Std. Mean
The frequency of disinformation in the mediaCOMP	High school and course	373	.5564	.19355	.01002
	Study	278	.5423	.16598	.00995

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
The frequency of disinformation in the media COMP	Equal variances assumed	13.635	.000	.978	649	.329	.01412	.01444	-.01424	.04249
	Equal variances not assumed			1.000	636.312	.318	.01412	.01413	-.01362	.04186

*Table 6: Comparison of sample groups regarding the perception of the frequency of disinformation by media area*

**Group Statistics**

	High school - studies	N	Mean	Std. Deviation	Std. Error Mean
Frequency of disinformation in media messagesCOMP	High school and course	373	.5626	.20405	.01057
	Study	278	.5605	.16912	.01014

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Frequency of disinformation in media messages COMP	Equal variances assumed	12.601	.000	.144	649	.885	.00217	.01505	-.02738	.03172
	Equal variances not assumed			.148	641.686	.882	.00217	.01465	-.02659	.03093

Given that both groups of respondents most often use social networks to find information, a comparison of their perception of the frequency of disinformation on social networks is also presented, and the results shown in Table 7 show that there is no statistically significant difference between the sample groups with regard to the perception of the frequency of disinformation on social networks ( $t=1.566$ ,  $p=0.118$ ).

*Table 7: Comparison of sample groups regarding the perception of the frequency of disinformation on social networks*

**Group Statistics**

	High school - studies	N	Mean	Std. Deviation	Std. Error Mean
Frequency of disinformation on social networks COMP	High school and course Study	373	.6112	.21717	.01124
		278	.5860	.19266	.01155

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Frequency of disinformation on social networks COMP	Equal variances assumed	5.742	.017	1.539	649	.124	.02524	.01641	-.00697	.05746
	Equal variances not assumed			1.566	629.616	.118	.02524	.01612	-.00642	.05691

It is interesting that the results showed that there is no statistically significant difference between the sample groups regarding the use of methods to protect against disinformation ( $t=1.235$ ,  $p=0.217$ ) as well as regarding the use of methods to protect security and privacy on the Internet ( $t=0.184$ ,  $p=0.854$ ) but a statistically significant difference was found between the sample groups with regard to the experiences of cyberattacks on the Internet ( $t=-3.470$ ,  $p=0.001$ ), so that the group of students had more negative experiences on the Internet regarding cyberattacks than what a group of high school and course participants had. Such a result may indicate a moderating effect of the age variable. There is also a statistically significant difference between the sample groups with regard to the perception of the strength of the influence of disinformation ( $t=-3.947$ ,  $p=0.000$ ) and the results in Table 8 show that the group of students assigns a more significant influence to disinformation on the individual and social events compared to the group of high school students and course.

*Table following on the next page*

*Table 8: Comparison of sample groups regarding the perception of the strength of the influence of disinformation*

**Group Statistics**

	High school - studies	N	Mean	Std. Deviation	Std. Error Mean
The impact of disinformation COMP	High school and course	373	3.8164	.66596	.03448
	Study	278	4.0054	.55423	.03324

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
The impact of disinformation COMP	Equal variances assumed	8.235	.004	-3.844	649	.000	-.18904	.04918	-.28562	-.09246
	Equal variances not assumed			-3.947	641.113	.000	-.18904	.04790	-.28309	-.09499

The difference between the sample groups regarding the perception of one's own ability to recognize disinformation and being informed about the dangers and ways of recognizing disinformation is statistically significant. The group of participants of the secondary police school and the course achieve higher results on the mentioned subscale ( $t=2.507$ ,  $p=0.012$ ), and the difference is shown in table 9. The analysis was not performed on separate variables of this subscale, and no aspect was determined in which the difference between the sample groups was evident.

*Table 9: Comparison of sample groups with regard to beliefs about disinformation on the subscale Recognizing and being informed about disinformation*

**Group Statistics**

	High school - studies	N	Mean	Std. Deviation	Std. Error Mean
Recognizing and being informed about disinformation COMP	High school and course	373	3.7158	.70940	.03673
	Study	278	3.5779	.67275	.04035

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Recognizing and being informed about disinformation COMP	Equal variances assumed	.433	.511	2.507	649	.012	.13788	.05499	.02990	.24586
	Equal variances not assumed			2.527	612.915	.012	.13788	.05456	.03073	.24503

Correlation analysis of the relationship between age and the subscale of the questionnaire showed a significant relationship with three variables: age and the victim of a cyber attack ( $r=0.173$ ), age and the impact of disinformation ( $r=0.103$ ), age and recognition and awareness of disinformation ( $r=-0.121$ ). These are very low correlations, with values lower than 0.2. but these are also the same variables that proved to be significant in the comparison of sample groups, which indicates that age can at least partially explain the significant differences obtained between sample groups. There is also a statistically significant relationship between age and four variables that examine the amount of use of Internet portals and social networks. These variables are: How often do you go to social networks? ( $r=0.119$ ), How much time per day do you spend on Internet portals? ( $r= - 0.089$ ), How often do you share content on social networks? ( $r= - 0.0123$ ) and How often do you post your own content on social networks? ( $r= - 0.143$ ). These are very low (negligible) correlations with values lower than 0.2. That young people prefer to get information through social networks compared to traditional media was confirmed by the latest research on the young Mexican population, conducted by Galarza-Molina, and the research on the young African population conducted by Camara, Banu and Abeck. A study conducted by Tynes Brendesha, Stewart, Hamilton, and Willis revealed that the majority of respondents initially demonstrated a basic or "mastered" level of understanding when it came to interpreting search results and assessing website trustworthiness. However, there was a need for further engagement to enhance competencies related to critically evaluating online content. Pérez-Escolar, Ordóñez-Olmedo, and Alcaide-Pulido in their work on "Fact-Checking\_Skills\_And\_Project-Based Learning about Infodemic and Disinformation" emphasize the crucial role of education in facilitating a better grasp of contemporary challenges related to disinformation. They suggest that educational activities should address deficiencies and the risks of disinformation among young people through project-based teaching methods. In addition to the above, Van der Linden et al. underscore the importance of proposing solutions that address students' vulnerability to disinformation. Astuti, Giri, and Hidayah propose a need to revise fact-checking training and teaching methods in the fight against disinformation. They found that an innovative approach involving web drama series had a positive effect on older respondents, but younger individuals were not able to perceive the role of journalism as an essential element in verifying information. They recommend using educational videos with a style that resonates with popular culture. The study by Sachdeva and Tripathi, focusing on young Indian social media users, emphasizes the necessity of fostering critical thinking within the educational system. They base their findings on the UN Department of Economics and Social Affairs on youth document. Kaufman, in his work on "Civic Education in a Fake News Era: Lessons for the Methods Classroom," stresses the importance of educating students about disinformation and fake news through project-based teaching, while also emphasizing the development of a critical approach. Dhiman shares a similar perspective in his study. The study of children in Finland, conducted by Vartiainen, Kahila, Tedre, Sointu, and Valtonen, highlights the need for a more comprehensive understanding of disinformation as a task for the educational system, in line with the recommendations made by most of the authors mentioned here. It also underscores the importance of studying disinformation through courses covering information communication content and machine learning mechanisms, which encompass tracking, profiling, data engineering, and psychometric-based advertising. On the other hand, some authors, like Farmer, believe that school librarians should play a pivotal role in addressing disinformation. According to the majority of authors and the research presented in this paper, it is advisable to incorporate content that enhances comprehension of the role of digital technologies, particularly social networks that facilitate the dissemination of disinformation, especially among the younger population. This content should be integrated into subjects within the field of information and communication technologies. Consequently, educational materials should encompass knowledge of information verification tools and techniques, including source

verification, image and video analysis, metadata analysis, and the significance of addressing disinformation issues in safeguarding the integrity of information and communication infrastructure. Incorporating knowledge of information verification tools as a learning outcome, which covers skills such as source verification, image and video analysis, and metadata analysis, should be included in the curricula of courses related to information security. Spurava and Kotilainen, in their research on young people's perception of necessary educational content, report that young individuals consider having a strong understanding of social network algorithms essential for addressing disinformation.

## 8. CONCLUSION

In conclusion, this paper provides a comprehensive examination of the intricate intersections between artificial intelligence (AI), technological landscapes, and geopolitical considerations, particularly within the realms of chip production and the global AI ecosystem. Emphasizing the pivotal roles played by major industry players like Amazon, Microsoft, and Google, the study highlights the multifaceted applications of AI technologies in diverse sectors. The exploration of political dimensions, exemplified by the Netherlands' chip export embargo to China and the U.S. CHIPS Act, underscores the intricate global dynamics influencing AI development. The geopolitical lens, with a focus on Taiwan and TSMC, further accentuates the interconnectedness of political, technological, and geopolitical factors in the AI landscape. Shifting towards the contemporary challenge of disinformation, the paper advocates for a systematic approach to information verification and the implementation of cybersecurity measures. The survey findings from the University of Applied Sciences in Zagreb underscore the importance of addressing disinformation at the educational level, emphasizing standardized learning outcomes to foster consistent competencies. Ultimately, the paper underscores the imperative of understanding and managing the multifaceted nature of AI and disinformation for successful navigation in the modern digital era. Standardized education and proactive cybersecurity measures are deemed essential for maintaining the integrity of information and public discourse on a global scale.

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## DIGITAL HEALTH TECHNOLOGIES – A POTENTIAL FOR IMPROVING HEALTHCARE AND A CHALLENGE FOR PATIENT SAFETY AND EQUAL ACCESS

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### ABSTRACT

*Technological progress, digital health technologies (DHT) and artificial intelligence (AI) have a great potential for improving processes in healthcare delivery. Many new digital interventions have the potential to deliver transformative gains in the efficiency and quality of the healthcare system. In addition, citizens, particularly the young, also care about having access to the latest technological developments and convenient modern digital solutions, many of which are already classified as medical devices. Rapid developments in DHT have also introduced risks and raised concerns about their security, privacy, sustainability, interoperability and fair distribution of benefits among citizens, particularly among vulnerable groups. At the national and EU policy level, legislators must balance promoting national industrial competitiveness with international requirements for free trade alongside health benefits. A correct balance must be found between ensuring product safety and performance while enabling the innovation needed to deliver better patient approaches and affordable, efficient health care for society. In our work, we will analyze six areas that can affect safety in the provision of digital health care: ethics and integrity, cybersecurity, equal access, environmental sustainability, financial and operational feasibility, and interoperability. Legislators must balance approaches that will ensure strong oversight of patient safety over the long term, while bringing important new advances in diagnosis and treatment and meeting citizen expectations to provide the best health care for all citizens.*

*Improvement in the provision of health care by implementing innovative technologies will only be achieved if accompanied by effective governance and guidelines that ensure patient safety and public trust.*

**Keywords:** *digital health technologies, equal access, governance, privacy, safety*

### 1. INTRODUCTION

The Internet of Things (IoT) and related digital technologies continue to transform people's lives, with an increasing number of use cases in areas such as education, living, working spaces and healthcare. People use a variety of digital tools to shop, socialize, travel and leisure, but also increasingly use digital tools for health-related issues. The COVID-19 pandemic that spread around the world in early 2020 further highlighted the important role that digital health technologies (DHT) play in healthcare.



At the time when social distancing measures were introduced to prevent the spread of the COVID-19 pandemic, the wider application of digital tools to facilitate communication and services in the healthcare system began. Digital solutions served as a great help in maintaining the continuity of work processes and enabled patients to access various healthcare services (1,2). The availability of digital health information has been found to have a positive effect on the quality of preventive care, health promotion and the adoption of health habits, all of which contribute to the reduction of direct medical costs as well as better management of personal health or illness. From the point of view of health economics within the health care industry, innovative information technology and the use of internet have proven to be very successful for trade and for direct marketing between the various stakeholders of the health system (pharmaceutical and medical industry, health institutions, health professionals and patients) (3). Understanding the opportunities and potential risks arising from the use of DHT is important to ensure maximization of their benefits, while at the same time recognizing and minimizing the risks associated with their use (4). A lot of health information is exchanged outside the physical and virtual spaces which are supervised by health professionals (hospitals, clinics). Since digital interventions have become an integral part of patient care and professional medical work in health care institutions, the need for prescribed regulation of these within health care systems has arisen. Moreover, most of the digital health solutions that are now used either outside or within the existing health systems have not even passed a basic reliability and safety check in terms of the "healthiness" of these digital solutions (5,6). Therefore, before creating guidelines for the safe use of DHT, it is necessary to analyze the current situation, identify trends and gain an understanding of the key shortcomings in the development, management and dissemination of digital technologies. Different working groups were formed, first at the level of countries and national health systems, and then at the European and world level, in order to discuss and better understand this issue and to establish clear priorities for further work and management of digital health solutions (7-14).

## **2. DIGITAL HEALTH TECHNOLOGIES**

Digital health refers to the use of digital technologies by people and health systems for health. It covers a wide range of services and products, including medical devices, such as those used to provide remote care, health data and information management, patient management (therapeutic decision-making), telemonitoring and telediagnosis. (15) The introduction of digital technologies has changed the way health and care services are provided. The scope of health data processing, which was traditionally limited to electronic health record systems and other IT systems managed by health professionals, has also been changed. Sources of patient health data are becoming increasingly decentralized and with much more diverse information due to the fact that online and portable electronic devices and biosensors have become more popular and more accessible. These technologies increasingly rely on the production, access, processing and transmission of health data by patients themselves, and their range goes far beyond traditional healthcare systems. (15) This decentralization has also expanded the data domains relevant to healthcare delivery, including, for example, data generated from digital health products such as wearables or mobile health applications (which may also be medical devices), as well as wellness mobile applications. Various medical devices for patient care and monitoring increasingly use wireless networks and independently update, collect data and report to health care providers about the health status and progress of patients. The use and exchange of data from electronic health records (EHR) and the wireless connection of various medical devices represent the places where the health system is most vulnerable (16). For this reason, there was a need to classify digital health technologies according to their purpose and based on the potential medical risk they pose to users of health services (patients), but also to the health system (17).

Based on the potential risk for patients, the English National Institute for Health and Care Excellence (NICE) grouped digital solutions in healthcare as follows: 1. Solutions that improve the efficiency of the healthcare system, but without measurable benefit to the outcome individual patient; 2. Mobile digital health, which informs or provides basic monitoring and encourages behavior change and patient self-management; 3. Clinical Decision Support (CDS) and predictive models that guide treatment, are used to actively monitor patients, and calculate and/or diagnose disease (17). A special area of computerization development that has found its place in health care and thus attracted the attention of health regulators is the use of artificial intelligence (AI). The European Commission's High-Level Expert Group on AI (AI HLEG) provided a definition of an AI system: Artificial intelligence systems are software (and possibly also hardware) systems designed by humans that, given a complex goal, act in a physical or the digital dimension by observing their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information derived from that data and deciding the best actions to take to achieve the given goal. AI can either use symbolic rules or learn a numerical model, and can also adapt their behavior by analyzing how their previous actions affect the environment. As a scientific discipline, artificial intelligence includes several approaches and techniques, such as machine learning (of which deep learning and reinforcement learning are specific examples), machine reasoning (which includes planning, scheduling, knowledge representation and reasoning, search and optimization), and robotics (which includes control, perception, sensors and actuators, as well as the integration of all other techniques into cyber-physical systems) (18). However, it has been observed that the use of AI and other digital solutions in healthcare has numerous implications, especially in relation to issues of ethical use of innovative technological solutions, privacy protection, health outcomes, patient safety and equal access to the healthcare which becomes directly related to the availability of technology.

### **3. CHALLENGES FOR DHT IMPLEMENTATION**

European healthcare systems are under pressure as healthcare costs grow at a faster step than Gross domestic product (GDP) due to, among other things, structural problems such as an aging population and the high costs of developing new drugs and treatments. (19) The COVID-19 pandemic has exacerbated this problem. The healthcare sector, which represents approximately 10% of EU GDP and includes public and private providers, is a fundamental ecosystem for both the well-being of Europeans and the EU economy. (20) Studies estimate that around 20% of healthcare spending is unnecessarily spent, so this waste could be reduced by better organization of work without jeopardizing the efficiency of healthcare systems (21). The sharing and reuse of health data, especially in combination with digitalization, would contribute to increased efficiency. When relevant health information is available at the point of care, tests no longer need to be duplicated, the administrative burden on healthcare professionals when entering or copying health data between systems is reduced, as well as medical errors. On the other hand, as dependence on connected devices and networks continues to grow, so do the risks and management challenges in areas such as privacy, security, fairness, sustainability, financial and operational feasibility, and interoperability.

#### **3.1. Ethics and integrity**

The question of ethics has arisen in the use of personal health information that has become easily accessible in the health system due to digitalization. Easily available and unprotected health information is susceptible to information theft and manipulation. (22) The lack of a solid framework surrounding ethics in digital technologies and AI has created widespread mistrust among users. People don't know who companies share collected data with, what their rights are over their personal data, how to delete their own data, or how much of their data is kept (23).

According to a 2022 survey, even 82% respondents showed a general lack of confidence that users of connected devices and connected technologies are protected from unethical and irresponsible use of technology, with the majority of them saying they were either not very confident (51%) or not confident at all (31%). It is assumed that this is caused by a lack of information and data transparency, insufficient regulation of data privacy, the need for greater education and awareness of users, and disharmony of information between companies, users and regulators (23). Concern that the use of artificial intelligence (AI) in healthcare could lead to human rights violations and will further increase ethical issues, is arising from the specific characteristics of artificial intelligence. (24,25). Most current AI systems require large data sets for training and for validation purposes and such data sets contain personal information. Big data analytics is process of discovering trends, patterns, and correlations in large amounts of raw data to help make data-driven decisions. These processes use known techniques of statistical analysis, such as clustering and regression, and apply them to larger data sets with the help of newer tools. Another question is raised about the quality and origin of the source of these “training datasets” which are used to generate AI decision-making patterns. In healthcare, this is a sensitive topic and a potential problem, especially if the data sources come directly from industry without first being evaluated by the healthcare sector they ultimately affect (26-28). The proposed solution would be the establishment of a joint regulatory agency, which would have a strong positive effect on the protection of personal data and privacy, as it would ensure the implementation of a consistent framework for the reuse of health data in accordance with the General Data Protection Regulation (GDPR) and in cooperation with the national and EU authority for the supervision of personal data. (25) Among the solutions proposed to bridge the gap in ethics and responsible use of connected devices and health digitalization are policy and clear regulation, better design practices, guidelines and standards, digital literacy and user empowerment, legal frameworks and better transparency of user data (23).

### **3.2. Cybersecurity**

Healthcare security is a product of many interconnected parts of the healthcare system that change over time. The biggest change that has occurred in healthcare in the era of digitalization is that the medical records and reliable data infrastructure, needed for improving patient safety, have also become dependent on digital technologies and numerous technological risks (29,30). Protection of personal data and the information security of both health data and digitalized health procedures in the health sector have moved into the sphere of cyber security. Cyber threats are continuously growing all over the world, and attacks in virtual space are becoming more and more complex and sophisticated. Their impact on the economy, healthcare and other public services is becoming more and more powerful. Cyber attacks can expose sensitive information about patients or lead to the inability to access patient electronic health record (EHR), the inability to treat the patient by blocking or interfering with the proper operation of medical software in medical devices, and thus cause significant health consequences, but also financial costs for healthcare organizations in order to regain control over IT systems and patient data (31). Cyber attacks can happen not only to small healthcare systems but also to large and integrated ones. It is estimated that cybercrime caused a total of 6 trillion dollars of damage on a global level in 2021, and if compared with countries, it was the world's third largest economy after the USA and China. Experts have estimated that the global cost of cybercrime will grow by 15 percent annually over the next five years, reaching \$10.5 trillion annually by 2025, up from \$3 trillion in 2015. This represents the largest transfer of economic wealth in history, threatening incentives for innovation and investment. It is exponentially greater than the damage caused by natural disasters in one year and will be more profitable than the global trade in all major illegal drugs combined (32).

In 2017, a cyber attack threatened more than 60 health organizations (trusts) within the National Health Service of Great Britain, and spread to more than 200,000 computer systems in 150 countries, including Canada. After the attack, it was discovered that the UK's National Health Service had been underinvested for years, leaving the entire information system vulnerable to attack, as some of its Windows operating systems were over 15 years old and Microsoft no longer updated or supported them (33). The costs of cybercrime include damage and destruction of data, stolen money, lost productivity, theft of intellectual property, theft of personal and financial information, misappropriation, fraud, disruption of business operations after an attack, forensic investigation, recovery and deletion of hacked data and systems, and reputational damage. In the healthcare system, the damage that can be caused by cybercrime can directly affect an individual's life. The most common use in healthcare is ransomware, malware that infects computers and mobile devices and restricts their access to files, often threatening to permanently destroy data unless a ransom is paid. It has reached epidemic proportions globally and is "the main attack method" of cybercriminals (34). In 2020, the Federal Bureau of Investigation (FBI) announced that they were particularly concerned about ransomware affecting healthcare providers, hospitals and emergency services because these types of cyberattacks could affect the physical security of American citizens. (32) According to data collected by Emsisoft (an international antivirus software distribution company based in New Zealand), 764 healthcare providers in US were victims of ransomware during 2019. In 2019, the US was hit by unprecedented and unrelenting ransomware attacks that affected at least 966 government agencies, educational institutions, and healthcare providers at a potential cost of more than \$7.5 billion. (35) Affected organizations included: 113 state and municipal governments and agencies, 764 healthcare providers, 89 universities, colleges and school districts. (32) The incidents were not only expensive inconveniences but also put people's health, safety and lives at risk. While there were no confirmed deaths related to the incident in 2019, emergency patients had to be transported to other hospitals, medical records were unavailable and in some cases permanently lost, surgeries were canceled, tests were delayed, hospital admissions stopped, calls to emergency services did not work, and dispatch centers had to rely on printed maps and paper logs to track emergency services in the field. Surveillance systems were disabled, doors could not be opened remotely, badge scanners and building access systems stopped working. Due to the lack of publicly available data, it was not possible to accurately estimate the costs of these incidents, however US statistics show that the average ransomware incident costs \$8.1 million and takes 287 days to recover (33). A similar attack was reported by the German authorities in September 2020. A ransomware attack caused an IT system failure in a large hospital in Duesseldorf, and a patient who needed emergency admission died after having to be taken to another city for treatment. The Duesseldorf University Clinic's systems have been disrupted for a week (36). Malicious software attacks can be expected in all countries and healthcare systems of the world, no matter how well the systems are digitally protected. The priorities for digital health security can be seen in two parts: first, the intrinsic security of the technologies themselves, and second, the extrinsic ability of the technologies to drive security in the health system. In order to achieve these goals, it is necessary for digital clinical security to become part of the healthcare culture, whereby all stakeholders in the system understand their role in digital clinical security, familiarize themselves with the guidelines and target standards.

### **3.3. Equal access**

The digital literacy of citizens is a key element for the successful implementation of e-health. Health literacy is the ability to seek, understand, evaluate and apply information related to health care, prevention or health promotion. (29,30,37,38) This requires personal skills and suitable environmental conditions such as providing information in understandable language,

internet availability, technical support (computer, smartphone) and education support. However, older people, people with a lower level of education, including those employed in low-skilled occupations and with a lower socio-economic background, people facing vulnerabilities, usually have a lower level of digital literacy in the field of health and can hardly keep up with the technological progress. This affects their participation in their own health care and the ability to access health information. Therefore, the growth of digital health technologies may result in increasing health inequalities. If digital solutions become interoperable and supported by reimbursement, this will inevitably drive their further growth and adoption. The issue of promoting health literacy and digital skills is even more important in the context of the societal challenge of demographic change. All individuals in society are holders of human rights. In assessing the impact of the digitalization of healthcare on the community, the primary focus is on those rights holders who are more likely to be negatively affected by isolation due to digitalization of healthcare. (37) During stakeholder identification, it is especially important to consider which rights holders and in which context are the most sensitive to potential impacts for the implementation of digital tools in order to get a sense of the social environment and human factors that technology can affect (9,22,37). Therefore, actors who have certain duties or responsibilities regarding the implementation of human rights, are invited to monitor what opportunities and risks exist for the digitization of healthcare in the country, considering the state of digital and health literacy of specific population. There is extensive debate about how societies can realize the benefits of using artificial intelligence while simultaneously identifying, addressing and mitigating its shortcomings. A comprehensive approach is needed to implement the use of digital tools and AI for general human progress. In addition to the fact that such an approach requires attention to various aspects, especially respect for human rights and ethical values, it also calls for education and raising the awareness of all stakeholders to take responsibility in activities at the individual, professional and corporate level (2).

### **3.4. Environmental sustainability**

With regard to environmental impacts, the establishment of extensive digital infrastructure, large amounts of data traffic and storage, and the production of digital devices to support research and innovation can lead to digital pollution including some negative environmental impacts. (23) Also, the use of certain metals used in the devices, such as cobalt and tungsten, contributes to the carbon footprint because these materials are difficult to recycle or recover. On the other hand, digitization will reduce resources needed for various processes related to health care (eg travel-related pollution, energy and paper). Wider adoption of digital health technologies is likely to have some limited environmental impacts as a result of improved efficiency of resources and data use, reduction of unnecessary tests or patient hospital visits, and reduction of the need for paper documentation. (22) However, we must not overlook that digital infrastructures and data centers are energy intensive, and this aspect can significantly abolish the advantages mentioned above. There are problems of the necessity of frequent installation of new software, failures due to exposure to cybercrime and poor maintenance of information equipment due to lack of money or people who should do it. If the technology is not regularly maintained, it is subject to malfunctions and cyber threats, and the growing problem of the short lifespan of devices has also appeared. Proposed solutions to address this governance gap include promoting remote upgrades and regular maintenance of IoT devices and related technologies, and clear and harmonized guidelines for all device manufacturers. This must include regulations on repair, refurbishing, resale and servicing that encourage individuals to return end-of-life devices for recycling, as well as standardization and interoperability to ensure ease of patching and updating (23).

### **3.5. Financial and operational feasibility**

In the publication "Health at a Glance: Europe 2018", the OECD presented comparative analyzes of the health status of EU citizens and the performance of the health systems of EU countries, the latest trends in key indicators of health status, risk factors and health spending, together with a discussion of progress in improving the efficiency, accessibility and resilience of European health systems. (21) Overall, studies have shown that increased use of health data and increased interoperability could generate potential savings estimated at €4.6 billion per year for health services and €4.3 billion per year for patients. (39) Recent OECD estimates suggest that the combined economic benefit of the use of data and digital technology in the health sector could amount to 8% of the total health expenditure of all OECD countries. (40) Although investments in digital health contribute to the competitiveness of member states' economies and their future growth, enabling cost savings and increased efficiency of health systems, detailed assessments are still not systematically available. EU is expected to cover most (if not all) of the national digitalization efforts that would be needed to support patients' control over their own health data through the funding of the strategy for the digital transformation of society and the policy of the EU digital single market. However, without clear EU-level standardization and interoperability agreements, these digitalization efforts risk prolonging the fragmented landscape that currently exists (22). The global digital health market, which includes various software and hardware solutions used in the processing of health data, is constantly increasing, and as of 2015, when it was EUR 16 billion, it is estimated to double to EUR 31 billion in 2020. (41) The total amount of data stored in the cloud — which includes public clouds operated by vendors and social media companies (Apple, Facebook, Google, Microsoft, Twitter, etc.), government-owned clouds available to citizens and businesses, private clouds in owned by medium and large corporations and cloud storage service providers will reach 100 zettabytes by 2025, or 50 percent of the world's data at that time, up from approximately 25 percent stored in the cloud in 2015. It is impressive that approximately one million more people are joining the Internet every day, and it is expected that in 2030 there will be 7.5 billion people connected to the Internet and interacting with data, compared to 5 billion in 2020, and 1 trillion networked sensors embedded in the world around us (32). Accordingly, global spending on cybersecurity products and services to defend against cybercrime is growing cumulatively and has exceeded \$1 trillion in the five-year period from 2017 to 2021. Healthcare has lagged behind other industries, making it a tempting target due to outdated IT systems, fewer cybersecurity protocols, understaffed healthcare IT staff, extremely valuable data, and the urgent need for medical practices and hospitals to quickly pay ransoms to recover files. It is estimated that the US healthcare industry will respond by investing \$125 billion cumulatively from 2020 to 2025 to strengthen its cyber defenses (32).

### **3.6. Interoperability**

The reliable exchange of health information between health organizations, institutions and patients is extremely important because it directly affects the efficiency of health systems, health outcomes and better management of material and human resources. Experience shows that reliable IT interoperability is much more difficult to achieve in the health sector compared to other non-health sectors where information is also shared using digital tools, such as banks, academia, etc. (42) Interoperability is the ability of two or more systems to work together, regardless of the differences in interfaces, platforms and technologies adopted until then. The problem of exchanging traditionally inherited and heterogeneous data in healthcare organizations is recognized as one of the obstacles to the introduction of the electronic health record (EHR) in the healthcare system. Semantics is the study of the meaning of certain words and concepts, focused on the relationships between people and their words, which is a fundamental help for people to understand each other despite different experiences or points of

view. Semantic integration of the healthcare system enables the sharing of data between organizations and their internal ecosystems with reliable certainty about the exact meaning of that data and the concepts being discussed. (42,43) It is important to point out that clear health informatics standards help not only in interoperability and the construction of a health information system, but also directly contribute to the quality of health care, personalized care and patient safety. Duplication of data and interoperability still remained a major problem, especially in light of the fact of the need for interdepartmental and cross-border cooperation. Significant progress has only been made in the development of legal frameworks for the use of electronic health records, both in the countries of the EU and in the Republic of Croatia. (43) The decentralization of health information sources has brought new challenges for interoperability, especially regarding interoperability between digital devices and digital health applications. Due to the lack of interoperability, healthcare professionals cannot access the complete medical history of the patient and cannot make optimal medical decisions for the treatment and diagnosis. This causes significant costs for health systems and patients, and affects poorer health outcomes. In addition to the problem of personalized care, researchers and innovators cannot access large enough amounts of health data that is necessary today to further advance the field of real-time medicine. Similarly, policy makers and regulators lack relevant health data to make effective decisions and ensure proper surveillance of health problems. In accordance with the Refined European framework for the interoperability of the eHealth network, to implement interoperability it is necessary to ensure legal interoperability (same rules), organizational (similar policies and care processes), semantic (similar way of coding information entered into the system) and technical interoperability (for applications and IT infrastructure) (44).

#### **4. CONCLUSION**

Digital health refers to the use of digital technologies and covers a wide range of services and products including assistive technologies, web platforms and monitoring systems. There are numerous advantages of using digital tools, but also potential risks due to observed privacy and security issues of personal health data and problem of access to digital technologies. Unavailability of digital technology is a fundamental driver of even greater inequality in the availability of healthcare. People who are most in need of health care (elderly people, marginalized groups, people with disabilities) are less likely to have access to digital health, which can be related to the unavailability of technology (hardware, software, internet), lack of digital literacy or lack of interest in using digital applications for health needs. The acceptability of DHT depends also on several non-technological factors such as clinical condition (mental and physical abilities), type of health services (clinician contact, health information, digital health intervention) and characteristics of the population group (demographics, digital literacy, social factors or affinities towards digital tools). Consequently, mapping inequities in digital infrastructure will support efforts to address this potential barrier to access to DHT. Issues of semantics and interoperability, privacy, security, fairness, sustainability, financial and operational feasibility, which are often neglected in the beginning of the development and implementing new digital health tool, are essential for proper understanding and using digital health solutions. Finally, it is very important to assess the potential hazards that digitalization of healthcare contributes to and to significantly improve digital literacy of all stakeholders in the healthcare system. An inclusive approach to the design of digital solutions is recommended to ensure that solutions are usable and meet the needs of all population groups.

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## EUROPEAN INTEGRATION AS A POSSIBLE SOLUTION FOR THE WESTERN BALKANS PROBLEMS

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### **ABSTRACT**

*The accession of the Western Balkan countries to the European Union is often cited in public discourse as something that will certainly happen and that will solve all their problems after the end of the accession negotiations. Through this research, it was established that independent political and economic indicators unequivocally indicate that not a single country in the Western Balkans is ready for the EU accession, nor will it be any time soon. A much bigger problem is the fact that the EU, as a weak global foreign policy factor, has almost no absorption power to accept new members. That has a very negative impact on whole Western Balkans whose undemocratic political leaders abuse this situation in order to stay in power as long as possible, thus creating a closed circle in which their countries economically stagnate.*

**Keywords:** *integration into the European Union, Western Balkans, democratization, economic development, accession negotiations*

### **1. INTRODUCTION**

Western governments, international and non-governmental organizations almost universally recognize the integration of the countries of the Western Balkans<sup>1</sup> (WB) into the European Union (EU) as the only viable strategy for introducing stability, improving democracy and their economic development. The EU's policy towards the candidate countries is based on the Stabilization and Association Process, which enables them to become potential members. The goal of this process is to introduce peace and stability, encourage the development and sustainability of democratic institutions, ensure the rule of law, social progress and support an open economy, which should open the perspective for integration into the EU. The accession of the countries of Central and Eastern Europe only fifteen years after the fall of the Berlin Wall showed that the EU had gained power in the form of a powerful transformational force that could influence the countries of Southeastern Europe to become full members of this exclusive interstate club after the necessary reforms. The paper deals with the question of the success of the Stabilization and Association Process in the democratization of the countries of the Western Balkans, while investigating the state of democracy and the level of economic development of Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia. The current state of their democratic institutions and economic indicators is compared with Croatia and Slovenia, as two EU members who, not so long ago, shared a similar fate with them on the turbulent Balkan Peninsula.

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<sup>1</sup> A political term for the countries of the Balkan Peninsula that have not integrated into the EU, which are Bosnia and Herzegovina, Serbia, Montenegro, Kosovo, North Macedonia and Albania. The geographical term follows the borders of the Sava and Danube rivers, and because of that, all areas south of these rivers (located on the Adriatic, Ionian and Aegean seas) are considered part of the Balkan Peninsula. The western part of Peninsula includes the southern regions of Slovenia and Croatia, Bosnia and Herzegovina, Serbia without Vojvodina, Montenegro, Albania and North Macedonia. The eastern part of the Balkan Peninsula includes Greece, Bulgaria, a small part of Romania (near the confluence of the Danube River into the Black Sea) and the European part of Turkey.

The goal of this paper is to examine whether the two EU member states are at similar political and economic levels as the Western Balkan states, which would certainly be a very good argument for their accession to the EU as soon as possible. The first part of the paper discusses the specifics of the integration process of each of the analysed countries, and their evaluation is based on the achievements in fulfilling the criteria for EU membership of each of the aspirants. Second part of the research is based on the analysis of various indicators of democratization and economic development as related indicators of the post-transition political-economic consolidation of the Western Balkans. In the conclusion, the results of the research are presented and an analytical overview of the length of the accession negotiations is given. The aim is to predict the possibility of a successful conclusion of the negotiations in order to provide an answer to the question about the success of EU integration in the process of democratization of Western Balkan countries.

## **2. SUCCESS OF DEMOCRATIC CONSOLIDATION**

The launch of the EU stabilization and association policy for the Western Balkans in 1999, as well as the declarations on the perspective of EU membership for the countries of the region at the conferences in Zagreb in 2000 and Thessaloniki in 2003, fuelled optimistic expectations of a quick transition. It was expected that all of the countries of Southeastern Europe would enter the EU in the same way the 10 (mostly) Central European countries entered the EU in 2004 in a joint package, with implementation of the required reforms without any major difficulties. Later, it turned out that this great expansion of the EU was more of a geopolitical project for the unification of Europe after the end of the Cold War, so there was less insistence on meeting the criteria, and more looking "through the fingers" for a higher goal. The relationship of the EU countries towards Southeast Europe was also observed through the fact that Greece became a full member in 1981, as well as that Bulgaria and Romania have been negotiating with the EU since 1995, the process which began shortly after the beginning of the process with Hungary and Poland. However, the first problems in fulfilling the requested reforms vis-à-vis the Balkan states were shown in Bulgaria and Romania, which failed to enter in the package with the other accession countries. These two countries joined the EU in 2007, but their membership is conditional on monitoring. It was a political decision to accept unprepared members by which they undertook to continue the fight against corruption and organized crime, while agreeing to the EU surveillance mechanisms<sup>2</sup> that are still in force. Judging by the failures of continued further integration into the EU regarding access to the borderless Schengen zone and non-acceptance of the common currency Euro, Bulgaria and Romania have not yet fully succeeded in European integration, which did not help the EU's negotiations with other candidate states. The example of Croatia showed that future EU accession processes will be increasingly demanding, as the negotiations with the last joined EU member state lasted the longest so far (five years and nine months), additionally burdened by accusations of Croatia's non-cooperation with the International Criminal Tribunal for the former Yugoslavia (ICTY) and bilateral blackmailing of Slovenia for changing the sea demarcation line. Ultimately, Croatia became a full member of the EU in 2013, and ten years later it overtook numerous EU countries in the continuation of the integration process by joining the borderless Schengen zone and accepting the common currency Euro.

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<sup>2</sup> The so-called Cooperation and Verification Mechanism (CVM) as a kind of monitoring of progress, within which the Commission published a progress report once a year and issued recommendations for eliminating shortcomings in the field of justice and internal affairs. Available at: [https://commission.europa.eu/strategy-and-policy/policies/justice-and-fundamental-rights/upholding-rule-law/rule-law/assistance-bulgaria-and-romania-under-cvm/cooperation-and-verification-mechanism-bulgaria-and-romania\\_hr](https://commission.europa.eu/strategy-and-policy/policies/justice-and-fundamental-rights/upholding-rule-law/rule-law/assistance-bulgaria-and-romania-under-cvm/cooperation-and-verification-mechanism-bulgaria-and-romania_hr) (access 7/19/2023)

## 2.1. Democratization by promising accession of the Western Balkan countries to the European Union

As Boduszyński (2010: 261) established, the promise of the EU enlargement was the most important political instrument available to ensure a stable, prosperous and democratic continent. Nevertheless, the EU's action on the Western Balkans showed the objective limitations of this transformational power, because after twenty years of applying the policy of stabilization and association as a framework for the Europeanization of Southeastern Europe, only Slovenia and Croatia became the EU members. The reasons for the impossibility of reforms in the Western Balkan countries can be found in the exposure to war conflicts and the consequent strengthening of nationalist policies, insufficiently developed institutions, a weak judiciary and numerous open issues of post-conflict societies (Kovačević, 2019: 11). However, it still remains unclear why some states succeeded to overcome these problems, while others have not.

	SLOVENIA	CROATIA	FR YUGOSLAVIA <sup>3</sup>	MACEDONIA <sup>4</sup>
<b>COMPATIBILITY OF WESTERN LIBERALISM WITH LOCAL STRUCTURES</b>	Strong	Medium	Poor	Very poor
<b>FORM OF NORM TRANSFER</b>	Contagion and convergence: passive leverage	Conditionality: positive and negative inducements	Control and conditionality: mostly negative inducements	Mixture of positive and negative inducements
<b>ACCEPTANCE OF NORMS BY ELITES IN 1990S</b>	Consensus on Western liberalism	Nominal acceptance	Outright rejection	Nominal acceptance by part of the elite
<b>DOMESTIC POLITICAL EFFECTS IN THE 1990S</b>	Illiberal groups quickly marginalized; process of integration becomes main locus of political competition	Elites and public divided; external impetus for democracy moderate	Strong anti-Western sentiment; little external impetus for democracy	Public divided; anti-Western presence in politics
<b>RESULTING REGIME TYPE</b>	Substantive democracy	Simulated democracy	Populist authoritarianism	Illegitimate democracy
<b>EFFECTS OF EXTERNAL INFLUENCE AFTER 2000</b>	Some disenchantment with the EU; general consensus on appropriateness of West and liberalism	Economy falters and pro-West coalition wins; elite and public still divided. By mid-2000s, increasing consensus on integration, elites and public are coopted	Economy fails and democratic coalition wins; elites and public still deeply divided over liberalism; external impetus weak but growing by 2006	Illegitimacy comes to a head in 2001; conflict breaks out and West becomes intensely involved in domestic politics; public still deeply divided but external engagement continuous to assure reform and stability

*Table 1: External Impetus for Liberalism and Regime Outcomes*  
(Source: Boduszyński, 2010: 267)

<sup>3</sup> In his analysis, Boduszyński investigates FR Yugoslavia, which formally existed at the time, and included the present-day states of Serbia, Montenegro and Kosovo, which are observed in this analysis.

<sup>4</sup> Prior to June 2018, the use of the name Macedonia was disputed between Greece and the then - Republic of Macedonia. The Prespa agreement of June 2018 saw the country change its name to the Republic of North Macedonia eight months later.

One of the most prominent theories in explaining regime change in post-communist states and the consequent failure in the EU accession process stems from the constructivist point of view. States adopt the norms of other more successful states (in this case EU members) in order to share group success and reputation, which Risse and Ropp (1999: 238-239) describe as a "spiral model" of norm transfer in which states act in order to gain rewards (in this case membership in an elite interstate club). Accepted norms are embodied in state institutions and shape the behaviour of politicians, but in this way, elites are actually encouraged to simulate democratization<sup>5</sup>. Therefore, it happened that although all of these countries declaratively wanted to enter Euro-Atlantic integration, they differed in the degree to which they were ready to pursue this goal. Some governments considered the costs of accession lower than the benefits, and some higher, that is, for some of them the EU was an opportunity to ensure staying in power, while for others the EU represented the loss of a ruling position. Fulfilling the conditions necessarily implies renunciation of part of the sovereignty, part of local practices and cultures, as well as some economic sectors, which is why the internal and external circumstances of the government often pulled in opposite directions (Boduszyński, 2010: 262). Taking look at the Table 1, it is clear that Boduszyński's analysis detects links between the acceptance of liberal norms and the successful acceptance of the idea of EU accession in the observed countries. It is obvious that the Western Balkan states have not successfully implemented all the requested economic and political reforms, and as far as democratization is concerned, democratic regression has also been recorded. Even though the stagnation of the Western Balkan states in terms of democratization and the consequent strengthening of authoritarian regimes called "stabilocracy" is evident, during these years the process of accession to the EU took place, which led to the paradox that negotiations with European institutions do not necessarily mean progress in the democratization process (Kovačević, 2019: 11). Political leaders simply had no desire to implement reforms because they could harm their popularity and reduce their space for manoeuvre needed to stay in power as long as possible.

	REQUEST FOR MEMBERSHIP	CANDIDATE STATUS	START OF NEGOTIATION	NEGOTIATION STATUS/ MEMBERSHIP YEAR
<b>ALBANIA</b>	2009	2014	2020	-
<b>BOSNIA AND HERCEGOVINA</b>	2016	2022	-	-
<b>MONTENEGRO</b>	2008	2010	2012	33 open / 3 closed chapters
<b>CROATIA</b>	2003	2004	2005	2013
<b>KOSOVO</b>	2022	-	-	-
<b>NORTH MACEDONIA</b>	2004	2005	2020	-
<b>SLOVENIA</b>	1996	1997	1998	2004
<b>SERBIA</b>	2009	2012	2014	18 opened / 2 closed chapters

*Table 2: The relationship between the countries of Southeast Europe and the EU  
(Source: official website of the European Union<sup>6</sup>, 2023)*

<sup>5</sup> Democracy has become the norm in today's world, so even dictators (with a few exceptions) cannot avoid embellishing their rule with democratic epithets. In a world where human rights and democracy are used as criteria for aid and membership in international organizations, it would be insane to ignore these principles. In many countries, there is a simulation of democratic practices: a facade parliament, opposition groups hold symbolic protests, minority groups have their representatives in parliament and constitutional courts make decisions. However, substantive (consolidated/liberal) democracy is missing. (Boduszyński, 2010: 254)

<sup>6</sup> Available at: [https://european-union.europa.eu/index\\_en](https://european-union.europa.eu/index_en) (access 8/9/2023)

In an effort to preserve the stability of the Western Balkans, the EU shortsightedly prioritized effective governments over democratic consolidation, thereby contributing to the consolidation of undemocratic and corrupt Balkan regimes. Namely, the goals of the EU remained solely on the stabilization of states in order to prevent further conflicts in the region, while democratization and institution building was left to them. That is, the so-called shallow Europeanization in which the ruling Western Balkan elites were committed to European integration with words but not deeds, while at the same time EU bureaucrats were not in a hurry to expand the EU. In this way, a kind of "Gentleman's Agreement" was created between the EU, tired of enlargement and other problems of its own, and the leaders of the Western Balkan states, who are not inclined to democratization because it could significantly increase the possibility of their replacement. As time progressed, and there is already a perspective of more than twenty years, challenges to regional stability began to renew with the survival of non-democratic regimes. They arise from the weakness of states where there is no rule of law, organized crime is rampant, corruption is widespread, pro-democratic reform coalitions are absent, and states tolerate the functioning of illegitimate institutions (Anastasakis, 2008: 371 cited in Kovačević, 2019: 11). Such an environment favoured the rise of populism because it offered simple solutions to numerous problems and encouraged the strengthening of national feelings. As Boduszyński (2010: 254) argues, radical populists depended on a coalition of rural and low-skilled workers, as well as on the political and economic elite of party henchmen. They accepted nationalism (skilfully wrapped in populism) due to poor economic status and cultural reasons and with the aim of removing certain resources and power levers of national minorities. The low level of economic sustainability helped the development of the rentier state, which used authoritarian politics in a targeted manner in the development of interest networks necessary to stay in power. Therefore, these elites worked to strengthen their influence in the police, the security apparatus and in the media, and as a result of the above, they had no reason to introduce liberal reforms. On the other hand, the inconsistent conditioning of European institutions contributed to the weakening of the EU's transformative power in the region. In reality, it looked like the EU in some cases carried out a strict assessment of the fulfilment of conditions, while in others was much more flexible in order to avoid security risks, thereby compromising the consistency of the entire negotiation process. Bechev (2012: 6 cited according to Kovačević, 2019: 13) claims that there was a "tacit pact between EU member states tired of enlargement and *rent-seeking*<sup>7</sup> elites in the Western Balkans". This approach actually puts the EU in the position of an accomplice in the legitimization of insufficiently democratic political regimes and erodes its transformational power, clearly proving that two decades of intensive EU action in the Western Balkans actually resulted in a weak effect.

## 2.2. Current democracy status of the Western Balkan states

As explained in the previous chapter, after more than two decades of negotiations between the Western Balkan countries and the EU, not one of them has yet closed the negotiations, nor is the approximate year of full membership in sight. According to the guidelines of this paper stated in the introduction, it is necessary to "measure" the degree of democracy of the Western Balkan states in order to determine the correlation with the negotiation process with the EU. Analysis of the state of democracy is one of the main areas of research in comparative political science. By gradually determining the quality of the regime, and thus focusing on democratic performance, the empirical materials provide an important contribution to other integral fields of political science.

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<sup>7</sup> A term that means the act of increasing existing wealth (in this case power) by manipulating the social or political environment without creating new value (which from the perspective of this paper would mean democratization). Such activities have negative effects on the rest of society, and are positive only for those who maintain them.



Finally, apart from the scientific value, it can also have an international political meaning, since the policies of granting development aid depend on the degree of democratization of the observed regime, and thus the success of the planned programs can be evaluated (Knack/Paxton 2011 cited according to Lauth and Schlenkrich, 2022: 2). An additional problem is the contestation of statehood, as several states in the region face secessionist tendencies, controversies over the issue of national identity, unresolved border issues, ethnic tensions, reconciliation problems and weak management capacities. In such conditions, the process of democratization in the Western Balkan states became very problematic, as confirmed by the reports of international non-governmental organizations. In particular, Kovačević (2019: 11) assessed the state of democracy through the report of the international non-governmental organization Freedom House<sup>8</sup>, according to which "the process of democratization in the Western Balkans fell into a deep crisis... Namely, after the significant progress achieved between 2004 and 2010, a decline over a six-year period is noticed that will lead to, for example, the average Democracy Index at the Western Balkans in 2016 being the same as it was in 2004. With the exception of Albania, all countries recorded a worsening rather than an improvement, while in 2018, Serbia recorded one of the largest declines achieved in a single year. None of the countries of the Western Balkans are considered consolidated democracies, but rather partially consolidated democracies (Serbia, Montenegro), transitional governments or hybrid regimes (Albania, Bosnia and Hercegovina, North Macedonia)."

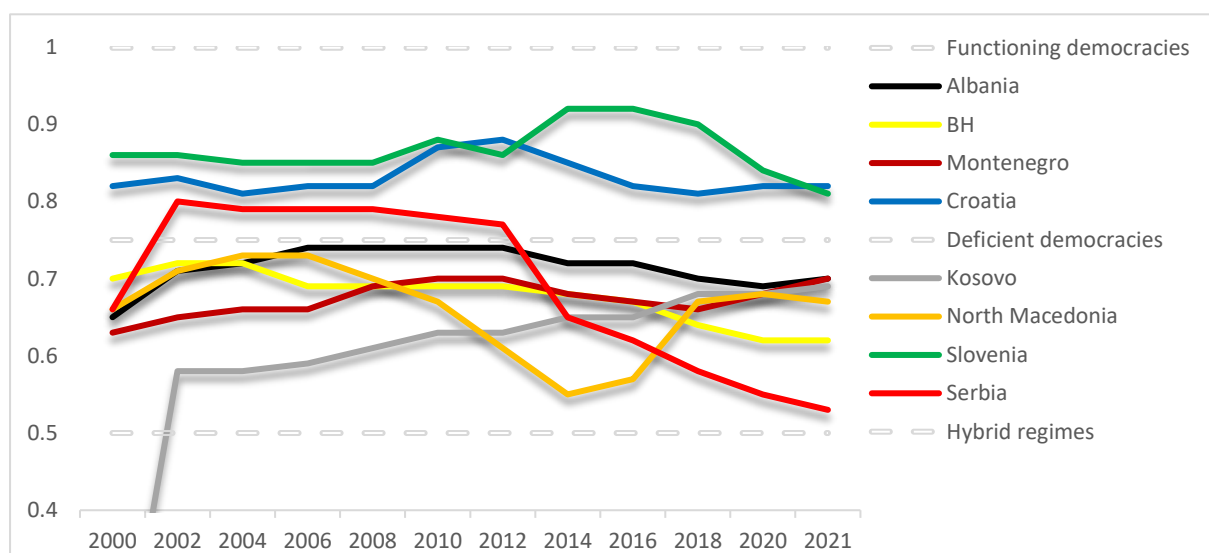


Figure 1: The degree of democratization of the countries of Southeast Europe  
(Source: Democracy Matrix, 2022)

To measure the degree of democratization of the observed countries of the Western Balkans and the two EU members Slovenia and Croatia, the data of the research project Democracy Matrix<sup>9</sup> is taken, because it is known<sup>10</sup> to be adequate tool for the comparative analysis of the

<sup>8</sup> An NGO that has been researching and supporting democracy, freedom and human rights in the world for decades by measuring 25 indicators such as political rights, civil liberties, political pluralism, freedom of religion, individual rights and other factors. (Bošnjak, 2022: 46)

<sup>9</sup> It is a tool for measuring the democratic quality of the Julius-Maximilians University in Würzburg, Germany. Their reports provide data on the state of democracy for more than 170 countries between 1900 and 2022. On the one hand, the extent of the three key democracy dimensions of political freedom, political equality, and political and legal control are surveyed. On the other hand, the matrix depicts the functioning of five institutions: procedures of decision, regulation of the intermediate sphere, public communication, guarantee of rights, and rules settlement and implementation. In addition, the democracy matrix distinguishes between three levels of analysis – core measurement, context measurement and trade-off measurement – and thus makes possible a differentiated look at the democracy quality of political systems. (Lauth and Schlenkrich, 2022: 5-9).

<sup>10</sup> For example, Amjad (2022), Schlenkrich (2021), Ciokajo (2022), Lemm (2021) and others.

relationship between different types of democratic regimes and their transformation over the years. The goal is to compare Freedom House's data for providing an additional contribution to their analysis and give more precise insight of the observed problem. The analysis of the Democracy Matrix data during the observed twenty-year period provides an interesting presentation of the democratic development and the decadence of the democracy of the observed countries of Southeast Europe. In the foreground, two EU members Slovenia and Croatia certainly stand out, which also oscillate in the level of development of their democracies, but at the same time these levels are above the limit by which countries are classified as deficient democracies. Slovenia was thus in most of the time a more successful democracy than Croatia, which began to degrade after joining the EU as a conscious concession to the electorate in demands for the weakening of democratic institutions (Bošnjak, 2022: 206). However, Slovenian democracy weakened with the populist rule of the Slovenian Democratic Party (SDS) (Petrović, Raos & Fila, 2023: 268-275) and was even below the level of Croatia in 2021. However, the observed oscillations of the democratic indicators of Croatia and Slovenia did not threaten their status as functional democracies, which was not the case within the Western Balkan countries. All of the observed non-EU countries thus fall into the category of deficient democracies for almost the entire time period. At the same time, the case of Serbia stands out, as a country that has an open status of negotiations with the EU and which, until the change of pro-European authorities in 2012, was almost at the level of Croatia with the status of a functional democracy. After that, Serbia began to decline democratically and in a relatively short period became the worst ranked country in the Western Balkans with a tendency to move into a hybrid regime. Such a strong democratic regression is attributed to the populist rule of Aleksandar Vučić (Popović and Todorović, 2021: 3-6), who controls all governing processes and simulates democracy with frequent elections and the selection of loyal coalition parties (Spasojević, 2017: 80). Other countries do not have such intense oscillations of their democratic indicators, the only positive example that can be highlighted is Montenegro, which is gradually progressing, and from the opposite point of view, Bosnia and Hercegovina as a country whose democratic processes are almost constantly regressing.

### **3. ECONOMIC INDICATORS**

Macroeconomic stability is one of the key factors affecting the development and growth of the economy. In order to achieve macroeconomic stability and sustainable economic development and growth, especially in the countries of the Western Balkans, it is necessary to implement a rational economic policy and structural reforms. One of the criteria for joining the EU is the economic integration of countries. Therefore, one of the goals of this paper is to use scientific methods to examine indicators of economic development in the EU members Croatia and Slovenia, and the Western Balkan countries Albania, Bosnia and Hercegovina, Kosovo, Montenegro, North Macedonia and Serbia, that is, to investigate whether the EU accession process in those countries has an influence on the economic development of the Western Balkan countries and their readiness of economic integration in the EU. According to Mügge (2016), the goal of macroeconomic indicators analysis is to show the state of the economy and its stability and to enable investors to react to new situations in a timely manner. One of the goals of this paper is to determine the position of the countries of the Western Balkans in the European integration processes through a descriptive analysis of the economic situation. Data from the World Bank (World Bank, 2023) on selected economic indicators listed in Table 3, in a time series from 2003 to 2022 were used for the analysis. The year 2003, in which Croatia applied for membership in the EU, was chosen as the initial year of analysed data. All the other observed countries, except for Slovenia, which joined the EU in 2004, applied for membership in the EU after 2003. Data for Kosovo are first available since 2008, on account of the fact that Kosovo declared its independence from Serbia on February 17, 2008.

No.	CODE	VARIABLES	UNITS
1.	GDP p.c.	GDP per capita	current US\$
2.	GDP growth	GDP growth	annual %
3.	EXP g.s.	Exports of goods and services	% of GDP
4.	FDI n.i.	Foreign direct investment, net inflows	% of GDP
5.	INF c.p.	Inflation, consumer prices	annual %

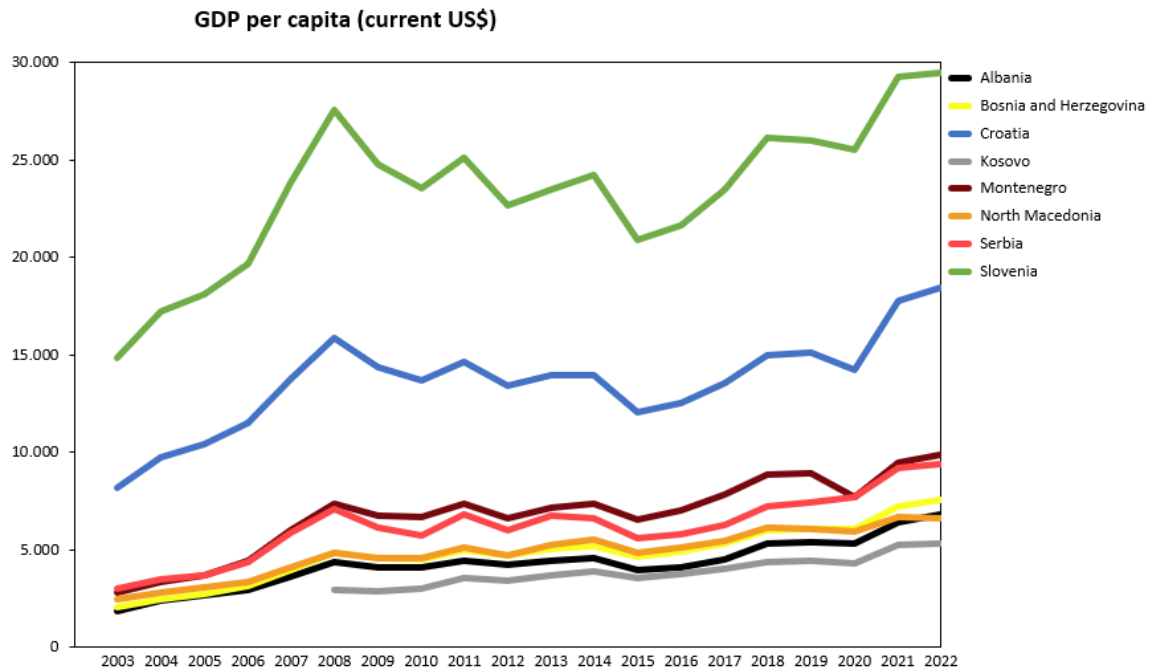
*Table 3: Examined macroeconomic indicators*  
(Source: Authors)

The dependent variable in this analysis is GDP per capita, while all other economic indicators represent independent variables. GDP is an indicator of the economic health of an individual country, it represents a comprehensive picture of the economy and can give investors an insight into economic trends by comparing GDP levels as an index. GDP is not only used as an indicator of planning and policy formulation by most governments and economists, but also helps investors manage their portfolios by giving them guidance on the state of the economy. GDP per capita is often used as an indicator of the development of countries as a measure of average real income. GDP growth as one of the most important macroeconomic indicators represents the total value of goods and services for final consumption in a certain country in a certain period - most often this period is one year (Mankiw, 2019). Export and import of goods and services are part of the current account within the country's balance of payments. Most empirical papers point to the fact that openness to international trade stimulates economic growth. Stable economic growth in the long term can be achieved by increasing production and exports. In their research, Tahir and Azid (2015) came to the conclusion that openness to international trade has a statistically significant and positive impact on economic growth, however Ulaşan (2014) claims that openness to international trade alone, without previously built institutions and macroeconomic stability, does not contribute to economic growth. Foreign direct investments have a positive impact on economic development (Iamsiraroj & Ulubaşoğlu, 2015). They are considered as an effective way of raising the country's comparative advantages and a significant source of economic development, modernization, growth in production, exports, employment and income (Marjanović & Domazet, 2021). Therefore, for most countries, attracting foreign direct investments is a necessary condition for increasing production and exports to a level that will enable the country to have stable economic growth (Domazet and Marjanović, 2018). The most important factor for foreign direct investments is access to new markets. Therefore, foreign direct investments also reflect the social and political situation of the country, because investors prefer to invest in countries with a stable political, social and economic climate (Foley, 1996). Inflation, average consumer prices, is defined as the change in the prices of a basket of goods and services typically purchased by specific groups of households. It is measured in terms of annual growth rate and index. Inflation is a measure of the deterioration of living standards. A consumer price index is calculated as a series of summary measures of the proportional change in the prices of a fixed set of consumer goods and services of constant quantity and characteristics acquired, used, or paid for by the reference population from period to period.

### 3.1. Gross domestic product per capita

When comparing starting positions of gross domestic product per capita (GDP p.c.) in 2003 (see Figure 2 and Table 4), it can be observed that Albania had the lowest GDP p.c. compared to other countries: 8 times lower in comparison to Slovenia and 4.4 times lower in comparison to Croatia, countries which had the highest starting positions of GDP p.c. among observed countries.

In 2022 the gap between those countries decreased – Slovenian GDP p.c. was 4.33 times of Albanian and Croatian 2.7 times higher than Albanian GDP p.c. The lowest GDP p.c. in 2022 had Kosovo 5.5 times lower than Slovenia and 3.44 times lower in comparison to Croatia.



*Figure 2: GDP per capita of selected Southeast European countries  
(Source: Authors' research and analysis according to World Bank, 2023)*

Comparing trends of GDP p.c. among surveyed countries and GDP p.c. in 2003 and 2022, we found that the highest growth of GDP p.c. had Bosnia and Herzegovina (3.73 times), followed by Albania, Montenegro and Serbia (3.68, 3.54 and 3.12 times respectively). The lowest growth of GDP p.c. of Western Balkan countries had Kosovo (1.8 times) and North Macedonia (2.7 times). Slovenia and Croatia were also at the lower part of the scale with GDP p.c. growth of 1.98 and 2.24 times respectively.

*Table following on the next page*

year	Albania	Bosnia and Herzegovina	Croatia	Kosovo	Montenegro	North Macedonia	Serbia	Slovenia
2003	1846,12	2031,40	8192,32	-	2789,16	2440,48	3005,43	14849,04
2004	2373,58	2451,58	9723,38	-	3380,17	2795,90	3502,80	17233,14
2005	2673,79	2741,08	10446,36	-	3674,62	3072,68	3720,48	18098,91
2006	2972,74	3170,17	11489,39	-	4425,68	3362,97	4382,62	19672,97
2007	3595,04	3936,93	13728,52	-	5976,39	4079,39	5848,48	23817,89
2008	4370,54	4846,79	15857,71	2965,45	7367,75	4841,25	7101,04	27595,60
2009	4114,13	4542,31	14387,66	2847,56	6727,11	4584,71	6169,11	24792,13
2010	4094,35	4506,93	13664,21	3009,52	6688,40	4577,69	5735,42	23532,48
2011	4437,14	4980,91	14623,99	3540,82	7328,79	5098,09	6809,16	25128,02
2012	4247,63	4688,35	13410,82	3410,69	6586,40	4728,31	6015,95	22641,81
2013	4413,06	5025,24	13949,12	3704,56	7188,86	5241,05	6755,07	23503,28
2014	4578,63	5196,97	13970,98	3902,53	7387,87	5495,73	6600,06	24247,17
2015	3952,80	4654,61	12071,09	3520,78	6517,19	4861,56	5588,98	20890,17
2016	4124,06	4917,26	12550,71	3759,47	7033,44	5149,59	5765,20	21678,36
2017	4531,03	5327,39	13562,14	4009,36	7803,36	5450,50	6292,55	23514,03
2018	5287,66	6024,49	15003,14	4384,19	8850,38	6108,74	7252,40	26123,75
2019	5396,21	6094,72	15086,21	4416,03	8909,65	6070,39	7417,21	26016,08
2020	5343,04	6095,10	14236,54	4310,93	7677,37	5965,45	7733,80	25545,24
2021	6377,20	7230,20	17747,79	5269,78	9465,97	6694,64	9230,17	29291,40
2022	6802,80	7585,38	18413,23	5351,44	9893,52	6591,47	9393,63	29457,40

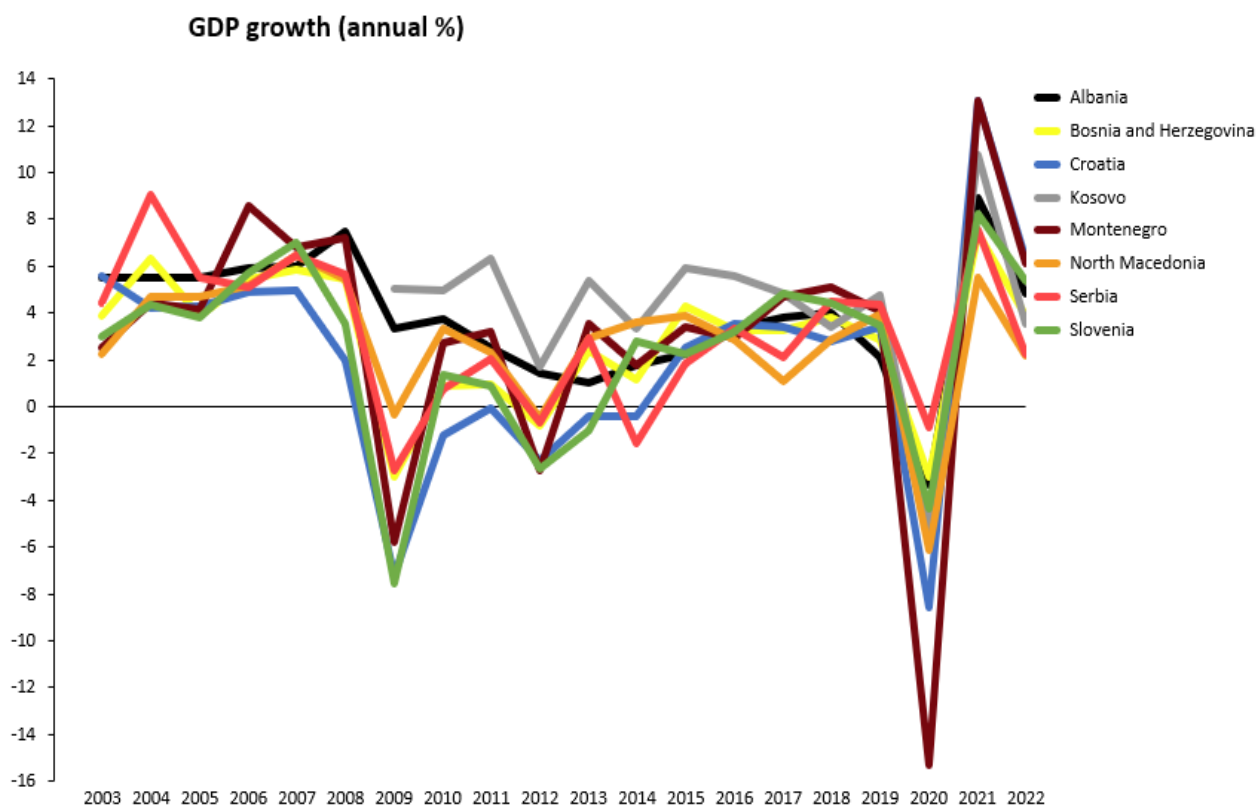
*Table 4: GDP per capita of selected Southeast European countries  
(Source: Authors' research and analysis according to World Bank, 2023)*

We observe an increasing trend in GDP p.c. growth in selected South European countries. Bosnia and Hercegovina, Albania, Montenegro and Serbia in comparison to Slovenia and Croatia had experienced higher growth of GDP p.c. within the selected period which is understandable for those two countries in 2003 started with higher GDP p.c. than those of other Western Balkan countries. Kosovo, being the youngest country struggling with political difficulties and complex relations with neighbouring Serbia, has the lowest GDP p.c. growth rate. It is important to stress out that all of the surveyed countries in 2022 in comparison to the initial year of 2003 (2008 in case of Kosovo) experienced multiple increase of GDP p.c. which indicates their significant economic improvement. However, although the gap between Slovenia and Croatia and the Western Balkan countries in 2022 decreased, it is still significant and visible, and represents a substantial challenge in the process of their EU integration and implementation of structural reforms.

### **3.2. Gross domestic product growth**

Comparing the GDP growth, after 2003, we found a diverse trend in analysed countries (Figure 3). Until 2009, all of the analysed countries experienced positive trend of GDP growth. In 2009 only Albania had the GDP growth of 3.35 % of GDP which was still a decline in comparison to the previous period and Kosovo's starting point, being the newly independent country in 2009, was 5.03 % of GDP. All the other countries had decline in GDP growth which can be explained by global recession which affected most of the countries' economy. Negative trend of GDP growth in Croatia continued until 2014.

*Table following on the next page*



*Figure 3: Annual GDP growth of selected Southeast European countries  
(Source: Authors' research and analysis according to World Bank, 2023)*

Another year in which there has been a decrease of GDP growth in most of the countries, except Albania and Kosovo, is 2012 when the public debt crisis in the EU led to the recession in majority of analysed countries. Due to the COVID-19 crisis, there was a drastic decrease of GDP growth in 2020, the highest decrease amounted 15.3 % in Montenegro and 8.5 % in Croatia. These two countries also had the highest increase of the GDP growth during the analysed period in 2021 (13.04 and 13.07 % respectively) which can be explained by the high portion of tourism revenue in GDP. When analysing GDP growth, it is not possible to make a simple conclusion about the progress of the analysed countries since the GDP growth trend is very diverse in all of the countries.

### 3.3. Exports of goods and services

There has been an increasing trend of exports of goods and services in all the examined countries comparing the starting point in 2003 with year 2022 (Figure 4). Expected decrease was shown in 2009 due to the recession (except for Kosovo) and in 2020 due to the COVID-19 crisis. The highest share of exports of goods and services in GDP in 2003 had Slovenia (51 %), followed by Croatia with 35.5 %, Montenegro with 30.6 %, North Macedonia with 27.6 %, Serbia with 23.1 % and both Albania and Bosnia and Hercegovina with 20 %. In 2022, export of goods and services from Slovenia made up 90.3 % of its GDP which is a substantial increase in comparison to 51 % in 2003. Although Croatia had the second highest share of export of goods and services percentage in GDP in 2003 being 35.5 %, in 2022 lost its position scoring 60.6 % in comparison to North Macedonia with the share of 74.8 % and Serbia with 63.4 % of GDP coming from exports of goods and services.

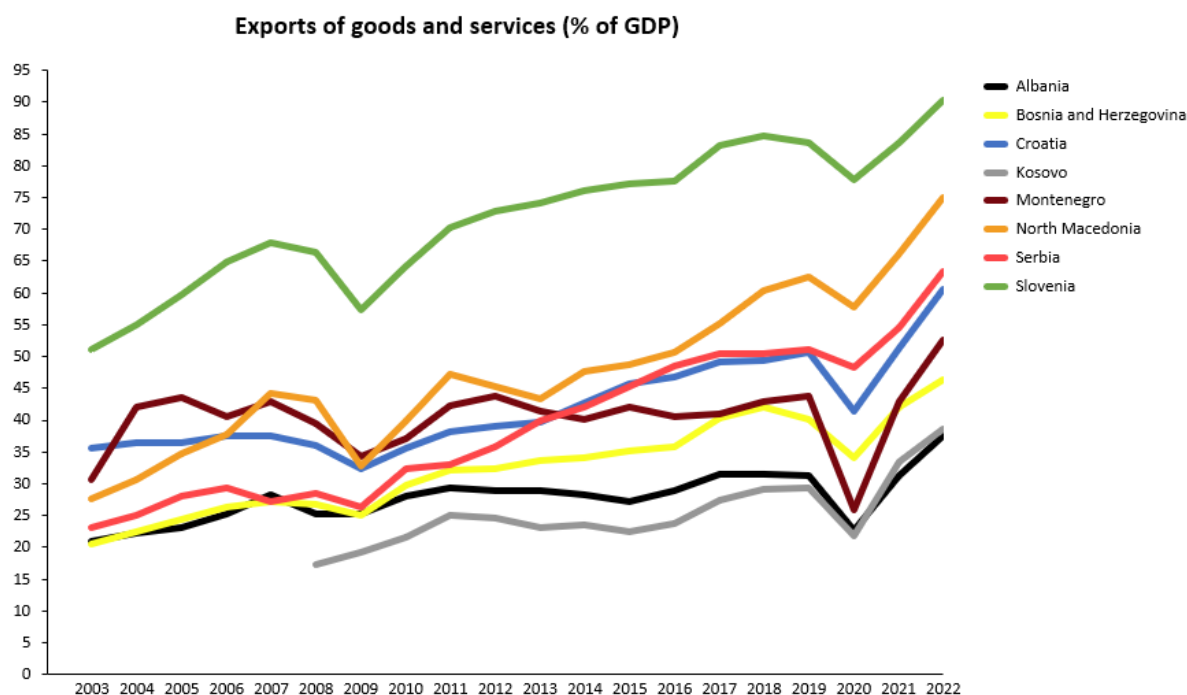


Figure 4: Export of goods and services of selected Southeast European countries  
(Source: Authors' research and analysis according to World Bank, 2023)

Analysing percentage of exports of goods and services in GDP in surveyed countries in 2003 and 2022, we found that in four countries Albania, Croatia, Montenegro and Slovenia exports of goods and services in GDP had increased for approximately 1.7 times, two countries Bosnia and Herzegovina and Kosovo experienced increase of 2.24 times and the exports of goods and services in remaining two North Macedonia and Serbia increased approximately 2.7 times.

### 3.4. Foreign direct investments

Foreign direct investments stimulate developmental potentials and reduce gaps between developed countries and countries in development. To attract foreign direct investments inflow, country has to have a relevant legal and economic basis, i.e., attractive and efficient conditions for foreign direct investments. Site-specific advantages such as e.g., government policies, marketing factors, costs of production, etc. and internationalization advantages are the main preconditions for foreign direct investments (Dunning, 1993). The most important factor for foreign direct investments is the access to new markets (Foley, 1996). As shown in Figure 5, the highest average of foreign direct investments from 2003 until 2022 amounting 14.8 % of GDP had Montenegro, with the highest foreign direct investments individual score of 37.2 % of GDP in 2009, which can be attributed to infrastructural investments. The next year 2010, foreign direct investments in Montenegro decreased in half and amounted 18.3 % of GDP, which was still the highest percentage among surveyed countries. At the lowest bottom with the average of 2.1 % of foreign direct investments in GDP was Slovenia which could be explained by the reluctance of foreign investors to act due to mistrust by policy-makers and adopted measures which hindered foreign investors to invest in Slovenia (Rojec and Kovač, 1999). Bosnia and Herzegovina and Croatia had the similar average foreign direct investments at the level of 3.7 and 3.9 % respectively, while North Macedonia, Kosovo, Serbia and Albania had 4.1, 5.9, 6.6 and 7.3 % respectively.



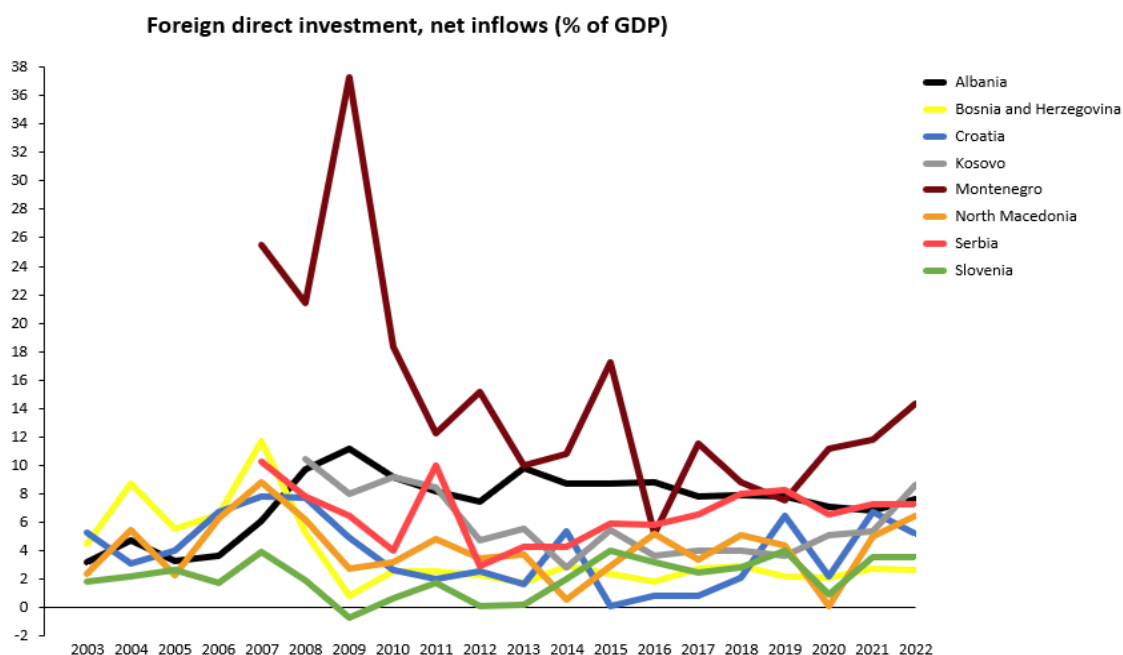


Figure 5: Foreign direct investment of selected Southeast European countries  
(Source: Authors' research and analysis according to World Bank, 2023)

Reluctance of foreign investors to invest in Western Balkan countries could be explained by still unstable political and economic situation as well as unfavourable investment conditions.

### 3.5. Inflation, consumer prices

When analysing data regarding inflation rates (Figure 6), we found that Bosnia and Herzegovina, Kosovo, Croatia, North Macedonia, Slovenia and Albania had the lowest average rates of inflation from 2003 until 2022 ranging from 2.1 to 2.3 %. Montenegro had slightly higher average rate of inflation of 3 % and the highest had Serbia 6.8 %.

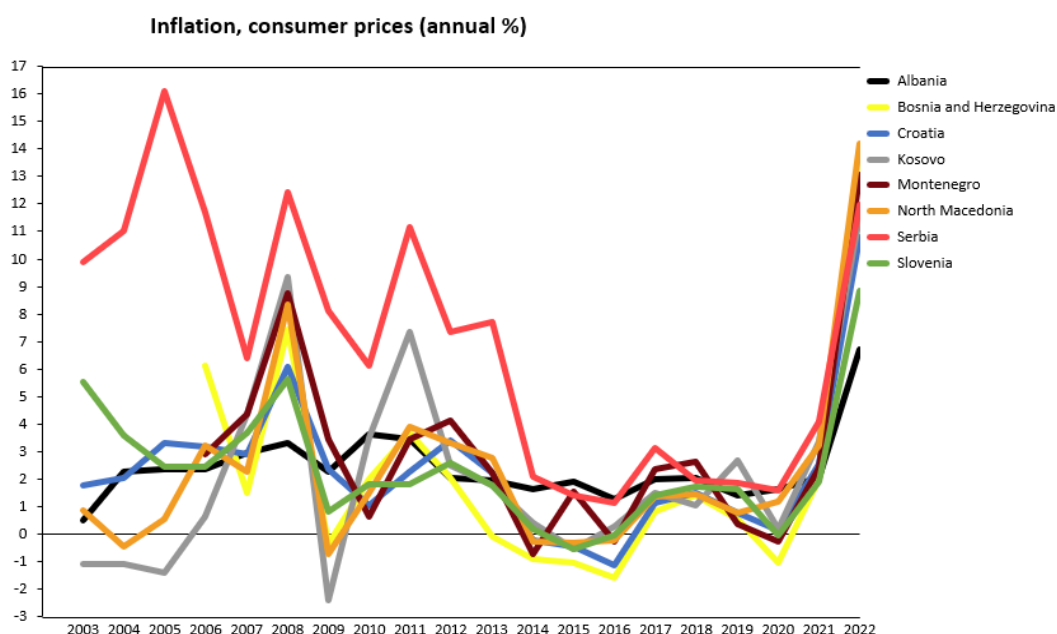


Figure 6. Inflation, consumer prices of selected Southeast European countries  
(Source: Authors' research and analysis according to World Bank, 2023)



Due to global recession, there was an increase of the inflation rates in 2008 and 2022 in all the examined countries.

#### 4. ANALYSIS OF ECONOMIC INDICATORS

This section presents the descriptive statistics, the Pearson correlation and OLS model including the coefficient of determination R and the p-value of the variables of the mode. Analysis of the World Bank (2023) data was performed by the Microsoft Excel program. Results of this study show that the correlation between the selected economic indicators in various Southeast European countries is various. Such results are not unexpected, while the countries in many ways differ in the pace of political and economic changes. According to the findings, there is a positive correlation between GDP per capita, exports of goods and services and foreign direct investments in Albania. Inflation in surveyed countries is positively correlated with all of the observed indicators, except with export of goods and services in Slovenia and Serbia.

	GDP p.c.	GDP growth	EXP g.s.	FDI n.i.	INF c.p.	p-value (95%)
GDP per capita (current US\$)	1					0,112
GDP growth (annual %)	-0,168	1				0,346
Exports of goods and services (% of GDP)	0,792	0,043	1			0,002
Foreign direct investment, net inflows (% of GDP)	0,526	-0,332	0,421	1		0,330
Inflation, consumer prices (annual %)	0,419	0,226	0,521	0,165	1	0,708

*Table 5: Pearson correlation of economic indicators for Albania  
(Source: Authors' research and analysis according to World Bank, 2023)*

Contrary to Slovenia, whose foreign direct investments are related to GDP growth (0,796), Albanian foreign direct investments are in negative correlation with it. Unlike in Albania, foreign direct investments in Croatia are negatively correlated with exports of goods and services. Exports of goods and services in Bosnia and Hercegovina is in positive correlation with GDP per capita, and foreign direct investments are positively correlated with GDP growth, but negatively with GDP per capita and exports of goods and services.

	GDP p.c.	GDP growth	EXP g.s.	FDI n.i.	INF c.p.	p-value (95%)
GDP per capita (current US\$)	1					0,872
GDP growth (annual %)	0,081	1				0,383
Exports of goods and services (% of GDP)	0,856	0,254	1			0,001
Foreign direct investment, net inflows (% of GDP)	-0,425	0,520	-0,386	1		0,815
Inflation, consumer prices (annual %)	0,266	0,344	0,168	0,220	1	0,204

*Table 6: Pearson correlation of economic indicators for Bosnia and Hercegovina  
(Source: Authors' research and analysis according to World Bank, 2023)*

Similar to Slovenia and Croatia, exports of goods and services in Bosnia and Hercegovina is positively related to GDP per capita, and foreign direct investments are positively correlated with GDP growth. That correlation is slightly lower in Croatia than in those two countries. Exports of goods and services is positively correlated with GDP per capita and GDP growth in Croatia. There is a low correlation between foreign direct investments and GDP per capita and GDP growth.

	GDP p.c.	GDP growth	EXP g.s.	FDI n.i.	INF c.p.	p-value (95%)
GDP per capita (current US\$)	1					0,777
GDP growth (annual %)	0,042	1				0,026
Exports of goods and services (% of GDP)	0,587	0,439	1			0,001
Foreign direct investment, net inflows (% of GDP)	0,217	0,347	-0,102	1		0,082
Inflation, consumer prices (annual %)	0,426	0,258	0,226	0,447	1	0,293

*Table 7: Pearson correlation of economic indicators for Croatia*  
(Source: Authors' research and analysis according to World Bank, 2023)

There is a higher correlation between foreign direct investments and GDP growth in Slovenia than it is in Croatia as well as between exports of goods and services and GDP per capita and foreign direct investments. Contrary to Slovenia, inflation in Croatia is in higher correlation to GDP per capita. Positive relation between exports of goods and services with GDP per capita, and inflation with GDP per capita, exports of goods and services and foreign direct investments is visible in Kosovo.

	GDP p.c.	GDP growth	EXP g.s.	FDI n.i.	INF c.p.	p-value (95%)
GDP per capita (current US\$)	1					0,687
GDP growth (annual %)	0,054	1				0,145
Exports of goods and services (% of GDP)	0,886	0,272	1			0,001
Foreign direct investment, net inflows (% of GDP)	-0,208	0,128	0,017	1		0,614
Inflation, consumer prices (annual %)	0,506	0,138	0,725	0,499	1	0,403

*Table 8: Pearson correlation of economic indicators for Kosovo*  
(Source: Authors' research and analysis according to World Bank, 2023)

In comparison to Slovenia and Croatia, foreign direct investments are negatively related to GDP per capita in Kosovo and their correlation with GDP growth is lower than in Croatia and Slovenia. On the other hand, correlation of exports of goods and services in Kosovo with GDP per capita is higher than in Croatia and Slovenia.

	GDP p.c.	GDP growth	EXP g.s.	FDI n.i.	INF c.p.	p-value (95%)
GDP per capita (current US\$)	1					0,020
GDP growth (annual %)	0,326	1				0,606
Exports of goods and services (% of GDP)	0,403	0,737	1			0,700
Foreign direct investment, net inflows (% of GDP)	-0,449	-0,157	-0,206	1		0,040
Inflation, consumer prices (annual %)	0,317	0,308	0,558	0,316	1	0,116

*Table 9: Pearson correlation of economic indicators for Montenegro*  
(Source: Authors' research and analysis according to World Bank, 2023)

Positive relation between exports of goods and services and GDP per capita is also visible in Montenegro. Foreign direct investments in Montenegro are negatively related to GDP per capita, GDP growth and exports of goods and services, in contrast to Slovenia where foreign direct investments are positively related to all three economic indicators mentioned.

Similar to Montenegro, foreign direct investments in Croatia are negatively correlated to exports of goods and services. Foreign direct investments in North Macedonia have a positive correlation with the GDP growth, and exports of goods and services are highly correlated with the GDP per capita. Although not significant, there is a negative correlation between GDP growth and foreign direct investments with GDP per capita, as well as exports of goods and services with the GDP growth.

	GDP p.c.	GDP growth	EXP g.s.	FDI n.i.	INF c.p.	p-value (95%)
GDP per capita (current US\$)	1					0,161
GDP growth (annual %)	-0,253	1				0,733
Exports of goods and services (% of GDP)	0,910	-0,145	1			0,000
Foreign direct investment, net inflows (% of GDP)	-0,025	0,616	0,142	1		0,469
Inflation, consumer prices (annual %)	0,344	0,081	0,472	0,459	1	0,714

*Table 10: Pearson correlation of economic indicators for North Macedonia  
(Source: Authors' research and analysis according to World Bank, 2023)*

Both in Slovenia and Croatia as well as in North Macedonia, exports of goods and services are in positive correlation with GDP per capita, but differently from Slovenia and Croatia, negatively related to GDP growth in North Macedonia. GDP growth, exports of goods and services, foreign direct investments and inflation in Serbia are positively related to GDP per capita and foreign direct investments with GDP growth. There is a low negative correlation between foreign direct investments and inflation with exports of goods and services.

	GDP p.c.	GDP growth	EXP g.s.	FDI n.i.	INF c.p.	p-value (95%)
GDP per capita (current US\$)	1					0,169
GDP growth (annual %)	0,324	1				0,794
Exports of goods and services (% of GDP)	0,639	0,190	1			0,001
Foreign direct investment, net inflows (% of GDP)	0,273	0,564	-0,015	1		0,460
Inflation, consumer prices (annual %)	0,214	0,046	-0,383	0,191	1	0,022

*Table 11: Pearson correlation of economic indicators for Serbia  
(Source: Authors' research and analysis according to World Bank, 2023)*

When compared to Slovenia and Croatia, selected economic indicators in Serbia are to an extent also positively related to GDP per capita and GDP growth. There is a similarity between Serbia and Croatia in slight negative correlation of foreign direct investments with exports of goods and services and inflation and export of goods and services between Serbia and Slovenia. As already mentioned, Slovenian exports of goods and services are moderately positively correlated to GDP per capita as well as foreign direct investments with GDP growth and exports of goods and services. There is also a positive correlation between all of the selected economic indicators and GDP growth.

*Table following on the next page*

	GDP p.c.	GDP growth	EXP g.s.	FDI n.i.	INF c.p.	p-value (95%)
GDP per capita (current US\$)	1					0,604
GDP growth (annual %)	0,009	1				0,709
Exports of goods and services (% of GDP)	0,713	0,237	1			0,000
Foreign direct investment, net inflows (% of GDP)	0,116	0,796	0,446	1		0,501
Inflation, consumer prices (annual %)	0,077	0,355	-0,110	0,135	1	0,205

*Table 12: Pearson correlation of economic indicators for Slovenia  
(Source: Authors' research and analysis according to World Bank, 2023)*

Based on the results of the statistical analysis, it is visible that exports of goods and services are positively correlated with the GDP per capita in all Southeast European countries and foreign direct investments are positively related to GDP growth in all countries except in Albania and Montenegro where there is a weak negative correlation. The only significant correlation is also the one between the exports of goods and services and the GDP per capita, except in Montenegro where none of the correlations are at the significant level. In general, we can claim that the surveyed Western Balkan countries progressed, as their macroeconomic indicators are to a degree comparable with Croatia and Slovenia. The main question is, is this progress sufficient for their integration in the EU. Even though there is a clear significance of exports of goods and services for the economic development of the Western Balkan countries, successful international trade alone, without democratically developed institutions and overall macroeconomic stability, does not contribute to the economic growth. Primary limitation of the analysis was unavailability of data for Kosovo from 2003 until 2007 because Kosovo declared its independence from Serbia in 2008. It would be interesting to include additional indicators in future research such as research and development expenditure (% GDP) and the UN Human development index (HDI).

## 5. CONCLUSION

The very fact that some countries of the Western Balkans have been in the status of candidates for EU accession for two decades indicates that there is a serious problem in their European integration, and the main idea of this paper was to try to find out is it really the case. Democratic and economic indicators obtained from independent institutions unequivocally indicate that no Western Balkan country is simply ready for EU accession, nor is such a thing possible in the near future. Underdeveloped democratic institutions, as well as economic backwardness, are obvious evidence that the Western Balkans will be the source of instability in this part of Europe for years to come. The analysis of the collected data on the examples of successful members Slovenia and Croatia also pointed to the fact that democratic consolidation and economic development are closely related and that it is very difficult to progress in one segment and ignore the other. Therefore, as the missing unknown factor to solve this political-economic equation is a strong external influence, based on which most of the war conflicts in the area of former Yugoslavia were stopped. Through military-diplomatic activity, the USA ended the wars on the Balkan Peninsula, and now the EU "only" has to stabilize and integrate the remaining part of that part of Europe. All other foreign actors, such as the Russian Federation, China or Türkiye, are simply not in the interest of stabilizing the Western Balkans, because this proves unequivocally that the EU is a successful liberal-democratic project, which (due to its desire for expansion) will one day reach their borders and threaten their autocratic ruling structures. However, the aforementioned scientists warn us that due to internal problems in the impossibility of consolidating its own foreign policy, the EU actually was preserving the non-democratic regimes of the Western Balkans in exchange for stability and the prevention of the

outbreak of war conflicts as the only red line that should never be crossed. The political and economic rewarding of non-democratic authorities resulted in legal and tax uncertainty, the spread of corruption and organized crime, and the consequent weak inflow of foreign investments. Such an approach is increasingly proving to be a failure because the Russian military aggression against Ukraine collapsed the global security architecture (outside the NATO umbrella). That was sign after which the corrupt autocrats from the Serbia began to spread their nationalist and populist ideas to the neighbouring Western Balkan countries. The re-emergence of fears of the renewal of regional conflicts and attempts at border corrections clearly proves how misguided the EU policy was. As a possible solution to this problem, the entry into the EU of Western Balkan states as soon as possible is suggested, but in the form of conditional membership with strong monitoring, so that these states get access to European cohesion funds and, with increased economic growth, begin to strengthen their own democracies. However, an insurmountable problem in the realization of this idea is consensual decision-making within the EU on the most important (especially foreign policy) issues. But at the same time, the degradation of the democratic status in EU member states Hungary, Poland and recently Slovakia, raises doubts about the possibility of independent strengthening of the democratic institutions of the Western Balkan countries in case of their early accession to the EU. Although biggest part of the responsibility is in the countries of the Western Balkans, conclusion of this paper is that the solution to the problems of the Western Balkans is within the EU. Without a strong internal reform and a change of the approach towards the acceding states the EU will not be able to solve the problem of Western Balkans.

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## APPLICATIONS OF THE BALANCED SCORECARD CONCEPT IN RELATION TO SOCIAL DEVELOPMENT

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### **ABSTRACT**

*The aim of this study is to gather sufficient evidence and arguments in order to prove to society that during the process of change in thinking and especially of effective practical implementation of management models such as the Balanced Scorecard model, high levels of efficiency can be achieved on all hierarchical levels in systems key for the society and the state.*

**Keywords:** *Balanced scorecard, Application, Social Development, Organisation*

### **1. INTRODUCTION**

One of the features of recent decades is the rapid development of concepts, models and technologies for corporate governance. Particular attention is paid to strategic management. The analysis of the activity of large and medium-size economic units operating without strategic management is a very risky venture. Research in this area has evoked the emergence of new paradigms, concepts and tools. Undoubtedly, assessment is a valuable management practice. One of the roles of measurement, especially in the form of balanced schemes, is to facilitate the verification of the course of action on events in the organization. The starting point of the balance methods is the understanding that reliance on the financial indicators in the assessment of the achievement of the set goals in the organizations is incorrect. Adapting balance-to-performance analysis to new conditions, apart from paying attention to traditional measures, complements them with new indicators of expected status and development in the future. The basis for this type of analysis is the validation of the Balanced Scorecard (BSC) presented in the early 1990s (Kaplan, Norton 1992). The Balanced Scorecard (BSC) is a practical tool to help organizations implement their business strategy. Strategic objectives, criteria and action plans are formulated for each perspective. The continuous process of development of the balanced scorecard is focused on the reconciliation of those perspectives. The card directs the organization's efforts on the critical analysis of the future and its association with the content of the ideal. The process of introducing BSC into the practice of each organization predisposes establishment and regulation by certain cycles and principles (Kaplan, Norton, 1993). Through the language of goals and incentives, a connection is created between all hierarchical levels of effective communication. BSC is distinguished by a logically bound and easy to understand architectonics for the essential expression of the adopted strategy. The emphasis in the overall analysis of the BSC model is on the logic of combining different criteria. It also has a retrospective character, because it illustrates the history of the organizational strategy.

### **2. APPLICATIONS OF THE BALANCED SCORECARD CONCEPT IN RELATION TO SOCIAL DEVELOPMENT**

The successful social development is a result of an effective governance and control. This requires all operating organizations to continuously improve their measurement systems. The main message to those responsible for the development, improvement and implementation of these systems from the outset of the process is the identification of the role of the performance

measurement system for the activity itself. The creators of these performance measurement systems and measurement methods are actually looking for sophisticated ways to reconcile work-based behavior in the particular organization with its overall strategic goals. In this context, the measurement allows managers to determine whether the planned events are being implemented in practice, whether the activity is improving and, if so, whether the organizational activity is secure for a long period of time (Terziev, Georgiev, 2017; Terziev, 2018a; 2018b; 2018c). Nowadays, managers from all sectors of the social system on a global scale face the dual challenge of how to mobilize their human capital and information resources and how to transform their organizations towards new strategies in line with the high requirements of their informed and demanding users and customers. Institutions and organizations generally respond to this challenge by formulating new strategies and redirecting, through declaring new inspirational missions and concepts, to delivering increased value to their clients and partners. But the major problem they all face is their inability to successfully implement their new strategies due to management difficulties and the resulting control over the measurement process and strategic development based primarily on intangible assets. The data obtained from the system for measuring the indicators enables the organization's strategy and the principles of its practical activity to be adjusted, as well as the feasibility of the measurement model. However, looking at just one indicator can not give an accurate idea of the status of any system, whether it be a business or a non-profit structure. The need for a balanced set of measures is becoming increasingly important, both in terms of efficiency and strategy. The advantage of this approach is that when using a combination of several key metrics, results are less likely to be affected by manipulation of the information reports. Each factor attempts to give a relevant indicator of the performance of the company or its condition and can be used independently as an indicator of financial viability or as part of a certain perspective. The BSC is a rational summary of accumulations in the field of measuring performance indicators, which is done in an appropriate form and demonstrates in practice how it can achieve a real value as a result of management on the basis of intangible assets by combining them with the organizational strategy. The introduction of a new content of the measurement methodology with the use of its three roles - for compliance with standards, for verification and refinement – differs significantly and it is much wider than the traditional concept of measurement as a tool for strategic management and relevant control. It is not based on the understanding that behavior can be controlled by measurement. It is based on the view that BSC is an instrument that is used to improve the course of institutional development and that it is precisely this move that has other features to be measured and managed in a new and different way. On this basis, the sophisticated measurement methodology goes beyond the standard of confirmation of compliance and is established as a methodology for measuring strategic stability, which more fully responds to public interests. It is also interesting to devote little attention to the application of the concept of BSC and its application on a larger scale. Specifically, there are significant and large-scale plans involved with the future of society or the state, and with cases involving social programs, the realization of which is linked to a system of design decisions. One of the central problem areas provoking an expansion in the quest for management theory and practice at the beginning of the 21st century is related to the implementation of effective strategies, not only aimed at specific organizational structures, but also implying a balanced socio-economic development. Despite the versatility of efforts and the record of significant results, the theoretical summaries have not reached the necessary integrity and a high degree of completeness. The main achievements are mainly in the heuristic plane of scientific knowledge and it can reasonably be said that they do not have a sufficiently systematic and complete character. A publicly significant and persuasive example of multiple recurrences of this deficit is the general development of the society itself, viewed as a state and its systems, and more specifically in the behavior of actively participating in its functioning.



Authorities in scientific thought argue that at this stage the key issues that provoke serious demand but also immediate solutions are several: poor and low-performing markets, inadequate corrections by the political system and deepening of the principle of injustice; the lack of synergies in the work and the interaction between the political and the economic system. The presence of these tendencies proves that the problems of the society predominantly stem from the markets, which are interpreted as the main social motive for development and improvement. The claim of their inherent resilience is disproved by the global financial crisis, which transforms them into extremely unstable and generating devastating consequences. Critical analysis of the emerging situation shows a threateningly decreasing market efficiency based on poor satisfaction of ever more specifically stated, socially significant needs, ignoring investment interests and total depreciation or deletion of huge resources present in the form of human capital, technics and technology. This situation is largely due to the fact that the efforts of the scientific community in the last thirteen years of the last century were focused mainly on the development and modeling of strategies and not on the process of their realization and improvement. As a result, significant scientific and applied results have been recorded as a great model, such as a plan, a doctrine and a strategic position. In the early 1990s, however, the issue of strategy implementation came to the fore. It was aware that even good strategies require special scientifically grounded mechanisms for their realization. At the same time, it became increasingly obvious that the rapid, unexpected and radical changes in the dynamic environment did not allow the moment of action to wait until the development of a comprehensive strategy and the processes of development and implementation had to be considered as running in parallel. This is reflected in the emergence and establishment of the concept for the evolving strategy. The practical development of this problematic area of social management has put economic science, in particular, in the face of social sciences, the need to develop the theoretical and practical aspects of effective publicly relevant governance and relevant control within a short period of time. It has been concluded that the existing principles in this respect do not sufficiently serve the needs of the objective reality and the practices in it. As a result of their closer ties to practice, leading analysts and consultants were more aware of the problem and were moving their efforts in this direction. Due to their specificity, the searches conducted are mainly instrumental, resulting in a number of new tools such as a balanced scorecard model aimed at optimizing operations and structuring strategies and exercising a real control over them. However, it should be noted here that when the focus of attention is placed on the state as an organization for most of the strategies and doctrines it is difficult to claim that they are associated with an organized and systematic control. On the basis of the presented trends evolving in the objective reality and the improvement of the sciences for the society, and in particular in the social management on the theoretical and conceptual basis, changes are also registered in the model of the behavior of the state, interpreted and perceived as a supreme, socially structured institution. In fact, the leading management concepts of recent years have provoked changes in ongoing and state-coordinated social development processes and rethinking the process of shaping targeted social strategies (programs) considered as a regulated and controlled program. Cardinal changes are reflected in the following aspects:

- Social development, driven by in-depth social programming, becomes a process consolidating the potential of targeted social doctrines and public interests;
- The state has transformed its behavioral model and has been reforming its structure accordingly, thereby making it a strategically focused, self-perpetuating, functionally-based organization;
- Social programs from a tool for legitimate measurement of socio-political applications are transformed into a modern canonized method of legalizing modern, socially significant strategies, as well as an established opportunity to interpret and prove chains of hypotheses

and assumptions constructing successful strategic doctrines and simultaneously as a specific tool for an effective management control at the highest level in the social hierarchy.

The emerging situation raises the need to scientifically justify the practice of effective management of social programming and the creation or adaptation of models for adequate control, compliant with two aspects: Firstly, on the concept of social development and programming and its associated process as a public mechanism combining meaningful strategies with key state and public interests and guaranteeing the sovereignty of their integrity and unity as well as the balance between their individual programs and policies. Secondly, related to the process of control as a continuous and timely process-level feedback to ensure the unity between the process of social programming itself, considered as a state doctrine and the specific program level of governance. However, ensuring that this unity is addressed not only as a result of the implementation of social programming but also as a factor for its development and updating in line with changing social environment conditions. An adequate proposal, which as a concept would make it possible to manage effectively and to control objectively, is the strategic map. The analysis shows that, both as a model and as a feasibility and as a visual and potential, the model of the BSC has a real opportunity to find the balance between the needs of social governance and the stated expectations of society. Seen and purely formal, the classic perspectives of the model created by Kaplan and Norton create opportunities to complement them with key perspectives of socio-economic development. In addition to what has been said about the implementation of the BSC model in improving the management and control of the public sphere, it is also worth noting the role of the BSC in the project work. Building on the understanding that active social programs are systems of social projects and events with a direct relation and feedbacks of social interaction, which determines the opportunities of adaptation of their components to the new conditions and expectations, it can be said that they are social phenomena that occur in the form of a process and possess strategy features. In this context, it can be concluded that they evolve and change in a specific way the concept of self-perpetuating organization on the one hand, and on the other, perceiving the corrected real-life realities. But here is another very important thing, namely that in the present almost all the socially important ideas find their material realization in the form of results of a project. Generally, the BSC is recognized to have very large application capabilities, addressing both management and control of various organizational structures and their parts, operations, and processes. As an application in the project activity, the model is aimed at evaluating the overall lifecycle of individual projects as well as the portfolio of projects, i.e. the project portfolio for organizations and a program of projects when it comes to the state (Terziev, 2018d; 2018e; 2018f; 2018g; 2018h; 2018i; 2018j). Good practices provide information that, for project-oriented functionality, the BSC can contain four perspectives - financial, customer, inner processes, innovation and development. Regarding this, the evaluation of the portfolio (program) of projects in the project-oriented organization, regardless of the scale, is proving to reproduce the following effects:

- The project portfolio adds value to the organization's results or to the importance of the social program;
- The portfolio (program) generates benefits to the organization or the state;
- Portfolio implies the improvement of a number of organizational activities, social policies and related practices;
- Models are developed as a benchmark of best practices for managing a portfolio of projects.
- The goals of the BSC used in the evaluation of the project portfolio are as follows:
- providing a situation where indicators represent key values and practices of the project-oriented organization;

- developing robust business measures to assess the success of projects throughout their life cycle.

From the written about the application of the BSC in the project practice it can be said in general that they are intended for:

- Creating an assessment of the extent to which individual projects are consistent with the strategic vision of the project-oriented organization;
- An estimate of the level of utility of the individual projects in the portfolio shall be made;
- Making a full evaluation of the projects in terms of their contribution as part of the overall results;
- Evaluating the quality and competence in managing the individual projects and the organizational portfolio and identifying the alternatives for its improvement.

The above discussion provokes the following implications (2019a; 2019b; 2019c; 2019d; 2019e; 2019f; 2019g; 2019h; 2019i; 2019j; 2019k):

- The main role of the BSC as a tool for strategic management and control is related to their essence of an operationalized and synthesized expression of the strategy, which provides prerequisites good enough for metering its realization. The model of the BSC, which envisages the localization of the key success factors and the resulting controllable parameters, their target values and the initiatives for their implementation, is considered as a basis for regulating and controlling the realization of the strategy. As far as this model is seen as a function of a strategy already in place, the BSC is fully fed into the strategy's views as a model, a plan and as a tool for implementing the strategy. In principle, this role of the BSC serves the manifestation of the control as a feedback at a strategic level.
- BSCs as a tool for strategic control fully fit into the existing views of the elements of the control function. The main novelty they introduce, as mentioned, is related to the applied theoretical and practical approaches for operationalization of the system norm in a strategic aspect, i.e. with respect to the first element of the control function. In this respect, it should be stressed the leading role of this element in the manifestation of control in different fields and at different organizational levels. Until the appearance of BSCs, this element of the control function is either fragmentarily or absent in the theoretical developments about the structure of the control function.
- The technology of developing BSC at the same time creates sufficient prerequisites for their active role as a tool for effective management and control over the very process of formulating the strategy. This role can be significant even in terms of the concepts of strategy being implemented as a model or as a plan. This is because in the process of operationalizing the strategy and determining the key controllable parameters included in the BSC it is necessary to prove the causal relationship between them and the impact of the changes in their meanings on the organization's target results. Practice shows that in most cases this leads to rethinking, redefining and refining the strategy itself. In this sense, the development of the BSC sends back control signals to the strategy itself, i.e. plays the role of a positive feedback in the process of its improvement even before its implementation.
- As a synthesis of the strategy, the BSC is no analogue among the well-known strategic tools for the clear, concrete and accessible presentation of strategic intentions among wide circles of organizational staff at all organizational levels. In this context, the BSC can be seen as an instrument for implementing the concept of the learning organization. From this point of view, the process of developing the BSC down the hierarchical structure of the organization can be seen as a process of controlling the perceptions of different categories of staff about success factors and ways to master them. In other words, as a tool for strategic management and control, the BSC creates preconditions not only for the analysis and control of behavior

but also for its deep conditioning in the face of the intellectual models of success. Again, this is a feedback role that makes it easy for senior management to understand the strategy and the ways for its implementation at the different levels of the organization, and initiates measures to manage the perception of problems and regulate all this understanding (Terziev, 2019l; 2019m; 2019n; 2019o; 2019p; 2019q).

The use of the BSC as a tool for organizational communication in accordance with the concept of the learning organization creates favorable prerequisites for the manifestation of the control over the implementation of the strategy as a positive feedback. As a clear, concrete, and accessible expression of the strategy, the BSC not only conveys the strategic intentions from the top down the organization hierarchy, but also pulls up the initiatives to change the strategy from bottom to top. In this sense, the BSC plays the role of a tool that is predominant to control the adequacy of the strategy in the process of its realization. From this point of view, it is necessary to conclude that, as a strategic control tool, the BSC is capable of equally well serving both the application of strategy concepts as a plan, and the application of the concept of strategy as emerging or developing. This makes the card a universal tool for management and control, which is organically integrated into the implementation of contemporary views on strategic management, regardless of their specificities and differences (Terziev, 2019r; 2019s; 2019t; 2019u; 2019v; 2019w).

### 3. CONCLUSION

In conclusion, the conceptual and model development of the BSC confirms that the intangible capital of the organization is more important and essential than the physical capital. It is a basis for development of all organizations in the narrower sense, and for the whole society at a wider level, regardless of the level and the direction of its change. The introduction of a balanced method of managing and controlling the strategic process allows to analyze the results achieved and to use the most favorable opportunities for realization and prosperity in the dynamic conditions. On the other hand, the process of developing BSC proposals creates essential prerequisites for their improvement. A broad discussion aims to achieve consensus on the final parameters of the indicators in the BSC and to realize a backward impact, including on the individual intellectual models. Based on this, BSC can be validated and perceived with conviction as a guide to action, as a challenge for analysis, as an alternative to improvement and as a method, primarily for effective management under difficult conditions and a mandatory control (Terziev, Bogdanova, 2019x; 2019y, 2019z; Terziev, 2022a; 2022b).

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## EVOLUTION OF THE CONCEPT OF THE BALANCED SCORECARD

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### ABSTRACT

*This study focuses on the Balanced Scorecard (BSC) which is a performance measurement model that helps organizations achieve their strategic goals. Developing and improving the Balanced Scorecard model is a continuous process that aims to incorporate and link together the four main perspectives. The model helps the organization using it to concentrate on the critical evaluation of its future and achieve better performance on all levels.*

**Keywords:** *Balanced scorecard, Evolution, Management, Organisation.*

### 1. INTRODUCTION

The idea of looking at business from the viewpoint of a “card” is of considerable interest since the introduction of the model in 1992. The reason is that more and more managers find a need for more than mass-applied short-term reports, referring to the development of capabilities needed to the organization which will also be successful in the future, although these changes may deprive them of profits in the current year and lead to increased spending. This is the fundamental reason why companies need the balanced scorecard. This need is even more obvious for nonprofit organizations, such as government agencies and non-governmental organizations, and it outlines other legitimate reasons why a balanced system is successful in the world of business and consulting services (Terziev, Georgiev, 2017; Terziev, 2022a; 2022b):

- This is a timely idea. Outdated traditional measurement systems, as well as everincreasing efforts to exist in ever-complicated conditions, provide great opportunities for the BSC;
- BSC is extremely well-formulated and presented very extensively in a number of scientific journals and by leading consultants on scientific forums;

BSC looks simple but has a broad spectrum of nature. The advantage of this is that, at first glance, sufficient transparency and comprehensibility are found. Yet, in a more in-depth study of the concept itself, it becomes clear that the so-called “simplicity” is only apparent. Prerequisites for validating the management model of a balanced scorecard can be addressed in several ways:

- The low efficiency and the one-sided direction of management control towards finance, and hence the deformation of the database when creating a strategy;
- The need to put into practice a wide-ranging model, measuring effectiveness, analyzing relations and registering trends and directions of strategic development;
- The reconciliation of financial and non-financial measures of activity - their role in the implementation of effective management and control at all levels.

Since 1992 until now, the interest in the balanced system of indicators has been steadily increasing. The concept provokes the improvement of many managers. In the BSC, performance criteria are combined with criteria that describe spent resources or activities, and this combination is an incentive, a peculiar driver of work.

Wellconstructed maps combine several perspectives and elements that are difficult to distinguish. They are tied to a system of goals and means. In this line of thought, it can be argued that the maps largely illustrate the business's ability to rely on assumptions about relationships between the individual coefficients and that these assumptions should be used to accomplish a particular task. Contemporary requirements of business and social environment call for dynamic organizations with a high degree of autonomy for workers. Traditional financial control is not appropriate for this environment. Not only is the information it provides often obsolete and inaccurate to use as a basis for customer or product solutions. In addition, autonomous employees need goals and initiatives other than usual, based on profit and return on investment, and are modeled on revenue accounting financial reporting. Other landmarks are needed to indicate a way that is compatible with the full foresight or the concept of the business. The whole organization must embrace the unity of strategy and business rules that are based on a consensus among the necessary priorities. For these reasons, the BSC as a system has its place and role. The concept is an assistant in the process of reaching a common view of the business environment in the company. It enriches the management and control toolkit and strengthens them in a strategic direction, rethinking their effectiveness and provoking their improvement in functional terms (Terziev, Bogdanova, 2019a; 2019b; 2019c). The term “BSC” includes not only the specific structure for the “card” itself but also the process of its use. Thus, the concept of the BSC is a component of a welldeveloped management and control system focused on a strategic perspective and critical response to traditional management and control. Here one can see the connection between Kaplan and Norton's original assumptions of controlling the BSC with similar assumptions and the idea of the company's intellectual capital. In the presence of BSC, financial responsibility and management have been replaced by the richer picture of reality. Not that the monetary criteria have become less important, but also in this connection it is necessary to form a balance in the transition from financial to strategic management of the activity of the organizational activity.

## **2. EVOLUTION OF THE CONCEPT OF THE BALANCED SCORECARD**

There is a growing criticism of traditional management and control as only justified on financial criteria. The reason for this is that conditions today differ from the conditions at the time when the understanding of the meaning of traditional management and control was established. The strategy that underpins the processes that meet the customer's needs is incompatible with short-term thinking, the result of focusing solely on the financial criteria. Critical views on classical control are being formed as it generates certain management deficits because (Goldenberg, Hoffecker, 1994; Johnson, Kaplan, 1987; Eccles, Pyburn, 1992; Friedag, Schmidt, 1999; Stoyanov, Tranev, 2016a; Stoyanov, 2016b; Porter, 1996):

- Provides misleading information in making decisions. The basis for decisionmaking in a company is generated by information on costs, revenue and profitability. Traditional financial criteria show the results of past activities. Such information may result in an action incompatible with the strategic objectives;
- Does not take into account the requirements of today's organization and strategy. Focus on monetary criteria forces companies to ignore less tangible nonfinancial criteria such as product quality, customer satisfaction, delivery times, flexibility, time to develop a new product and a higher level of workers' know-how. Criteria used record false signals about enterprise performance and profitability;
- Encourages short-term thinking and sub-optimization. Financial control does not imply long-term thinking. It can lead to cutbacks in research and development, return to obsolete training methods, weak motivation and initiative programs, and delays in investment plans. So the main problem is “sub-optimization” over time, and the challenge is to strike a balance between short and long-term work;

- Management based on financial criteria diminishes the role of control. The structure of management and control systems is determined by the need for financial accounting on external information. The company's shareholders are constantly asking for information about the business's performance so they can be compared with alternative investment opportunities. Only financial criteria do not provide reliable and accurate information about business development;
- Generates misleading information on cost allocation and investment control. The traditional basis for cost allocation - distribution of indirect costs based on direct costs - is obsolete. The relationship between direct and indirect costs has changed as a result of increased research and development costs, joint work rationalization of production, and so on. Mixed product subsidies make it difficult to assess the actual returns of each product. In addition, it is often not possible to assess the long-term development costs of a product. Costs should be allocated in a way different from the traditional method of standard additives;
- Delivers abstract information to the employees. Another shortcoming of the financial criteria is that they do not mean anything to a large part of the organization, consisting of employees who do not find a link between their work and the figures in the different types of reports. The systems are too complicated and thus become an obstacle to the front line flexibility;
- The role of the business environment is ignored. Traditional systems built on financial criteria ignore the prospect of a client and a competitor and thus fail to warn us of the changes in the subject of the company's activities and in industry: the financial key ratios of most control-management systems are directed more inward than outward. The criteria are used for comparisons with past periods based on internally generated standards. It is so much harder to compare the company with its competitors, though that information is as important as the company's performance to achieve its goals;
- Opportunities of misleading information. Today's leaders are inclined to use information from monthly and quarterly reports - a factor that tilts the balance in favor of short-term investment decisions. In addition, this short-term perspective allows the manipulation of financial criteria so that financial key ratios may be misleading and unreliable for analytical and decision-making purposes. It is precisely the dynamics of the balance between attitude and state that sets the agenda for solving the dilemma: a document or a process is the BSC model. When talking about the BSC it is considered that success should reflect the balance between several important elements of work, the reasonable balance between attitude and the state of developed and developing components. It is equally important that the BSC is shaped as a document of achieved and expected results. It is then an alternative way of visualizing the business plan.

In the early models, the BSC is considered as a value measurement method. In these cases, it is very difficult to look for serious reasons for the process to be linked to strategy management and control. At this early stage, the development of BSC is tied to concrete initiatives and events, planned and budgetary provision. There is mutual influence between the shape of the BSC and the entire planning process, in particular the budgeting process. It implies a balance between short and long-term planning and an opportunity to set the necessary strategic direction for the efforts of each member of the organization. The BSC often creates occasions for discussions that might not have taken place without it, but are important because of its use. Thus, a document is formally a BSC, but it also contains much more (Terziev, 2019d; 2019e; 2019f; 2019g; 2019h; 2019i). The idea goes far beyond just creating an evaluation system. Although there are many views on the BSC, too many other content is also included in this concept. Practice has shown that BSCs have different applications - from budget management to strategy management.

They all have a common trait: their emergence in recent years is driven by the need to measure and manage both the efficiency of the activities of the organizations under consideration and far more complex processes such as the implementation of strategies. Underlying the concept of BSC is the idea of forming an innovation system to measure the activities of organizations. At present, organizations and corporations operate in a new kind of economic environment based on knowledge where it is necessary to manage practically nonmeasurable activities such as innovation and human capital. Organizations themselves are aware of how new phenomena exist in the new kind of economy, such as people's knowledge, new technologies and software products, corporate culture that fosters innovation. It is reported that organizations do not have the right tools to successfully implement their new strategies and to successfully control them. Based on the examined models of the BSC, the following conclusions could be drawn:

- In the evolution of the BSC, several major development lines can be highlighted: a. development of the BSC as a measurement tool and a tool for better reflection of the status and development of organizations; b. development of the BSC as a measurement instrument in strategic management and as a control instrument; c. development of the BSC as a measurement and management tool for the needs of the different levels of the organization;
- The development of the BSC as a measurement tool marks different stages of its improvement, which are related primarily to the enrichment of the parameters included in it and to the study of the relations and the relationships between them. Based on the gradual understanding of the new success factors of organizations, the range of indicators included in the BSC is expanded and clarified and approaches and methods for measuring their meanings are developed and implemented. The centerpiece of this process is the increasing attention and ability of organizations to explore the relationships and relations between different indicators and to rank them according to their role in the strategy. As a result, at the beginning of the century, significant leadership in implementing the BSC achieved the necessary maturity of opportunities for operationalization of the strategy in indicator models;
- As early as the first years of its promotion, the BSC began to be validated not only as a tool for measuring and modeling organizations but above all as a tool for modeling and implementing the strategy. Initially, the views in this regard are too general and represent the BSC as a strategic management tool. Gradually, emphasis has been placed on the role in controlling the implementation of the strategy, and in the last years, they have increasingly specified their role as a strategic control tool. The understanding that the card's purpose is to highlight the key controllable parameters in the strategy that has already been developed and to ensure that their meanings and implementation measures are targeted is becoming more conceived;
- Achievements in the development and implementation of the BSC at the organization and enforcement level and as a tool for strategic control lead to the dissemination of this process in the structural units of the organization. The leading implementation organizations achieve the formation of a hierarchically built system of BSCs, including the individual level. This is how the BSC is fully validated as a tool for control and evaluation and a central factor in targeting efforts at all organizational levels to implement the strategy;
- The evolution of the BSC in all directions has been stimulated and accelerated by the development and dissemination of computer-assisted management technologies that facilitate the use of the BSC. Information technology related to BSC implementation is not yet integrated organically into ERP systems, but in many cases they are successfully upgraded or run in parallel as a module of management information systems (Terziev, 2019j; 2019k; 2019l; 2019m; 2019n; 2019o).

The BSC was originally designed to give managers structured information from performance criteria based on a combination of leading and delayed indicators. But from the moment of its introduction, BSC has gradually evolved from a tool for organizing criteria into a strategic control mechanism. It evolves both in its construction, in the process of creation and in use patterns. This evolution goes through three stages, reaching what is now called the third-generation BSC. Third-generation BSC is a methodology for managing and evaluating the work of organizations on their way to achieving strategic goals. But years of practical experience and scientific work are needed to overcome the shortcomings of the original model, which is most often associated with the failure of the BSC to be an effective tool for corporate governance and control. Typical problems such as lack of ownership of management, monitoring only financial criteria, and the inability to force the management system to develop and improve are already addressed. The ideas of the third-generation BSCs are based on the following key concepts of business management and strategic development control. The model weight is placed on the following items from the content of organizational management:

- Cause: Finding and developing the activities needed to reach key results and implement strategies.
- Training: Use feedback to find ways to improve and improve your work.
- Ownership: Use consensus to make everyone aware of what needs to be done and to engage fully in the process.
- Communication: providing clear and unambiguous information for goal disclosure and optimization of organizational activity.

A significant breakthrough during the evolution of BSC is the realization that the successful use of this tool is not only dependent on the use of proper methods for selecting the criteria included in it, but also by the fact that organizations are implementing the right management processes that enable it to be effectively used by managers. These statements provoke the development of the BSC as a management and control framework, which proves the hypotheses by taking them out of the following factors:

- A pronounced wording for a "desirable state" or a strategic destination (positioning);
- Medium-term strategic objectives to be assessed, decomposed into activities and outcomes and, if necessary, standard prospects;
- Specific and clearly defined goals, interpreted on the basis of vision, mission and strategy;
- Priority initiatives relating to the structuring and implementation of strategic objectives;
- Analysis of expectations and organizational needs and on this basis formation of criteria for defining key characteristics, defined as a system of criteria.

The last-generation effective BSCs are those developed with the active involvement of the management team that will use them to manage the organization. Essential to success is the application of a technologically sound and appropriate creation process. The use of an "easy" process is recommended, according to which the management team itself defines the "content", which largely implies a positive and timely outcome. The analysis of the evolution of the concept of BSC and the evolution of the concept of strategic management and control clearly reveals similarities in terms of development trends and alternatives for improvement, which lead to the following implications:

- First. The BSC model from a value-enhancing organizational performance tool is transformed into a tool for managing and controlling the strategy. In this way, it can be assumed that a kind of expression of the transition in managerial thinking is formed in terms of management control systems in which the financial burden is redirected towards strategic control. Improving the concept of strategic management and control and modeling of its model area has a significant impact in forming a model prototype related to the concept of

BSC. All three models of strategic control have a very strong influence on the first generation BSC. From the three-step model, the principle of linking the environment with the strategy-building process is borrowed. From the process model comes the trend that deepens the development processes of the organization, namely the organizational training as a form of development of the training organization. From the conceptual model, that the control can be realized through criteria and objectives, which are differentiated in the BSC as indicators, summarized in several main areas / perspectives. By examining these concepts and their development, it can be concluded that in the process of mutual influence they aim to improve. The transition to the second generation of BSC resonates fundamentally and predominantly in the development of the model area of strategic control. The deepening of the strategic orientation on the BSC reveals the emergence of overlapping and generalizing indicators, which in the strategic management and control systems are defined as criteria for the rapid preliminary, respectively the subsequent, reverse control. Here, however, BSCs record a certain priority in the establishment of the strategic relations model (Terziev, 2019p; 2019q, 2019r; 2019s; 2019t; 2019u; 2019v; 2019w; 2019x; 2019y; 2019z).

- Second. Developing the idea of the learning organization finds a particularly strong charge in reconciling strategic control concepts and BSC. Though strategic correction models have been marked and corrected by the feedback on the behavior of the organization under review, this process has recorded a deepening in BSCs. As the most organized form of feedback, corrective actions, if necessary, can take the form of seminars to discuss the recorded results and expected changes in organizational behavior. In this case, we can talk about a particular form of organizational selfimprovement and training. This deepening trend brings about the creation of sustainable value by the organization, provoking the improvement of the methods of use and mobilization of its intangible assets - human capital, databases and information systems, sensitive high-quality processes, customer and trade relations, for the innovation and highly developed organizational culture. Perhaps this is the most significant evidence of the recent trend of shifting the focus from an economy based on tangible assets to an economy based on intangible assets, knowledge and service.
- Third. As the most important moment in the process of analysis on the relationship between the concepts of strategic management and control and of BSC is their reconciliation and the formation of a qualitatively new model. Theories prevailing among the leaders of governance have not created a particularly serious and universal strategic framework. Strategic doctrines are centered on shareholder, customer management, process management, quality, key competencies, innovation, human resources, information technology, organizational structures and training. And while each of the above-mentioned strands is in itself extremely important, none of them provides a thorough and integrated approach to strategy development. Even the theory of M. Porter, based on positioning for a competitive advantage, does not provide a comprehensive vision of strategy. It is here that we can speak of a unified, consistent system of realization of management and control over the strategy that results from conceptual eclecticism and model consolidation. This new model, a new strategic framework, exposes in a new way the importance of strategic management and control, based on a system of indicators and a portfolio of perspectives linking efficiency and strategies, between short and long-term results, forming a unity between the present and the future.

These three implications suggest that in the management and consulting practice, the BSC is validated and improving as a tool for strategic management and control. At the last stage of the evolution of the concept, the indicators for measuring the performance of not only the organizational activity, but above all its strategy, are being revolutionized.

Along with the imposition of strategic maps as a tool for effective management and precision control, the latest card designs are presented as a brilliant, accurate and holistic method to consolidate the most critical moments in the art of modern governance and the challenges of modern control.

### 3. CONCLUSION

The analysis of the place and role of the BSC in the process of strategic management and control, as well as the active presence of the model in the improvement of intangible assets, provides the basis for several general conclusions (Terziev, 2018a; 2018b; 2018c; 2018d; 2018e; 2018f; 2018g; 2018h; 2018i; 2018j):

- BSC, interpreted as a strategic management and control tool, as controlmanagement technology or as a synthesized expression of a stated strategy, provides an opportunity to show how concrete actions are transformed into a strategy and the way in which organizational performance from concrete results becomes a way of thinking and the basis of a structuring management doctrine. The logic construction model of the success factors - key indicators and their dependencies - target values of the indicators - strategic initiatives to achieve the target values creates extremely favorable prerequisites for the formation and alignment of the intellectual models in the modern organization. This behavior responds to the challenges of formulating new strategies and declaring new missions and concepts to deliver increased value to the customer. Specifically, the implementation of the BSC model identifies the solution to the problem faced by a large number of modern organizations, namely their inability to successfully carry out their stated strategies;
- Building a complete understanding of the essential feature and functional capabilities of BSC affirms the understanding that it is a model that provides the most dense adaptation to stated specific strategies of any modern organization and shows how intangible assets generate an improvement in the organizational efficiency of internal organizational processes which have a crucial role to play in creating value for customers, shareholders and society. The large scope of action and the proven ability to measure the behavior and the value of heterogeneous indicators by establishing causal dependencies justifies the model being perceived and imposed as revolutionary and significant in terms of both measurement and management, and related control and on results and strategies;
- Critical review of evolution in the modeling of BSC and extending its applications provides a solution to a key problem for the managers of all sectors of social development - a problem related to the relationship between strategies and intangible assets. On the one hand, the BSC demonstrates how the mobilization of human capital and the improvement of information resources increase the ability of modern organizations to generate value, and on the other hand - the rethinking of BSC based on the development of organizational capital provides an opportunity for organizational actions to find full compliance new strategies meeting the high requirements of its informed and demanding customers. In this way, the creation of high integrity and maximum coherence between key intangible assets and overall organizational activity, subject to the stated and necessary strategies, would create conditions for continuous improvement of organizations and more stable social development;
- The analysis of the application of the BSC in its various events and models provides the opportunity to look for ways and in the context of social governance and on the necessary control to think and work. Reinforcing the relationship between state and organizations shows that the results that society expects can only be obtained through the rational use of upgrading models such as the BSC that not only increase the effectiveness of interaction across the entire social hierarchy but also develop the key for the whole society assets predominantly manifested through human, information and organizational (social) capital.

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## FUTURE TRENDS IN THE CAMPING INDUSTRY: PERCEPTIONS OF CAMPING MANAGERS

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### ABSTRACT

*The purpose of this research is to explore changing trends in the development of camping accommodation, from standard plots to mobile homes. Previously, camping grounds offered only camping plots and very few sheltered types of accommodation. Nowadays, more and more luxurious accommodation is offered, especially mobile homes, transforming camping grounds into camping resorts. Based on a survey of the perceptions of camp managers, this paper explores the future trends in the development of accommodation in camping resorts. Managers' perspectives of camping accommodation development could strongly influence the future shape of camping resorts and more broadly, set new trends in the development of outdoor hospitality. Our findings show that most camping managers believe that innovation, sustainability, and limited growth in the number of mobile homes in campsites is the trend of sustainable camping resort development while the plot development will be strongly based on differentiation and diversification.*

**Keywords:** *tourism, camping industry, mobile homes, camping resorts, outdoor hospitality*

### 1. INTRODUCTION

Camping has experienced a new boom or renaissance during the pandemic and post-pandemic times. It has been increasingly recognized as a form of outdoor hospitality with its specific offer of dispersed outdoor accommodation (O'Neill, Riscinto-Kozub, & Van Hyfte, 2010). Various types of mobile homes as attractive and comfort camping accommodation started to play a key role instead of classic pitch accommodation generating new demand. Over the past 20 years in Europe, a significant mobile home industry has emerged, involving numerous manufacturers, craftsmen, and cooperatives responsible for associated equipment. The number of mobile homes in Croatia is growing year by year as well and has doubled in just 7 years (Cvelić-Bonifačić, *Mobilne kućice - izazovi i šanse u razvoju kamping resorta u Hrvatskoj*, 2022). To assess the trends of camping accommodation, especially in the context of the European Green Deal (A European Green Deal, 2020) and increasing pressures related to sustainable tourism growth, this study explores the growth trends in segments of camping accommodation, specifically pitches and mobile homes, based on a survey of camping managers' views. Research for this paper was conducted through a survey questionnaire, gathering the opinions of managers on the challenges and opportunities associated with camping accommodation especially focused on sustainability, competitiveness, demand, and occupancy of camping accommodation. These insights could be used to predict trends in the development of camping accommodation in the future.

### 2. CONCEPTUAL FRAME

Today, thanks to the availability of increasingly more luxurious types of accommodation in camping resorts, camping is considered a comfortable stay in a natural environment. As Rochado & Pereira stated: "From basic tent accommodation, camping has evolved into a luxurious offer like glamping and becomes a transitional form between outdoor and indoor hospitality" (Brochado & Pereira, *Comfortable experiences in nature accommodation*:

Perceived service quality in Glamping, 2017). This comfort is now provided to guests thanks to better camping equipment, including mobile homes (Bellis, 2020) and other glamping options (NN 54/2016, 2016). This subsector continues to enhance its offering to create a resort atmosphere that integrates personal wellness into the outdoor hospitality experience (Booker & Joppe, 2013). According to the Cambridge Dictionary, there is no definition of a camping pitch popularly recognized as a type of camping accommodation (Schwarz, 2024), but a campsite is defined as a piece of land where people on holiday can camp, usually with toilets and washrooms. A mobile home, on the other hand, is defined as a type of structure in which people live, usually in one place but with the possibility of being moved to another location using another vehicle for towing, and sometimes with its motor. (Cambridge Dictionary, 2022). The development of mobile homes and their increasing number in campsites marked the beginning of the transformation of camping into glamping (Milohnić, Cvelić-Bonifačić, & Licul, 2019). The general public often considers mobile homes as glamping accommodation. Still, research has shown (Vrtodušić-Hrgović, Cvelić-Bonifačić, & Licul, 2018) that the majority of guests do not perceive mobile homes as glamping. Indeed, mobile homes have become an important aspect of the competitiveness of camping (Rudančić & Sladoljev, 2021). Despite its importance for the overall European economy, and tourism strategies that support camping tourism (Strategija razvoja održivog turizma do 2030.godine, 2022), camping tourism remains insufficiently explored. This subsector, as Brooker & Joppe call it, continues to enhance its offering to create a resort atmosphere that integrates personal wellness into the outdoor hospitality experience (Booker & Joppe, 2013). The development of mobile homes and their increasing number in campsites marked the beginning of the transformation of camping into glamping (Milohnić, Cvelić-Bonifačić, & Licul, 2019). Although accommodation in mobile homes may contradict the concept of camping in nature, it is believed to motivate new markets, especially among hotel and apartment guests who appreciate luxury and glamour. Thus, new camping resorts combine the best of both camping and hotelier worlds (Cvelić-Bonifačić & Milohnić, Change Management in Camping Tourism, 2014). These processes of accommodation changes in camping resorts, significantly influence the further development of the sector and the characteristics of today's outdoor hospitality (Cvelić-Bonifačić & Milohnić, Change Management in Camping Tourism, 2014). What is the direction that the sector is heading into and how will it answer the calls for more sustainability and competitiveness compared to other industry sectors? This paper aims to find answers to these questions by surveying camping managers about their perceptions, opinions, and plans.

### **3. RESEARCH RESULTS**

The data collection was conducted on the territory of Croatia, via an online questionnaire using Google Forms and distributed to the email addresses of Croatian camping managers and former participants of the lifelong learning program "Management of Camping Resorts" (Educamping, 2023) conducted by the FMTU (Faculty for tourism and hospitality management, 2024), through the newsletter mailing list of the Camping Association of Croatia (Camping.hr, 2022). The questionnaire was completed by 58 managers who are managing campsites with an overall accommodation capacity of 50,530 units. This represents 55.3% of the total capacity of Croatian campsites, which amounts to 91,342 accommodation units (DSZ, 2023)

#### **3.1. Methodology**

For data analysis, IBM SPSS 27.0, a popular statistical package tool was applied. Descriptive statistics were used to summarize the respondents' demographic characteristics and assess the measuring instrument items. This involved calculating measures such as means, standard deviations, frequencies, and percentages to provide a clear overview of the data.

The author performed a factor analysis using the Principal Component Analysis (PCA) method with Varimax rotation. Factor analysis is a technique used to identify underlying factors within a set of related variables. Varimax rotation is a common method to simplify the interpretation of factors by maximizing the variance of the factor loadings. In this case, PCA is applied to 11 items to reveal the main factors related to managers' intentions. Before conducting the factor analysis, it was important to assess whether the data is suitable for this technique. KMO and Bartlett's sphericity test were used to determine whether the data has sufficient correlations between variables to perform factor analysis. AKMO value close to 1 and a significant Bartlett's test suggest that factor analysis was appropriate. To determine which factors to retain for interpretation, the author considered factors with eigenvalues equal to or greater than 1. Eigenvalues indicate the variance explained by each factor. Additionally, items with factor loadings equal to or greater than 0.5 were considered significant and retained. To assess the reliability of the scale and the internal consistency of the extracted factors, a reliability analysis was performed. This analysis typically involves calculating Cronbach's alpha coefficients for each factor. Cronbach's alpha assesses how closely related a set of items are as a group. A higher alpha coefficient indicates higher internal consistency.

### 3.2. Sociodemographic results

The survey participants were asked about their age, working experiences, current position and education. The majority of the respondents (70.7% ) fall within the middle age range, specifically between 31-50 years old. This suggests that the study primarily includes individuals with substantial work experience. On average, the respondents have been working in camping tourism for 11-20 years (29.3%). This indicates that the sample includes individuals with a relatively extensive background in the industry. Approximately 45% of them have a master's degree or an MBA. The majority of respondents work in top (39.7%) or middle management positions (39.7%) in 3-star camps (44.8%).

### 3.3. Descriptive analysis

The survey participants were asked to rank on a scale from 1 to 3 the truthfulness of the statements v1 to v10. Based on the answers, we were able to establish what were the most commonly planned infrastructural investments in camping sites in the future. The results of the descriptive analysis of the measurement instrument are presented in Table 1. On the Likert scale from 1 to 3, the statements "I am planning further plot diversification according to the quality of equipment" (2.07) and "I plan to use sustainable materials in the renovation of mobile homes" (2.02) were evaluated with the highest mean values. On the other hand, the lowest-rated statements are building "houses on the water" (1.17) and "underground houses" (1.12).

Items	Mean	St. Deviation
V1: In the camp, I plan to use sustainable materials in the renovation of mobile homes.	2,02	,737
V2: In the camp, I plan to install a pool in certain mobile homes.	1,86	,805
V3: In the camp, I plan horticultural landscaping of mobile home plots.	1,95	,826
V4: In the camp, I plan to build houses in the tree canopy	1,22	,497
V5: In the camp, I plan to develop innovative architectural solutions for mobile homes.	1,45	,680
V6: In the camp, I plan to build houses on the water.	1,17	,425
V7: In the camp, I plan to build underground houses.	1,12	,329
V8: In the camp, I plan to specialize in certain plots for mega-campers.	1,98	,761
V9: In the camp, I am planning innovative plots with private bathrooms.	1,60	,724
V10: In the camp, I am planning further plot diversification.	2,07	,697

*Table 1: Descriptive analysis of measurement instrument  
(Authors own calculation)*

### 3.4. Regression model: Sustainability

The R-squared value is a measure of how well the predictors explain the variance in the dependent variable. In this case, 79.1% of the variance in the dependent variable is explained by the set of predictors. The regression model is deemed statistically significant, indicating that the relationship between the predictors and the dependent variable is not likely due to random chance. Sustainable materials and horticultural landscaping are singled out as having a statistically significant contribution to the variance in the dependent variable ( $p=0.00$ ). This suggests that the surveyed managers believe that the planned mobile homes with sustainable materials and horticultural landscaping will play a significant role in improving the overall sustainability of the destination. This insight can be valuable for decision-makers and stakeholders involved in planning or managing mobile home destinations.

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	16,094	4	4,023	50,254	,000 <sup>b</sup>
	Residual	4,243	53	,080		
	Total	20,337	57			

a. Dependent Variable: Sustainability

b. Predictors: (Constant), sustainable materials, horticultural landscaping, pool, spa facilities

*Table 2: Model Sustainability  
(authors own calculation)*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	,352	,120		2,924	,005
	I intend to have mobile homes made of sustainable materials in the camp.	,315	,070	,388	4,508	,000
	I intend to have mobile homes with horticultural landscaping in the camp.	,413	,066	,570	6,288	,000
	I intend to have mobile homes with spa facilities (whirlpool, sauna, etc.) in the camp.	,039	,076	,050	,506	,615
	I intend to have mobile homes with a built-in private pool in the camp.	-,011	,078	-,014	-,135	,893

a. Dependent Variable: Sustainability

*Table 3: Coefficients, results of ANOVA-test  
(authors' own calculation)*

### 3.5. Regression model: Competitiveness

The regression analysis suggests that 27.2% of the variability in the dependent variable can be explained by the set of predictors. In other words, these predictors collectively account for a substantial portion of the observed changes in the dependent variable. Further analysis reveals that pool installation and spa facilities are identified as having a statistically significant contribution to the explained variance, with a p-value lower than 0.05. This implies a high level of confidence in the significance of these factors.

The implication drawn from these results is that surveyed managers perceive that the intention to have mobile homes with pool and spa facilities will have a notable influence on market competitiveness in camping tourism.

#### Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,521 <sup>a</sup>	,272	,217	,684
a. Predictors: (Constant), sustainable materials, horticultural landscaping, pool, spa facilities				

*Table 4: Analyse of model Competitiveness  
(author's own calculation)*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	9,269	4	2,317	4,949	,002 <sup>b</sup>
	Residual	24,817	53	,468		
	Total	34,086	57			
a. Dependent Variable: competitiveness						
b. Predictors: (Constant), sustainable materials, horticultural landscaping, pool, spa facilities						

*Table 5: Results of ANOVA-test  
(authors' rown calculation)*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,177	,291		4,044	,000
	I intend to have mobile homes made of sustainable materials in the camp.	-,016	,169	-,015	-,093	,926
	I intend to have mobile homes with horticultural landscaping in the camp.	,069	,159	,074	,436	,664
	I intend to have mobile homes with spa facilities (whirlpool, sauna, etc.) in the camp.	,748	,185	,742	4,046	,000
	I intend to have mobile homes with a built-in private pool in the camp.	-,455	,189	-,473	-2,399	,020
a. Dependent Variable: competitiveness						

*Table 6: Analysis of coefficients  
(authors own calculation)*

### 3.6. Regression model: Demand in camping tourism

The regression analysis suggests that 68.9% of the variance in the dependent variable is explained by the set of predictors. This indicates the overall effectiveness of your model in explaining the variability in the camping tourism demand. The set of predictors includes sustainable materials, horticultural landscaping, pool, and spa facilities. These variables collectively contribute to explaining the variance in the dependent variable.



Further analysis reveals that the pool factor has a statistically significant contribution to the variance, with a p-value of 0.00. Based on these results, it is implied that surveyed managers perceive that intention to make mobile homes with a pool will have a more substantial influence on increasing demand in camping tourism compared to other factors in the model.

#### Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,689 <sup>a</sup>	,475	,436	,604
a. Predictors: (Constant), sustainable materials, horticultural landscaping, pool, spa facilities				

*Table 7: Analysis of Demand  
(authors own calculation)*

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	17,509	4	4,377	11,998	,000 <sup>b</sup>
	Residual	19,336	53	,365		
	Total	36,845	57			
a. Dependent Variable: increase in demand						
b. Predictors: (Constant), sustainable materials, horticultural landscaping, pool, spa facilities						

*Table 8: Results of ANOVA-test  
(author's own calculation)*

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	,533	,257		2,074	,043
	I intend to have mobile homes made of sustainable materials in the camp.	,045	,149	,041	,303	,763
	I intend to have mobile homes with horticultural landscaping in the camp.	,080	,167	,080	,478	,634
	I intend to have mobile homes with spa facilities (whirlpool, sauna, etc.) in the camp.	,026	,163	,025	,157	,876
	I intend to have mobile homes with a built-in private pool in the camp.	,580	,140	,595	4,137	,000
a. Dependent Variable: increase in demand						

*Table 9: Analyse of coefficients  
(authors' own calculation)*

### 3.7. Regression model: Capacity utilization

The R-squared value of 0.375 (37.5%) suggests that the set of predictors collectively explains 37.5% of the variance in the dependent variable. This indicates a moderate level of explanatory power. The regression model as a whole is deemed statistically significant, implying that the set of predictors has a meaningful relationship with the dependent variable. The specific predictor "pool installation" is highlighted as having a statistically significant contribution to the variance, with a p-value of 0.011. A low p-value (typically  $\leq 0.05$ ) suggests that the variable is likely a meaningful predictor. The conclusion drawn is that surveyed managers perceive that their intention to have mobile homes with a pool will have a more pronounced influence on the increase of capacity utilization in camping tourism compared to other factors considered in the analysis.

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,612 <sup>a</sup>	,375	,327	,639
a. Predictors: (Constant), sustainable materials, horticultural landscaping, pool, spa facilities				

*Table 10: Analysis of capacity utilization  
(author's own calculation)*

**ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12,972	4	3,243	7,939	,000 <sup>b</sup>
	Residual	21,649	53	,408		
	Total	34,621	57			
a. Dependent Variable: capacity utilization						
b. Predictors: (Constant), sustainable materials, horticultural landscaping, pool, spa facilities						

*Table 11: Results of ANOVA-test  
(author's own calculation)*

**Coefficients<sup>a</sup>**

		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model		B	Std. Error	Beta		
1	(Constant)	,440	,272		1,618	,012
	I intend to have mobile homes made of sustainable materials in the camp.	,120	,158	,113	,760	,451
	I intend to have mobile homes with horticultural landscaping in the camp.	-,074	,177	-,076	-,416	,479
	I intend to have mobile homes with spa facilities (whirlpool, sauna, etc.) in the camp.	,255	,173	,251	1,474	,146
	I intend to have mobile homes with a built-in private pool in the camp.	,389	,148	,412	2,623	,011
a. Dependent Variable: capacity utilization						

*Table 12: Results of coefficients  
(authors' own calculation)*

#### 4. CONCLUSION

The results of this study show that the managerial focus in Croatian campsites is on sustainable materials, pool installation, spa facilities, and horticultural landscaping for mobile home plots. This factor may reflect a focus on enhancing the accommodation and amenities related to mobile homes. Concerning future development of the camping pitches/plots investments, the plot dispersions and differentiation factor is related to specializing in plots for mega-campers, differentiating plots based on equipment quality, and planning innovative plots with private bathrooms. This factor reflects the strategy of diversifying and customizing the camping experience for different types of campers in the future. Results of the research with the variables "I am planning further plot diversification according to the quality of equipment" (2.07) and "I plan to use sustainable materials in the renovation of mobile homes" (2.02) were evaluated with the highest mean values. The contribution of this paper is in the use of the regression analysis that shows that managers intend to use sustainable materials in mobile homes, landscaping of campsites with better horticulture, and spas and pools together with wellness offers in mobile homes. Based on these results, it is implied that surveyed managers perceive that these investments will have a substantial influence on increasing demand in camping tourism compared to other factors in the model. The conclusion drawn is that surveyed managers perceive also that their intention to have mobile homes with a pool will have a more pronounced influence on the increase of capacity utilization in camping tourism compared to other factors considered in the analysis. This research of the perception of camping managers shows that the development trends in camping tourism will be based on higher sustainability, more competitiveness in the outdoor hospitality market, a significant increase in camping demand, and an increase in occupancy in the accommodations in the camping resorts.

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## TRANSFORMATION OF THE MENTAL HEALTH SERVICES IN CROATIA - A CASE OF THE UNIVERSITY PSYCHIATRIC HOSPITAL VRAPČE

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### ABSTRACT

*University Psychiatric Hospital Vrapče is the oldest and biggest, in clinical, academic, and research sense, mental health care institution in the Republic of Croatia. Its establishment in 1879 marked the beginning of organized, systematic care for the persons suffering from mental health disorders in Croatia. During its history, University Hospital Vrapče went through many transformations, always reflecting new developments in the field and, more generally, society, while setting the tone for and of mental healthcare in Croatia. In the context of more recent developments, especially in the last ten years, several important trends emerging in care processes within University Psychiatric Hospital Vrapče can be highlighted. On the one hand, there is a trend of decreasing number and duration of treatments provided within its inpatient care system. On the other hand, there is a parallel trend of increasing number, scope, modalities, and type of services provided within its outpatient care system. For example, in 2015, about 84 % of all services provided within the Hospital were related to inpatient services, while only 16 % to outpatient ones. However, in 2021, that ratio was 64 % versus 36 %, that is, 64 % of the services provided were related to inpatient services while 36 % to outpatient services. At the same time, the average duration of inpatient treatment within the Hospital is steadily decreasing reaching a current average of 25 days (while in 2015 it was about 10 days longer). Furthermore, the Hospital is, among many other things, leading the adoption of new (digital) technologies in the clinical care, teaching, and research processes. Finally, today, on a daily basis, University Hospital Vrapče serves around 1200 patients, half of them through inpatient services while another half through various forms of outpatient services. All these changes are in accordance with the foundational and constitutional values and continuous efforts of the institution, which indeed has a long and fruitful history, and are in line with the most up-to-date global achievements and tendencies in the organization of the modern, comprehensive, person-centered mental healthcare systems.*

**Keywords:** *mental health, mental health services, transformation of services, person-centered care, recovery-oriented care*

## 1. INTRODUCTION

University Psychiatric Hospital Vrapče (hereinafter, where applicable the Hospital) is the oldest and biggest, in clinical, academic, and scientific sense, mental health care institution in the Republic of Croatia. Its establishment in 1879 marked the beginning of organized, systematic care for the persons suffering from mental health disorders in Croatia. Today it is organized in 12 clinical departments within which care is provided for all kinds and forms of mental health disturbances and disorders (psychotic disorders, personality disorders, anxiety disorders, organic psychiatric disorders, mood disorders and substance abuse disorders and other addictions, sleep disorders). In a period of one year, on average, inpatient care is provided for around 7,000 persons with mental health disturbances and disorders within University Psychiatric Hospital Vrapče, while almost 80,000 receive various models and modalities of outpatient care services. Daily, around 550 patients are being treated as inpatients while around 600 as outpatients. Alongside just mentioned, almost 100 “students” visit University Psychiatric Hospital Vrapče every day within numerous academic and educational activities. On a yearly basis, around 30-40 scientific papers are being published in respected, international journals; nearly 300 different expositions (whether in the form of poster or lecture) on various scientific and expert events are being performed; and around two books are being published by its staff. During its history, University Hospital Vrapče went through many transformations, always reflecting new developments in the field and, more generally, society, while setting the tone for and of mental healthcare in Croatia. More recently, prominent members from University Psychiatric Hospital Vrapče played a significant role in the creation and implementation of the Strategic Framework for the Development of Mental Health in the Republic of Croatia until year 2030. Central tenets of proposed framework are:

- re-orientation of mental health care towards the provision of services in the community,
- development of a functionally integrated mental health care system that promotes recovery and respect for human rights,
- a holistic approach to understanding mental health by encompassing all important areas of life that are important for recovery,
- treatment models and modalities based on an individual treatment plan,
- application of the evidence-based psycho- bio-social procedures that promote recovery,
- multidisciplinary and multisectoral approach,
- shift from treatment goals focused on clinical outcomes (of symptom improvement) toward personal goals of recovery and social inclusion.

In line with just mentioned, more general frameworks of contemporary mental health services are expressed in relevant guidelines issued by international regulatory institutions. For example, the European Union (hereinafter EU) declared a strong commitment towards a holistic approach to mental health.

Such holistic approach based on the guiding principles of:

- adequate and effective prevention
- access to high quality and affordable mental healthcare and treatment
- reintegration into society after recovery.

Likewise, high quality community-based mental health care, according to EU, is based on several fundamental tenets:

- protection of human rights;
- public health focus;
- supportive services oriented towards recovery;

- use of effective interventions based on evidence and services users goals;
- promotion of a wide network of support in the community and;
- use of peer expertise and support in service design and delivery.

Somewhat similarly, World Health Organization within their recent recommendations for community mental health services (that ought to be, in general, person-centered, recovery and rights-based) single out importance of the following principles:

- accessibility - services near the places where service users live,
- comprehensiveness - broad availability of various (treatment) procedures and services
- continuous coordinated care after hospital treatment using a variety of non-medical services such as social care, housing, and employment.
- service guided by the needs of users - respect for the opinions, experiences, and expectations of services users and their (pro)active participation,
- efficiency - use of the procedures and programs whose effectiveness can be easily and reliably proven,
- equality - services should be available to all people who need them,
- protection and improvement of human rights - people with mental disorders have the same human rights,
- information - accurate information about the treatment system and human rights,
- recovery and empowerment as the goals of treatment.

With the aim of determining the current position of the University Psychiatric Hospital within broader scope and aims highlighted within the Strategic Framework and other mentioned international institutions, analysis of recent trends in treatment models and modalities provided within the Hospital from year 2015 until year 2022 was performed (namely, rates of models and modalities of care provided; first versus non-first inpatient treatments, number of outpatient treatment by different modalities, duration of inpatient treatment, and rate of care provided within usual and telepsychiatry framework).

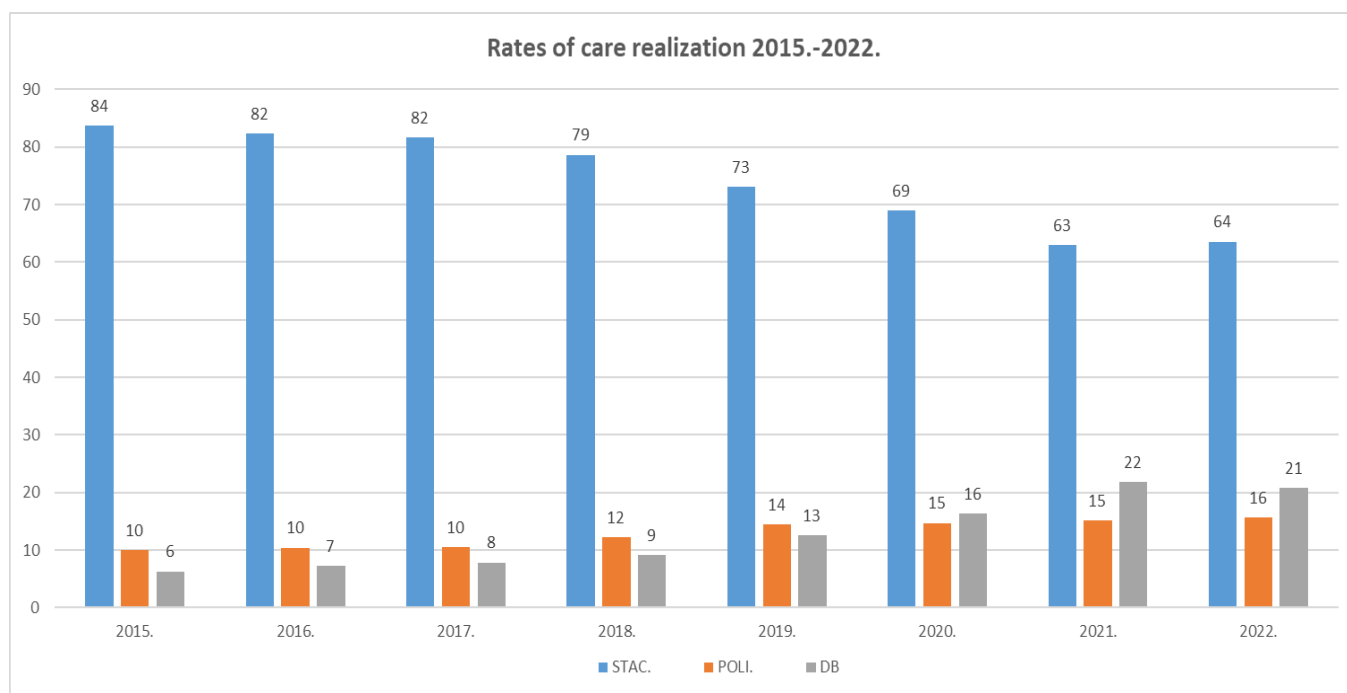
## **2. PRESENTATION AND ANALYSIS OF THE DATA FROM UNIVERSITY PSYCHIATRIC HOSPITAL VRAPČE**

In the context of more recent developments, especially within the last ten years, several important trends emerging in the patterns of care processes within the University Psychiatric Hospital Vrapče can be highlighted. On the one hand, there is a trend of decreasing number and duration of treatments provided within its inpatient care system. On the other hand, there is a parallel trend of increasing number, scope, modalities, and type of services provided within its outpatient care system. As presented in Table 1. and Figure 1. in year 2015, about 84 % of all services provided within the Hospital were related to inpatient services, while only 16 % to outpatient ones. However, in 2022, that ratio was 64% versus 36%, that is, 64% of the services provided were related to inpatient services, and 36% to outpatient services.

*Table following on the next page*

	2015	2016	2017	2018	2019	2020	2021	2022
	%	%	%	%	%	%	%	%
“acute”	19	18	20	20	20	21	22	21
“chronic”	65	64	62	59	53	48	41	42
INPATIENT (acute+chronic)	84	82	82	79	73	69	63	64
“ambulance”	10	10	10	12	14	15	15	16
“day hospital”	6	7	8	9	13	16	22	21
	100	100	100	100	100	100	100	100

*Table 1: Rate of care services realization according to treatment modality at University Psychiatric Hospital Vrapče – inpatient versus outpatient (from 2015. until 2022.)  
(Source: internal documentation of the University Psychiatric Hospital Vrapče)*



*Figure 1: Rate of care services realization according to treatment modality at the University Psychiatric Hospital Vrapče – inpatient versus outpatient (from 2015. until 2022.)  
\*STAC. = inpatient total; POLI.= outpatient – ambulance; DB.= outpatient – day hospital.  
(Source: internal documentation of the University Psychiatric Hospital Vrapče)*

Also, numbers of patients treated as outpatients within the Hospital are steadily increasing (except for COVID-19 pandemic – year 2020) both within ambulatory care services and within day hospital services (as presented in Figure 2 and Figure 3). For example, in year 2016 - 62,828 patients received ambulatory care services while in year 2022 - 81,570. Similarly, in year 2016 - 744 patients received day hospital services while in year 2022 - 1,896 of such services were received by patients.



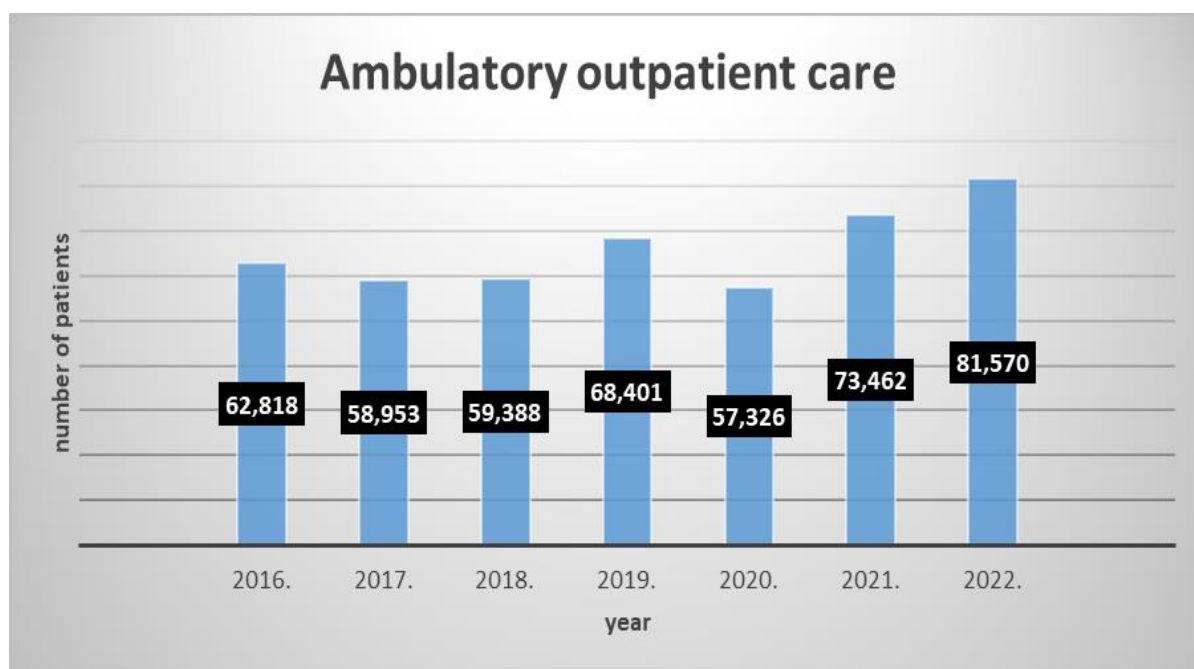


Figure 2: Number of patients in ambulatory outpatient care at the University Psychiatric Hospital Vrapče (from 2016 until 2022).

(Source: internal documentation of the University Psychiatric Hospital Vrapče)

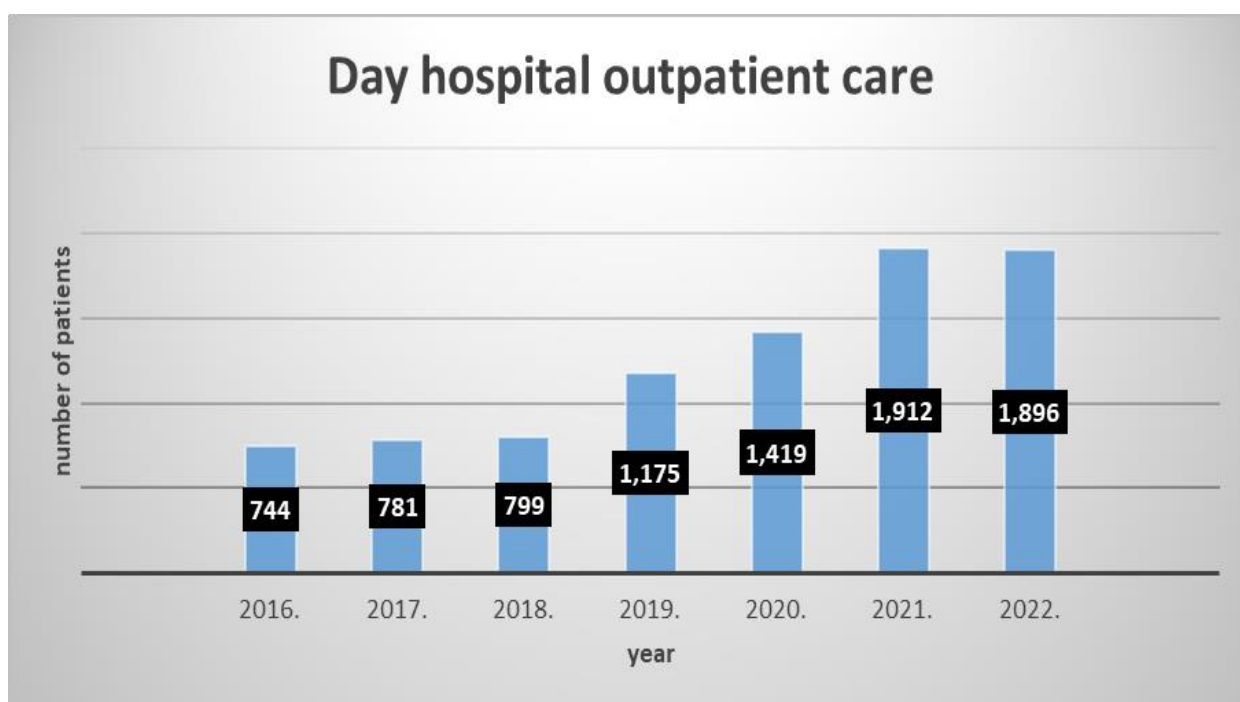


Figure 3: Number of patients within day hospital outpatient care at the University Psychiatric Hospital Vrapče (from 2016 until 2022).

(Source: internal documentation of the University Psychiatric Hospital Vrapče)

During the nearly same period (from 2015 until 2022) steady decline in rate of non-first (rehospitalization) can be observed (as presented in Table 2.) – in year 2015 - 37 % of all hospitalizations were first ones, while in 2022 - 41% of them.

YEAR	<i>FIRST HOSPITALIZATION</i>	<i>NON-FIRST HOSPITALIZATION</i>	<i>TOTAL</i>	<i>% RATE FIRST</i>	<i>% RATE NON- FIRST</i>
2015.	2,551	4,259	6,810	37	63
2016.	2,453	4,384	6,837	36	64
2017.	2,553	4,614	7,167	36	64
2018.	2,387	4,396	6,783	35	65
2019.	2,539	4,605	7,144	36	64
2020.	1,880	3,169	5,049	37	63
2021.	2,421	3,660	6,081	40	60
2022.	2,600	3,819	6,419	41	59
	<b>19,384</b>	<b>32,906</b>	<b>52,290</b>	<b>37</b>	<b>63</b>

*Table 2: Total numbers and rates of first versus non-first inpatient treatments (hospitalizations) at the University Psychiatric Hospital Vrapče (from 2015 until 2022) (Source: internal documentation of the University Psychiatric Hospital Vrapče)*

At the same time, the average duration of inpatient treatment within the Hospital is steadily decreasing reaching a current average of 24,14 days (while in 2015 it was about 10 days longer - 34,51 days), as presented in Table 3.

year	mean duration of inpatient treatment
2015.	34.51
2016.	32.37
2017.	30.10
2018.	27.75
2019.	28.12
2020.	24.45
2021.	25.32
2022.	24.14

*Table 3: Mean duration of inpatient treatment by year (from 2015 until 2022) at the University Psychiatric Hospital Vrapče (without forensic patients) (Source: internal documentation of the University Psychiatric Hospital Vrapče)*

Furthermore, the Hospital is, among many other things, leading the adoption of new (digital) technologies in the clinical care, teaching, and research processes. In Table 4. rates of day hospital outpatient services provided “live” versus by “telepsychiatry” in period from 2020 till 10/2023 are provided. What can be observed from presented data is that in year 2020 – 48 %, in year 2021 - 40 %, and finally, in year 2022 - 55 % of such services were provided within telepsychiatry framework.

*Table following on then ext page*

	2020.		2021.		2022.		2023.	
MONTH	ALL	"LIVE"	ALL	"LIVE"	ALL	"LIVE"	ALL	"LIVE"
<b>I</b>			5,217	3,026	6,562	2,956	6,104	3,383
<b>II</b>			6,244	3,875	7,176	3,103	6,472	3,582
<b>III</b>	2,038	2,009	6,998	4,540	7,787	3,261	7,864	4,430
<b>IV</b>	658	36	6,544	4,230	6,492	2,654	6,449	3,454
<b>V</b>	2,218	205	6,088	3,876	6,292	2,596	6,182	3,497
<b>VI</b>	3,227	1,714	5,627	3,575	5,678	2,416	5,562	3,355
<b>VII</b>	4,168	2,407	5,993	3,835	5,658	2,384	5,174	2,957
<b>VIII</b>	3,468	2,102	5,395	3,440	4,927	2,278	4,998	2,885
<b>IX</b>	4,281	2,435	5,811	3,777	5,448	2,471	4,736	2,764
<b>X</b>	4,872	2,732	6,047	3,566	5,848	2,990	5,219	2,918
<b>XI</b>	4,810	1,944	6,114	3,311	5,940	3,345		
<b>XII</b>	5,613	2,755	6,107	2,611	6,628	3,645		
<b>TOTAL</b>	<b>35,353</b>	<b>18,339</b>	<b>72,185</b>	<b>43,662</b>	<b>74,436</b>	<b>34,099</b>	<b>58,760</b>	<b>33,225</b>

*Table 4: Rate of day hospital outpatient services provided "live" versus by "telepsychiatry" (from 2020 until 10/2023) at the University Psychiatric Hospital Vrapče (Source: internal documentation of the University Psychiatric Hospital Vrapče)*

### 3. DISCUSSION AND CONCLUSION

All the previously presented data indicate changes within patterns of care provided within the University Psychiatric Hospital Vrapče that are in accordance with the foundational and constitutional values and continuous efforts of the institution, which indeed has a long and fruitful history, and are in line with the most up-to-date global achievements and tendencies in the organization of the modern, comprehensive, person-centered, recovery and rights-based mental healthcare systems. According to all the above mentioned, the fundamental goals of the further development of the University Psychiatric Hospital Vrapče in terms of content and organization will be based on social responsibility, economic effectiveness and efficiency, development of interpersonal relations and legal and ethical business. In this sense, it is worth (re)emphasizing the critical role of the Hospital as a psychiatric institution that should remain an integral part of an integrated and comprehensive mental health care system in which treatment takes place according to a complex biopsychosocial approach on the platform of a culture of recovery and respect for fundamental human rights. In order to achieve these goals, the Hospital is expected to undergo further processes of a more intensive transformation, which will focus on the ongoing strengthening of non-institutional forms of treatment models and modalities, further reduction, humanization, and improvement of inpatient capacities according to highest modern standards, establishment and nurturing relationships with all other stakeholders and shareholders in the health system and outside it (taking into account all those that participate in and are affected by such a system), strengthening focus on promotion, prevention, early recognition, treatment and rehabilitation of mental disturbances and disorders through networks of interdisciplinary and interprofessional cooperation and co-creation. Likewise, unique treatment programs, models and modalities will continue to be developed (for example, for certain kinds of mental health issues, certain kind of aims of services [for example, promotion and prevention] and/or specific groups), so that it would better serve the current and foreseeable requirements and circumstances. Here also, the further development and integration of telepsychiatry (and, more globally, telehealth) models and modalities, in their full range, scope and reach, into a comprehensive mental health care system plays an important role (now determined to a lesser extent by necessity, and to a greater extent by the needs and preferences of all involved stakeholder).

This equally includes the use of such models and modalities for the purpose of promotion and improvement of mental health, screening and early detection of various mental disturbances and disorders, assessment of condition and treatments and support of various procedures during treatment or recovery (such as monitoring of unwanted effects, provision of support, etc.). In addition, the potential of the same technologies is to be used for the purpose of training and education, for the purpose of implementing public health procedures, as support for research, management processes and the like. Furthermore, there is an exceptional need for further alignment with the highest well-established standards of healthcare quality and safety, based on the following fundamental values: care focused on the needs of patients and their close ones; involvement and participation of patients and their close ones in all care processes; access to effective, efficient, and safe care and an environment of inclusiveness, continuous learning and improvement. All of the above is aimed at meeting the needs of (all) patients through the "patient at the center" concept, which represents the backbone of the entire strategy, but also includes meeting the needs, both material and psychological, of the providers of care (where special emphasis ought to be made on recognizing their needs, improving their working conditions, encouraging proper motivational processes through various forms of material and non-material stimulation, generating a sense of security, equal distribution of work tasks and workload, inclusion in systems planning with clear division of responsibilities).

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## ANALYSIS OF THE EFFECTS OF INTEGRATED ARTIFICIAL INTELLIGENCE IN SMALL AND MEDIUM-SIZED CROATIAN ENTERPRISES

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### ABSTRACT

*Significant development of artificial intelligence (AI) began in the 1950s. For the purposes of this paper, artificial intelligence is considered the system's ability to collect and interpret data, learn and then apply new knowledge to achieve certain results or perform tasks through adaptive behavior (Anica-Popa et al., 2020). AI is understood as the ability of technology to perform tasks and possess skills naturally associated with human intelligence. The subject of this work is the analysis of the effects of the implementation of artificial intelligence in the operations of Croatian small and medium-sized enterprises (SME). The main goal is to determine the importance of applying artificial intelligence and the possibilities of such technology in business. In addition, the authors wanted to determine the level of management satisfaction with the profitability of integrated AI forms in organizational processes. The results of the empirical research showed that all 90 enterprises involved apply at least one form of artificial intelligence. The sample of respondents consisted of executive managers (owners) of different small and medium-sized Croatian enterprises from various industries. It emerged that, to a "larger" and "significantly large extent", the greatest benefits of implementing AI (both in manufacturing and service enterprises), are reflected in: 1. "improvement of production or service processes" (93%), 2. "saving time and resources" (92%) and 3. "increased sales" (82%). As many as 88% of respondents believe that they "achieved better financial results and increased customer satisfaction".*

**Keywords:** artificial intelligence (AI), cognitive technologies, Croatia, integration, small and medium-sized enterprises (SME)

### 1. INTRODUCTION

As far back as 1942, the American writer Isaac Asimov projected the challenges that can be generated by artificial intelligence (AI). However, the new technology was then called robots that can develop their own consciousness. In his short and positive story, he mentioned a robot that obeyed human laws. The term artificial intelligence was first mentioned at a scientific conference organized in 1956 by the American computer expert John McCarthy in Dartmouth (Smith, 2006). But the process of establishing the possibility that machines can truly think began much earlier. In his work "As We May Think", Bush (1945) proposed a system that increases people's knowledge and understanding. Five years later, Alan Turing wrote a paper based on the idea that machines could simulate human beings and undertake activities that require intelligence (eg. playing chess).

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In 1966, at the American MIT University, professor Weizenbaum wrote the first dialog system for simulating human conversation called Eliza (Sharma et al., 2017). It is the first computer program that could, at least partially, imitate a real person (psychotherapist) and show empathy. That program was among the first to pass the Turing test, that is, a simple method that proves that machines can think (McGuire, 2006). By the 1980s, many more computer programs were created that showed signs of human logic, thinking and intelligence (Haenlein and Kaplan, 2019). By 1985, more than 180,000 robots were already working on production lines, while since 1988, advanced machines have recognized human speech (Valerjev, 2006). AI proved itself globally in 1997, when IBM's supercomputer Deep Blue managed to defeat the world chess champion Gari Kasparov. The program could process 200 million possible moves per second and predict the opponent's next move (Haenlein and Kaplan, 2019). During the decade, more and more new devices and machines appeared that contained a certain form of AI (Valerjev, 2006). One of the definitions of AI emphasizes the system's ability to collect and interpret data, learn and then apply new knowledge through adaptive behavior to achieve certain results or perform tasks (Anica-Popa et al., 2020). It can be said that this technology is capable of performing tasks and possesses skills naturally associated with human intelligence (Dinu, 2021). Although some technologies have been around for more than 50 years, recent advances in computing power, the availability of vast amounts of data and new algorithms have led to major breakthroughs. As they become more competent and complex, today's AI systems show a tendency to develop unexpected and innovative behavior. Cognitive technologies has been applied by foreign language learning applications Duolingo, grammar correction tool Grammarly and a number of others. In Croatia, for example, a specially organized unit of the Fortenova group DataLab, a center of excellence for the application of advanced analytics as well as AI technology, has been operating for more than a year. Within the framework of the strategic partnership with Google Cloud and the application of their technologies, Fortenova own cloud data platform was developed, reliable and scalable to the level required by the largest private enterprise in Croatia. The largest Croatian retail chain Konzum, together with the startup enterprise ItFromBit, successfully developed a machine learning model for the purchase of perishable goods (Ivezić, 2023). The subject of this paper are the specific effects of artificial intelligence on business and financial indicators, that is, on the satisfaction's degree of customers and services of Croatian small and medium-sized enterprises. The main goal of this paper is to determine the importance of integrating artificial intelligence into business processes, i.e. the benefits that this technology provides for the development of the Croatian SME sector. Primary sources were obtained through empirical research conducted with an online survey questionnaire of six questions in Google form. The survey was conducted in the period from March 1 to March 20, 2023 on a sample of 90 managers (owners) of various small and medium-sized Croatian enterprises. Based on the practical experiences and personal views of the respondents, the aim was to identify the relevance of integrating AI into business processes, as well as the opportunities that such technology provides for building the competitiveness of enterprises. In addition, the purpose was to determine the level of management satisfaction with the profitability of integrated AI forms. The paper is divided into five chapters. The first chapter is an introduction related to the topic, the subject of research and the main goal. The structure of the work is also indicated. The second chapter provides an overview of the literature on the concept, meaning and forms of AI. The third chapter describes the approach, sample of respondents and research methods. The fourth chapter presents and interprets the results of the conducted empirical research. The fifth chapter concludes by summarizing the key emphases of this paper. At the end is a list of used literature.

## 2. LITERATURE REVIEW

The development of AI has been slower due to various challenges. The biggest obstacle were computers because they could not store enough information, nor process it quickly and efficiently. Over time, computers could store more information and became faster, cheaper and more accessible to the masses. The algorithms by which computers worked also improved and people began to understand which algorithm to apply to a particular problem. As scientists needed significant funds for their experiments, over time the investments slowed considerably and research stopped for several years (Barlow, 2017). McKinsey's research from 2022 showed a doubling of the level of AI use in the previous five years and an accelerated increase in investment in this technology (McKinsey, 2023). According to predictions by Next Move Strategy Consulting, the AI market could reach a value of 1.8 trillion dollars by 2030 from today's around 210 billion dollars! This market spans multiple industries, from supply chains, marketing and research, to manufacturing, services and consultant labor costs (Statista, 2023). In 2023, AI was included among the most significant global megatrends. It is an interdisciplinary field of research and practice which deals with the creation of such computer systems that have the cognitive capabilities, that is, the feature of human thinking. This requires the integration of different disciplines, such as computing, psychology, philosophy, neuroscience and linguistics. AI is the ability of software to perform tasks that until now required human intelligence (Barlow, 2017). According to Spremić (2017), we are talking about machines and computer systems that are based on three cognitive skills or three processes:

- *learning* - acquiring information and creating rules for transforming it into useful information)
- *reasoning* – focus on choosing the right algorithm to achieve the desired results
- *self-correction* - the process is continuously upgraded to obtain the most accurate results

The main technological areas of AI integration are expert systems, language processing, speech understanding, robotics and sensor systems, computer vision and scene recognition, intelligent computers and neural computing (Pannu, 2015). According to Copeland (2022), AI is the ability of a digital computer or computer-controlled robot to perform tasks associated with cognitive intelligence. As a term, AI is used in systems development projects related to intellectual processes characteristic of humans, such as the ability to make conclusion, to discover meaning and generalize or learn from past experiences. On the other hand, AI refers to programs, algorithms, systems or machines that exhibit intelligent behavior (Shankar, 2018).

### 2.1. Machine learning and generative AI

Broadly speaking, artificial intelligence is the ability of software to perform tasks that require human intelligence. Voice assistants like Siri, Cortana and Alexa are based on AI technology, as are customer service chatbots that pop up to help users navigate websites. One form of AI is machine learning. In this way, practitioners develop AI using computer models that can automatically learn from various data without human guidance and draw conclusions based on it. Other important forms of AI are machine language understanding, computer perception and robotics. According to Prister (2019), along with robotics, nanotechnology, the Internet of Things (IoT), autonomous vehicles, quantum computers and 3D printing, AI is one of the seven components of Industrial Revolution 4.0 (IR 4.0). Data from the International Federation of Robotics (IFR) show that in 2022, a record 3.5 million robots operated globally, while the estimated value of installations reached 15.7 billion dollars (Mohan, 2023). ChatGPT was developed by the enterprise OpenAI and offered for public testing in November 2022. It is already considered the best and most popular AI chatbot to date. In five days, more than a million people signed up to use this system, which can answer almost any question.

ChatGPT (and eg DALL-E) are considered generative AI tools, i.e. algorithms used to create new content, including audio, code, images, text, art, simulations and videos. Generative AI systems are just one segment in a broad group of machine learning that enables computers to generate all kinds of new and exciting content, from music, art and entire virtual worlds, to practical purposes such as creating new product designs or optimizing business processes. Generative AI technology is advancing quickly. The release cycle, number of startups, and rapid integration into existing software applications are remarkable. The latest discoveries in this area have the potential to fundamentally change the approach to content creation. However, the extent of the impact as well as the risks of these changes are still unknown (McKinsey, 2023). The complexity and huge amount of data (which humans don't manage anyway!) increases the potential and need for machine learning.

## **2.2. The effects of AI on entrepreneurship and the future of the labor market**

Knowledge and skills have never been more important. Therefore, educational institutions are expected to train students, employees, entrepreneurs and managers for jobs that don't exist yet, for the use of technologies that haven't even been invented, and for solving problems that haven't even appeared yet (Krohn et al., 2019). The abilities of various AI systems to learn, predict, analyze and make decisions, open up unpredictable possibilities that will significantly shape the life and work of the humankind in the future. In order to be ready to successfully deal with the mentioned challenges, entrepreneurs, enterprises and people will have to adapt, educate themselves and innovate creatively. Enterprises such as Google, Amazon, Salesforce, OpenAI or Microsoft are the leaders of the current megatrend, but more and more small and medium-sized enterprises are using AI to modernize their operations, optimize business processes, improve the user experience of products and services, and analyze large amounts of data (Jurković, 2023). In 2019, McKinsey conducted research that showed that the use of AI in business processes is growing by almost 25% annually. For the majority of enterprises (63%), the integration of cognitive technology enabled an "increase in revenue". In this sense, marketing (especially digital), sales, product and service development and supply chain management have the greatest benefit. In 44% of enterprises, AI "reduced costs" (Cam et al., 2019). According to Nadimpalli (2017), in order to proactively prepare for the future, people should think creatively and critically, develop curiosity, imagination, adaptability, "thinking outside the box", resilience, openness and self-regulation; social, interpretive and emotional skills (such as empathy, self-efficacy and cooperation) and practical and physical skills (such as using new information and communication technology devices, basic knowledge of ICT, etc.). Otherwise, as a number of authors claim (Bassens et al., 2019), the following three job groups will be most exposed to the effects of automation and shutdown in the near future:

- routine manual jobs
- complex social interactions
- jobs that require a relatively low level of employee qualifications.

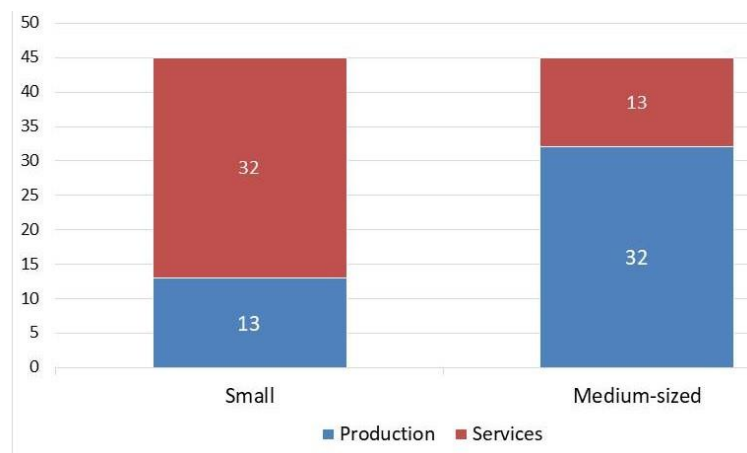
Above-average growth in the level of application of various forms of cognitive technology affects almost all segments of modern life. Therefore, AI has stimulated many dilemmas and ethical controversies related to privacy protection, corporate responsibility and legal regulations. So, in addition to positive effects, AI entails numerous socioeconomic implications. The International Labor Organization (ILO) has calculated that about 30 million jobs will disappear due to the expansion of AI, while Goldman Sachs estimates that this number could rise to 800 million by 2050. A Chinese mobile phone module factory in city of Dongguan replaced 650 workers with 60 robots, retained only 60 workers, and achieved a 250 percent increase in production and an 80 percent reduction in production errors (IEEE Spectrum, 2015).



This is what Elon Musk is trying to do by introducing the Tesla Bot in car production in order to reduce the number of people in repetitive jobs. The World Economic Forum (WEF) expects the demand for data analysts and computer scientists, as well as experts in machine learning and cyber security to grow by about 30 percent, but because of this, 26 million people working in data entry and similar basic jobs will be out of a job by 2027 (WEF, 2023). Enterprises are looking for experts who are able to incorporate AI into work systems. Just as the steam engine and electrification have completely changed entire sectors of the economy since the 18th century, the Internet, AI, 3D and 4D printers, drones, digital analytics, digitization and robotics are dramatically transforming all of today's industries (Perkov, 2019). The industrial sector is responsible for one third of the world's GDP and half of the world's energy consumption. It is a large consumer of water and other natural resources and a massive generator of waste and emissions of harmful gases. That is why improvements in the efficiency of industrial processes are crucial for a sustainable future of the world (Zavalishina, 2017). For example, according to Mueller and Massaron (2018), the global population will reach more than 9 billion inhabitants by 2050. In order to meet such a demand for food, it is imperative to increase agricultural production by 70%! Such and similar requirements represent an opportunity for manufacturers to contribute to sustainable development by introducing new information (social, mobile, analytical, cloud) and operational technologies (sensors, communication between devices, additive manufacturing and robotics) (Davenport et al, 2021).

### 3. RESEARCH METHODOLOGY AND SAMPLE DESCRIPTION

This chapter discusses research design, methods, and sample characteristics of respondents. Secondary and primary data sources were used. Secondary sources include domestic and foreign scientific and professional literature, and relevant online bibliographic databases. This part of the research was conducted using the method of analysis and synthesis, induction and deduction, and comparative and statistical methods.



*Figure 1: Structure of activities according to the size of the surveyed enterprises (N=90)  
(Source: authors' work)*

Primary sources were obtained through empirical research conducted with an online survey questionnaire of six questions and a Google form. The survey was conducted in the period from 1 to 20 March 2023. The sample of respondents consisted of 90 managers (owners) of various small and medium-sized Croatian enterprises. Most of the 54 respondents come from small and 36 respondents from medium-sized enterprises. Half of all enterprises (45) are engaged in production, and half (45) in service activities (Figure 1). It follows that 13 respondents from manufacturing and 32 from *small* service enterprises took part in the survey, that is, 32 respondents from manufacturing and 13 from service *medium-sized* enterprises.

Among the manufacturing enterprises, those for paper processing, i.e. the production of electrical equipment (10 each) and for the production of foodstuffs (9) dominate. Among the service enterprises, those from the insurance industry (12), medical and dental practice (10), and land transport and pipeline transport, i.e. the organization of tourist trips (8 each) dominate.

#### 4. RESEARCH RESULTS AND DISCUSSIONS

The use of AI in Croatia was first introduced by service industries, the telecommunications sector and banking, while the manufacturing sector is chasing global achievements (Dunković et al., 2010). However, business in the 21st century is more and more complex, huge amounts of data are available that are growing at an exponential rate, and changes in the market are constant and often unpredictable. In order to be competitive in such a dynamic environment, Croatian small and medium-sized enterprises are increasingly introducing AI in order to conduct business operations more efficiently and quickly. In this part of the paper, the results of the empirical research are presented and interpreted, and the statistical processing of the data is presented.

<i>1-not at all // 2 – to a small extent // 3 – moderately // 4 – to a greater extent // 5 – to an extremely large extent</i>						
<b>CLAIM (dimension)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>AM</b>
It saves time and resources.	0	0	7	60	23	4,18
It gives the highest return for invested money.	3	6	22	42	17	3,71
Uses logical thinking without emotion.	4	7	33	38	8	3,43
Performs tasks without interruption.	0	1	18	62	9	3,88
It enables workers to focus on important business segments and on creativity	3	7	11	50	19	3,83
Contributes to business optimization.	2	8	13	49	18	3,81
It improves production and service processes.	1	1	4	58	26	4,19
It reduces risks and uncertainty.	1	3	28	47	11	3,71
It enables expansion into new markets.	3	16	25	38	8	3,36
Develops and creates new products and services.	7	16	25	35	7	3,21
It enables the personalization of products and services.	4	11	19	44	12	3,54
Improves user experience.	2	8	13	50	17	3,80
Contributes to marketing activities.	0	1	16	64	9	3,90
Contributes to increased sales.	0	1	15	65	9	3,91

*Table 1: The level of influence of AI on individual business dimensions (N=90)  
(Source: authors' work)*

The purpose is to determine the importance of introducing AI into business processes as well as the possibilities that cognitive technology provides for building the competitiveness. In addition, authors want to determine the level of management satisfaction with the profitability of integrated forms of AI in business processes. The results showed that all involved enterprises use some form of cognitive technologies in their operations. Table 1 shows the levels of impact of AI on selected business dimensions, i.e. on processes, employee work and user experience. Respondents expressed their level of agreement with the statements about the influence of AI for each dimension using a Likert scale, with grades from 1 (not at all) to 5 (to an extremely

large extent). As the arithmetic mean (AM) shows, the greatest impact and benefits of applying AI in business are reflected in "improvement of production or service processes" (AM=4.19), "saving time and resources" (AM=4.18) and "contribution to increase in sales" (AM=3.91). This is followed by benefits such as "doing work without interruption" (AM=3.83). It is interesting that this last-mentioned benefit, in the form of enabling workers to focus, is noticed more by respondents from manufacturing and less from enterprises in service industries. AI has an extremely strong impact on KPI's of enterprises in the segment of beverage and electrical equipment production due to "time and resource savings", "work performance without interruption", but also "improvement of production processes". In the field of service provision, all enterprises within the financial sector of insurance and health care and social welfare, recorded an extremely strong impact of AI on "reducing risk and uncertainty", with a simultaneous "increase in sales". At the same time, it was confirmed that AI has at least a *moderate impact* on the remaining dimensions of the operations of all examined small and medium-sized Croatian enterprises. These results pretty much correspond to the Deloitte enterprise's research that was conducted in year 2017. The connection of cognitive technologies with business results and goal achievement in 250 enterprises that implemented them was established (Davenport et al., 2017). In 51% of them, AI integration improved business features and functions and/or decision performance. In 36% of enterprises, AI optimized internal business operations and freed workers from monotonous (repetitive) tasks, so they could devote themselves to a creative approach to their work and more demanding processes. By applying cognitive technology in 35% of the included enterprises, it was determined that better decisions were made, while in 32% of them the quality of the product improved. In 22% of enterprises, the number of employees was reduced due to process automation. Furthermore, within the framework of the authors' empirical research, the respondents, based on their experiences and attitudes, also using a Likert scale with grades from 1 (do not agree at all) to 5 (completely agree), expressed the degree of agreement with certain claims about profitability, i.e. the effects of the AI application on the development and financial indicators of the enterprises surveyed and on user satisfaction (Table 2). Based on the personal experiences of the respondents, it appears that a convincing majority "agree" (50) or "strongly agree" (29) that their small and medium-sized enterprises achieved "better financial results and increased customer satisfaction" by applying AI (AM= 4,10). There is also solid agreement with the claim that the application of cognitive technology "made a bigger profit, which made it possible to invest in other, less developed business segments" (AM=3.51). As many as 53 respondents "agree" with this, and 12 of them "completely agree". It is positive that in the minority are those enterprises that have only "covered the costs of applying AI but are still waiting for an increase in profits" (AM=2.58). When it comes to the respondents' personal opinions, the results show that a convincing majority "agree" (56) or "completely agree" (28) that "AI will continue to develop rapidly" (AM=4.24).

*Table following on the next page*

1 – <i>I strongly disagree</i> // 2 – <i>I disagree</i> // 3 – <i>I am not sure</i> // 4 – <i>I agree</i> // 5 – <i>I strongly agree</i>						
CLAIM	1	2	3	4	5	AM
<i>Personal experiences</i>						
By applying AI, a higher profit was achieved, which enabled the development of other business segments.	7	17	1	53	12	3,51
The costs of AI integration are covered, but we are still waiting for an increase in profits.	11	52	0	18	9	2,58
By applying AI, better financial results were achieved and user satisfaction increased.	1	7	3	50	29	4,10
<i>Opinions</i>						
Applying AI in business is expensive.	15	47	1	10	17	2,63
The AI introduction is essential for business expansion.	1	3	9	55	22	4,04
AI will continue to develop rapidly.	0	0	6	56	28	4,24
Enterprises that do not implement at least some AI form can expect very negative implications.	3	5	10	51	21	3,91

*Table 2: Experiences and opinions of the respondents on the effects of the AI application on the operations and finances of the surveyed enterprises and on user satisfaction (N=90)  
(Source: authors' work)*

A high level of agreement is also noticeable with the statement that the AI application is "key to the expansion of business" (AM=4.04). As many as 55 respondents "agree" with this, and 22 of them "completely agree". In case of the absence of application of at least one of the different AI forms, the opinion of the majority of respondents is that small and medium-sized Croatian enterprises can "expect very negative implications" in the future (AM=3.91). The attitude of the majority of respondents is indicative that the AI integration "is not an expensive process" (AM=2.63). Only 10 respondents "agree" with that and 17 of them "completely agree".

## 5. CONCLUSION

AI is based on the idea that the human intellect can be modeled and simulated on a computer. The megatrend of AI expansion is rapidly taking precedence in a technologically connected world. As a powerful driver of innovation, AI generates increasingly radical changes in the activities of all industrial sectors, but also in the ways of communication and people's lives in the digital age. Considering that for information processing, artificial intelligence and robotics use algorithms and computer models in a way similar to human thinking, there have already been dramatic changes in Croatian entrepreneurship and the labor market. The rapid increase in the value of the AI market is enhanced by the efforts of enterprises to keep up with the development and application of cognitive technologies. Among other obstacles that could slow down the progress of AI are legal regulation (especially when it comes to the data that this technology uses) and energy. The question is whether there will be enough energy for all AI ambitions, and regulation will only matter to the extent that it is consistently enforced. This paper fulfilled the goal because the importance of integrating AI into business processes was determined. The benefits that this technology provides for achieving better financial indicators and increasing the satisfaction of users of the products and services of 90 examined Croatian small and medium-sized enterprises have also been identified. The results of the empirical research showed that all surveyed small and medium-sized enterprises use some form of AI.

The greatest impact of the AI application in organization is reflected in "*improvement of production or service processes*" (93%) and "*saving time and resources*" (92%). When it comes to effects, a convincing majority of enterprises achieved "*better financial results and increased user satisfaction*" (88%). Based on personal views, 93% of respondents concluded that "artificial intelligence will continue to develop rapidly", that is, that the application of this technology is "key to the expansion of business" (86%). The opinion of a third of respondents is indicative that the application "is not an expensive process" (33%). In case of the absence of application of at least one of the various forms of artificial intelligence, the opinion of 80% of respondents is that such small and medium-sized Croatian enterprises can expect "very negative implications" in the future. The limitations of this research derive from the relatively small sample of respondents (N=90). In addition, there is a lack of information on the phases of business as well as on the specific forms of AI that the examined small and medium-sized Croatian enterprises applied. Also, three fifths of respondents are from service enterprises (60 percent). Although the mentioned limitations do not reduce the relevance of this survey, the results should be taken more as an orientation and not as a basis for making general conclusions. Nevertheless, the results are sufficiently indicative and credible for a better understanding of the level of application and effects of artificial intelligence on the operations of small and medium-sized Croatian enterprises. Therefore, this topic should be expanded in the future through different methods of empirical research on a larger, more complex and more deeply dispersed sample.

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## THE USE OF CYBER SECURITY IN COMBATING MARITIME PIRACY AND TERRORISM

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### **ABSTRACT**

*This article provides a thorough examination of cybersecurity concerns in the maritime sector, emphasizing the increased susceptibility resulting from the growing digitization and interconnectedness in marine activities. The report emphasizes the crucial importance of modern technology and cybersecurity frameworks in protecting marine infrastructure, with a specific focus on addressing maritime piracy and terrorism. The study explores different automated maritime systems, including the Automatic Identification System (AIS), Electronic Chart Display Information System (ECDIS), and Global Maritime Distress System (GMDSS), clarifying their two-fold functions in enhancing operating efficiency and ensuring cybersecurity. The importance of aligning global legislation and domestic policy is stressed in order to efficiently address cyber threats. The research further analyzes several cyber-attack vectors, such as malware, ransomware, phishing, and Denial of Service (DoS) assaults, elucidating their possible consequences on marine operations. Examining case studies of effective cybersecurity implementations in autonomous shipping and the incorporation of global cybersecurity frameworks offer practical perspectives on the utilization of strong cyber defense measures. The report promotes the establishment of a robust cybersecurity culture in the marine sector, highlighting the significance of thorough risk management and the incorporation of advanced technologies like AI, machine learning, and blockchain. The conclusion highlights the continuous requirement for the marine industry to adapt its cybersecurity strategy in order to address the ever-changing nature of cyber threats.*

**Keywords:** *Maritime Cybersecurity, Digital Maritime Operations, Cyber Threat Management, Autonomous Maritime Systems, International Maritime Regulations*

### **1. INTRODUCTION**

With the maritime industry's advancement into the digital era, cybersecurity has become a crucial concern due to the rising frequency of cyber-attacks that take advantage of the interconnectivity of contemporary marine operations. The increased use of digital technology and connection in the marine industry has made it more vulnerable to cyber threats. This includes important systems like navigation and communication, which may be targeted by advanced cyber attacks. The studies conducted by Hemminghaus et al. (2021) and Jacq et al. (2019) highlight the increased vulnerability of ship management systems and operational technology, which serve as major pathways for possible breaches. The marine industry, although making progress in improving effectiveness and implementing automated processes, is confronted with the challenging objective of safeguarding its technical boundaries from the simultaneous risks of piracy and terrorism. The Automated marine Systems are essential for both the daily operations and the cybersecurity framework of marine activities. The Automatic Identification System (AIS) and IT Network Systems have a double function: improving operational efficiency and strengthening protection against unauthorized intrusions. Nevertheless, there are discrepancies between international principles and country laws and practices regarding cybersecurity. The regulatory frameworks, as examined by Hopcraft and Martin (2018), impact the response to these growing difficulties, yet there is still a discrepancy in the successful implementation of these regulatory measures.



The marine sector is particularly susceptible to cyber-attacks since it heavily relies on a multitude of intricate and linked systems. If these systems are breached, it can result in significant ramifications such as the relinquishment of vessel control, disruption of trade channels, and the disclosure of sensitive data. The many forms of cyber-attacks, which include malware and denial of service, provide a wide-ranging danger environment that necessitates a complex and varied security approach (Martin and Hopcraft, 2022). With the ongoing progress in technology, the marine sector must also adapt its cybersecurity strategies. The incorporation of AI, machine learning, blockchain, and sophisticated encryption into marine IoT systems highlights the industry's dedication to safeguarding its digital and operational infrastructure. However, the use of these technologies must be supported by a similar advancement in the cybersecurity culture within the marine industry. Maritime operations must prioritize the use of cutting-edge technology and cultivate a cybersecurity culture that stresses continuous awareness, readiness, and flexibility to effectively combat the constantly shifting cyber threats. A robust culture, bolstered by thorough risk management and resilience measures, will serve as the foundation for the marine sector to safeguard its operations against the many threats posed by cyber piracy and terrorism.

## 2. CYBERSECURITY CHALLENGES IN MARITIME DOMAIN

The marine industry has distinct issues for cybersecurity. The increasing digitalization and connectivity in the marine industry heighten susceptibility to cyberattacks. Advanced cyber threats, including ransomware, phishing, and other types of assault, can specifically target critical infrastructure, such as navigation and communication systems. Research conducted by Hemminghaus et al. (2021) and Jacq et al. (2019) highlights that ship management systems and operational technologies are significant areas of susceptibility.

Systems	Use
Automatic Identification System (AIS)	- Vessel traffic monitoring and assistance - Avoid a collision - Notify ports and maritime authorities of the ship's location - Calculate the distance between the ship and the other ships - Ensure sea safety by monitoring traffic - Accident investigation and search and rescue operations
Electronic Chart Display Information System (ECDIS)	- Collect and combine data from electronic navigation sensors - Shows the position of the ship in real time
GPS and GNSS	- Displays the position of the ship - Displays the speed - Displays the route and time
Radar	- Provides information about the ship's surroundings - Detection of the position and speed of objects
Global Maritime Distress System (GMDSS)	- Broadcast the distress messages related to safety issues - Sending and receiving critical safety alerts
Global Industrial Control Systems (ICSs)	- Assist in reducing human errors - Increase resource productivity - Extend the life of the equipment - Control and monitor parameters on board a ship
Very Small Aperture Terminal (VSAT)	- Uses a satellite network to send and receive data - Offer a variety of communication and security services
Propulsion and machinery management and power control systems	- Monitor and regulate onboard machinery - Monitor and regulate propulsion - Monitor and regulate steering
Video Surveillance System	- Monitor transport operations in large storage areas - Monitor transport operations in large vessels
IT Network Systems	- Used for internal/external processes to send, receive, and store data - Used for crew welfare - Used for crew personal devices (BYOD)

*Table 1: Utilizing Automated Maritime Systems to Enhance Cybersecurity Measures against Maritime Piracy and Terrorism*

(Source: Akpan, F., Bendiab, G., Shiaeles, S., Karamperidis, S., Michaloliakos, M. (2022). *Cybersecurity Challenges in the Maritime Sector. Network*, 2, 123–138.)

In addition, rules and frameworks, as examined by Hopcraft and Martin (2018), have a significant impact on determining how these difficulties are addressed. Nevertheless, there exists a disparity between the current regulatory measures and their actual implementation. The aim is to achieve a harmonious alignment between international norms and national policies and practices. The Table 1 provided outlines a set of sophisticated automated maritime technologies that play a crucial role in the cybersecurity tactics used to address maritime piracy and terrorism. The Automatic Identification System (AIS) has a double function: it enhances navigational safety and acts as a watchful monitor, following vessel movements and deterring unlawful approach, so reducing piracy and terroristic intrusions. AIS facilitates prompt reaction in case of a security breach or illegal behavior by monitoring and informing maritime authorities about a ship's whereabouts. The Electronic Chart Display and Information System (ECDIS) enhances cybersecurity by integrating data from different sensors in real-time. This allows for the identification of unauthorized vessel movements, which may indicate potential threats or illicit activities. ECDIS may utilize its accuracy and ability to operate in real-time to implement geofencing, which involves establishing virtual boundaries. These boundaries can be used to detect potential security breaches when they are crossed. GPS and GNSS systems guarantee precise location information, therefore ensuring that vessels adhere to designated secure routes, thereby circumventing high-risk regions notorious for piracy or terrorism. The speed and route data can activate warnings in case of deviations, requiring fast inquiry and response, which is crucial in reducing risks related to marine security concerns. Radar systems expand the defensive perimeter surrounding a ship, providing timely identification of possible dangers coming, which is essential for taking defensive actions against pirate or terrorist assaults. The capacity to perceive the velocity and proximity of objects enables a deliberate reaction to dubious actions in the neighborhood of a vessel. The Global Maritime Distress System (GMDSS) is crucial for expeditiously disseminating distress signals pertaining to security breaches, facilitating a synchronized reaction to imminent hazards. This technology is crucial for preserving an essential means of communication during piracy or terrorism occurrences. Industrial Control Systems (ICSs) enhance the ship's operating parameters, minimizing the probability of human mistake that may jeopardize the ship's security. A vessel that is efficient and well monitored is less susceptible to hijacking or sabotage, since its systems may be remotely immobilized or manipulated in response to a security risk. The presence of Very Small Aperture Terminal (VSAT) devices highlights the need for strong and secure communication channels to communicate critical information and coordinate counter-piracy efforts. Secure satellite communications are essential for preventing eavesdropping and maintaining the integrity of key communications, which are crucial for anti-piracy and anti-terrorism activities. Propulsion, machinery management, and power control systems, which are equipped with cybersecurity protections, play a crucial role in preventing the unauthorized operation of essential ship systems. By implementing robust security measures to protect these systems from external influence, they serve as a deterrent against the technical components of maritime piracy and terrorism. Video Surveillance Systems bolster the physical security of a vessel, enabling immediate surveillance and prompt response to unwanted entry or suspicious activity that may indicate piracy or terrorist acts. IT Network Systems are responsible for establishing the digital framework required to securely transmit operational data and information. Ensuring the security of these networks is of utmost importance, since malicious actors like as cyber criminals or terrorists may seek to exploit weaknesses in order to obtain sensitive information, disrupt normal operations, or gain unauthorized control of the vessel. These automated solutions are essential components of a comprehensive cybersecurity strategy in the marine sector. By incorporating advanced surveillance and management technology alongside robust cybersecurity measures, marine vessels are strengthened against the diverse range of risks presented by contemporary piracy and terrorism.

The improved understanding of the situation, fast communication, and regulated operational conditions offered by these systems are crucial in anticipating, recognizing, and addressing security risks in maritime settings, thereby making a significant contribution to the safety and security of worldwide maritime operations. Kalogeraki et al. (2018) highlight the need of adopting comprehensive strategies to evaluate and reduce cyber threats in the context of risk management. Methods for enhancing cyber resilience encompass the establishment of resilient early detection systems, the deployment of sophisticated protection technology, and the ongoing education of personnel on cyber security.

## 2.1. Nature of Cyber Threats in Maritime Piracy and Terrorism

The marine industry encounters several intricate cyber risks that impact the safety and effectiveness of its operations. The attacks in question especially aim at crucial ship systems and port infrastructure, resulting in severe ramifications such as loss of ship command, interruption of trade routes, and compromising of critical data. The nature of these threats include a range of activities, including advanced assaults targeting data theft and espionage, as well as destructive actions intended to disrupt operations or cause bodily harm (Chang, Shi, Park, 2019). Gaining a comprehensive understanding of these dangers is crucial for formulating efficient measures to safeguard and enhance the resilience of the marine industry.

### 2.1.1. Types of Cyber Attacks

Cyber risks in marine security encompass a diverse range of attack categories, each characterized by distinct techniques and objectives. Hopcraft et al. (2023) state in their study "Developing a maritime cyber safety culture: Improving safety of operations" that the threats in question encompass a variety of cyber attacks, including ransomware, which is a form of malicious software that restricts access to a computer system until a payment is made, and phishing attacks, where attackers impersonate a reliable entity to obtain sensitive information. Such attacks can cause substantial disruptions to marine activities, compromising the safety and effectiveness of the maritime industry. This study highlights the significance of acknowledging and becoming ready for various cyber threats in order to sustain operational integrity and security in the marine environment.

Tactic	Description
Malware	Any malicious software designed to harm or exploit any programmable device, service, or network.
Ransomware	A type of malware that encrypts victims' information and demands payment (usually in Bitcoin) in return for the decryption key.
Phishing	A method of social engineering used to trick people into providing personal or confidential information. Phishing attacks commonly occur via email attachments or links.
Man-in-the-Middle (MITM)	When a hacker inserts themselves between a device and a server to intercept communications that can then be read and/or altered. Common MITM attacks include IP spoofing, DNS spoofing, HTTPS spoofing, SSL hijacking, email hijacking, Wi-Fi eavesdropping, and stealing browser cookies.
Denial of service (DoS) or distributed denial of service (DDoS)	An attack that attempts to disrupt normal web traffic and take targeted websites offline by flooding systems, servers, or networks with service requests, causing them to crash. A DDoS attack is launched from several host machines that are infected by malicious software controlled by the attacker.

Table 2: Cyber attack vectors

(Source: Malone, I., Strouboulis, A. (2021). *Emerging risks in the marine transportation system (MTS)*. The George Washington University.)

The Table 2 offers a concise yet thorough summary of the common strategies used by cyber adversaries to infiltrate digital systems in the marine sector. The approaches are classified into five separate categories, each with a particular mode of operation.

### *2.1.2. Vulnerable Maritime Systems*

The marine sector is highly dependent on intricate and linked systems, rendering it especially susceptible to cyber assaults. Kalogeraki et al. (2018) have highlighted many systems that are crucial for marine operations, such as navigational equipment, communication networks, and port infrastructure, as stated in their study on "Knowledge management methodology for identifying threats in maritime/logistics supply chains." The paper emphasizes that the penetration of these crucial systems might result in substantial disruptions in marine logistics and supply chains, hence impacting global trade and security. The susceptibility of these systems is worsened by their growing dependence on digital technology, which, while enhancing effectiveness, also creates new opportunities for assaults. To tackle these risks, it is necessary to have a thorough comprehension of the marine logistics ecosystem and to create strong cybersecurity strategies that are specifically designed to meet the distinct requirements of the maritime industry.

### *2.1.3. Case Studies of Cybersecurity Breaches*

Examining instances of cybersecurity breaches in the marine sector offers useful insights into the tangible consequences of these threats. For example, the cyber-attack on the Maersk shipping line in 2017 serves as a clear illustration of the seriousness of these dangers. This assault caused substantial interruptions to operations and resulted in huge financial losses. These case studies illustrate that cyber-attacks can result in both immediate operational interruptions and significant repercussions on the worldwide supply chain. They emphasize the significance of strong cybersecurity protocols and the necessity for ongoing alertness and adjustment to developing cyber risks in the marine sector. Examining these occurrences aids in comprehending the tangible obstacles and in formulating enhanced cybersecurity tactics.

## **2.2. Cybersecurity Frameworks and Regulations**

The marine industry, known for its global scope and dependence on intricate technical systems, requires a strong framework of cybersecurity rules. The International Maritime Organization (IMO) plays a crucial role in the context of effective maritime cybersecurity regulation, as emphasized by Hopcraft and Martin (2018) in their article "Effective maritime cybersecurity regulation – the case for a cyber code." The authors advocate for the immediate necessity of the International Maritime Organization (IMO) to establish strong and durable cybersecurity legislation. They propose the adoption of a distinct Cyber Code, drawing inspiration from existing IMO Codes like the Polar Code. The proposed Cyber Code aims to tackle the distinct cybersecurity obstacles encountered by the marine sector, utilizing insights gained from existing regulatory frameworks and customizing them to suit the maritime environment. Implementing such a code would guarantee the ongoing security and effectiveness of the marine industry in light of cyber risks. The proposal by Hopcraft and Martin (2018) highlights the significance of global cooperation and the necessity for a thorough, legally enforceable mechanism to safeguard the marine industry from cyber risks. The establishment of a Cyber Code would signify a substantial advancement in unifying international maritime cybersecurity standards and procedures, hence strengthening the overall ability of the marine sector to withstand cyber assaults.

### *2.2.1. International Maritime Organization (IMO) Guidelines*

The International Maritime Organization (IMO) has been instrumental in developing guidelines to enhance maritime cybersecurity. These guidelines aim to safeguard ships and port facilities from cyber threats, recognizing the increasing reliance of the maritime industry on technology. The IMO emphasizes the need for comprehensive risk management approaches, incorporating cybersecurity into the safety management systems of ships. The guidelines advocate for regular assessments, robust protection measures, and response plans to effectively mitigate cyber threats. The implementation of these guidelines is crucial for the global maritime community, ensuring consistent practices in cybersecurity across different nations and regions. The role of the IMO in establishing these guidelines demonstrates the importance of international cooperation and standardization in addressing the complex challenges of maritime cybersecurity.

### *2.2.2. National Cybersecurity Policies*

The study conducted by Kanwal et al. (2022) titled "Maritime cybersecurity: are onboard systems ready?" emphasizes the crucial significance of firm practices in augmenting maritime cybersecurity. These processes are essential for guaranteeing the safety of ships and crew members, as well as safeguarding the maritime environment. Company-level cybersecurity plans are enhanced by formulating policies in cooperation with stakeholders, which encompass risk management, strategy alignment, and integration with security. This entails the identification of crucial systems pertaining to safety operations and environmental protection, as well as the determination of tolerable levels of risk. The processes created in accordance with the rules of the International marine Organization must be precise, comprehensive, and encompass all facets of cybersecurity. This is essential in bolstering the resilience and strength of marine systems against cyber attacks.

### *2.2.3. Compliance and Enforcement Challenges*

The marine sector has substantial difficulties in adhering to international and national cybersecurity standards. Enforcing uniform cybersecurity standards in marine operations can be challenging due to their dynamic and global nature. Companies and ships frequently operate under distinct flags and countries, resulting in disparities in the implementation of cybersecurity protocols. Moreover, the fast progress of technology frequently surpasses legal frameworks, posing a challenge for rules to stay pertinent and efficient. To tackle these difficulties, it is essential for international regulatory organizations, national governments, and industry players to collaborate in order to establish and implement cybersecurity standards that are flexible, thorough, and universally applicable (Bradshaw and Global Commission on Internet Governance, 2017). Effective cooperation is crucial to maintain the resilience of the marine sector against ever-changing cyber threats.

## **2.3. Risk Management and Cyber Resilience**

Efficiently managing risks and cultivating cyber resilience are essential in combating cybersecurity threats in the marine industry. This entails the identification of possible cyber threats, evaluation of their impact on marine operations, and formulation of solutions to minimize them. The focus is on developing strong cybersecurity policies and plans for responding to incidents. The method encompasses the ongoing surveillance of cyber risks, frequent enhancement of cybersecurity measures, and assuring comprehensive training of all personnel in optimal procedures. These techniques are crucial for preserving the integrity and security of marine operations, safeguarding against both existing and new cyber threats.

Ensuring cyber resilience in the marine sector entails not only preventing attacks but also being prepared to promptly respond and recover from them, therefore reducing operational interruptions and economic damages.

#### *2.3.1. Risk Assessment Models*

Effective risk assessment models are vital for cybersecurity in the marine sector. Jensen (2015) highlights the necessity of developing models that thoroughly assess the probability and consequences of cyber attacks on marine activities in the article "Challenges in maritime cyber-resilience." These models should take into account the distinct susceptibilities of marine systems, such as navigation, communication, and cargo handling systems. Through comprehending these weaknesses, marine firms may formulate focused methods to alleviate risks, guaranteeing the security and soundness of their operations in the presence of advancing cyber threats. Regularly adjusting and revising risk assessment models is crucial to proactively address the constantly evolving cyber threats in the marine sector.

#### *2.3.2. Cyber Resilience Strategies*

Park, Kontovas, Yang, and Chang (2023) emphasize the significance of formulating robust cyber resilience measures in the marine industry, as shown in their research paper titled "A BN driven FMEA approach to evaluate maritime cybersecurity risks." This study highlights the importance of implementing a comprehensive framework to effectively manage cybersecurity risks. This framework should incorporate advanced approaches such as Bayesian Networks (BN) and Failure Mode and Effects Analysis (FMEA). The utilization of new analytical methodologies is vital for improving the marine sector's capacity to predict, endure, and efficiently rebound from cyber events. Maritime businesses may guarantee operational integrity and safeguard against interruptions by using these techniques. This strategy is crucial in dealing with the ever-changing and growing nature of cyber threats in the marine sector, emphasizing the necessity for ongoing adjustment and enhancement of cybersecurity measures.

#### *2.3.3. Best Practices in Cyber Risk Management*

Implementing marine cybersecurity best practices is crucial for reducing the risks associated with the growing digitalization, integration, and automation of maritime systems. With the increasing integration of information technology (IT) and operational technology (OT) on ships, the maritime sector is confronted with a larger digital and cyber vulnerability. To preserve the safety and operational integrity of ships, it is imperative to implement strong cyber risk management policies throughout this transition (Arampatzis, 2020). The implementation of efficient cyber risk management should start at the executive level, establishing a culture of cyber risk awareness throughout all levels and divisions of the firm. This strategy necessitates a comprehensive and flexible system for managing cyber risks, which is consistently in operation and assessed through efficient feedback systems. The International Maritime Organization (IMO) and the Baltic and International Maritime Council (BIMCO) have established some essential practices, which are as follows (Jones, Tam, Papadaki, 2016):

- **Recognizing the Threat Environment:** It is essential to comprehend both external and internal cyber risks to the ship. This entails acknowledging the possible hazards presented to different onboard systems and the repercussions of cyber attacks on these systems.
- **Evaluating Risk Exposure:** It is crucial to determine the probability and consequences of a vulnerability being exploited by individuals or groups from outside or within the organization. This evaluation aids in determining the order of importance of the hazards and developing a successful plan of action.

- Implementing strategies to safeguard and identify potential threats: It is important to implement steps aimed at minimizing the probability and consequences of potential exploitation of vulnerabilities. This may entail the installation of sophisticated cybersecurity software, frequent system upgrades, and personnel training initiatives.
- Developing strategies for unforeseen circumstances: It is important to create contingency plans that prioritize and address the specific cyber hazards that have been identified. These preparations are crucial for ensuring uninterrupted operations in the case of a cyber disaster.

Ensuring operational continuity is crucial while responding to and recovering from cyber incidents, and this may be achieved by utilizing the contingency plan. An expeditious and effective reaction to cyber disasters can greatly mitigate the consequences on marine operations. These recommended procedures are in accordance with the NIST Cybersecurity Framework and are essential for establishing robust operational resilience against cyber-attacks in the marine sector. With the growing adoption of marine digitalization, there is an increasing demand for immediate security awareness and visibility. This is particularly important because the operational technology (OT) environment is highly dependent on timely and accurate services. Ensuring robust cybersecurity is not just an IT concern, but rather a critical operational necessity in the contemporary marine landscape (Arampatzis, 2020).

### **3. TECHNOLOGICAL ADVANCEMENTS AND SOLUTIONS**

The marine sector is becoming more susceptible to cybersecurity risks as a result of the merging of operational technology (OT) systems with information technology (IT) systems. The incorporation of this integration, which is crucial for contemporary marine operations, has substantially heightened the vulnerabilities to cybersecurity, rendering the industry susceptible to cyberattacks. These assaults have the potential to have significant and wide-ranging effects, such as harm to health and safety, events that harm the environment, disruptions to supply chains, damage to reputation, and financial losses (Maritime Executive, 2023). The integration of cloud computing, the Internet of Things (IoT), and autonomous technologies in the marine sector has resulted in a significant rise in connectivity between operational technology (OT) and information technology (IT), hence intensifying cybersecurity vulnerabilities. Reportedly, there has been a 900 percent surge in cybersecurity events in marine operational technology (OT) systems during the past three years. This emphasizes the urgent requirement for robust cybersecurity policies. In order to tackle these difficulties, the marine sector need a thorough cybersecurity strategy that encompasses the establishment of a maritime operational technology (OT) cybersecurity initiative. The program should adhere to industry standards and best practices, with a specific emphasis on mitigating cyber threats to vital infrastructure and ensuring compliance with regulatory mandates. The process for managing cybersecurity in maritime settings entails a methodical and structured approach that incorpoes the recommendations provided by the International Maritime Organization (IMO), the U.S. Coast Guard, the National Institute of Standards and Technology (NIST), and the International Society of Automation/Electrotechnical Commission (ISA/IEC). This method encompasses the identification and evaluation of cyber vulnerabilities, the formulation and implementation of risk mitigation strategies, the deployment and resolution of these strategies, and the ongoing monitoring, maintenance, and response to evolving threats, technologies, and regulations. Proficiency in certain skills and knowledge is necessary to effectively carry out these procedures, underscoring the demand for competent security experts in the marine sector. The maritime sector encounters difficulties in deploying and sustaining cybersecurity measures as a result of limited workforce and inconsistencies in operational processes across different vessels. Engaging with an industrial cybersecurity consultant helps expedite the process of marine firms in creating thorough and efficient programs (Maritime Executive, 2023).

Ultimately, as the marine sector progresses alongside interconnected technology, it becomes crucial to safeguard operational technology (OT) and information technology (IT) systems against cyber risks. Implementing a structured approach to cybersecurity, in addition to fostering cooperation among industry stakeholders and adhering to legal requirements, is crucial for protecting the marine sector in the modern day.

### **3.1. Innovative Technologies in Maritime Cybersecurity**

The latest technological breakthroughs are essential in determining the future of cybersecurity in the marine industry.

#### *3.1.1. AI and Machine Learning Applications*

The application of artificial intelligence (AI) and machine learning (ML) in maritime cybersecurity, namely for predictive analytics and threat detection, is progressively advancing in complexity. These tools enable the thorough examination of large databases to identify trends and anomalies, enabling preventative measures against possible cyber attacks (Lee, et al., 2017). The integration of artificial intelligence (AI) and machine learning (ML) in marine logistics has brought about significant changes, particularly in areas such as network planning, trip planning, cargo optimization, and other related domains. Machine learning techniques, for example, are employed to analyze data obtained from vessel operations in order to enhance fuel efficiency and improve journey itineraries. AI and ML possess the capacity to swiftly handle and examine substantial amounts of data, rendering them indispensable instruments for bolstering marine cybersecurity. The progress made in artificial intelligence (AI) and machine learning (ML) technologies in the marine industry is a vital stride towards bolstering cybersecurity and optimizing operational efficiency. Through the integration of these technologies, the marine sector may enhance its ability to effectively handle the growing intricacy and advancement of cyber dangers.

#### *3.1.2. Blockchain for Secure Maritime Operations*

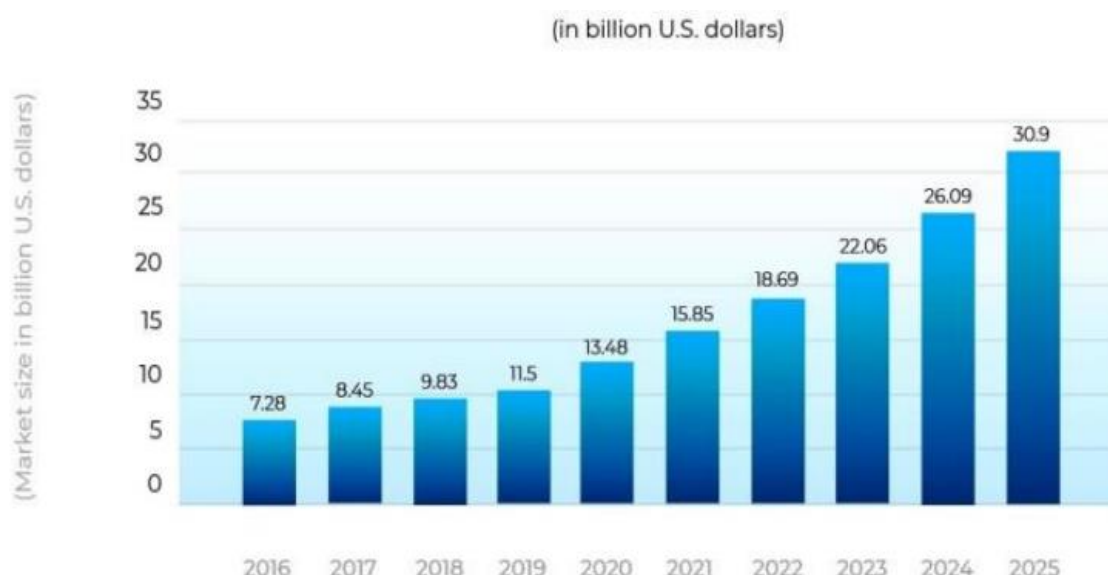
The potential of blockchain technology to change marine operations is being widely acknowledged. This technology offers a decentralized and unchangeable record, which is particularly suitable for improving transparency and security in the marine sector (Polatid, et al., 2018). According to a CSIS investigation, blockchain enables secure and efficient data interchange across ships, ports, and logistics companies, greatly reducing the possibility of data tampering or fraudulent behavior. Blockchain technology is utilized in marine operations for several important purposes such as tracking shipments, creating smart bills of lading, and implementing smart contracts. These applications help to simplify administrative procedures and minimize the delays commonly associated with conventional, manual approaches. Digitizing papers by transforming them into safe, intelligent bills of lading accelerates shipping approval procedures and diminishes the likelihood of fraudulent activities. Furthermore, blockchain technology plays a crucial role in effectively regulating the environmental consequences of transportation through the monitoring of fuel usage and optimization of space utilization. The implementation of blockchain technology within the marine industry has the potential for improved operational efficiency, less environmental impact, and a globally interconnected shipping system that is more secure and transparent (Benson and Judd, 2021).

#### *3.1.3. Advanced Encryption and Network Security in Maritime IoT Systems*

In modern marine operations, the incorporation of Internet of Things (IoT) technology has become more common. These technologies provide the ability to monitor and manage many elements of maritime activities in real-time. The integration of technology, although advantageous, also increases the range of weaknesses, especially in the field of cybersecurity



(Ben Farah et al., 2021). The fundamental significance of IoT devices in marine settings is in their capacity to collect, transmit, and analyze data instantaneously, hence enabling improved operational effectiveness and decision-making procedures. Nevertheless, this interconnection automatically makes these systems vulnerable to a wide range of cyber attacks. The dangers encompass a wide variety of risks, including illegal data access and manipulation of navigational systems. These risks have the potential to result in severe repercussions in terms of safety, environmental damage, and financial losses. Figure 1 illustrates the global IoT security market's dimensions from 2016 to 2025.



*Figure 1: The global IoT security industry is projected to grow from 2016 to 2025  
(Source: Statista.com)*

Given the awareness of these potential dangers, it is very necessary to implement strong and effective cybersecurity measures. The cybersecurity framework for marine IoT systems should include sophisticated encryption algorithms, which are crucial for safeguarding the integrity and confidentiality of data. Encryption methods, including both symmetric and asymmetric algorithms, guarantee that data sent between IoT devices and control centers is secure and cannot be intercepted or tampered with by malevolent individuals (Simonin, Brosset, Jacq, Kermarrec, 2019). Furthermore, network security methods are equally crucial. This includes the deployment of firewalls, intrusion detection and prevention systems (IDPS), and periodic security assessments. These procedures are intended to prevent unauthorized access, identify abnormal activity that suggest cyber-attacks, and rapidly reduce the impact of any security breaches. Aside from technology solutions, the human component is of paramount importance. It is crucial to guarantee that people receive comprehensive training in cybersecurity techniques and remain knowledgeable about the most recent threats. This entails frequent training sessions and drills to adequately equip them for proficiently recognizing and addressing cyber problems. Ultimately, with the increasing importance of IoT devices in maritime operations, it is imperative to give utmost importance to implementing sophisticated encryption and network security measures. This is not only crucial for operational efficiency but also essential for guaranteeing safety and security in the marine industry. According to Ben Farah et al. (2021), incorporating strong cybersecurity measures is essential for protecting these systems from the always changing cyber threats.

### **3.2. Case Studies: Successful Cybersecurity Implementations**

Case studies have shown effective deployments of cybersecurity solutions in the marine sector.

#### *3.2.1. Cybersecurity in Autonomous Shipping*

The marine sector is entering a new era of shipping with the introduction of marine Autonomous technologies (MAS), which mainly depend on automation and remote control technologies. Autonomous ships and remotely operated boats have the capacity to transform marine transport by improving efficiency, minimizing human mistakes, and decreasing operating expenses. Nevertheless, the implementation of MAS has also presented new and intricate cybersecurity obstacles. These self-governing systems depend greatly on data connectivity, navigation systems, and remote control technologies, all of which are vulnerable to cyber-attacks. The breadth of threats encompasses the unauthorized acquisition and alteration of data, as well as the takeover of ship control systems. An exemplary case study is on a prominent shipping firm that effectively executed a multi-tiered cybersecurity approach for its fleet of self-governing vessels. The plan incorporated cutting-edge encryption technologies for secure data transmission, stringent access restrictions, and ongoing monitoring systems to identify and address cyber risks. The corporation further allocated resources to provide regular cybersecurity training for its workforce, therefore ensuring that the human aspect of cybersecurity was duly addressed (MaritimeCyprus, 2020).

#### *3.2.2. Implementation of Cybersecurity Frameworks*

The adoption of extensive cybersecurity frameworks, as specified by global and domestic organizations like the International Maritime Organization (IMO) and the National Institute of Standards and Technology (NIST), has played a crucial role in enhancing the cybersecurity status of the maritime sector. An illustrative example is the implementation of the International Maritime Organization's (IMO) rules for cybersecurity aboard ships. These guidelines provide a systematic method for shipowners and operators to evaluate their existing cybersecurity condition and implement essential measures to enhance it. The framework prioritizes a risk management methodology, encompassing the identification of vulnerabilities, implementation of preventive measures, detection of incidents, response to cybersecurity events, and recovery from them. Moreover, the use of the NIST framework has demonstrated its efficacy in several marine enterprises. This framework, known for its versatility and capacity to adjust, has been customized to fulfill the particular requirements of marine operations. It offers an extensive range of standards and optimal methods that assist firms in effectively managing risks associated with cybersecurity. The efficacy of these frameworks has been proven in many circumstances, including the prevention of illegal entry into ship control systems and the reduction of the consequences of cyber-attacks on operational technology systems. Organizations that have used these frameworks have seen greater resistance to cyber attacks, improved incident response capabilities, and a more robust overall cybersecurity stance. (International Maritime Organization, 2017).

### **3.3. Developing a Cybersecurity Culture in Maritime Industry**

Establishing a resilient cybersecurity culture is essential for the efficient execution of various technology solutions:

- Training and awareness initiatives are crucial for marine personnel at all levels. These initiatives should prioritize increasing knowledge on the most recent cyber dangers and the most effective methods to minimize their impact (Lee, Y.C., et al., 2017).
- Developing and executing comprehensive cyber risk management strategies is of utmost importance.

The policies should include all facets of marine operations, including onboard systems and port operations, to ensure a cohesive approach to cybersecurity (Polatid, et al., 2018).

- Collaboration among many stakeholders, such as shipping firms, port authorities, and regulatory agencies, is vital to establish efficient cybersecurity protocols. Disseminating information and optimal methodologies can contribute to elevating the overall security level of the marine industry (Ben Farah, et al., 2021).

Essentially, the incorporation of cutting-edge technology and the development of a robust cybersecurity culture are crucial for tackling the cybersecurity issues in the marine industry. In order to safeguard marine operations against growing cyber threats, it is imperative that the tactics and solutions deployed remain dynamic and adaptive, as technology continues to advance.

#### 4. CONCLUSION

After analyzing the numerous cybersecurity difficulties encountered by the marine sector, it is clear that the business is currently at a crucial point. The convergence of escalating digitization with the enduring risks of maritime piracy and terrorism has compelled a fundamental change in the strategy towards maritime cybersecurity. This study has explored the intricate terrain of cyber threats, clarifying the diverse range of cyber-attack methods and the inherent vulnerabilities of marine systems. The incorporation of automated marine systems, as emphasized in this discussion, has two main purposes: improving operational efficiency and strengthening cybersecurity measures. The Automatic Identification System (AIS), Electronic Chart Display Information System (ECDIS), and other important technologies have become key components in the cybersecurity system, reducing risks and promoting a proactive defense against unauthorized intrusions. Moreover, the effective adoption of cybersecurity frameworks and examination of real-life examples in the marine industry have shed light on the way to provide strong and resilient maritime operations. The exemplary projects, such as those in autonomous shipping, have not only demonstrated the potential for strengthened defensive mechanisms but also highlighted the urgent requirement for continuous innovation and strategic foresight in cybersecurity operations. The aforementioned critical analysis has emphasized the need for a coherent synchronization between global laws and domestic policy. The implementation of a comprehensive cybersecurity framework, as suggested by the International marine Organization (IMO), is crucial in coordinating a unified and efficient worldwide response to the cybersecurity challenges faced by the marine sector. In conclusion, the marine sector must persist in developing and adapting its cybersecurity strategies in order to effectively traverse the perilous realm of cyber threats. In order to strengthen its cybersecurity infrastructure, it is imperative for it to utilize technology developments such as AI, machine learning, and blockchain. The development of a strong cybersecurity culture, supported by thorough risk management and resilience methods, continues to be essential. In order to navigate the digital future, the marine industry has to prioritize a cybersecurity mindset that is strong and flexible, guaranteeing the secure execution of its operations despite growing cyber threats.

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## CROATIAN CONSUMER ELECTRONIC MARKET DURING COVID 19 CRISIS

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### ABSTRACT

*ICT technology and ICT sector has crucial role in shaping global economic and business trends due to globalization movements and activities. Currently, on global level consumer electronic industry has value of more than EUR 1.000 billion with expected CAGR of more than 2% by 2028. This paper brings review of challenges which occurred during latest COVID crisis in 2019. and 2020. The study analyses the resilience of the IT sector during the COVID-19 crisis, highlighting its growth in 2021 and 2022. It further examines the performance of the top 10 companies in the Croatian IT dealer sector, emphasizing the positive correlation between GDP growth and sector performance. The impact of the pandemic on demand for IT equipment, supply chain disruptions, and the subsequent effects on the profitability of IT retail companies are thoroughly examined. Main challenge for consumer electronic industry during latest COVID crisis were lack of products availability due to difficulties in supply chains and increased demand. In 2020. Croatian consumer electronic market recorded highest sales growth in 2020 of more than 9% while GDP was decreased by more than 8%. Despite challenges posed by COVID 19 pandemic period Croatian consumer electronic industry showed significant resilience based on growth in sales which occurred after COVID Crisis period.*

**Keywords:** *COVID crisis, Croatia consumer electronic industry, inventory, profitability*

### 1. INTRODUCTION

ICT sector has very strong influence on global economy trends and ICT sector make globalization process more efficient due to transaction cost reduction. Also ITC is considered as a driver of globalization activities which are strongly integrated on global economy levels. On a global level there are several roles and activities which are important for modern world and which comes from ICT sector. Apart from integration, mobilisation, adaption and regeneration world transformation into new economic order and neo globalism is under strong influence of ICT development (Edoun, E). Based on UNCTAD research ICT sector has positive impact on economy trends through productivity improvement, innovation and efficiency increase as well as for poverty reduction. It is worth to mention that on micro level basis (firm – level) in developed countries ICT sector also has positive relationship with business performance mostly through networks and broadband. Unlike to developed countries, in developing countries ICT sector has impact on company performance through less developed technology like computers.

There are also some negative impacts of ICT sector on global world which mostly comes from security issues, data protection and loss, and usage of technology in illegal manner. Regarding environmental issues ICT sector has positive and negative impacts. Positive impact comes from production efficiency increase and climate monitoring while negative impacts are caused by CO<sub>2</sub> emission from increased IT equipment production and electronic waste disposal (UNCTAD). During recent COVID crisis, most of companies introduced remote work and work from home in order to protect employee health and to continue business process despite moving limitation. There was same situation in education sector in which lectures were held online even in primary school as well as in secondary school and on university. COVID crisis forced whole world to immediate transformation and adoption to new living and behaving model (Qekaj-Thaqi, A, 2021). Part of ICT sector relates to consumer electronic industry which is driven by global trends in ICT sector. COVID crisis and post crisis time is one of the most challenged time for consumer electronic industry. Generally, consumer electronic industry is very exposed to inventory complexities and very fast inventory obsolescence. Besides that, it is very hard to ensure inventory availability and to utilize store on efficient and appropriate level. (<https://www.relexsolutions.com/resources/top-challenges-for-consumer-electronics-retailers>). Low profit margin in consumer electronic industry force market players to be cost efficient and wrong business decision or inappropriate inventory structure could have severe impact on business profitability (<https://meanseng.com/top-5-challenges-faced-by-electronics-manufacturers/>). Demand fluctuation and problems in supply chains channels caused problems in regular ICT equipment delivery and environment for consumer electronic dealer become most challenging than ever before. After introduction, in second part of the paper brief literature review regarding consumer electronic industry and importance of IT sector in Croatia will be presented and before conclusion in third part of the paper performance drivers of top 10 players in Croatian consumer electronic industry from 2018 to 2022 will be analysed.

## 2. LITERATURE REVIEW

Consumer electronic industry has value of more than EUR 1.000 billion in 2023 with expected CAGR of 2,2% from 2023 to 2028. Almost half of the industry relates to telephones while more than 30% of total revenue is generated through online sales (Statista.com, 2023). Generally speaking, there are various risks associated with consumer electronic industry which can deteriorate company business model. Most significant risk connected with inventories are: capacity risk, single sourcing risk, supplier delays, production quality issues and inventory risk. Overcapacity can cause increased costs due to overcapacity and increased fixed costs while undercapacity will cause opportunity cost of lost sales. Capacity risk is tightly linked to supplier delays risk which is crucial for normal operation. Supplier delay risk can be mitigated by having more suppliers, having long term contract with one supplier or by holding more inventory. Inventory holding is not recommended in this industry due to high rate of obsolescence. Inventory risk which is associated with inventory holding can deteriorate financial performance in case of inventory write-off. In order to offset inventory risk managers need to take care about inventory turnover (Sodhi, M., 2007). Apart from before mentioned risks, it is necessary to mention that consumer electronic retail industry is highly competitive among market players and under constant profitability pressure. In order to increase profitability retail companies need to find out balance between inventory level, inventory turnover, final product price and customer satisfaction. For such industry it is highly recommended to implement data warehouse model which includes customer services, marketing, procurement/purchasing, inventory handling and customer relationship management in order to maintain business successfully (Habte, S, 2017). Another challenge associated with consumer electronic industry are spare parts during warranty period. It was always questionable whether is reasonable to repair the item with spare parts or to change it with new one.

Based on research from 2012 it is recommended to repair items in order to avoid overstock costs and to avoid scraping out of date inventory (Pourakbar, M, 2012). Optimum inventory level and optimum selling quantity depends on future demand and arrivals as well as of pricing scheme (Calmon, A. P, 2017). In addition optimum inventory level in particular period of time depends on total demand in that period and this inventory will be easily sold until price of new item is higher than the price of refurbished item (du Pin Calmon, A., 2015). Appropriate inventory level is not only question in IT consumer industry. Also FMCG industry face inventor turnover problem and has challenge with costs which comes from this problem. In order to reduce inventory level and stock which incurs greater costs, supply chain manages need to develop strategies with fast response toward consumers. Company main goal should be having available item on stock at the time of buying in order to increase sales and customer satisfaction or buyer will go to another store. As an alternative can be immediate transfer from alternative location or having / producing small batch which can be perfect and cheap solution for FMCG industry (Vaz, A, 2020). COVID 19 crisis which suddenly occurred in in last quarter of 2019 and first quarter of 2020 had significant influence on world's economic movements, social life as well as world's supply chains channels in almost all countries. Economic downturn caused by COVID 19 crisis was confirmed by GDP decrease of 4,9% in 2020 for OECD countries. This was the largest GDP plunge since 1962 (OECD). Since COVID crisis suddenly happened, retailer companies were not prepared for immediate reaction to mitigate supply chain disruptions. Crisis forced retailers to revise their relations with suppliers, to think about alternative suppliers and to reduce dependence on one or two suppliers. In pandemic period cash and good liquidity were driver of competitive advantage among competition. Companies which were cash rich and with good liquidity were able to accumulate additional stock and on the other hand were able to help their suppliers with negative cash flow in order to support them. During supply chain disruptions, decrease of available goods and increased demand for same goods cash rich companies were "king on the market". Apart from problems on supply chain side, customers also were forced to change their habits due to limits in moving outside their homes. This were resulted with increased demand and requests for online orders and deliveries to home address (Schleper, M. C, 2021). China as a world largest electronic devices producers had strict lockdown regulation during latest crisis. Lack of workforce in China, difficulties in logistics and increased demand for IT equipment caused delays in delivery of 40% of consumer electronics industry and 24% in automotive industry (Nayak, J, 2022). Similarly, to consumer electronics retail industry, COVID crisis also influenced food retail industry. Lack of food fear caused increased demand for home consumption goods and caused turbulences in inventory management of retail companies. On the one hand, retail companies faced inventory reduction while in the same were challenged with order difficulties and order lates caused by lockdown period. Disturbances in supply chains also caused backlogs of some produces due to late orders in the first period of lockdown period. Furthermore, food processing industry and transportation capacities were reduced by decreased workforce in order to minimise contacts and reduce corona virus spread. During COVID crisis it was very hard to expect on time delivery. Generally, COVID crisis caused following issues with supply chain and consumer behaviour: quantity order and demand patterns, reduction in suppliers' output, inventory shortages, establishment of new distribution channels (increase of online shopping), capacity constraints at distribution centres and increased delivery time. In order to respond to before mentioned challenges it was recommended to increase communication over the supply chain channel, to define alternative plans and to secure additional inventory stock. Food retailers in Germany had the opportunity for additional growth and benefit from crisis if they respond and reaction were quick and appropriate (Burgos, D. 2021). On manufacture side, Korea is one of the leading country in producing electronics components.



During latest crisis (COVID crisis) industrial sector, consumer digital services, software and IT services as well as electronic entertainment companies all have increased their share prices based on good performance (Thorbecke, W, 2021).

### 3. CROATIAN CONSUMER ELECTRONIC INDUSTRY IN PRE COVID, COVID AND POST COVID PERIOD

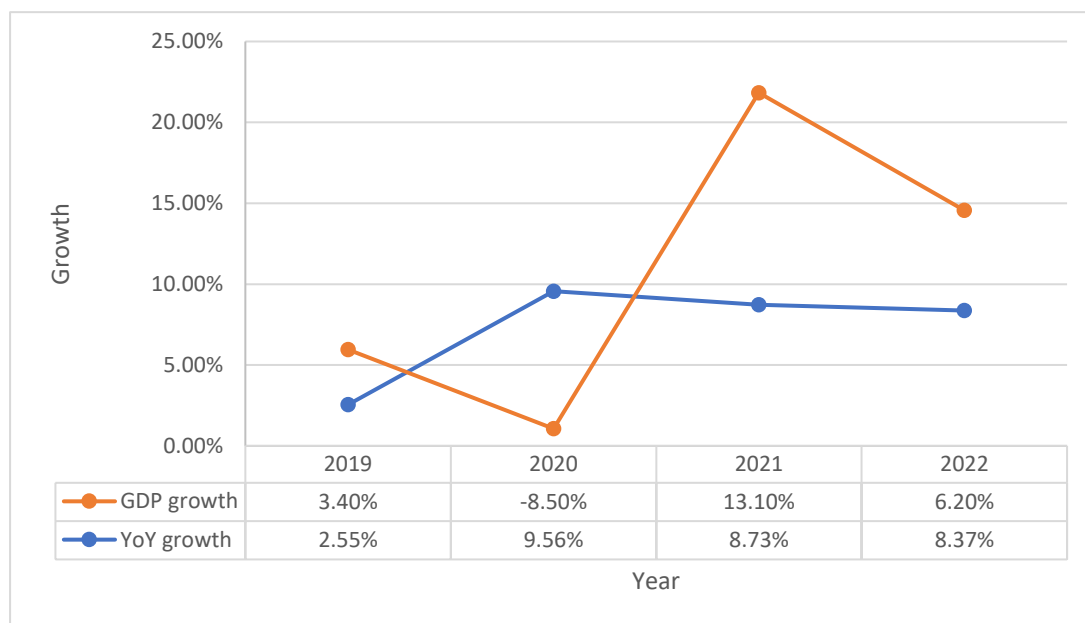
Consumer electronic industry is under significant influence of world digitalisation and digital world as well as under influence of development of IT sector. Croatian IT industry and IT sector has constant growth over last ten years. In 2019 whole Croatian IT sector recorded EUR 3,58 billion of total annual revenue with annual CAGR of 11,2% from 2014 – 2019. It is worth to emphasize that growth on export market is greater than growth on domestic market. IT sector had four-time faster growth compared to Croatian GDP in period from 2014 – 2019 and IT sector can be considered as flagship industry. There were totally more than 33 thousand employees in IT industry with an average salary which was 48% greater than Croatian average salary in 2019. Regarding IT retail companies, in 2019. There were 231 companies in total (wholesale + retail) with more than 2.500 employees. Total annual revenue in 2019 was approximately EUR 1 billion with annual CAGR of 10%. (HGK 2019). Based on data which are collected for 2021. IT Sector was very resistant to COVID crisis what is confirmed by following data. At the end of 2021 there were in total more than 6.500 companies in IT sector and from 2016 to 2021 it was 50% growth. Regarding number of employees there were almost 40.000 people which worked in IT sector which generated approximately EUR 4,2 billion of annual revenue. In period of COVID crisis when almost whole world and Croatia had BDP plunge, IT sector managed to have growth. (HGK 2021). Same trend was continued in 2022 in which IT sector has 15% of employees number growth and 10% salary growth. (HGK 2020). IT dealer companies (retail and wholesale) are considered as support of IT industry for technical equipment procurement. Based on latest available data, whole IT dealer companies sector (companies which has NACE code C26.20 Manufacture of computers and peripheral equipment) generated EUR 711 million of total annual revenue in 2022. Top 10 companies which are mentioned in table below holds 82,19% of total market in Croatia. (FINA)

Revenue in EUR mn					
Year	2018	2019	2020	2021	2022
M San Grupa	257,56	251,58	276,60	287,37	329,70
Microline	43,50	47,17	56,19	62,47	66,19
Links	29,07	31,25	43,09	48,87	45,62
Storm Computers	14,65	17,05	15,07	20,94	30,09
CS Computer	18,67	20,14	20,89	24,00	26,62
Comtel Corp	29,70	32,75	31,08	33,35	23,86
Instar center	15,45	17,50	18,58	20,23	21,13
Kodeks	12,06	14,06	12,09	18,22	14,80
Altpro	8,67	8,93	9,13	10,38	14,24
Mikronis	12,12	12,27	13,27	13,47	12,20
<b>TOTAL</b>	<b>441,45</b>	<b>452,70</b>	<b>495,99</b>	<b>539,30</b>	<b>584,45</b>

Table 1: TOP 10 IT sales companies by revenue in Croatia.

(Source: prepared by authors based on data form annual financial statements in FINA basis)

As mentioned before IT sector has significant CAGR what is also followed by growth in IT dealer sector. In 2019 growth was 2,55% while from 2020 to 2022 growth was greater than 8%. If we analyse movements of GDP and IT dealer sector in last four years it can be concluded that sector is positively correlated to GDP growth except 2020 when GDP was plunged due to COVID crisis. In 2021 GDP growth was greater than growth of IT sector mainly due to plunge of GDP in 2020 and strong economy recovery supported by government measures.

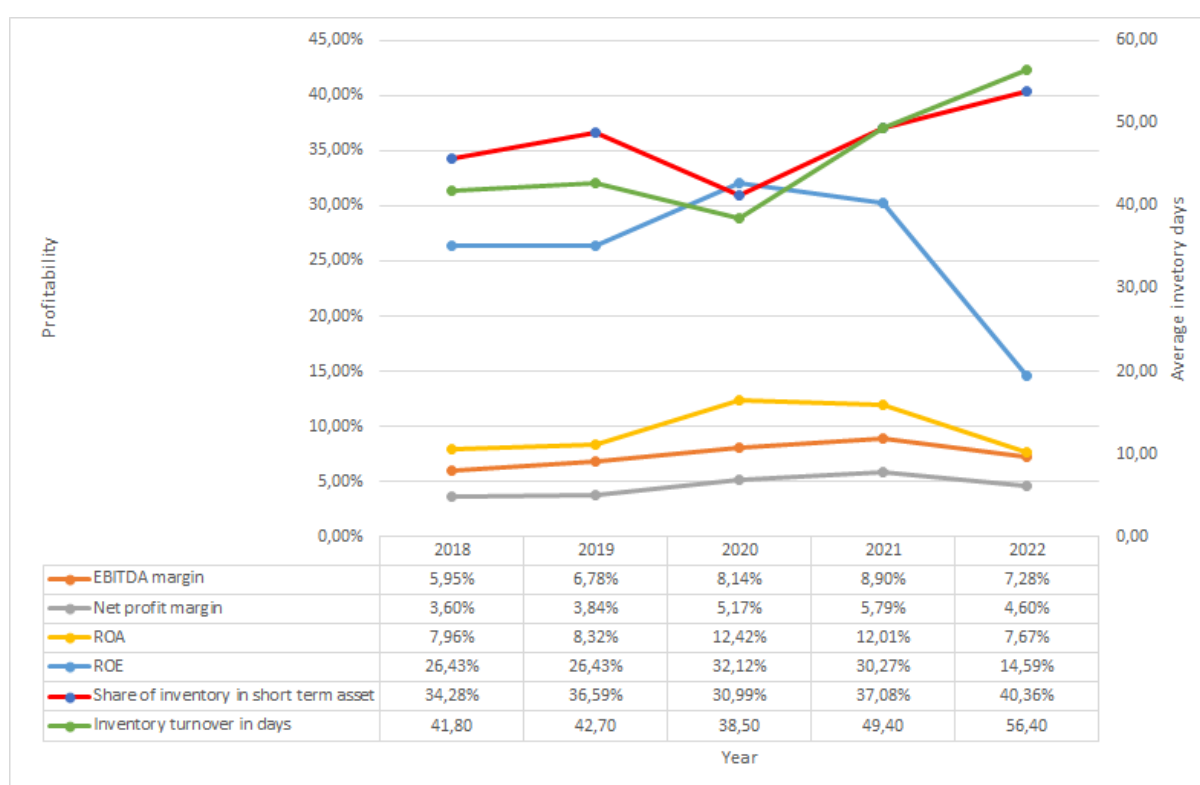


*Graph 1: GDP vs IT sales company revenue correlation*

*(Source: prepared by authors based on data form annual financial statements in FINA basis)*

It is worth to mention that in 2022 when Croatia recorded strong GDP growth of more than 6%, IT dealer sector recorded greater growth of 8,37% what can be considered as significant resilience evidence. Regarding profitability of IT dealer sector, during recent COVID crisis in 2020 and 2021 all profitability indicators were increased on average basis for top 10 companies in sector. Graph bellow shows movements of key profitability indicators and inventory turnover in days as a one of most significant activity indicators.

*Graph following on the next page*



Graph 2: Financial indicators of TOP 10 IT sales companies.

(Source: prepared by authors based on data form annual financial statements in FINA basis)

Profitability increase on IT retail sector basis during recent COVID crisis are driven by following facts:

- There were increase demand for IT equipment due to introduction of work from home business model for each possible industry / sector
- IT sector generally recorded business growth and had stronger demand for IT equipment
- Increased demand for IT equipment and in the same time lack of IT components, PCs, notebooks together with difficulties on global supply chain channels gave opportunity for margin increase in IT dealer sector
- In 2022 profitability indicators were slightly worse compared to COVID years (2020 & 2021) due to recovery of supply chains and inventory backlog from USA
- During COVID crisis inventory turnover was faster due to increase demand and after COVID crisis inventory turnover was slower mainly due to market situation stabilisation.
- There is also worth to mention negative correlation between inventory turnover and profitability what is aligned with most of articles in existing literature and this could be recommendation for IT dealers to impose Just in time delivery model or consider inventory downsize in order to increase profitability
- Inventory turnover and inventory share in short term assets are positively corelated what is signal that there is no significant changes in financial statements and business model change in top 10 companies in last five years

#### 4. CONCLUSION

ICT sector is one of the most significant sector for globalization activates and plays one of the crucial role in further globalization processes. Importance of IT sector can be observed through contribution to world development and GDP as well as through innovation process on global level.

During recent COVID crisis historical development of information technology and technology achievements of modern world enabled business process continuity in almost all service sectors in order to offset imposed lockdowns. Croatian IT sector records constant growth and strongly contributes to Croatian export and GDP for a long period of time with annual CAGR of more than 10%. Consumer electronic industry and sales of IT equipment as a part of IT sector was strongly hit by COVID crisis by increased demand for IT equipment and on the other hand by difficulties to satisfy all customer needs caused by supply chain problems. IT dealers and retailers were forced to increase their stock immediately in order to satisfy all customer requirements. It is necessary to emphasize that from 2019 to 2022 sales of IT equipment records constant growth especially in 2020 and 2021 when crisis influence was strongest. During that period top 10 Croatian IT dealers showed significantly better results in term of profitability. Inventory share in short term assets as well as inventory turnover are negatively correlated to profitability what was in aligned with most of previous studies and can be recommendation to IT dealer companies for inventory reduction in order to increase profitability. As a limitation of this research can be short time period and it would be recommended to conduct further research with longer time period which will include other macroeconomic trends like recession in 2008 and once in future global inflation which occurred in 2023.

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## THE COST-EFFECTIVENESS OF SCREENING A GENERAL POPULATION FOR CARDIOVASCULAR RISK WITH HIGH-SENSITIVITY TROPONIN-I

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### ABSTRACT

*To introduce and to estimate the effectiveness of a high-sensitive troponin-I (hsTnI) guided screening program for cardiovascular disease (CVD) and evaluate potential clinical and health economic consequences of applying this program. Existing tests for assessing the risk of cardiovascular diseases such as Framingham Heart Study in U.S. or (EURO)SCORE I and EURO(SCORE) II are not cardio-specific and they most often use only the parameters of age, gender, total cholesterol, smoking, and blood pressure. A study of asymptomatic women aged above 45 years with no specific symptoms and no confirmed or known coronary artery disease who voluntarily participated in a risk assessment and screening program for CVD in Zagreb, Woman Heart Project (WHP) was performed. Participants were stratified into three risk categories according to their hsTnI level. Subjects in the moderate and high-risk class were referred to further non-invasive cardiovascular diagnostic test and coronary angiography or PCI (Percutaneous Coronary Intervention), if required. The number of CVD events and deaths, direct and indirect costs, and quality-adjusted life years (QALY) were assessed over 10 years from a societal perspective. In the model, WHP reduced the incidence of acute CVD events by 180 per 10,000 subjects, equal to a number-needed-to-screen of 56. CVD-related mortality decreased by 40%. Screening asymptomatic female subjects with hsTnI and guiding those at higher risk to further cardiac testing, identified women with coronary artery disease and referred those at high risk to further diagnostic tests. In a cost-effectiveness analysis, this strategy might reduce the CVD related burden and mortality and would likely be cost-effective. High-sensitivity troponin-I (hsTnI) should be a part of daily preventative test for cardiovascular disease.*

**Keywords:** *cardiovascular, cost-effectiveness, high-sensitivity troponin-I, population, screening*

### 1. BACKGROUND

Cardiovascular disease (CVD) is a major contributor to the worldwide health burden and the number one cause of death globally (1), and it is expected that by 2030 this number of deaths will increase from the current 18,6 million to 23,3 million. In Europe, about 4 million people die annually from cardiovascular diseases, or 45% of all deaths.

In Croatia, CVD's are also at the top of the mortality scale, and about 22,300 people died from them in 2022, i.e. 39% of the total number of deaths. The total economic burden of CVD in the EU was estimated to €210 billion in 2015 with 53% and 21% accounted for by direct medical costs and productivity losses (2). In Croatia, although mortality from CVD has decreased over the last decade, CVD remains the leading cause of death and accounts for 48% of deaths in women and 37% in men (3, 4). The general mortality rate from CVD is higher in women than in men, and CVD in women have received special interest in the last ten years (4). Due to a wide distribution of behavioral risk factors in Croatia including tobacco smoking and low physical activity, the mortality from preventable causes in Croatia is above the EU average (5). With a share of almost 13%, CVD is the leading cause of hospitalization in Croatia with an average length of hospital stay of 7.2 days for men and 7.8 days for women (4). To decrease the burden of CVD, reliable tools are required to identify persons without known CVD who are at high cardiovascular risk and to guide those persons to lifestyle modifications or preventive medication (6-8). Several risk assessment strategies have been used based on large prospective cohort studies, such as the Framingham Heart study (9). In European countries, the SCORE (Systematic Coronary Risk Evaluation) risk calculator has been created and recently updated to estimate the 10-year risk of fatal CVD in asymptomatic individuals (10, 11). The cardiac specific protein high-sensitivity troponin-I (hsTnI) that is found detectable in over 90% of the general population (12), has proven to be the most promising biomarker for determining the individual cardiac risk (13). It has been shown that elevated hsTnI values are associated with incident fatal and non-fatal CV events, and act as an independent predictor for future CVD events (14, 15). Although hsTnI is being discussed for targeted primary prevention of asymptomatic individuals, a consensus on a uniform algorithm has not been proposed yet (13). The objective of this study is to test the effectiveness of a hsTnI guided screening program in a voluntary women health program and estimate potential clinical and health economic consequences of applying this program at a national level in Croatia.

## 2. METHODS

The Women & Heart Project (WHP) was implemented at the Institute for Cardiovascular Prevention and Rehabilitation (Srčana) in Zagreb as a voluntary program to assess cardiovascular risk in women aged above 45 years, with no specific symptoms and no confirmed or known coronary artery disease. All participants provided written informed consent an agreement in accordance with the General Data Protection Regulation of the EU and following the ethical principles outlined in the Declaration of Helsinki. Participants completed an online questionnaire about their principal characteristics, medical history, and self-reported awareness of cardiovascular risk factors. A blood sample was taken for the evaluation of laboratory parameters including hsTnI. According to their hsTnI level, participants were stratified into three risk categories: Low-risk (hsTnI <4ng/L), moderate-risk (hsTnI  $\geq$ 4 –  $\leq$ 10ng/L), or high-risk category (hsTnI >10ng/L). Subjects at low risk were discharged home without further intervention or follow-up. All subjects in the moderate and high-risk class were referred for non-invasive cardiac workup that consisted of examination by a cardiologist, electrocardiogram at rest (ECG), echocardiography, exercise ECG test and 24-hour ECG. If the left ventricular ejection fraction on the echocardiography was less than 50%, or a ST-segment depression ( $\geq$ 1mm) was observed in the exercise ECG test or 24h ECG test, subjects were referred for invasive or non-invasive coronary angiography (MSCT coronary angiography or SPECT nuclear cardiology or direct coronary angiography related to according to the findings and agreement with the patient. In subjects with significant obstructive coronary disease (narrowing  $\geq$ 50% of coronary arteries) or high-risk plaques, percutaneous coronary intervention was recommended and subsequently performed.

Subjects in the high and moderate hsTnI category with no findings in coronary angiography were considered for preventive treatment (mostly lifestyle changes, high-dose statin, aspirin or beta receptor blockers).

### 3. RESULTS

A total of 1,034 women voluntarily agreed to participate in the WHP. Mean age at baseline was 55.6 (interquartile range 49.0 – 62.0) years. Based on the online questionnaire, the prevalence of smokers was 25.0%, 26.6% had hypertension, 45.9% dyslipidemia, and 7.3% diabetes. Depending on the hsTnI-results, 921 (89.1%), 100 (9.7%), or 13 (1.3%) subjects were classified as low, moderate, and high risk, respectively. All subjects at moderate and high risk were assessed with non-invasive cardiac tests (n=113, 10.9% of all). Of these, 26 (2.51% of all) were further referred to invasive cardiac tests, of which 14 and 12 subjects fall into the moderate and high hsTnI risk category, respectively. Despite classified as low risk, one woman was referred to cardiac workup but was found negative in coronary angiography. A total of 12 (1.16% of all) subjects were eventually diagnosed with CAD, three (3.0% of women at moderate risk) and nine (69.2% of women at high risk) of whom were categorized in the moderate or high troponin risk class, respectively. In the standard strategy, 429 (95%CI 411; 445) CVD events and 89 (81; 91) CVD related deaths occurred per 10,000 subjects over ten years. In the WHP strategy, 53 (95%CI 46-56) per 10,000 screened women were diagnosed with CAD during the workup process. Compared to current practice, the incidence of CVD events was reduced by 180 per 10,000 (95%CI 177; 184) resulting in a 40% decrease of CVD related deaths. The average number of women screened to prevent one CVD event in a period of ten years was 56. The reduced disease burden led to a gain of 15.5 (95%CI 12.8; 17.2) additional QALYs per 1,000 subjects.

*Table 1: Management of subjects participating in the Women & Heart Project Zagreb.*

Troponin risk class (RC)	N	% of all	Non-invasive work-up		Invasive work-up		CAD		
			N	% of all	N	% in RC	N	% of RC	% of all
All	1034	100.0	114	11.03	27	2.61	12	1.16	1.16
Low	921	89.1	1	0.10	1	0.11	0	0.00	0.00
Moderate	100	9.7	100	9.67	14	14.00	3	3.00	0.29
High	13	1.3	13	1.26	12	92.31	9	69.23	0.87

Troponin risk class: Low (hsTnI <4ng/L) Moderate (hsTnI ≥4 and ≤10ng/L) High (hsTnI >10ng/L). Non-invasive workup: examination by a cardiologist, electrocardiogram (ECG), echocardiography, exercise ECG test and 24-hour ECG. Invasive workup: coronary angiography.

*Table 2: Current practice (CP) and Women & Heart Project (WHP).*

hsTnI risk class	CP				WHP				
	All	%	CVD	Risk, %	WHPP	CAD	Prevention	CVD	Risk %
All	100,000	100.00	4,293	4.3	10,864	531	10,333	2,488	2.5
Low	89,136	89.14	2,315	2.6	0	0	0	2,315	2.6
Moderate	10,086	10.09	1,681	16.7	10,086	238	9,848	169	1.7
High	778	0.78	297	37.3	778	293	485	4	0.5

MS: Microsimulation (n=100,000 trials)



*Table 3: CP: Current practice. WHP: Women & Heart Project. ARR: Absolute risk reduction. RRR: Relative risk reduction. NNS: Number needed to screen.*

hsTnI risk class	CP	WHP	ARR	RRR	NNS
All	0.043	0.025	0.018	0.420	56
Low	0.026	0.026	0.000	0.000	n/a
Moderate	0.167	0.017	0.150	0.901	7
High	0.373	0.005	0.368	0.986	3

*MS: Microsimulation (n=100,000 trials).*

#### 4. DISCUSSION

The WHP is the study that provides prospective observational data for using high-sensitivity troponin I for CVD risk stratification in an asymptomatic population. More than 1,000 women in Zagreb volunteered to participate in the study. Guided by the use of the biomarker hsTnI, participants were excluded or referred to cardiac testing and interventional cardiology, if required. More than 89% of enrolled women fall into the low-risk class for CVD and were excluded from further workup. In 10.6% of subjects referred to further workup, significant CAD was identified and managed, likely preventing acute cardiac event and/or CVD related death. This study confirmed the association between the hsTnI level and the cardiovascular outcome in asymptomatic women. In a trial-based cost-effectiveness model, the WHP strategy was extrapolated to the national level in Croatia. Compared to current practice, WHP reduced the number of CVD events and related deaths by 42% and 40%, respectively, which has a clear public health impact. In summary, this resulted in a statistically significant increase of 15.5 QALYs per 1,000 women over a period of 10 years. Testing women with the WHP protocol increased direct medical costs, but decreased indirect costs caused by CVD related productivity loss. The WHP was a voluntary program and women provided information in a self-reported survey prior the first laboratory test, and the accuracy and quality of cohort characteristics could not be assessed. A study suggests that voluntary screening programs tend to underestimate the disease prevalence. Whether the women who participated in the WHP are representative of the population or whether a selection bias have to be considered, is not clear. Since cost-effectiveness of the WHP strategy increases with risk, however, the results can be considered conservative. Current risk assessment tools have several limitations such as a restricted age range or the difficulty of applying such tools in regions with different baseline risk for CVD. Some limitations have been addressed by the development of the updated SCORE II to estimate 10-year CVD risk in Europe which is also recommended by the guidelines on CVD prevention by the European Society of Cardiology (ESC). However, the use of risk assessment tools is highly variable, and there is still a lack of evidence in the overall effectiveness and cost-effectiveness of risk assessment tools.<sup>8</sup> Consequently, the implementation of a uniform risk assessment tool including SCORE into routine practice is largely insufficient.<sup>8</sup> Several articles have demonstrated and discussed the usefulness of hsTnI for CVD risk assessment.<sup>14</sup> The most efficient algorithm for using hsTnI for CVD risk assessment is still subject for discussion,<sup>14</sup> and only one article is proposing a potential algorithm. We acknowledge several further limitations. Our study estimated the cost-effectiveness of applying the WHP strategy based on national figures and assumed a full coverage of the tested population, which is not realistic. This should be considered before interpreting potential effects on the national burden of CVD. As discussed, the model was not based on a controlled study, and the actual underlying CVD risk of the tested cohort compared to Croatian data is unknown. We only considered the first CVD event and did not take potential events into account that may occur after detecting CAD. Both aspects likely have an impact on all tested strategies and should be considered to finally assess the value of a new strategy.

For CVD risk reduction in our model, we only used a mean value that was informed by the efficacy of statin treatment but did not further address the actual prevention measure. All results should be interpreted against these limitations. Future studies should evaluate specific hsTnI risk assessment algorithms in conjunction with and in comparison, to established risk assessment tool.

## 5. CONCLUSION

Assessing the cardiovascular risk in asymptomatic women with hsTnI and guiding those at higher risk to further cardiac testing, identified individuals with CAD and referred those at high risk to preventive measures. This strategy could reduce CVD related burden and mortality and would likely be cost-effective in Croatia. More studies are needed to confirm these findings.

**Clinical significance:** Assessing the cardiovascular risk in asymptomatic women with hsTnI and guiding those at higher risk to further cardiac testing.

**Author's contribution:** Each author made substantial contributions to the work and interpretation of data for the work.

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## CORPORATE ENTREPRENEURSHIP AS A KEY FACTOR IN PUBLIC SECTOR REFORM IN SERBIA

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### **ABSTRACT**

*The aim of the paper is to point the role of the corporate entrepreneurship, exploring the key factors named Management support, Work discretion, Rewards, Time availability, and Organizational boundaries in the process of public sector reform in Serbia. In this study, the authors investigated the current state in 12 public organizations in domain of the key factors of corporate entrepreneurship using the Corporate Entrepreneurship Assessment Instrument. A research sample consisted of 523 respondents. Data were processed by appropriate statistical procedures using the SPSS v25. The research results confirmed the starting hypothesis. It highlights the relevance of management support as a predictor of higher creativity and financial support for new innovative project in observed companies. Statistically significant differences were identified within a reward by the female respondents assess much more important for the development of entrepreneurial organizational culture than their male respondents. The results can be a base for the model of public companies transformation that will fit the majority of public companies in Serbia.*

**Keywords:** corporate entrepreneurship, public entrepreneurship, creativity, public sector, Serbia

### **1. INTRODUCTION**

The current COVID-19 pandemic has led to a global economic and social crisis, that highlighted the importance of innovation and entrepreneurial behavior of the companies. The extended analysis on public entrepreneurship has been included 61 peer-reviewed journal articles based on six key elements: time and geographical distribution, article type, theories utilized, research themes, and methods (Mohammed et al., 2021). The results showed that they have been reasonable numbers of studies, but future researches need to focus the role of public entrepreneurship in fostering economic growth and development in localities. However, a little attention has been given to understand its role of corporate entrepreneurship in transforming public sector. By adapting the concept of corporate entrepreneurship as well as key factors, top management of the public sector have an opportunity to transform the public sector (Kearney & Meynhardt, 2016). Recently, the authors started to interpret entrepreneurial orientation as a form of corporate entrepreneurship (Covin & Wales, 2019), but it is worth to mention that predictors of entrepreneurship in the public sector may differ from those in private sector (Meynhardt & Diefenbach, 2012; Smith, 2014). This study goes in line with this research agenda. There is no generally accepted definition, but one broad definition is as follows (Kearney et al. 2009, p. 28): “[The] process that exists within the public sector organization that results in innovative activities such as the development of new and existing services, technologies, administrative techniques, and new improved strategies, risk taking and proactivity. Personal goals and objectives are less important than the generation of a good result for the state/semi-state enterprise.” The theoretical and methodological approaches used in traditional entrepreneurship research can not be applicable to public companies. It is important to understand what is happening in a public sector to show who stimulates enterprising behavior, and how enterprising processes are both developed and managed (Liddle & McElwee, 2019).

Public sector changes rapidly both nationally and internationally, thus imposing immediate adaptation of public services in an effective and efficient way (Karyotakis & Moustakis, 2014). The internal factors such as structure, rewards, decision making, culture, risk taking, and foresight as well external factors i.e. change, complexity, and munificence have been influenced corporate entrepreneurship in public sector (Kearney et al., 2008). The previous study has been embodied four public organizations in Serbia (Kontic&Vidicki, 2016), but became longitude study financed by Government of Vojvodina approved the implementation of CEAI in Serbian context (Kontic et al., 2017). Kuratko et al. (2014) stress that this instrument might show at what extent an organization would successfully implement an innovative strategy, highlighting the areas of the internal work environment that should be improved in future. The first author of this paper got the written permission for use CEAI instrument by Kuratko et al. (2014). In this study, the authors investigated the current state in 12 public organizations in domain of the key factors of corporate entrepreneurship using the Corporate Entrepreneurship Assessment Instrument, also known as the CEAI (Hornsby et al., 2002). This is an instrument that can facilitate the enhancement of the crucial role that employees should play in the process of organizational changes i.e. transformation process.

## **2. RESEARCH CONTEXT**

The Serbia is a case in point. First reason is that Serbia is in an European Union access process. Second reason is that Serbia is one of Western Balkan countries, along with Montenegro, Bosnia and Herzegovina, The North Macedonia, Albania. Third reason is specific environment regarding the social ownership and transition to market economy. The public sector reform is the high priority of the Government of the Republic of Serbia. This process has been started in 2014 when a strategic framework, included the Public Administration Reform Strategy and the Action Plan, had been adopted. The changes include about 500,000 employees (Public Administration Reform, 2022). The coordination body in domain of public sector reform in Serbia is the Ministry of Public Administration and Local Self-Government.

The public sector reform includes the following activities (Public Administration Reform, 2022):

- Optimizing the number of employees
- Reform of labor relations and salary system
- Human resources management and professional development
- Reform of the administrative procedure
- Reform of the inspection service system
- Reform of the local self-government system
- Improving transparency of administration.

The main characteristics of public sector in Serbia are low efficiency along with high costs, comparing to quality and the extend of services. The organization of public sector has not been changed although the society had gone thought significant changes. To measure the preconditions and the actual implementation of reforms and subsequent outcomes in Serbia, The Methodological Framework for the Principles of Public Administration has been used (OECD, 2019). The framework is composed of 52 indicators, that is assessed on scale from 0- the lowest value to 5 - the highest value, 340 sub-indicators and 1,000 individual criteria (OECD&SIGMA, 2021). The current state in public sector reform is presented in Table 1.

Thematic field/Indicator	Points 2021	Change from 2017
<b>1. Strategic Framework of Public Administration Reform (PAR)</b>		
1.1. Quality of the strategic framework of public administration reform	8/23	-4
1.2. Effectiveness of PAR implementation and comprehensiveness of monitoring and reporting	2/15	-1
1.3. Financial sustainability of PAR	0/10	-2
1.4. Accountability and co-ordination in PAR	3/16	-5
<b>2. Policy Development and Co-ordination</b>		
2.1. Fulfillment of critical functions by the centre-of-government institutions	12/16	+3
2.2. Fulfillment of European integration functions by the centre-of-government institutions	11/18	-5
2.3. Quality of policy planning	22/39	+11
2.4. Quality of policy planning for European integration	4/16	-3
2.5. Quality of government monitoring and reporting	9/25	+1
2.6. Transparency and legal compliance of government decision making	11/20	+1
2.7. Parliamentary scrutiny of government policy making	17/24	+4
2.8. Adequacy of organization and procedures for supporting the development of implementable policies	3/12	-3
2.9. Government capability for aligning national legislation with the European Union <i>acquits</i>	6/17	-3
2.10. Evidence-based policy making	14/28	-2
2.11. Public consultation on public policy	14/41	-4
2.12. Consultations with Ministries on public policy	13/21	+2
2.13. Predictability and consistency of legislation	9/13	+2
2.14. Accessibility of legislation	14/16	+4
<b>3. Public Service and Human Resource Management</b>		
3.1. Adequacy of the scope of public service	11/13	+4
3.2. Adequacy of the policy, legal framework and institutional set up for professional human resource management in public service	14.5/27	+3
3.3. Meritocracy and effectiveness of recruitment of civil servants	30/50	+7
3.4. Merit-based termination of employment and demotion of civil servants	7/18	-2
3.5. Merit-based recruitment and dismissal of senior civil servants	32/57	+7
3.6. Fairness and competitiveness of the remuneration system for civil servants	14/22	+7
3.7. Professional development and training for civil servants	27/42	+1
3.8. Quality of disciplinary procedures for civil servants	13/18	+2
3.9. Integrity of public servants	15/24	+1
<b>4. Accountability</b>		
4.1. Accountability and organization of central government	14/40	+6
4.2. Accessibility of public information	21.5/30	+0.5
4.3. Effectiveness of scrutiny of public authorities by independent oversight institutions	42/61	+3
4.4. Fairness in handling of administrative judicial disputes	27/40	+1
4.5. Functionality of public liability regime	6/12	=
<b>5. Service Delivery</b>		
5.1. Citizen-oriented service delivery	58/86	+13
5.2. Fairness and efficiency of administrative procedures	15/18	+4
5.3. Existence of enablers for public service delivery	13.5/24	+6.5
5.4. Accessibility of public services	15.5/24	+8.5

*Table 1: The state of public sector reform in Serbia  
(Source: OECD & SIGMA (2021))*

Comparing data from 2017 with 2021, the major decrease has been evidenced in domain of strategic framework of reform. The results of Policy Development and Co-ordination have been twofold. The positive trend of the public sector reform in Serbia has been noticed in service delivery and human resource management. The possible guidelines for transformation of the public sector may be as followed (Veselinovic, 2014):

- Establish the corporate entrepreneurship into public sector,
- Public-private partnership, and
- The combination of aforementioned two models.

In this paper, we present the study that goes in line with first strategy - incorporating entrepreneurship into public companies.

### **3. RESEARCH METHODOLOGY**

The aim of the paper is to stress the role of the corporate entrepreneurship, exploring the key factors named Management support, Work discretion, Rewards, Time availability, and Organizational boundaries in the process of public sector reform in Serbia.

Main proposition of this research was:

- $H_0$ : The key factors of corporate entrepreneurship have positive effect on creativity and innovation as accelerators of the public sector reform in Serbia.

Other propositions were the followed:

- $H_1$ : The key factors of corporate entrepreneurship are predictors of higher financial support for the public sector transformation.
- $H_2$ : There are significant gender differences in assessment the key factors of the corporate entrepreneurship in Serbia.

The research instrument was the original CEAI translated into Serbian language. Authors of original questionnaire gave the author of this study written permission for use (See Apendix 1). Respondents were asked to indicate their current views of their organizations on a Likert scale ( i.e. from 1 - disagree strongly to 5- agree strongly). The research took place during March to June 2021 in organizations' facilities. The survey was conducted directly, i.e. the participants were aware they were participating in a survey, but the questions were not known ahead of time. This was important to avoid any behavioral bias in the responses. The choice of the company determinate by willingness of senior management to participate in this study. A research sample consisted of 523 respondents. The following socio-demographic variables have been analyzed: gender, age, work experience, educational level, and managerial position. The structure of sample is presented in Table 2.

*Table following on the next page*

Variable	Percent
<b>Gender</b>	
Female	50.8
Male	49.2
<b>Age</b>	
21-30	14.6
31-40	27.3
41-50	35.2
51-60	18.9
Up to 60	5.4
<b>Work experience</b>	
Less than 1 year (i.e. new comer)	2
1 to 3 years	8.5
3 to 5 years	9.4
6 to 10 years	17.9
11 to 20 years	33
Over 20 years	31.5
<b>Education level</b>	
Secondary education	
College	28.4
University degree	15.6
Master / Master of Science	40.3
Ph.D.	9.9
<b>Managerial position</b>	
I am not a manager	40.4
Middle- level management	52
Senior management	7.6

*Table 2: The structure of research sample  
(Source: Author's calculation)*

Data were processed by appropriate statistical procedures using the SPSS v25. The following statistical methods have been used in this study: descriptive statistics, frequency analysis, Analysis of variance (ANOVA), Confirmatory factor analysis, t-test, and regression.

#### 4. RESULTS

The results of this study include regression - predictors of creativity (*See Table 3*); the key factors as predictors of financial support (*See Table 4*), descriptive analysis by key factors from CEAI (*See Table 5*), Independent sample test (*See Table 6*), and Confirmatory factor analysis (*See Table 7*).

*Table following on the next page*



### Model Summary

R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
<b>0.735(a)</b>	0.54	0.53	0.77

a. Predictors: F1, F2, F3, F4, F5

b.

### ANOVA(b)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	112.45	5	22.49	37.77	<b>0.000(a)</b>
Residual	95.86	161	0.60		
Total	208.31	166			

a. Predictors: F1, F2, F3, F4, F5

b. Dependent Variable: The creativity has been supported by managers

### Coefficients(a)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	$\beta$	Std. Error	$\beta$		
<b>Management support</b>	<b>0.07</b>	<b>0.01</b>	<b>0.74</b>	<b>9.93</b>	<b>0.00</b>
Work discretion	0.01	0.01	0.06	0.84	0.40
Rewards	0.00	0.02	-0.02	-0.21	0.83
Time availability	-0.01	0.02	-0.03	-0.41	0.68
Organizational boundaries	-0.02	0.02	-0.08	-1.20	0.23

a. Dependent Variable: The creativity has been supported by managers

Table 3: Regression - CE factors as predictors of the creativity  
(Source: Author's calculation)

Table following on the next page

### Model Summary

R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate
<b>0.677(a)</b>	0.46	0.44	0.79

a. Predictors: F1, F2, F3, F4, F5

### ANOVA(b)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	85.64	5	17.13	27.20	<b>0.000(a)</b>
Residual	101.39	161	0.63		
Total	187.03	166			

a. Predictors: F1, F2, F3, F4, F5

b. Dependent Variable: There are several options within the organization for individuals to get financial support for their innovative projects and ideas.

### Coefficients(a)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	$\beta$	Std. Error	$\beta$		
<b>Management support</b>	<b>0.06</b>	<b>0.01</b>	<b>0.71</b>	<b>8.82</b>	<b>0.00</b>
Work discretion	-0.02	0.02	-0.12	-1.48	0.14
Rewards	0.01	0.02	0.04	0.53	0.60
Time availability	0.02	0.02	0.07	0.95	0.34
Organizational boundaries	-0.02	0.02	-0.09	-1.22	0.22

a. Dependent Variable: There are several options within the organization for individuals to get financial support for their innovative projects and ideas.

Table 4: Regression - CE factors as predictors of the financial support for innovative projects  
(Source: Author's calculation)

	Min.	Max.	Mean	Std. Dev.
Management support - F1	21	79	51.00	12.53
Work discretion - F2	15	47	31.97	5.87
Rewards - F3	6	30	16.92	4.51
Time availability - F4	10	27	19.04	3.33
Organizational boundaries - F5	14	33	23.59	4.33
CE_SUM	80	192	142.52	23.94

Table 5: Descriptive analysis by factor  
(Source: Author's calculation)

Table following on the next page

#### Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Err. Mean
F1	F	266	-0.09	1.01	0.09
	M	257	0.15	0.94	0.16
F2	F	115	-0.09	0.93	0.09
	M	257	0.23	1.24	0.21
<b>F3</b>	<b>F</b>	<b>266</b>	<b>0.12</b>	<b>0.97</b>	<b>0.09</b>
	<b>M</b>	<b>257</b>	<b>-0.34</b>	<b>1.09</b>	<b>0.18</b>
F4	F	266	0.03	0.99	0.09
	M	257	-0.18	1.08	0.18
F5	F	266	0.01	1.02	0.10
	M	257	0.04	0.88	0.15
FAC_CE	F	266	-0.06	0.99	0.09
	M	257	0.09	1.05	0.17

#### Independent Samples Test

	t	df	Sig.	Mean Diff.	Std. Err. Diff.
F1	-1.24	149	0.22	-0.23	0.19
F2	-1.65	149	0.10	-0.32	0.19
<b>F3</b>	<b>2.43</b>	<b>149</b>	<b>0.02</b>	<b>0.46</b>	<b>0.19</b>
F4	1.08	149	0.28	0.21	0.19
F5	-0.14	149	0.89	-0.03	0.19
FAC_CE	-0.82	149	0.41	-0.16	0.19

*Table 6: Independent sample test  
(Source: Author's calculation)*

The results of the Confirmatory factor analysis with Varimax rotation have been revealed 8 factors which had been explained 63.65% of total variance. Due to the fact that proposed CEAI includes 5 factors, second model have been compared with the first model with 8 factors (See Table 7).

Fit	First model	Second model	Criteria
CMIN/DF, p	3.213, p = 0.000	2.885, p = 0.000	CMIN/DF>5, p>0.05
PCFI	0.719	0.744	PCFI > 0.8
CFI	0.785	0.818	CFI > 0.9
PCLOSE	0.000	0.000	PLOSE > 0.05
RMSEA	0.079	0.073	RMSEA < 0.1 (it should be less than 0.05)
GFI	0.705	0.777	GFI > 0.9

*Table 7: Confirmatory factor analysis  
(Source: Author's calculation)*

The second model better fits with original data that proves the possibility of use CEAI in Serbian context.

## 5. DISCUSSION

Results of testing hypothesis ( $H_0$ ) about the key factors of the corporate entrepreneurship that have positive effect on creativity and innovation as accelerators of the public sector reform in Serbia showed that Management support significantly affected creativity (See Table 4).

A company's ability to increase entrepreneurial efforts is conditional on compatibility of managerial experience and their entrepreneurial initiatives (Kuratko et al., 2014). Besides encouraging ideas, the promotion of entrepreneurial behavior includes providing resources for entrepreneurial activities. The results revealed that Management support was a predictor of financial support for realization innovative projects (*See Table 5*). Results of testing hypothesis (H<sub>2</sub>) about gender differences in assessment the key factors of the corporate entrepreneurship in Serbia showed that there was significant difference in assessment of Rewards (*See Table 6*). Female respondents higher assessed the Rewards as a key factor of the corporate entrepreneurship than their male counterparts. The validity of use the CEAI in Serbian public companies has been proven by confirmatory factor analysis. The second model better fitted the data from observed public companies in Serbia (*See Table 7*).

## 6. CONCLUSIONS

The recent research calls for the study of corporate entrepreneurship as it manifests in the public sector where it can be labeled public entrepreneurship. The companies that engage in entrepreneurial activities tend to be more profitable than companies that do not. The main contribution of this study is expanded existing literature by empirical testing of CEAI in Serbian public companies. The topic of entrepreneurship in the public sector is under-researched theme (Liddle & McElwee, 2019; Martens et al., 2016). This study fills the theoretical gap, as well. The total of 523 managers and employees from twelve Serbian public companies participated in the survey. Respondents from particular company differed in their socio-demographic variables such as gender, age, work experience, educational level, and managerial position. The research results confirmed the starting hypothesis. It highlights the relevance of management support as a predictor of higher creativity and financial support for new innovative project in observed companies. Statistically significant differences were identified within a reward by the female respondents assess much more important for the development of entrepreneurial organizational culture than their male respondents. In conclusion, this study has shed light on corporate entrepreneurship in Serbian public sector. It highlights the role of public governance i.e. top managers in the process of transformation of public sector in Serbia. This is a first step in generating a model of public companies transformation that will fit the majority of public companies in Serbia. Future study will include the rest of public companies in Serbia, on the one way. Second research avenue will be extending study on public companies in other Western Balkan countries in order to gain wider picture of public reform process.

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## APPENDIX

### 1. THE CORPORATE ENTREPRENEURSHIP ASSESSMENT INSTRUMENT (CEAI)

We are interested in learning about how you perceive your workplace and organization. Please read the following items. Using the scale below please indicate how much you agree or disagree with each of the statements. If you strongly agree, write “5”. If you strongly disagree write “1”. There are no right or wrong answers to these questions so please be as honest and thoughtful as possible in your responses. All responses will be kept strictly confidential. Thank you for your cooperation!

Strongly disagree	Disagree	Not Sure	Agree	Strongly agree
1	2	3	4	5

#### *Section 1: Management support for corporate entrepreneurship*

1. My organization is quick to use improved work methods.
2. My organization is quick to use improved work methods that are developed by workers.
3. In my organization, developing one's own ideas is encouraged for the improvement of the corporation.
4. Upper management is aware and very receptive to my ideas and suggestions.
5. A promotion usually follows from the development of new and innovative ideas.
6. Those employees who come up with innovative ideas on their own often receive management encouragement for their activities.
7. The “doers on projects” are allowed to make decisions without going through elaborate justification and approval procedures.
8. Senior managers encourage innovators to bend rules and rigid procedures in order to keep promising ideas on track.
9. Many top managers have been known for their experience with the innovation process.
10. Money is often available to get new project ideas off the ground.
11. Individuals with successful innovative projects receive additional rewards and compensation beyond the standard reward system for their ideas and efforts.
12. There are several options within the organization for individuals to get financial support for their innovative projects and ideas.
13. People are often encouraged to take calculated risks with ideas around here.
14. Individual risk takers are often recognized for their willingness to champion new projects, whether eventually successful or not.
15. The term “risk taker” is considered a positive attribute for people in my work area.
16. This organization supports many small and experimental projects, realizing that some will undoubtedly fail.
17. An employee with a good idea is often given free time to develop that idea.
18. There is considerable desire among people in the organization for generating new ideas without regard for crossing departmental or functional boundaries.
19. People are encouraged to talk to employees in other departments of this organization about ideas for new projects.

#### *Section 2: Work discretion*

20. I feel that I am my own boss and do not have to double check all of my decisions with someone else.
21. Harsh criticism and punishment result from mistakes made on the job.
22. This organization provides the chance to be creative and try my own methods of doing the job.

- 23. This organization provides the freedom to use my own judgment.
- 24. This organization provides the chance to do something that makes use of my abilities.
- 25. I have the freedom to decide what I do on my job.
- 26. It is basically my own responsibility to decide how my job gets done.
- 27. I almost always get to decide what I do on my job.
- 28. I have much autonomy on my job and am left on my own to do my own work.
- 29. I seldom have to follow the same work methods or steps for doing my major tasks from day to day.

*Section 3: Rewards/Reinforcement*

- 30. My manager helps me get my work done by removing obstacles and roadblocks.
- 31. The rewards I receive are dependent upon my innovation on the job.
- 32. My supervisor will increase my job responsibilities if I am performing well in my job.
- 33. My supervisor will give me special recognition if my work performance is especially good.
- 34. My manager would tell his/her boss if my work was outstanding.
- 35. There is a lot of challenge in my job.

*Section 4: Time availability*

- 36. During the past three months, my workload kept me from spending time on developing new ideas.
- 37. I always seem to have plenty of time to get everything done.
- 38. I have just the right amount of time and workload to do everything well.
- 39. My job is structured so that I have very little time to think about wider organizational problems.
- 40. I feel that I am always working with time constraints on my job.
- 41. My co-workers and I always find time for long-term problem solving.

*Section 5: Organizational boundaries*

- 42. In the past three months, I have always followed standard operating procedures or practices to do my major tasks.
- 43. There are many written rules and procedures that exist for doing my major tasks.
- 44. On my job I have no doubt of what is expected of me.
- 45. There is little uncertainty in my job.
- 46. During the past year, my immediate supervisor discussed my work performance with me frequently.
- 47. My job description clearly specifies the standards of performance on which my job is evaluated.
- 48. I clearly know what level of work performance is expected from me in terms of amount, quality, and timelines of output.

*Source: Kuratko et al., (2014)*

## INSTITUTIONAL FOUNDATIONS FOR FINANCIAL REGULATION OF SOCIAL INNOVATIONS

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### ABSTRACT

*The article examines the approaches of scientists to the concepts of “institution” and “institutional environment” within the framework of the development of institutional economic theory for the formation of institutional foundations for the financial regulation of social innovation. The subject-institutional composition of participants in the social innovation process has been systematized. In modern conditions, the need to create a developed institutional environment for the financial regulation of social innovation is a particularly important task, since the effective implementation of social innovation processes contributes to solving socially significant problems of society. When constructing an effective institutional environment for the financial regulation of social innovation, it is necessary to combine existing and newly emerging institutions, to develop areas of key institutions that have confirmed their positive results, the functioning of which ensures an increase in social effects and the level of socio-economic well-being in general.*

**Keywords:** Social innovation, Institutions, Support institutions, Government regulation Institutions, Social effect

### 1. INTRODUCTION

The development of social innovation contributes to a more effective solution of social problems, however, it should be noted that the currently formed institutional environment cannot fully quickly and effectively ensure the satisfaction of the urgent needs of citizens, including due to the lagging reflection of the public sector due to the limitations financial resources (Omonov, Veretennikova, 2019). The institutional environment of financial regulation of social innovations, being a complex of interacting institutions and institutional agreements, influences the formation of connections that arise between economic agents, determining the conditions (rules and norms) of their functioning and is capable of both encouraging the introduction of social innovations and creating certain barriers in the process of their implementation. Today, the institutional environment, which is directly focused on the development of social innovation, is at the stage of formation, and is not stable enough, as it faces many obstacles arising in the socio-economic space, such as the dysfunction of institutions, institutional voids due to the lack of required norms and rules or their low efficiency, which complicates the implementation of social innovations and, as a consequence, solving problems in the social sphere (Andreeva, 2023).

### 2. DEVELOPMENT OF INSTITUTIONAL THEORY

#### 2.1. Approaches to the concept of “institution”

The concept of “institution” was first introduced by the founder of institutional economic theory, T. Veblen, who argued that “institutions are: habitual ways of responding to incentives; structure of the production or economic mechanism; the currently accepted system of social life” (Veblen, 1961).



According to the researcher, institutions, despite the processes of their obsolescence, provide interconnection between individuals, eliminate differences in their behavior, and form understandable and predictable behavior of economic entities for others. Institutions develop due to the differences existing between them and the presence of individuals' desire for creative activity. D. Commons, a representative of neo-institutionalism, believed that an institution is a collective action to control, liberate, and expand individual action. Researching and analyzing institutions, the scientist considered them as organizational mechanisms for achieving collective goals and identified them with organizations, i.e. mixed the concepts of “institution” and “organization”. Defining the broad boundaries of collective activity - from unorganized custom or tradition to a variety of organized ongoing relationships, such as family, corporation, trade association, trade union, reserve system, and state, the scientist identified “a single principle for everyone - one or another degree of control over the activities of individual persons, which is carried out by collective action” (Commons, 2012). D. North, one of the founders of the theory of modern institutionalism, believed that institutions that determine the special “rules of the game” in society set the structure of incentives for human interaction in various fields of activity (North, 1997). The scientist believed that institutions are formed from three main elements, which include: informal restrictions, formal rules, and enforcement mechanisms that ensure compliance with the rules. In this definition, the main emphasis is on the fact that it is institutions that form restrictions on the economic behavior of people. D. North believed that “the study of institutions and institutional change inevitably entails, as a primary requirement, the conceptual separation of institutions from organizations. Institutions are the rules of the game, organizations are the players” (North, 2000), thereby, unlike D. Commons, distinguishing between the concepts of institution and organization. E. Furubotn and R. Richter define the concept of institution as a set of formal and informal rules, which include devices that ensure their compliance (Furubotn, Richter, 2005a). This interpretation, without moving away from the position of D. North, gives a more complete understanding of the institution. D. North and T. Veblen in their works, describing institutions, focus on the principle of familiarity and stability of a particular way of thinking. Initially, institutions appear based on human instincts and simple needs. By contributing to their satisfaction, they acquire a self-sustaining character and, according to the feedback principle, form thinking stereotypes. Thus, the emergence of norms of economic behavior is determined by the interaction of individuals, which is further formed into legal norms, traditions, informal rules, and cultural stereotypes. The institution functions only if restrictive rules (sanctions) are regularly applied and influence the behavior of those to whom they are applied. The lack of regular application of sanctions to violators indicates that this rule is not an institution. In Russian science, the approaches of authors to the concept of “institution” as a whole were formed under the influence of neo-institutionalism, based on the definition proposed by D. North. A.E. Shastitko defines institutions as “a series of rules that implement the function of limiting the behavior of economic agents and regulating the interaction between them, as well as the corresponding mechanisms for monitoring compliance with these rules” (Shastitko, 2010). A.N. Oleinik interprets the concept of the institution as “a set of formal frameworks fixed in law that structure the interactions of individuals in the economic, political, and social spheres” (Oleinik, 2004). V.L. Tambovtsev believes that “an institution is a set of sanctioned rules in unity with a social mechanism for their protection” (Tambovtsev, 2010a). Therefore, based on the new institutional economic theory, institutions can be defined as rules of conduct, that is, as regulatory principles that establish or prohibit any course of action. These rules limit and create incentives for participants in social innovation projects, allowing them to make informed choices and predict the actions of others. What all definitions of an institution have in common is their derivation from the norms and rules of interaction between people. At the same time, institutional economics identifies the following components of the institution: norm (rules),

sanction, and functioning mechanism (implementation of sanctions). Only if all three elements are present can an institution be considered complete and functional. The functions of institutions in the system of social relations (political, economic, social) are to form the social infrastructure of our behavior, ensure the stability of the existing structure of relationships between agents, and reduce social costs. The study of institutional space is aimed at determining the vectors of development of economic entities, which requires the need to consider institutions, institutional environment, and institutional processes as the basis of the socio-economic system as a whole.

## **2.2. Institutional environment**

The set of formal and informal institutions that forms the space around economic entities represents the institutional environment. Currently, in economic studies, despite their significant number, there is no generally established definition of the institutional environment and the approaches of the authors on this issue differ. Thus, most authors define the institutional environment as a set of institutions, while others consider it as an economic category. The concept of the institutional environment is interpreted quite broadly by researchers, which is because scientists consider the institutional environment from the perspective of various economic theories, however, a common feature traced in fundamental research is the determination of the behavior of economic agents through an established set of norms and rules, conditions and forms. The concept of "institutional environment" was introduced by D. North and L. Davis in the early seventies of the last century and is used in economic sciences more often than other definitions. Researchers understood the institutional environment as a set of fundamental political, social, and legal rules that form the basis for production, exchange, and distribution, and used this interpretation to designate general institutional boundaries, which are the conditions for contractual relations between individuals within the framework of relations formed at the macro level. O. Williamson believes that the institutional environment is the rules of the game that determine the context in which economic activity is carried out (Williamson, 1996). Russian scientists in their studies most often interpret the institutional environment as a set of fundamental social, political, and legal rules that define the framework for establishing institutional agreements (Institutional economics: new institutional economic theory, 2011). A.E. Shastitko considers the institutional environment as a set of fundamental political, social, and legal rules that form the basis for production, exchange, and distribution (Shastitko, 2010). Previously, the author considered the institutional environment as "one of the most important components of the institutional matrix that frames the process of allocating limited resources, as well as identifying new opportunities for using existing resources and creating new resources" (Shastitko, 1998). A.N. Eliseev and I.E. Shulga reveal the institutional environment as a system of rules influencing the distribution of property rights, which sets the minimum level and structure of transaction costs and determines the nature and content of legal conflicts (Eliseev, Shulga, 2005). M.V. Kondratov and R.I. Garipov consider the definition of the institutional environment as a set of socio-economic, organizational-economic, technical-economic, institutional-economic relations regarding the formation and implementation of institutions, the purpose of which is the efficiency of economic development (Kondratov, Garipov, 2013). E.B. Dondokov and Zh.B. Tumunbayarova propose to consider the institutional environment as "a set of formal and informal institutions that arise and operate in specific historical conditions, which are expressed in the form of interacting regulations, infrastructure, network interaction, and also the basis for such behavior of subjects" (Dondokova, Tumunbayarova, 2014), while the authors the dependence of subjects on their influence is emphasized, forcing them to function in their interests, but without causing damage to other economic subjects and social wealth as a whole. Thus, based on the above definitions, we can state that there is no unified approach to determining the institutional environment.

Most often, researchers use the definition from the perspective of a set of rules of behavior and norms (B. Veblen, D. North, O. Williamson, A. Shastitko, etc.), many researchers (E. S. Silova, E. Dondokova, Zh. Tumunbayarova, etc.) the institutional environment is considered as a set of institutions, which brings this definition closer to the concept of institutional infrastructure. The institutional environment is quite flexible; the transformations taking place in it are caused by changes in formal or informal institutions. It should be noted that changes in informal institutions occur evolutionarily and are almost impossible to predict; the transformation of formal institutions is associated mainly with the state's initiation of changes in regulations, as well as with the initiative of economic entities (changes in contractual agreements). The institutional environment must have the necessary set of state and public institutions for the effective implementation of socio-economic processes. For a clearer idea of the fullness of the institutional environment, it is necessary to consider the available approaches to the systematization of the institutions that form it. Currently, there are various approaches to the systematization and typology of these institutions, but the following criteria are most often used: by level and scope of implementation, scale, industry affiliation, concerning state legal territorial entities, performance assessment, managerial functionality, degree and the nature of the impact, impact, and place of occurrence, etc. The use of certain criteria is determined by the focus of the study, its goals, and objectives. In the framework of the study of social innovation, in our opinion, it is justified to use the main classification characteristics of institutions proposed by E.V. Popov, A.Yu. Veretennikova, Zh.K. Omonov, namely: place of origin, level of formalization, degree and nature of impact, scale. The classification feature “place of origin (exogeneity, endogeneity) of an institution” makes it possible to identify institutions that can be influenced at the preparation stage of the social innovation process, and to determine the influence of which institutions can be predicted. The level of formalization makes it possible to determine the degree and nature of the influence of the institution, as well as how stable certain rules and norms are. According to the degree of impact, institutions should be differentiated into direct impact institutions, which directly influence social innovation, and indirect impact institutions, which characterize the environment in which social innovation is created and implemented.

### **3. INSTITUTIONAL ENVIRONMENT FOR FINANCIAL REGULATION OF SOCIAL INNOVATIONS**

The financial support of social innovation is, to one degree or another, influenced by a fairly wide range of formal institutions, however, in our opinion, two types should be distinguished among them:

- institutions for supporting social innovation, designed to create effective standards for supporting the development of social innovation;
- institutions of state regulation, which play a primary role in the process of formation and implementation of social innovations through their initiation and financing (Veretennikova, Omonov, 2019a).

Under institutions for supporting social innovation, it seems appropriate to consider a set of norms and rules for the interaction of economic actors in the process of creating and promoting innovations in the public socio-cultural environment to obtain social effects as a result of meeting the social needs of society and correcting its institutional structure. Based on the above. It is possible to distinguish the types of relationships that develop, namely:

- relationships that arise at the stage of creating social innovation;
- relations at the stage of implementation, development, and scaling of social innovation;
- relationships regarding the formation of an effective institutional environment conducive to the development of social innovation.

State regulatory institutions, in contrast to institutions supporting social innovation, whose role is to create effective norms necessary for the development of social innovation, occupy a key role in the social innovation process, since the state is the main actor in the formation and implementation of social innovation, often acting their initiator and implementer, as well as supporting citizens participating in this process. Social innovations are implemented more successfully in an institutional environment where there is an effective regulatory environment aimed at developing socially oriented activities, which should include a legal framework that ensures participants in the process have access to tax preferences, subsidies, and various financial instruments. In addition, social innovation can be the result of effective cooperation between the state and non-profit organizations, businesses, and civil initiatives. The norms and rules underlying formal institutions are usually established at the state or municipal level. The state's responsibility includes the formation of a regulatory framework and the creation of a comfortable economic space for participants in the social innovation process. Particular attention during their design and development should be paid to the availability and quality of support provided. The results of the implementation of social innovations largely depend on the presence of developed social connections, social capital, which is determined by the values that were formed in the process of development of a particular territory, which, of course, requires the creation of conditions to support the interest of social innovators in the implementation of social innovations, the continuation of this activity directly in this territory. Taking into account ethnic and territorial characteristics should be reflected in regional and municipal development programs. This will make it possible to intensify civil initiatives as a source of social innovation, as well as to involve the population in solving social problems and increasing their social responsibility. Also, in our opinion, when considering the institutions of social innovation activity, it should be understood that the set of norms and rules governing the interaction between economic agents in matters of support, development, and implementation of social innovations as a result of positive effects can stimulate their development, and in the case of the opposite effect – to restrain, and these properties must be taken into account at the initial stage of designing this group of institutions when forming an effective institutional environment for the financial regulation of social innovation. In modern conditions, the need to create a developed institutional environment for the financial regulation of social innovation is a particularly important task, since the effective implementation of social innovation processes contributes to solving socially significant problems of society. When constructing an effective institutional environment for the financial regulation of social innovation, it is necessary to combine existing and newly emerging institutions, to develop areas of key institutions that have confirmed their positive results, the functioning of which ensures an increase in social effects and the level of socio-economic well-being in general. The effectiveness of the institutional environment is determined not only by the effectiveness of formal institutions but also by the action of informal institutions, taking into account which serves as an integral condition for forming a complete picture of the institutional environment of social innovation (Popov, Veretennikova, Omonov, 2016). Particular attention, as already noted, should be paid to informal institutions operating in a specific territory, since the effects of implementation and further scaling are generally determined by the characteristics of the territory in which social innovation is planned or implemented, as well as the quality of existing formal and informal institutions. The level of trust and readiness of the population and state and municipal authorities for mutual cooperation is important. At the same time, it should be noted that despite the intensification of activity in this direction, the level of state and regional support remains insufficient, which is due, among other things, to a small number of developments, both theoretical and methodological, regarding the issues of forming an effective institutional environment. D. North, characterizing informal institutions, noted that they “lie deeper than formal rules” (North, 2000).

Informal institutions began to act as objects of research in the early 2000s, which is primarily due to the study of the influence of the cultural sphere on the processes occurring in the economic sphere. Research in this area has led to the conclusion that the institutional environment is a determining factor when an individual decides to participate in the socio-economic process, which is consistent with the position of J. Stiglitz, who identified informal institutions with social capital, which in turn The scientist identified them with trust, reputation, and network structures, which are “non-market institutions” (Stiglitz, 2000a). According to the author, the general level of trust seems to be the main criterion when assessing the effectiveness of informal institutions. In this regard, it should be noted the importance of combining the characteristics of formal and informal institutions and their impact on the implementation of social innovation. Institutions collectively form the institutional environment for effective financial support for subjects participating in social innovation activities and set restrictions in the process of implementing social innovations in the form of laws and relevant rules. The structure of the institutional environment for the financial regulation of social innovation, determined by the totality of formal and informal institutions, is dynamic and is transformed under the influence of exogenous and endogenous factors, as a result of which informal rules and norms become formal and, conversely, are lost and new ones appear.

#### **4. SUBJECT-INSTITUTIONAL COMPOSITION OF PARTICIPANTS IN THE SOCIAL INNOVATION PROCESS**

The institutional environment of financial regulation of the social innovation process (social innovation) reflects the interconnection of system elements, where the main burden falls on the subject-institutional composition of the participants in this process, who perform their specific functions. It seems appropriate to consider the subject-institutional composition of participants in the social innovation process (social innovation) as a combination of two blocks:

- Subjects and institutions that initiate and implement social innovations. This block includes:
  - state (state authorities, government institutions of all organizational and legal forms);
  - socially oriented business;
  - social entrepreneurs;
  - non-profit organizations;
  - citizens, social groups, society.
- Mediating the social innovation process:
  - financial support institutions and financial institutions (state, financial development institutions, business entities, credit organizations, guarantee organizations, venture funds, charitable organizations);
  - organizational and auxiliary entities (social innovation agencies, etc.);
  - organizational structures that provide regulation and control of the implementation and financial support of social innovations (Ministry of Finance, ministries and departments of social orientation, etc.).

Based on the above, it seems appropriate to understand the institutional environment of financial regulation of social innovation as a set of economic, legal, financial, social, and public institutions that ensure the implementation of social innovation at all stages of the life cycle to obtain the maximum possible positive social effect. The social effect of social innovation should be considered as a useful result of satisfying social needs, obtained not only at the stages of their life cycle but also at an indefinite stage after the implementation of a social innovation project and the scope of its coverage (improving the quality of life, expanding the range of social services, expanding employment, reduction of unemployment, etc.).

## 5. CONCLUSION

Thus, the study revealed the following:

- the institutional environment of financial regulation of social innovation determines the basis for the formation of conditions for interaction between subjects of the social innovation process;
- prerequisites for the effective development of social innovation are the resolution of inconsistencies and contradictions that arise between formal and informal institutions;
- institutions of financial regulation of social innovations coordinate all stages of their life cycle, which leads to the dependence of the development of social innovations on their completeness, consistency, and efficiency;
- the creation of a favorable institutional environment is possible only in full, taking into account the interests of potential innovators, and stimulating them to develop this process. At the same time, these conditions can serve both as limiting factors and as opening opportunities for the development of socially oriented businesses.

Social innovations are aimed at improving the welfare of society; the formation of an effective institutional environment for their financial regulation will make it possible to fully use both economic and human potential to solve social problems.

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## IMPACT OF ARTIFICIAL INTELLIGENCE ON DIGITAL TRANSFORMATION AND ECONOMIC CHALLENGES OF SOCIETY IN GLOBAL ENVIRONMENT: ANALYSIS AND PERSPECTIVES FOR CROATIA UNTIL 2030

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### ABSTRACT

*The development of artificial intelligence (AI) is starting to have an increasing influence on the economy and business models around the world. This paper analyzes the impact of artificial intelligence on digital transformation and economic challenges in the global business environment with special reference to Croatia and its significance for Croatian economy until 2030. The impact of artificial intelligence on the level of digital transformation of society and global economic trends, i.e., the economic impact of artificial intelligence in Croatia, is examined using the sample of large joint-stock companies listed on the Zagreb Stock Exchange, and it is considered how artificial intelligence will be integrated into business processes and affect the labor market and business models in Croatia. The degree of digital transformation, indicates, among other things, the degree of improvement of business processes, increase in efficiency and thus the creation of a company's competitive advantage. According to the author's previous research, the digital transformation index itself is based on digitalization and digitization activities in the digital maturity model and indicates the degree of disruptive innovation and changes in business operations resulting from the implemented transformation of the organization. At the same time, artificial intelligence occupies a significant place in the segment of implemented technology of the organization and, according to the research conducted for the purposes of this work, will strongly influence the choice of future data-driven business models, and provide an infrastructure for sharing and analyzing data between companies. This paper investigates the significance of artificial intelligence on data-driven business models, i.e., it examines the significance of service models, data products and data-driven production. It also investigates the extent to which models transform products into intelligent services and the extent to which data products increase product value through the use of artificial intelligence. Further, it analyzes to what extent artificial intelligence and the selected business model ensure business sustainability and greater user satisfaction. The aim of the paper is to test the importance of artificial intelligence in the digital transformation of society, and to give a critical assessment of the importance of artificial intelligence in the part of implemented technology in society. The subject of the research is determining the measure of the influence of artificial intelligence, the index of digital transformation and other factors on the future creation of new value of business organizations. The paper confirms the importance of artificial intelligence for the index of digital transformation and its increased impact on the digital maturity of business organizations, and thus predicts a significant increase in the newly created value of the observed organizations with the use of artificial intelligence in the future.*

**Keywords:** artificial intelligence, AI, digital transformation, index of digital transformation



## 1. INTRODUCTION

The significant progress of digital technologies leads to greater recognition of the need for further development and encouragement of business transformation. Artificial intelligence, implemented in various applications, enables business organizations to significantly develop their business, and improve digital services and smart analytics that analyze user habits. There are obvious opportunities to improve business with the use of artificial intelligence, but as with any new technology, they must be introduced and adopted in a planned manner, in accordance with the strategic goals of the business and by implementing the necessary adjustments based on digital transformation procedures. To what extent does artificial intelligence, as one of the factors of digital transformation, affect the future performance of business organizations in Croatia? This type of question opens research horizons and stimulates various scientific discussions and research. The previous steps in the research of this issue were achieved by defining the index of digital transformation and the influence of individual areas of digital transformation on the index itself. Similar research, related to the analysis of the impact of artificial intelligence on business results, encourages further research to the extent that artificial intelligence changes the operations of organizations as an instrument for increasing efficiency in business and increasing business excellence. The digital transformation index examines the state of the organization's digital transformation and determines strategic priorities and the development of comprehensive action plans aligned with overall strategic goals, primarily in the area of using new technologies and innovating business models. The index of digital transformation<sup>1</sup> indicates the degree of disruptive innovation resulting from the implemented digital transformation of the company's operations. Artificial intelligence as a factor of the digital economy participates in various system improvements, from gradual to radical, transforms business processes, products and services of all entities represented on the market. The industrial perspective has changed significantly in this century. Existing concepts and numerous superior technological improvements influence production processes, going beyond the meaning of conventional production transformation and smart intelligent machines. The integration of the digital and physical world enables the production of advanced and intelligent products<sup>2</sup>. Automation and advanced manufacturing technology includes cybersecurity, artificial intelligence, the Internet of Things, cloud accounting, robotics, and advanced systems integration techniques. Its main goal is the integration and speed of production processes by using the advanced information technologies. It combines advanced manufacturing methods with new era digital technologies and various communication protocol technologies. It enables the production of superior quality products with prices comparable to those of mass production. The technical basis for this concept is provided by intelligent, digitally connected systems and production methods<sup>3</sup>. There are various devices on the market that effectively use artificial intelligence and that can be connected in various ways to the desired environment to produce sufficient and reliable data needed for multiple purposes. There are numerous potential benefits of incorporating artificial intelligence and machine learning into management. It is possible to use artificial intelligence and machine learning, for example, to detect fraud or monitor urban areas, identifying problems before they occur. Artificial intelligence is used to easily automate processes and replace usual and repetitive tasks. At the same time, an advanced and commercially interesting alliance of artificial intelligence and data is redirecting the contents of our exchanges towards cyberspace.

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<sup>1</sup> Ustundag, A., Cevikcan, E., Ervural, B. C., & Ervural, B. (2018), Overview of cyber security in the industry 4.0 era. *Industry 4.0: managing the digital transformation*, 267-284.

<sup>2</sup> Kabak, Ö., & Ervural, B. (2017). Multiple attribute group decision making: A generic conceptual framework and a classification scheme. *Knowledge-Based Systems*, 123, 13-30.

<sup>3</sup> Bramha S. Tripathi, Ritu Gupta A. (2023) Survey on Cyber Security and AI-Based Industry 4.0: Advances in Manufacturing Technology and Its Challenges

The combination of technological progress, the introduction of artificial intelligence in business and development in the field of "smart" objects results in a contemporary major change in mechanical production, "based on the premise of sophisticated digitization within industrial facilities".<sup>4</sup> The production frameworks of the future generation are calculated and efficient, exactly like the instance of the independent production planning. Manufacturing sectors are showing significant interest in the innovative revolution in industries, which is also known as the advanced production system Industry 4.0. For manufacturing industries throughout the new world, operational efficiency, productivity, and customized features are absolutely essential. The traditional manufacturing industry is undergoing revolutionary changes as a result of digitization of production, contributed by advances in sensors, artificial intelligence, robotics and networking technology. This change encourages a rethinking of manufacturing as a service. At the same time, there is a movement in demand from the production of goods in large quantities to the production of things on an individual basis<sup>5</sup>. Digital business models differ from traditional ones in the way that they are based on information instead of material resources. The topicality and relevance of the mentioned problem originate from large investments in artificial intelligence and, according to available research, from the insufficient increase in profitability as a consequence of such investments.<sup>6</sup> "The strategy of digital Croatia for the period until 2032"<sup>7</sup> "presupposes the application of advanced technologies such as 5G/6G, artificial intelligence (AI), machine learning, cloud computing, big data technology and blockchain technology in the public and private sector, and remains open to the implementation of some future disruptive technologies that will appear in the observed period".<sup>8</sup> The application of the aforementioned advanced technologies will enable better processing and use of data, which, in turn, will contribute to work efficiency. Leaders of the organizations who are aware of the need to apply new technologies, but often faced with rapid changes, do not know when and how to initiate, and implement the necessary changes. Managing change due to employee resistance, lack of strategy, organizational rigidity and lack of key resources becomes extremely challenging. The rapid development of technology and innovative solutions also requires a rapid transformation of business. At the same time, focusing on service users remains the primary goal of any change. This paper analyses the importance of investing in artificial intelligence and its impact on the degree of digital business transformation, and whether and to what extent investments are long-term related to increased productivity, profitability, or the possibility of creating new value. The goal of the research is also to determine to what extent it is necessary to correct or adjust the index of digital transformation, which was created for the purposes of measuring the transformation carried out in organizations focused on creating new value. By measuring the index of digital transformation in selected organizations, the intention is to investigate the extent to which the created model can be confirmed and the correctness of the measurement regarding the importance of artificial intelligence predicted in the model. The goal of this research is to determine the measure or significance of artificial intelligence conditioned by the need for digital transformation of business, that is, to test to what extent the degree of success in adapting the business model to the needs and habits of users through digital transformation is affected by investment in artificial intelligence. The subject of the research is to determine to what extent the digital transformation of business and the resulting index of digital transformation affect the necessary investment in tools that use artificial intelligence and

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<sup>4</sup> Ustundag, A., Cevikcan, E., Ervural, B. C., & Ervural, B. (2018). Overview of cyber security in the industry 4.0 era. *Industry 4.0: managing the digital transformation*, page 269

<sup>5</sup> Ustundag, A., Cevikcan, E., Ervural, B. C., & Ervural, B. (2018). Overview of cyber security in the industry 4.0 era. *Industry 4.0: managing the digital transformation*, 267-284.

<sup>6</sup> Pihir, I., Križanić, S., & Kutnjak, A. (2019). Digital transformation of makreting in small and medium-sized enterprisers – review of existing researc.. *CroDiM: International Journal of Marketing Science*, 2(1), 125-134.

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thus the adaptation of business. In this paper we will also test the importance of artificial intelligence and the index of digital transformation in assessment of the initiated process of artificial intelligence implementation on selected organizations in Croatia. We will use the knowledge of the existing scientific literature and previous research through secondary research and methods of compilation and description. The synthesis and classification method defines the success of the use of artificial intelligence in the index of digital transformation, which will be tested using the inductive method on selected organizations. Primary research in selected organizations will determine the current importance of artificial intelligence in the digital transformation of business, as well as investment plans and assessment of increasing profitability and creating new value in the future in the time frame up to 2030 in Croatia. The paper answers the question of what level of digital transformation companies are in regarding the investments in artificial intelligence and at what level they should be in order to be competitive in the global business environment in the long term. Furthermore, how to determine the level of digital maturity of an organization regarding the investments in artificial intelligence and what steps would be necessary for a company to increase its digital transformation by investing in artificial intelligence? To what extent can organizations improve their own digital capabilities by investing in artificial intelligence and will this reflect in the profitability of its activities? How do current market regulations, bonded by the paternalistic standards, paralyze the use of new technologies, including the use of artificial intelligence, and slow down the creation of digitally mature companies that strive to adopt new technologies for the continuous development of stable business? This paper will provide answers to the above questions based on the conclusions obtained from the conducted research.

## **2. USING THE INDEX OF DIGITAL TRANSFORMATION OF BUSINESS IN DETERMINING BUSINESS SUCCESS**

The knowledge society constantly modifies economic, cultural, political, and social concepts under the influence of information technology.<sup>9</sup> Society transforms the information used by artificial intelligence into the main resources and products and turns information and communication knowledge into the most important factor of social transformation. At the same time, the framework of artificial intelligence helps us to determine the correct application in the upcoming business challenges. Onofre, Carreiro da Costa and Marcelo<sup>10</sup> confirmed that knowledge is one of the main values that people have in today's society. Once artificial intelligence is understood and defined as a combination of individual capabilities of related sets, we can meaningfully seek solutions to new business problems and challenges. The value of today's societies is directly related to the investment in artificial intelligence and thus in their capacity for innovation and entrepreneurship. The ever-present and necessary awareness of society requires investment in artificial intelligence. Digital skills and the use of artificial intelligence are becoming crucial for inclusion in the digital age and the knowledge society. Artificial intelligence is becoming a key tool for supporting creativity and innovation, but at the same time for increasing profitability. Knowledge-based societies significantly change the behavior of people<sup>11</sup>, so investing in artificial intelligence enables access to other levels of well-being and progress. The digital gap in terms of access and management of information and communication technologies among different groups in society<sup>12</sup> will be deepened by the use of artificial intelligence.

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<sup>9</sup> Daniel BELL, „The Coming of Post-Industrial Society“, 1999., New York: Basic Books.

<sup>10</sup> Marcos ONOFRE, Francisco CARREIRO DA COSTA i C. G. MARCELO, „Practical knowledge, self-efficacy, and quality of teaching: A multicase study in PE teachers“. AISEP International Congress, 2001., Madeira, Portugal.

<sup>11</sup> Ana AYUSTE, Begoña GROS i Sofía VALDIVIELSO, „Sociedad del conocimiento. Perspectiva pedagógica“. Sociedad del conocimiento y educación, 2012., pages 17-40., Madrid: UNED.

<sup>12</sup> Cristian PLISCOFF VARAS, Luis Ramirez QUINTANILLA i Hugo VÁSQUEZ, „La Brecha Digital como punto inicial“. Brecha Digital y Sociedad de la Información: Paradojas y Nuevos Paradigmas, 2006., 8.

Bridging the digital gap in all segments and groups of society does not only focus on providing equality or ease of access in all segments of business, but also on improving the quality of life in general, for example in education, culture, sports, research and art – as is stated in the work of San Juan-Rivero and Bielma-López<sup>13</sup>. Moreira<sup>14</sup> points out that in the twenty-first century, the progress and development of a country depends not only on its material resources or capital investments, but also more and more clearly on the quantity and quality of available human resources. The development and investment in artificial intelligence in this century shows that only the effective use of artificial intelligence, and that means in all segments of society, enables business progress. Effective use of digital technology should be defined with the help of three main concepts<sup>15</sup>: access, information, and communication education (digital literacy) and content. The index of digital transformation should be implemented as a comprehensive solution that can indicate gaps in digital literacy and indicate the need to reduce the digital gap in society, especially in the area of investments and use of artificial intelligence. In previous research, an index of digital transformation of business<sup>16</sup> was defined based on five areas of digital maturity: user treatment, strategy development, the use of technology, business process development, and culture, people, method, and organization of management.<sup>17</sup> Each of the areas is associated with factors that significantly affect the state and development of a particular area. Failures in the digital transformation of business are common because companies must redefine and reinvent processes, services, and culture on all organizational levels, before using new digital technology, and business rules must be changed extremely quickly and dynamically. The phases of the digital maturity model are thus derived from five areas, in which each segment is located: insufficient, basic, defined, advanced and optimal phase. Each of these stages is shown with a corresponding index to make the model itself simpler. Forming of the index<sup>18</sup> is based on scoring models for individual factors that contain relevant blocks of questions and seek the optimal degree of implemented digitization and business digitalization in the defined areas of examination. Thus, in the part of the research of the degree of business automation, the method of implementing the process (manual, automated, self-regulated) is determined. To calculate the index of digital transformation, it is necessary to review the influence of individual factors and connect them with the desired effect.<sup>19</sup> The operationalization of the actual implementation of activities for each of the factors is assessed in terms of their realization in a particular area (not planned; planned; realized). At the same time, their impact and the success of their implementation are evaluated. The analysis of each factor is based on increasing productivity, availability, or customer satisfaction. Furthermore, the degree of realization of each activity is assessed (not realized; small change; significant change). Thus, the change achieved through the implemented digital transformation of business is determined, and the current digital maturity of the organization is represented by the index of digital transformation in the observed non-profit organizations. On a scale from 1 to 100, the state of digital transformation of the company is evaluated. At the same time, every organization, even if it has an insufficient level of digital maturity, starts at least with an index of 10 regarding its existence and continuous operations. Likewise, the rapid development of technology and the need for constant adaptation practically makes it impossible for any

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<sup>13</sup> I. G. SAN JUAN RIVERA i F. A. BIELMA LÓPEZ, „Factores que influyen en la conformación de la brecha digital“. COSIT, Innovar para crecer, 2011.

<sup>14</sup> Manuel Area MOREIRA, „La alfabetización en la sociedad digital“. Alfabetización digital y competencias informacionales, 2012., 5-40.

<sup>15</sup> Lisa SERVON, „Four myths about the digital divide“. Planning Theory and Practice, 2002., vol. 3, br. 2, pages 222-227.

<sup>16</sup> Žarko KRULJAC i Danijel KNEŽEVIĆ, „Modeli digitalne zrelosti poduzeća – objašnjenje, pregled literature i analiza“, Obrazovanje za poduzetništvo – E4E9, 2019., vol. 9, br. 2, pages. 72-84.

<sup>17</sup> Zvonko MERKAŠ, isto.

<sup>18</sup> Eva BOGNER, Thomas VOELKLEIN, Olaf SCHROEDEL i Joerg FRANKE, „Study Based Analysis on the Current Digitalization Degree in the Manufacturing Industry in Germany“, 2016., Procedia CIRP, 57, 14-19.

<sup>19</sup> Zvonko MERKAŠ, same.

organization to be evaluated as optimal, that is, with an index of 100. With respect to those facts, the index of digital transformation usually ranges from 10 to 90. Each individual factor is rated on a Likert scale from E to A (with the rating "E" representing insufficient and the rating "A" the optimal state of an individual factor) for previously described level of automation, i.e., realization of individual activities. Depending on the ratings of the factors (according to the representation of ratings in the area), each of the ratings of a particular area can range from 2 (inadequate) to 20 (optimal). The total sum of the mentioned areas thus forms an index of digital transformation based on the described model of digital maturity. In the above-described way, new technologies, including artificial intelligence, are introduced as necessary in the processes of digital business transformation, and the existing business, organizational and management model is changed. The process is conducted in accordance with the created digital transformation strategy until management capacities become technologically fluent, that is, able to introduce organizational models that enable the application of new technology. In this case, the increase in digital maturity comes after the digital transformation of the business has been carried out by targeting the optimization of the share of transactions with customers and suppliers through digital channels and the establishment of an advanced use of analytics and an appropriate management framework<sup>20</sup>. The index of digital transformation, derived from the change in the state of the digital maturity model, goes through phases in which: an index of up to 20 describes insufficient transformation, up to 40 basic, up to 60 theoretically necessary or defined, up to 80 advanced, and up to 100 optimal transformation. In the research of Silva et al<sup>21</sup>, "the existing frameworks for calculating the digital transformation of society were considered through a systematic literature review in the main academic databases and a total of 47 scientific studies", with the aim of proposing a digital transformation index applicable to small and medium-sized enterprises in order to assess the level of maturity of these organizations that need to be digitized in order to maintain their competitiveness. Research results suggest: Integrated Digital Transformation Framework and Integrated Digital Transformation Index. Silva and others investigate in detail the frameworks for digital transformation with different approaches in the scientific literature and give proposals for the calculation of digital transformation by combining some of the research carried out so far, namely: Turchi, 2018, Merkaš, 2022 and Mueller, 2022. As a result of their research, they construct the model with four areas (C1 - Technology, C2 - Corporate execution, C3 - Business strategy and C4 - Organizational culture). They assign a set of associated variables with each area (they define a total of 40 variables in their model). Investigating existing models, they confirm the field of artificial intelligence as a significant technology and state it as a mandatory integral element of calculations in all research, including the new calculation model of the index of digital transformation they constructed. In the conclusion of the paper, they state that no empirical research has been conducted on the significance of individual variables in the defined areas of the digital transformation index, that is, it is stated that the proposed model has not been statistically tested, and their research only starts from the assumption that organizations in the future without the use of artificial intelligence will not be able to achieve a degree of advanced digital transformation. The main goal of this work and related research emerges from the aforementioned need to deepen the previous research. Namely, the main question of this work is: to what extent is it correct to assume that in the future, without the use of artificial intelligence, it will not be possible to achieve a degree of advanced digital transformation?

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<sup>20</sup> Zvonko MERKAŠ, same.

<sup>21</sup> SILVA, K., FROGERI, R., JUNIOR, P.. (2023). Proposta de um Índice de Transformação Digital para Pequenas e Médias Empresas / Proposal of a Digital Transformation Index for Small and Medium Enterprises, Konferencija: 9º Congresso Internacional Grupo Unis / 9th Grupo Unis International Congress U: Varginha, MG, Brazil

The hypothesis of the work extends the conclusions of the previous research and the observed need to further determine the importance of certain areas and variables related to the degree of digital transformation of organizations, i.e.: artificial intelligence and the index of digital transformation of society impact, to a greater extent than other elements of implemented technology, the assessment of the initiated process of artificial intelligence implementation from which it follows that their use is in a direct correlation with an additional increase in productivity, i.e. the creation of new value in organizations by 2030.

### **3. RESEARCH METHODOLOGY**

This paper tests the importance and the impact of artificial intelligence and the digital transformation index on increasing the creation of new value of business organizations. The tested sample consists of joint-stock companies listed on the stock exchange, and the research was mostly conducted in 2023. In addition to testing the impact of artificial intelligence and the index of digital transformation, the paper also determines whether there is a need to adjust the index of digital transformation due to the increasingly strong influence of artificial intelligence on digital transformation in order to obtain a model that will be more adapted to new technological possibilities. Due to the presence of multicollinearity in the index of digital transformation in the research, it was not possible to use all the variables in all investigated cases contained in the model, however, this did not affect the results of the research on the correlation between the index of digital transformation of the business for the tested organizations and their business efficiency. The paper investigates the extent to which artificial intelligence and the index of digital transformation can indirectly have impact on business in organizations, i.e. it determines whether it is possible, based on the described and conducted research, to conclude that by using artificial intelligence one can achieve multiple times higher productivity in organizations and, consequently, an increased index of digital transformation. The research shows to what extent the use of artificial intelligence will affect the agility and efficiency of employees and thereby increase productivity and profitability in organizations by 2030 in Croatia. Further in the paper, the results of the conducted research are presented. The presented analysis points the established index of digital transformation in selected companies and the impact of artificial intelligence. The totality of areas and factors by area reflects all the features of a company's digital maturity, so the calculation and status display are meritorious for showing the impact of artificial intelligence and the digital transformation index of the analyzed companies on creating new value and increasing business productivity. Given that the data was not collected only from publicly available sources, but partly through interviews and a survey, the collected data are not presented individually by society but collectively in order to show the general impact in society.

### **4. INCREASING PROFITABILITY USING ARTIFICIAL INTELLIGENCE**

Artificial intelligence is changing many aspects of our lives, from the workplace to everyday activities. The transformative power of artificial intelligence brings both challenges and opportunities, offering significant potential for increased efficiency, better decision-making, and personalized services. The State of Connected Operations 2023 report<sup>22</sup> examines the operations of organizations that drive more than 40% of global GDP. Based on research in which more than fifteen hundred managers in organizations that manage operations participated globally, the strategy of new sources of income was investigated using superior technology in overcoming economic and geopolitical risks. The report states that at the time of global transformation, the working modes are being rethought by leveraging real-time data to increase agility through increased investments in workforce and technology.<sup>23</sup>

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<sup>22</sup> SAMSARA, „State of Connected Operations Report“, 2023.

<sup>23</sup> SAMSARA, same.

The data shows that the vast majority of respondents believe that having accurate real-time operational data is crucial for decision-making, and that 84% of respondents plan to use generative artificial intelligence in the short term to increase business efficiency. The research predicts that by 2025, up to 15% of new operating jobs that do not exist today will be created. The leaders of the connected operations, who report the highest level of digital maturity in their operations, outperform their colleagues with increased efficiency. Compared to organizations in the early stages of digitalization, the leaders of the connected operations are up to five times more likely to rate their workforce's performance as "excellent" and up to six times more likely to achieve 25% higher financial goals in profitable organizations. Transformation of operations is possible by speeding up and automating processes. Artificial intelligence learns to speed up processes in order to be more efficient, cameras can detect security hazards and behaviors and thus detect risky behavior early and quickly correct it. Artificial intelligence is used to organize and analyze data and can detect cases of property loss or theft and automatically trigger an alert. These monitoring technologies are a drastic improvement in prevention. Efficiency due to the use of artificial intelligence can increase in various ways. Increasing operational efficiency is possible by monitoring individual assets and locations and by making recommendations on improving efficiency. Artificial intelligence is used to manage tasks and it enables better monitoring and organization of activities, which improves efficiency and facilitates job allocation, progress monitoring and deadline management. Artificial intelligence directly affects the improvement of communication and cooperation and includes the possibility of joint use of documents, discussions, notifications, and activity calendars. Data analysis, together with the tools that use artificial intelligence, can generate reports and analyses which can help in making quality decisions. A better understanding of results and effects by using the artificial intelligence can help target resources to more meaningful activities. Automating routine tasks with artificial intelligence saves time and reduces human errors, allowing employees to focus on priority tasks. Automatic sending of personalized messages and automatic monitoring of interactions using artificial intelligence facilitates fundraising processes and maintaining and developing relationships with key stakeholders. There are various studies that try to estimate the effect of artificial intelligence on gross domestic product (GDP). The study conducted in 2017<sup>24</sup> analyzed the impact of artificial intelligence on the GDP of the twenty largest world economies until 2030. According to the obtained estimates, artificial intelligence could increase global GDP by 14% by 2030, which is equivalent to an additional \$15.7 trillion. Of that, \$6.6 trillion would come from increased productivity and \$9.1 trillion from increased consumption. According to that research, the biggest gainers of the increase would be China, which could increase its GDP by 26%, and North America, which could increase its GDP by 14.5%. The European Union could increase its GDP by 9.9%, which includes Croatia. In its 2018 report, the McKinsey Global Institute (MGI) analyzed the impact of artificial intelligence on the GDP of 19 industries and 46 countries by 2030. According to their estimates, which are very similar to those of PwC, artificial intelligence could increase global GDP by 1.2% per year by 2030, which is equivalent to an additional \$13 trillion. Of this, 70% would come from increased productivity and 30% from increased consumption. The biggest winners would be China, which could increase its GDP by 26%, and the US, which could increase its GDP by 14%. The European Union could increase its GDP by 11.5% including Croatia<sup>25</sup>. From the research conducted so far, it is obvious that artificial intelligence will strongly influence the increase in productivity in the world by 2030.

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<sup>24</sup> PwC: The economic impact of artificial intelligence on global GDP.

<sup>25</sup> MGI: Notes from the AI frontier: Modeling the impact of AI on the world economy.

## 5. TESTING THE SIGNIFICANCE OF ARTIFICIAL INTELLIGENCE AND THE INDEX OF DIGITAL TRANSFORMATION AND THEIR CORRELATION WITH THE ACHIEVED LEVEL OF PROFITABILITY IN BUSINESS

Based on numerous research<sup>26</sup> conducted over the past decade, we know for sure that numerous factors related to the digitalization of business lead to an increase in its efficiency. In the same way, recent research try to determine the connection between the use of artificial intelligence and the increase in profitability of business. In the previous chapter we presented examples of activities in which artificial intelligence can significantly increase the profitability of business and indicated the existence of a strong connection between the use of artificial intelligence and various factors related to increasing profitability and productivity of business, which consequently affect the creation of new value. There is an obvious connection between the degree of use of artificial intelligence and the growth of profitability, and between the relationship and clear criteria that determine the increase in productivity and the growth of newly created value in business. Various new trends have been identified in the research: the creation of analytical portals; determining the degree of responsibility and transparency of work; and the changing philosophy of using artificial intelligence in the development of electronic services.<sup>27</sup> The success criteria defined by researchers are: process automation, cloud technology to reduce costs and a more favorable cost structure of digital business models<sup>28</sup>. In previous studies, it was emphasized that business strategy clearly indicates the importance of management transformation and business planning. In the analysis of the state of digital transformation (Figure 1), there are all significant digital technologies and management methods for organizations that today form a competitive advantage of organizations that are digital leaders. The analysis includes the use of digital business models, especially data-driven and AI-driven platforms, and models. The impact of the transition from linear business models to platforms is a significant indicator of digital transformation. Changes in the business operations of economic entities are not a coincidence, but the result of huge investments in research and development, the right management methods, and a superior business model. Organizations often begin their digital transformation by adding digital components to their analog models. In our previous research<sup>29</sup>, it was concluded that the first step in the transformation is the addition of chargeable services in a subscription model that is not yet a digital model. In a further step, additional digital services can be developed, for example remote monitoring or predictive maintenance. The third step allows switching to a model that is available to the customer and is charged according to use or performance. The previous studies<sup>30</sup> show that there is a strong connection between the degree of use of artificial

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<sup>26</sup> PwC: The economic impact of artificial intelligence on global GDP.

MGI: Notes from the AI frontier: Modeling the impact of AI on the world economy.

Milan BRKLJAČ, Bobana BERJAN BAČVAREVIĆ i Vladimir DŽAMIĆ, „Digitalizacija, inovacije i društveno odgovorno poslovanje“, *Ecologica*, 2022., vol. 29, br. 106, pages 178-184.

Tetyana V. NOVACHENKO, Tetiana V. BIELSKA, Eduard A. AFONIN, Mariia H. LASHKINA, Oksana M. KOZHEMIKINA i Nataliia P. DIACHENKO, „Use of information technology to increase economic efficiency and credibility in public administration in the context of digitization“, *International Journal of Economics and Business Administration*, 2020., vol. 8, br. 1, pages 374-382.

Christian PEUKERT i Imke REIMERS, „Digitization, Prediction, and Market Efficiency: Evidence from Book Publishing Deals“, *Management Science*, 2022., vol. 68, br. 9, pages 6907-6924.

Kristina MARŠIĆ i Anica HUNJET, „Doprinos tekstilne industrije sjeverozapadne Hrvatske“, *Radovi Zavoda za znanstveni rad HAZU Varaždin*, 2021., br. 32, pages 35-57.

Lorena DADIĆ, „Self-funding as a key element of financial sustainability of non-profit organizations“, *Naučne publikacije Državnog univerziteta u Novom Pazaru. Serija B, Društvene i humanističke nauke*, 2020., vol. 3, br. 1, pages 4-16.

<sup>27</sup> Tetyana V. NOVACHENKO i dr., same.

<sup>28</sup> Milan BRKLJAČ i dr., the same.

Christian PEUKERT i Imke REIMERS, same.

<sup>29</sup> Zvonko MERKAŠ, same.

<sup>30</sup> Milan BRKLJAČ i dr., same.

Tetyana V. NOVACHENKO i dr., same.



intelligence and the value of the index of digital transformation of business. For the purposes of this paper, continuing the study in which it was determined that there is a positive correlation between digital transformation and successful business in times of crisis<sup>31</sup>, a research was performed on the degree of use of artificial intelligence and the index of digital transformation in Croatia regarding the assessment of the initiated process of artificial intelligence implementation, i.e. it was investigated whether artificial intelligence or the value of the digital transformation index is in correlation with the increase in business productivity. In previous studies, the results of the regression analysis (used when testing hypothesis) which proved to be statistically significant suggested that there is a positive correlation between digital transformation and Altman's Z-score model for organizations listed on the stock exchange in the period from 2019 to 2021. Based on that result, the authors<sup>32</sup> confirmed the hypothesis that there is a positive correlation between the digital transformation index and Altman's Z-score, that is, between digital transformation and business excellence. Based on the above-mentioned results, for the purpose of this research, the impact of artificial intelligence on the level of digital transformation was estimated in the selected companies until 2030, together with the effect of such transformation on increasing business productivity in selected companies.

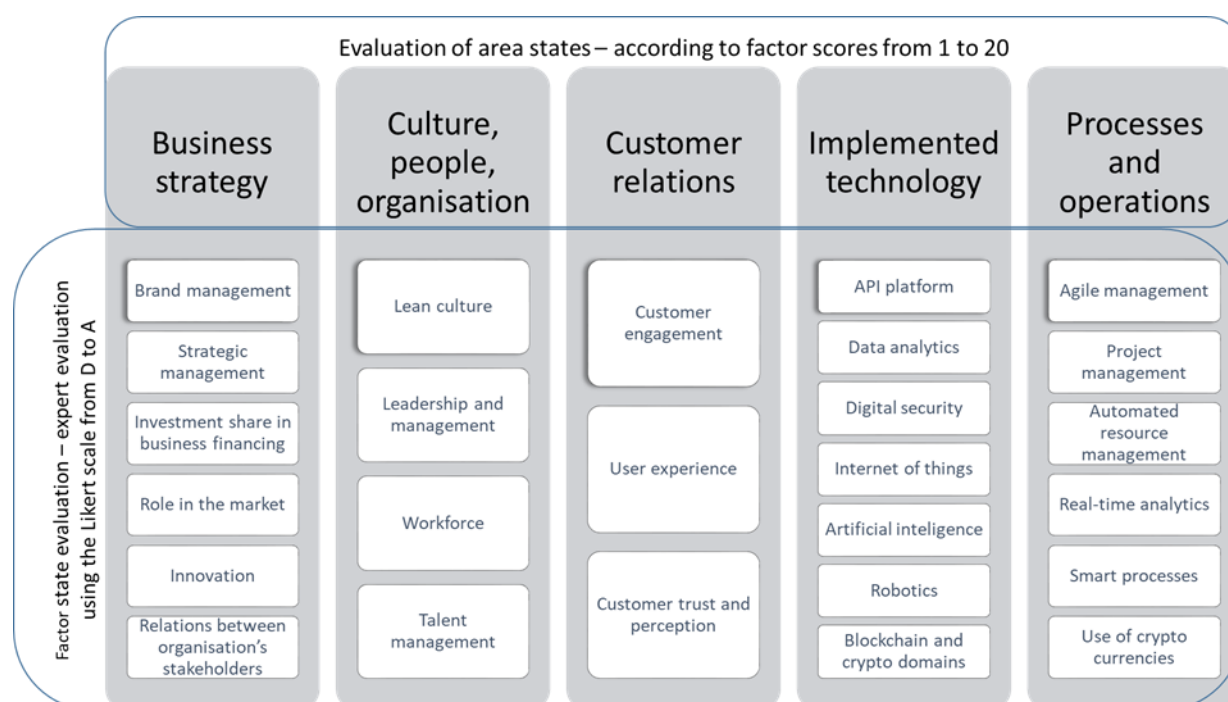


Figure 1: Method of evaluating the areas and factors of the digital maturity model  
(Source: Zvonko MERKAŠ, same)

## 6. THE RESEARCH RESULTS

Hereafter, for selected organizations listed on the Zagreb Stock Exchange, the calculation of the digital transformation index will be presented, together with the company's business stability assessment and artificial intelligence assessment in order to estimate their impact on the initiated process of artificial intelligence implementation, and it will be determined whether the percentage of the estimated impact of artificial intelligence corresponds to the impact of artificial intelligence in the calculation of digital transformation.

<sup>31</sup> Merkaš Z., Roška V., Plečaš M: (2023): TESTING THE APPLICABILITY OF THE DIGITAL TRANSFORMATION INDEKS USING THE ALTMAN Z-SCORE MODEL Interdisciplinary Management Research Conference – IMR 2023., pages 526-549

<sup>32</sup> Merkaš Z., Roška V., Plečaš M., same, page 545

In this way, the working hypothesis, that the assessment of the artificial intelligence in the index of the digital transformation affects the initiated process of artificial intelligence implementation, and consequently the productivity of the organization, to a greater extent than other elements of implemented technology, will be tested – from which it will follow that its use is directly correlated with increased productivity, i.e., creation of new value in organizations by 2030. If it is established that the importance of artificial intelligence is not proportional to the contribution of other technologies, the necessity for index correction will be indicated and further development of research will be encouraged in order to determine to what extent certain variables need to be weighted in order to establish the real value of the model area and their influence on the organizations' productivity. Previous research has shown that there is a strong connection between the degree of digitization and the financial success of a company.<sup>33</sup> However, the question arises to what extent this success can be attributed to artificial intelligence. The conducted research shows the extent to which Croatian leading companies assess the importance of the impact of the artificial intelligence implementation in business, and to what extent it will be crucial for their successful business in the coming period until 2030. When operationalizing the measurement of the digital maturity degree, it is necessary to consider how to objectively determine the impact of artificial intelligence on the digital transformation index of a company based on its degree of digital maturity and how to test it objectively. Using the index of digital transformation in selected large companies in Croatia that are listed on the Zagreb Stock Exchange and participate in the creation of the CROBEX index, (in 16 of the 20 companies that currently participate in the creation of the CROBEX - CBX index of the Zagreb Stock Exchange), an analysis of the state of digital transformation was made. Each factor which participates in the creation of the digital maturity index is graded on a Likert scale from E to A, where the grade E represents insufficient and A the optimal state of a particular factor, i.e., the degree of automation or realization of a particular activity. Analyzing the state of digital transformation, all significant digital technologies and management methods that today represent a significant competitive advantage of digital leaders are listed. The analysis includes the use of digital business models, particularly data-driven and AI-driven platforms, and models. The impact of the transition from linear business models to platforms is a significant indicator of digital transformation. Changes in the business operations of economic entities are not a coincidence, but the result of huge investments in research and development, the right management methods, and a superior business model. Below we present the results of the conducted research. From the presented analysis, the determined index of digital transformation in the selected companies is visible. The totality of the areas and factors by area reflects well all the features of the digital maturity of the company, so the calculation and presentation of the situation is meritorious for showing the index of digital transformation of the analyzed companies. Given that the data were not collected only from publicly available sources, but through interviews and surveys, the collected data cannot be presented individually by company. The average index of digital transformation in the selected organizations was 74, and the median index of digital transformation was 77. At the same time, eight organizations had a digital transformation index of 80 or higher. According to previous research<sup>34</sup>, it was confirmed that the totality of areas and factors per area reflect well all the features of the digital maturity of organizations, and therefore the state report was calculated and meritorious for the analysis of the impact of artificial intelligence and the index of digital transformation of the analyzed organizations on the initiated process of artificial intelligence implementation, and thus on the organization's productivity and profitability. The data which were generated based on research showed that in the field of implemented technology, it enters the index of digital transformation with an average score of 3.86, and at the same time, an integral part of that field

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<sup>33</sup> Merkaš Z., Roška V., Plečaš M., same, page 549

<sup>34</sup> Zvonko MERKAŠ, same.

of the started implementation of artificial intelligence with an average score of 3.31. In the continuation of the research, it was determined to what extent the increase in profitability until 2030 will be based on the implementation of artificial intelligence in the organizations selected for research. It was found that the average estimated increase in productivity based on the implementation of artificial intelligence is 4.3%. The stated results are in accordance with previous research<sup>35</sup>. The calculation of the (Pearson's) correlation coefficient shows that there is a moderate (positive) linear correlation ( $r=0.4618$ ) between the company's business stability assessment and the assessment of the initiated process of artificial intelligence implementation in the observed organizations. Furthermore, the correlation coefficient shows that there is also a strong (positive) correlation (0.5221) between the index of digital transformation of the observed organizations and the assessment of the initiated process of artificial intelligence implementation in the observed organizations. As expected, the strongest (positive) linear correlation (0.6907) was obtained by observing the impact of the assessment of the artificial intelligence and the obtained assessment of the initiated process of implementing artificial intelligence.

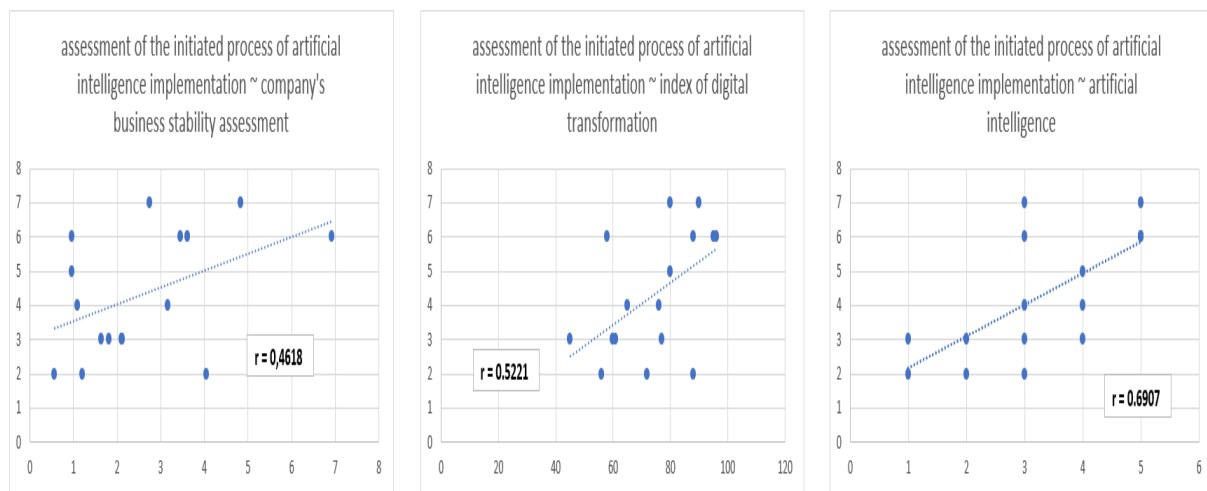


Figure 2: Pearson correlation coefficient for each pair of variables

Based on the above results, the conclusion is that the research hypothesis is confirmed: "Artificial intelligence to a greater extent than other elements of implemented technology affects the assessment of the initiated process of artificial intelligence implementation, from which it follows that its use is directly correlated with increasing productivity, i.e. creating new value in organizations by 2030". Likewise, the higher the index of digital transformation, the higher the assessment of the initiated process of artificial intelligence implementation, i.e., there is a correlation between the determined index of digital transformation and the degree of the initiated implementation of artificial intelligence in business. The hypothesis of the work was confirmed after testing by regression analysis with a certain criterion of significance  $\alpha = 0.05$ , i.e., the main hypothesis of the work was confirmed after the research established that there is a positive correlation between the assessment of artificial intelligence and the determined index of digital transformation in selected organizations with the estimated impact of implemented artificial intelligence on increasing labor productivity. The linear regression details for the all three predictor variables impacting the response variable are presented in the following figures.

<sup>35</sup> PwC: The economic impact of artificial intelligence on global GDP.

MGI: Notes from the AI frontier: Modeling the impact of AI on the world economy.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,461795834
R Square	0,213255393
Adjusted R Square	0,157059349
Standard Error	1,666790897
Observations	16

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	10,54281348	10,54281348	3,794847109	0,071746765
Residual	14	38,89468652	2,778191894		
Total	15	49,4375			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	3,045396929	0,772479073	3,942368198	0,001473695	1,388594098	4,702199761
company's business stability assessment	0,491363285	0,252235123	1,948036732	0,071746765	-0,049627249	1,032353819

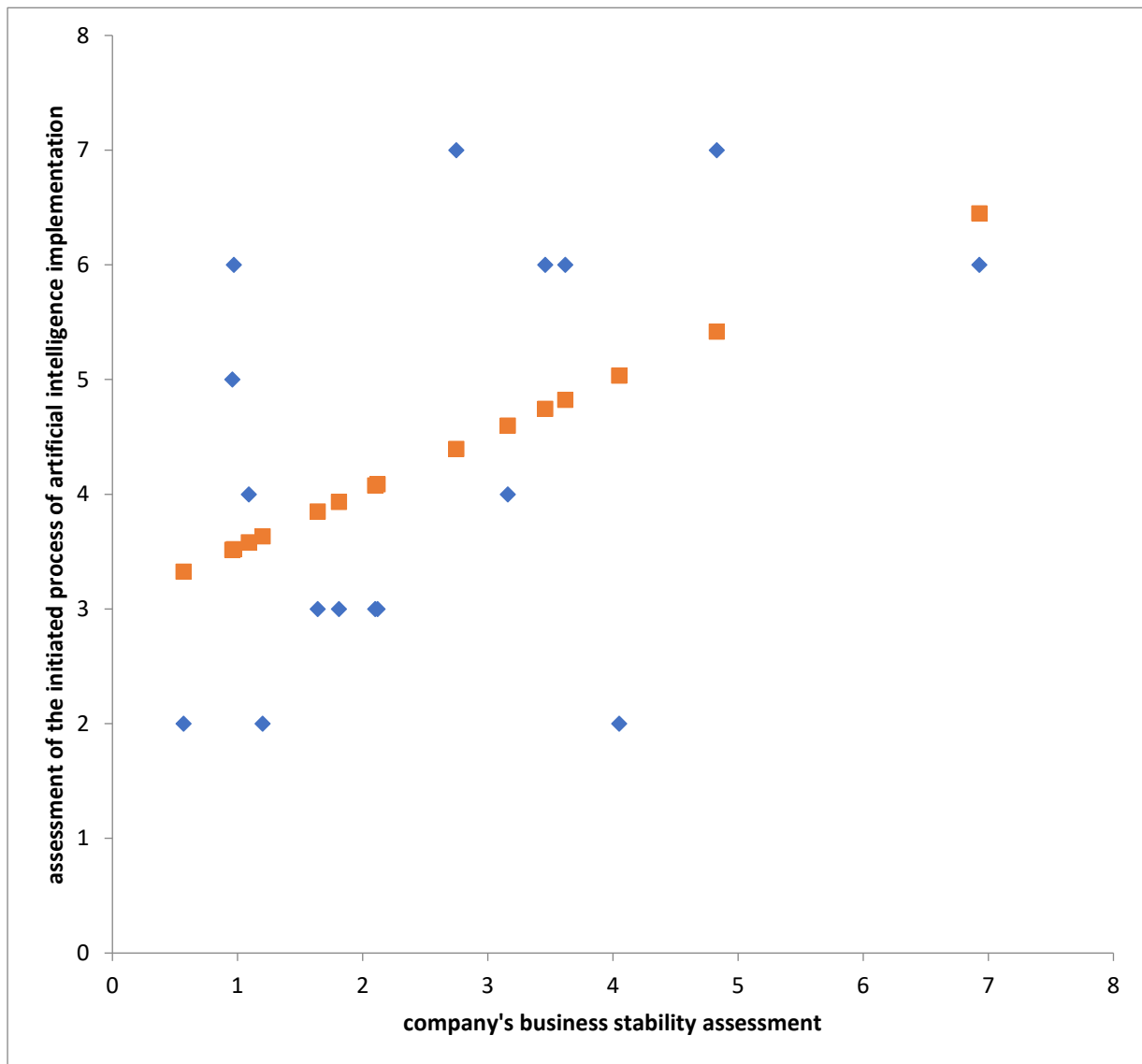


Figure 3: Linear regression summary results showing the linear connection between response variable of assessment of the initiated process of artificial intelligence implementation in the observed organizations and predictor variable of company's business stability assessment.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0,52210941
R Square	0,27259824
Adjusted R Square	0,22064097
Standard Error	1,60269694
Observations	16

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	13,47657537	13,47657537	5,246585206	0,03802575
Residual	14	35,96092463	2,568637474		
Total	15	49,4375			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-0,27239394	2,041370619	-0,13343679	0,895747046	-4,650698471	4,105910587
index of digital transformation	0,06180143	0,026981134	2,290542557	0,03802575	0,003932659	0,119670211

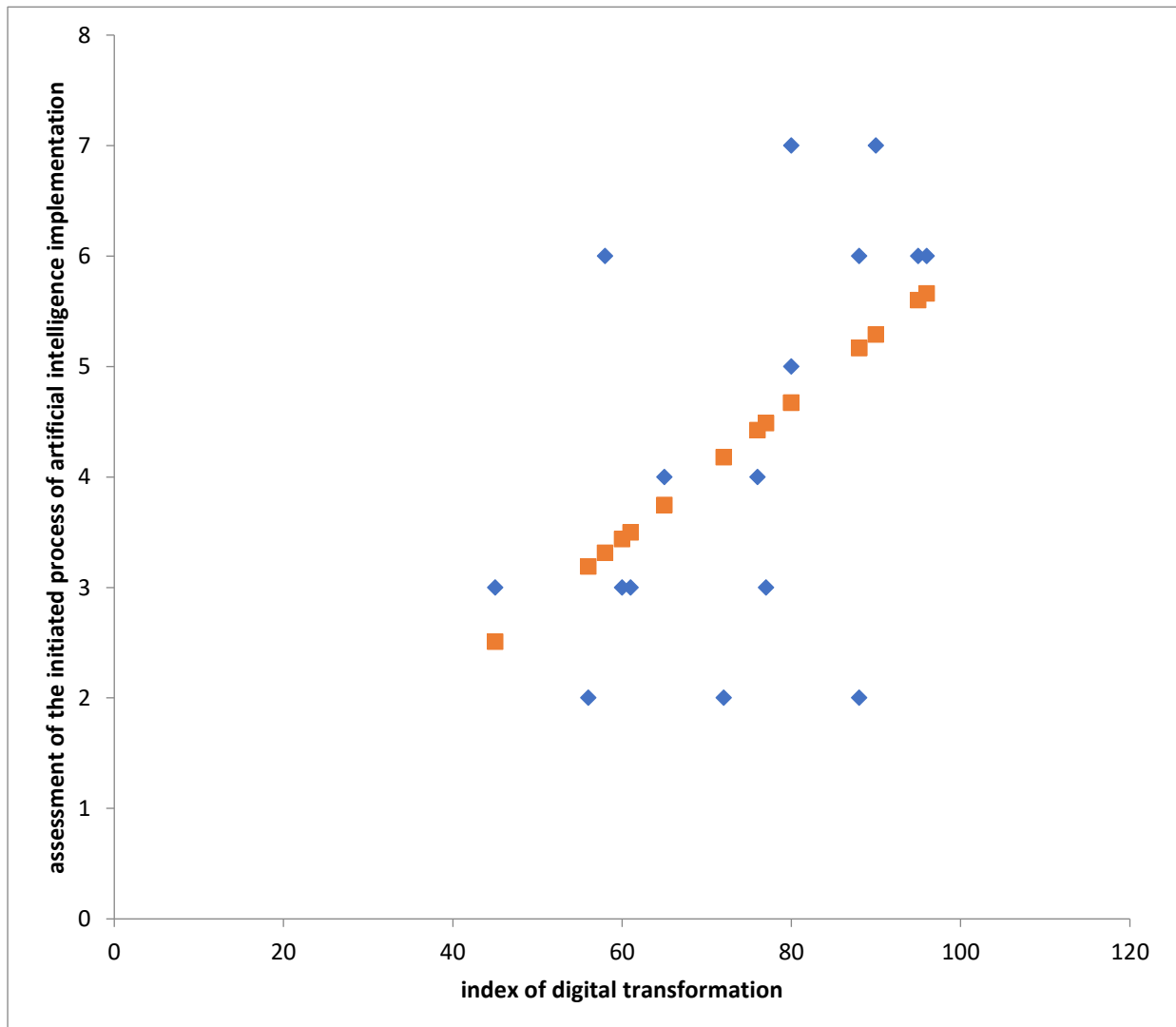


Figure 4: Linear regression summary results showing the linear connection between response variable of assessment of the initiated process of artificial intelligence implementation in the observed organizations and predictor variable of digital transformation index

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0,690675272
R Square	0,477032331
Adjusted R Square	0,439677498
Standard Error	1,358944289
Observations	16

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	23,5832859	23,58328588	12,77029736	0,003054668
Residual	14	25,8542141	1,84672958		
Total	15	49,4375			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	1,241457859	0,92409668	1,34342854	0,200505136	-0,740532407	3,223448124
artificial intelligence assessment	0,927107062	0,25943549	3,57355282	0,003054668	0,370673279	1,483540844

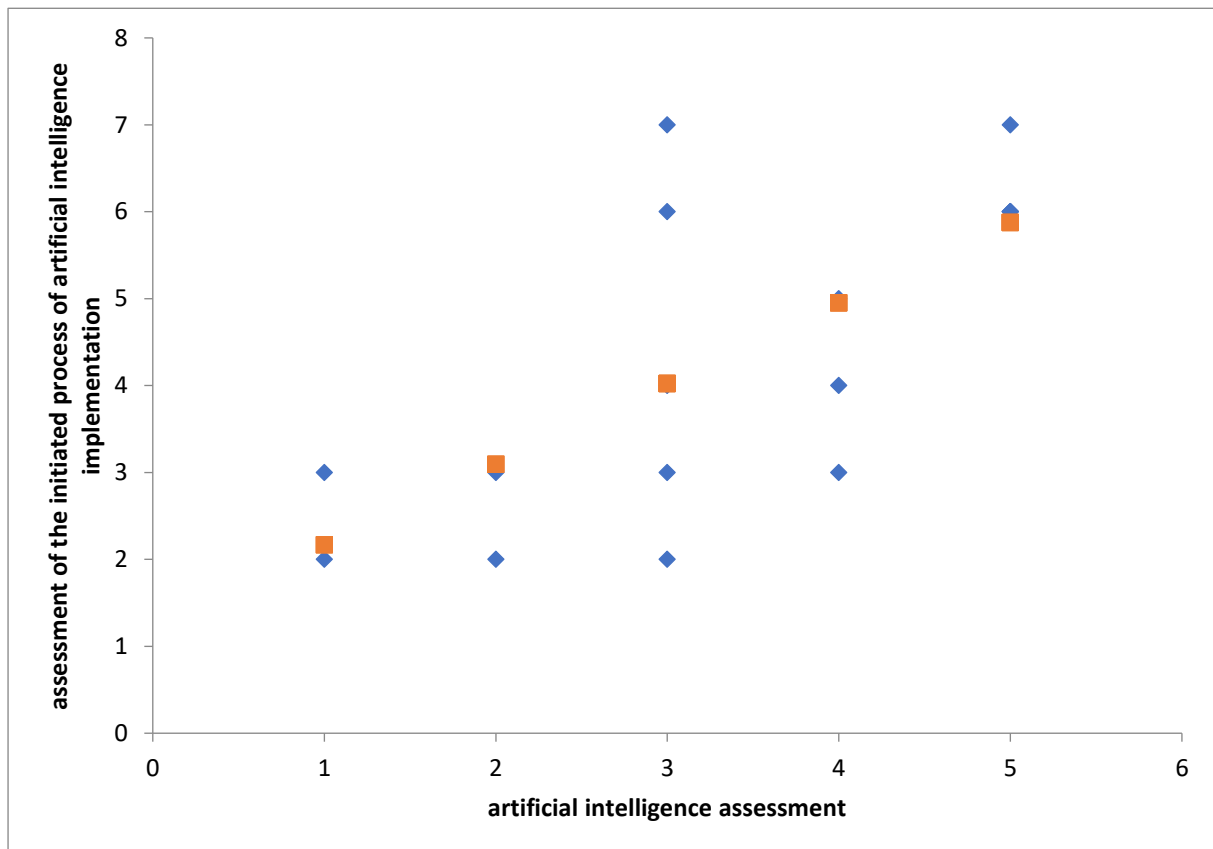


Figure 5: Linear regression summary results showing the linear connection between response variable of assessment of the initiated process of artificial intelligence implementation in the observed organizations and predictor variable of artificial intelligence assessment.

## 7. CONCLUSION

By checking the factors of the digital maturity model and determining the index of digital transformation, the organization must define the key steps towards the optimal digital transformation of business and the effective application of artificial intelligence in order to achieve comparative and competitive advantages and actively, by applying new digital technologies, create the necessary prerequisites for effective business. From this and the previous research, it is clear that the digital transformation of business remains the best way to adapt in a project-based sustainable economy and rapidly approaching disruptions.

Research for the purposes of this work confirmed global estimates according to which artificial intelligence has the potential to increase labor productivity in the range of 0.1% to 0.6% per year until 2040, depending on the speed of technology adoption and redistribution of working time to other activities. If we combine artificial intelligence with other technologies, work automation processes, according to available estimates, can contribute to an increase in productivity of up to 3.3% per year. For organizations to take advantage of these benefits, employees will need to be supported in acquiring new skills, and most of them will need to change their occupation. Managing changes in the project's sustainable economy, workforce transition, and other risks related to the use of AI tools will be critical to achieving the potential benefits of AI. Adaptation processes and obtaining all the advantages of artificial intelligence will take place gradually and will require serious effort and attention from organizations. It is very likely, as this research has shown, that the impact of artificial intelligence will be closely related to the way and speed of its implementation. Long-term economic growth is conditioned by an increase in the number of employees or an increase in labor productivity. In developed economies with demographic problems and population decline, productivity plays a key role in the growth of the social gross product. Research has shown that artificial intelligence has the potential to significantly accelerate productivity growth in the future. It is also clear from the research that the time frame in which artificial intelligence is predicted to have a significant impact on increasing productivity is the period after 2030, instead of in the near future, which is in line with other conducted research. The reasons can also be found in history, where all kinds of widely applicable technologies in different sectors of the economy, for example electricity, computers, or the Internet, had a measurable impact on productivity 10 to 30 years after the appearance of these technological innovations, and not immediately or in the near future. The results of the research that was conducted for the purposes of this paper is in line with the global research conducted by McKinsey.<sup>36</sup> According to the mentioned global research, the impact of artificial intelligence on productivity could add trillions of dollars to the global economy. About 75% of the added value will come from four areas that are in the process of implementing artificial intelligence: customer support, marketing and sales, software development and research and development. Global economic growth was slower from 2012 to 2022 than in the previous two decades.<sup>37</sup> Reduction of employment is one of the factors that impacted this behavior. Total annual growth in the total number of workers worldwide has slowed from 2.5 percent in 1972–82. to just 0.8 percent in 2012–22, mainly due to aging. In many large countries, the workforce is already declining. Productivity, which measures output relative to input, or the value of goods and services produced divided by the amount of labor, capital and other resources needed to produce them, was the main driver of economic growth in the three decades from 1992 to 2022. The research showed the necessity of carrying out the digital transformation of business as a necessity for a significant long-term increase in business efficiency. The conducted research confirmed the working hypothesis that only organizations with a high index of digital transformation and the intended implementation of artificial intelligence in their business can readily expect changes in the environment and in the future achieve the necessary increases in efficiency and become leaders of changes in contrast to organizations based on traditional ways of doing business in the activities they perform. The research showed that only organizations with new business models, based on digitization and digitalization of business using artificial intelligence, are ready to wait for the upcoming disruptions and remain leaders of change. Further research should show to what extent there is a difference in the assessment of the index of digital transformation and the influence of all areas and elements that influence the index.

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<sup>36</sup> McKinsey & Company, same.

<sup>37</sup> HNB, Globalni gospodarski rast, <https://www.hnb.hr/analize-i-publikacije/makroekonomske-projekcije>, pristup 21.10.2023.

Thus, it would be possible to evaluate the universality of the presented index of digital transformation and its daily application in the project sustainable economy. The presented correlation is certainly just one of the indicators for unequivocally deducing that the use of artificial intelligence and the digital transformation of business fully demonstrate the organization's resistance to challenges in the environment. Further analysis and monitoring of the impact of artificial intelligence on business and society is needed in order to better understand how it can contribute to the resilience of societies to challenges in the environment. We can conclude that the index of digital transformation is applicable and that as well as the use of artificial intelligence impacts the increase in business productivity on the Croatian market, but it is recommended to use them as an additional, and not as a basic indicator of a possible increase in business productivity in society in the coming period.

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## MAIDAN AND NOVOROSSIYA – COVERT ACTIONS OR SOCIAL MOVEMENTS?

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### ABSTRACT

*Social movements are, first and foremost, carriers of identity and social change, but as such, they do not act independently of structural and material limitations. Movements try to achieve the maximum within the material limitations without exceeding the minimum of identity determinations, and thus, three key components are set that determine analyses of movements - identity, structure and resources. The three perspectives are contained in three theories of social movements, namely, resource mobilization theory, political opportunity theory (political process theory) and framing theory. The emergence of a movement requires a political space for mobilization, an organization that will mobilize available resources, and an identity as a basis of which the movement will emerge and resonate its further activities. If at least one of the components is missing, the movement can't emerge. All three mentioned categories can also be a consequence of the intelligence activities aimed primarily at achieving state interest, while the fundamental goal of the movement's activities is social and/or political change. Covert action is an instrument of state interventionism that includes attempts of certain countries to influence events in other countries or territories without revealing their involvement. The element of "plausible deniability" is crucial when distinguishing the hidden activities from the desired political and military ones to intervene and influence political events in a specific country or in a specific area, which can be brought into direct connection, respectively attributed to the government that undertakes them. What if the two mentioned definitions coincide, that is, if the movement's goal is social change, which consequently, in the political sense, leads to the realization of the political goals of another country? In what framework can we then talk about a social movement as a reflection of social tendencies and when it can be considered primarily as a result of the activities of the intelligence services? The first part of the paper will consider the theoretical framework, which primarily refers to definitions of the terms social movements and covert operations. After the formation of the theoretical framework, the study of two cases of movements in Ukraine that had far-reaching consequences for international security - Maidan and Novorossiya – will be conducted with subsequent comparative analysis. Based on the research, it will be determined in which of the two categories the two analyzed cases can be located, that is, whether they primarily arose due to intelligence activities or as a reflection of social tendencies.*

**Keywords:** *Euromaidan, Novorossiya, social movements, covert operations, social conflict.*

### 1. INTRODUCTION

On April 22, 2022, the President of the Russian Federation, Vladimir Putin, announced the beginning of a military operation in Ukraine with the aim of de-Nazification of Ukraine and protecting the Russian population, which faces a direct threat from the authorities in Kyiv. According to the narratives of the Russian government, the processes that led to the overthrow of Viktor Yanukovich in 2014 were the result of social engineering organized by Western intelligence services aimed at achieving geopolitical goals.

A direct consequence of such activities is a security threat to the Russian Federation, especially in the form of the expansion of the NATO alliance on Russia's doorstep. According to the same narratives, such processes are a continuation of the Color Revolutions as a systematically organized process by the Western intelligence services that began with the operation to topple Slobodan Milošević in Serbia and continued later in Georgia, Ukraine and Kyrgyzstan. In the context of securitization discourses, Colored revolutions have replaced the Soviet counter-revolutionary theory, i.e. the tsarist conspirology based on the Protocols of the Elders of Zion as the central element of subversive activities with which the Russian security services have been faced and which also served as support for the geopolitical goals and efforts (Galeotti, 2019). Within the framework of such efforts, covert operations play one of the central roles. The term covert operation refers to attempts by a specific state to influence events in other states or territories without revealing its involvement (Godson, 1981, according to Bilandžić, 2005). One of the first covert operations of the Central Intelligence Agency (CIA) was in the former Socialist Soviet Republic of Ukraine, where American services tried to infiltrate Ukrainian nationalists, that is, opponents of the communist authorities, to create networks of agents and carry out subversive activities. (Michel, 2022). All attempts failed, and similar narratives came to the fore again during the Maidan protests (2013-2014), where, according to Russian narratives, the central role was played by radicals and nationalists instrumentalized by the USA. Unlike the CIA, whose activity was still in its infancy, the Soviet Committee of State Security (*Komitet gosudarstvennoi bezopasnosti*, KGB) already had a history of activities that it inherited from the Cheka, that is, the Soviet secret police that carried out counter-revolutionary terror. Lyubyanka, as the headquarters of the Cheka and the KGB, was succeeded by the Federal Security Service (*Federal'naja služba bezopasnosti Rossijskoj Federacii*, FSB), which, instead of the Foreign Intelligence Service (*Služba vnješnej razvjedki Rossijskoj Federacii*, SVR) continued to operate in Ukraine as a key intelligence actor and in a way this also reflects the Russian attitude towards Ukraine as its own backyard. Like Georgia, which also faced the Russian invasion, Ukraine is part of what is considered to be the near abroad - deep in the sphere of Russian interest and represents red lines<sup>1</sup> regarding security perspectives for the Russian political establishment. Since the collapse of the Soviet Union and the formation of the modern Ukrainian state, Moscow has tried to exert control over Ukraine at the highest levels through its intelligence structures, starting with the actions of Yevgeny Marchuk<sup>2</sup>, who, as an extended arm of the FSB, unsuccessfully tried to take over the presidential position from Leonid Kuchma (Felštinski & Stančev, 2022 ). Vladimir Putin's ascension to power also marked two changes that can be considered in a simultaneous context, namely the establishment of a vertical of power in which the security services played a vital role and a much more aggressive attitude towards the countries of the near abroad. Ukraine was not an exception in this case, and this was evident from the case of the poisoning of the presidential candidate Viktor Yushchenko, who represented the pro-Western option and whose wife was described by his opponents as a CIA agent<sup>3</sup>. In 2014, Victoria Nuland publicly announced that from the beginning of the 1990s to 2014, the USA invested more than 5 billion USD in Ukraine for democratization processes.<sup>4</sup> For these purposes, the National Endowment for Democracy (NED) foundation also actively participated, whose president, Carl Gershman, stated that Ukraine was the greatest prize (Mearsheimer, 2014).

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<sup>1</sup> The symbolism of using the red line term is also reflected in the fact that no country whose borders were drawn by the Bolsheviks joined NATO or the European Union.

<sup>2</sup> In his career, Marchuk held a number of high positions, such as Prime Minister and Minister of Defense.

<sup>3</sup> All evidence suggests that Viktor Yushchenko was poisoned during a meeting with officials of the Security Service of Ukraine (SSU). The main suspect in that act was the deputy head of the SSU, Vladimir Saciuk, who was granted political asylum in Russia (Felštinski & Stančev, 2022), which speaks volumes about the relationship of influence between the Russian and Ukrainian security services.

<sup>4</sup> It is important to note that this aid per capita was several times smaller than in other cases, such as Kyrgyzstan and Georgia (Wilson, 2006).

Despite the statements of American officials that these were investments aimed primarily at the promotion of democracy, according to Russian narratives, this kind of activity was primarily the result of subversive activities and social engineering aimed at bringing pro-Western governments to power and achieving geopolitical goals. Given that Ukraine represents the greatest prize for America and a security imperative for Russia, it is not unexpected that both countries tried to influence socio-political processes in different ways. The fact that Ukraine was at the centre of the activities of foreign intelligence services is best demonstrated by the fact that between February and April 2014, Sergei Beseda, a high-ranking official of the FSB, and then John Brennan, then head of the CIA, visited Kyiv. From all of the above, the question arises to what extent the social processes summarized in the Maidan and Novorussia movements resulted from covert operations and to what extent they reflected social tendencies. Therefore, the paper aims to analyze the concepts of secret actions and social movements, to determine the connection between these two phenomena using a comparative correlation approach and to apply the extracted insights to empirical cases in concrete case studies to determine whether the indicated movements are social movements or the product of covert actions.

## **2. COVERT ACTIONS AND SOCIAL MOVEMENTS – ANALYSIS OF CONCEPTS**

### **2.1. Covert actions**

Due to the extensiveness and almost central role they played in the bloc conflict, we can say that covert actions are a product of the Cold War (Bilandžić, 2005). Also known as the silent or third option, covert operations are carried out when the goals of the home country can no longer be achieved through regular political and diplomatic means while going to open war is still not an acceptable option, which does not mean that military means and assets are not used in the process of conducting covert operations. In the late 1950s, at the height of the Cold War, the Soviet authorities began to use the term active measures (*aktivnye meropriyatiya*) for the covert political and/or other subversive activities aimed to support friendly movements or to incite disorder and/or spread disinformation in the case of a hostile regime.<sup>5</sup> Active measures represent an instrument of state activities in which the intelligence services are the central actor in their implementation, but other state and non-state entities (media, ministries, Cossack organizations, business people, members of the clergy, etc.) also participate in these processes (Galeotti, 2019). Within the framework of the narrative of the fight against the red menace and the policy of containment of communism, the CIA, as the successor of the Office of Strategic Services (OSS) of the USA, began to develop the policy of covert operations systematically. According to the American interpretation from 1948, covert operations are a part of political warfare that includes all activities short of war to achieve national goals (Lucas & Mistry, 2009). Covert operations, which until then were almost undeveloped at the institutional level, gradually became one of the key elements of US foreign policy. Despite a series of unsuccessful operations, successful attempts were recorded in Italy during the 1948 elections, where, under the strong influence of the CIA, the Christian Democratic Party won victory over the increasingly powerful Communist Party. Such outcomes were a crucial incentive for the further development and instrumentalization of covert operations because the communist movement was gaining more and more influence in Europe, and covert operations ideally fit into the containment strategy. Victory in the Cold War nullified the red threat, the central element of American securitization discourses. At the same time, the area of the post-Soviet Union opened new spaces for democratization processes in which public and private foundations such as the International Republican Institute (IRI), the National Democratic Institute (NDI) and the US

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<sup>5</sup> As the respected expert on Russian security structures, Mark Galeotti (2019) claims active measures were used significantly less during the time of Mikhail Gorbachev, who tried to build better relations with the West during the chaos of the 1990s. However, they became an important instrument again with the ascension of Vladimir Putin.

Agency for International Development (USAID) played a significant role. Activities that were partly carried out by the CIA in Italy and other places in a covert manner, the foundations now practically carried out in public<sup>6</sup>, while under Bill Clinton, the promotion of democracy became one of the three pillars of the national security strategy. Despite the unipolarity of the 1990s and the democratic transitions in post-Soviet countries, the combination of the activities of foundations and covert operations of the CIA as part of politics did not completely disappear but acquired a different dimension, and this was manifested primarily in Serbia, during the reign of Slobodan Milošević. The CIA was part of a systematic policy to remove Milošević, which consisted of secret and public parts. The public part was carried out through foundations in terms of support for activists and the opposition; while the details of the CIA's operation are not revealed, several statements from US officials confirm the involvement, including President Clinton, who approved such action (Shimer, 2020).<sup>7</sup> Despite the relative theoretical vagueness, the models of covert operations differ according to the field of action, which can be divided into the psychological/propaganda, economic, political and military fields (Rudgers, April 2000, according to Bilandžić, 2005). Military activities include military assistance to paramilitary formations, that is, guerilla and terrorist forces and their guidance to achieve the goal or their suppression, depending on whether we are speaking about the enemy formations and/or a friendly regime. The area of economic activity includes activities aimed at causing economic and social instability or incentives to stabilize economic systems. Political activities include advisory, financial and organizational services to parties or individual groups, while more extreme measures may include targeted killings or assassinations. Propaganda-psychological activity means carrying out activities aimed at forming opinions and attitudes. Depending on the sender's source, this type of activity can be divided into white, grey and black propaganda. When the source of the sender of the message is clear and known, then it is white propaganda. When the sender's source cannot be clearly determined, it is grey propaganda, while black propaganda refers to activities when messages are attempted to be attributed to the other party, that is, to a subject that is not the actual sender (Bilandžić, 2005). The central element of covert operations is secrecy, that is, the conductor's ability to plausibly deny responsibility for such actions, without revealing its involvement. The direct connection between the one executing the covert operation and the conductor must remain absolutely hidden; that is, in case the operation is compromised, the conductor must be able to plausibly deny his involvement at any given moment. The question arises to what extent the conductor of the operation can deny his involvement despite existing evidence that indicates the opposite. Plausible deniability is a central element of the covert operation concept, and in investigative practice, its demystification is crucial in establishing the presence of influence by a particular entity. Considering the secrecy and indeterminacy of its nature, the question is whether it is possible at all and how to distinguish between influence through secret channels and the genericity or originality of a particular social phenomenon that the subjects instrumentalize to achieve their goals. When are the rebellions and riots a results of society's response to the accumulation of tension (social strain), and when are they a result of subversive activities of an external entity?

## 2.2. Social movements

In the Dictionary of Sociology, Nicholas Abercrombie, Stephen Hill and Bryan S. Turner, under the term social movement sum up a multitude of different forms of collective actions of varying

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<sup>6</sup> The forms of these public activities are also included in covert actions (political and psychological areas of activities), but essentially, they are two types of activities, both aimed at democratization in other countries.

<sup>7</sup> There was significant opposition to Milošević, especially in the form of the Otpor movement, and it would be wrong to attribute its existence to a covert operation or public assistance from the USA. However, direct assistance in financial and know-how terms enabled mobilization. It prevented the theft of election results, which means that direct foreign help was a factor in the overthrow of Milošević but not the cause of the movement's existence.

levels of organization that are aimed at social reorganization with goals that can be broad or limited in scope (Abercrombie et al., 2008). By analyzing the definitions and perspectives of different authors, we can say that social movements are at least partially organized, non-institutional forms of collective action that, as carriers of identity and a form of contentious politics in a certain continuity of action, try to achieve or prevent specific changes in society. At the same time, it is essential to note that the size and continuity of action distinguishes movements from ordinary protest action and pressure groups (Burazin, 2023). Within the framework of analyzing social movements, three primary schools, that is, theoretical approaches that consider the dynamics of the origin, activities and development of social movements in different ways have developed: resource mobilization theory, political process theory (structure of political opportunities) and framing theory.<sup>8</sup> Resource mobilization theory (RMT) analyses the process of emergence and the movement's success through the prism of the successful collection and allocation/use of resources in the environment in which they operate. The central element of this theoretical approach is contained in the perspective that dissatisfactions exist in society; however, for social mobilization, it is necessary to have an organization that will successfully facilitate the mobilization of resources and, ultimately, social activities. Without organization and resources, social dissatisfactions cannot be channelled into mobilization. The central element of political process theory, like RMT, is the strategic rationality of actors, but above all, this theory considers the structural political opportunities that enable and facilitate mobilization. Supporters of this theory believe that existing dissatisfactions cannot be mobilized in social action if no structural conditions would allow such action. In the same way, they emphasize the role of structural political conditions as key mobilization factors, and these factors can be considered in the spheres of international support for the regime or movement, state capacities and tendencies for repression, the presence of elite allies and the stability of elites that solidify the polity (Romano, 2006 ). Unlike the first two theories, which primarily consider mobilization through the prism of the strategic rationality of actors, the framing theory emphasizes the role of identity in the process of creating meanings through interpretive frameworks. Within the tripartite theoretical framework, this theoretical approach primarily considers the discursiveness of the process in terms of the creation of meaning through interpretive frameworks as the basis on which mobilization is carried out. Framing provides meaning to all the activities contained in the political opportunity structure theory and the resource mobilization theory. The fundamental framing tasks can be divided into three categories: diagnostic, prognostic and motivational. Diagnostic framing consists of defining the problem or situation that needs to be solved; prognostic motivation defines means and ways for solving these problems, while motivational framing serves as a call to arms, i.e. it defines the reasons that refer to the urgency of mobilization and the importance of solving the diagnosed social problem.

### **3. SUBVERSIVENESS AND/OR SOCIALITY – CASE STUDY ANALYSIS OF MAIDAN AND NOVOROSSIA**

Enforcement of covert operations can be located within the realm of psychological, military, economic and political activities. Therefore, even theoretically, covert operations can be considered in correlation with the factors defined in the three social movement theories. Moreover, the goal of the movement is to achieve or prevent social and political change, while the goal of a covert operation is also to achieve or prevent a certain change, but with the condition of plausible deniability and in the interest of the entity that implements them.

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<sup>8</sup> In addition to the above, it is necessary at least to mention the theory of new social movements. While resource mobilization, political process and framing theories are structural and process theories that deal with the issues of the process of origin and development of the movement, the theories of new social movements primarily consider the role of the movement's identity. Instead of resources and structures, this theory considers identity as the starting point for considering the dynamics of movement development. The framing theory is an element that, in a procedural sense, connects the two categories.



Conversely, movements are a form of non-institutional activity, while a covert operation is one of the key instruments in achieving the state's goals. In complex cases of conflict such as Ukraine, the question arises: Where does the social movement begin, and where does the covert operation begin? Suppose the dynamics of the movement's origin, action and development are conditioned by the factors contained in the three theories of social movements. Does this mean that in these elements, we should also look for the possibility or the extent of the influence of the implementer of the covert operation? The subject of the analysis is two case studies, Maidan and Novorossiia, that rival narratives perceive precisely through the prism of the division between a social movement and a covert operation. The key factors that defined the dynamics of these movement's origin, development, and activities will be analyzed, and the extent to which they can be considered as a consequence of a covert operation will be determined. Given the nature of the covert operation, the question is whether such an effort is truly what John Ruggie (1982) described as trying to find a black cat in a dark room based on the assumption of its existence and showing the scratches on the walls as evidence of its existence. Considering the nature of the analyzed concept, i.e. secrecy as the central element of a covert operation, an essential factor in the analysis will be the element of institutionality, i.e. the influence of the state, which, based on a broader analytical framework, could be located in the area of the covert operation. In this context, the dynamics of the origin, development and operation of the movement are dependent, while the activities that fall under the category of secret operations are an independent variable. Subsequently, a comparative analysis of the research results will be conducted. This is qualitative research in which secondary data will be primarily used, but quantitative indicators such as surveys of social attitudes will also be used. Research of social attitudes is an essential factor because it can indicate whether there was a social tendency for mobilization at all, which is a prerequisite for the existence of a social movement. That is, they can help us demarcate between marginal groups that acted as a proxy of another state or a legitimate reflection of social tendencies that are, to a lesser extent, directly or indirectly facilitated by external factors.

#### **4. UKRAINE - BETWEEN THE WEST AND THE EAST**

With the dissolution of the Soviet Union in 1990, Ukraine, for the first time, became an independent state within the borders as they are today. However, history and geopolitics remain vital factors that condition the regional security architecture. Such circumstances positioned Ukraine at the crossroads between East and West, i.e. the conflict between the two superpowers, the USA and Russia, which, over the past two decades, again assumed the contours of the Cold War conflict (Bilandžić, 2015) in which covert operations play a central role. Within the framework mentioned above, the division of Ukrainian society along various lines expectedly became the object of securitization and the target of proxy influences of external actors. Despite the history of divisions, different governments, and separatist tendencies that existed in the eastern and southeast areas, Ukrainian society has always been uniform in terms of the unity of the state. One of the dividing lines of Ukrainian society was the foreign policy orientation of the state. According to research conducted by the Kyiv Institute for International Sociology (KIIS) (KMHC, 2013a) in September 2013, 41% of respondents believed that Ukraine should join the EU, while 35% of them believed that Ukraine should join the Commonwealth of Independent States (CIS) led by Russia. The highest EU support of 75% was recorded in the western regions, while in the eastern regions, the support for joining the CIS amounted to 57%. The difference between the western and eastern regions was even more pronounced regarding the question of historical figures. In the west of the country, 74.9% consider Stepan Bandera<sup>9</sup> a

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<sup>9</sup> Stepan Bandera was the leader of the Organization of Ukrainian Nationalists (OUN), which fought first against the Polish authorities in western Ukraine and then against the German and Soviet authorities. The term *banderites* was used to describe members of the OUN movement and underground Ukrainian nationalism. During the Soviet Union, it became an accusatory

positive personality, while in the Donbas region, 81.3% of respondents consider him in negative terms (Kulyk, 2016). Until 2013, the political divide between East and West reached its peak during the Orange Revolution of 2004 and 2005, when hundreds of thousands of Ukrainians protested against the rigging of the election results in which Viktor Yanukovych defeated Viktor Yushchenko. While on the streets of Kyiv, hundreds of thousands of protesters, as well as a number of local officials throughout the cities, refused to accept the victory and power of Viktor Yanukovych in the east of the country, in the city of Sievierodonetsk, a congress of local officials was organized in support of Viktor Yanukovych. The main messages of the congress were not only support for Yanukovych and accusations of Yushchenko being a foreign agent but also calls for separatism of the eastern regions in case they refuse to accept the election results and Yanukovych's victory (*Янукович и Лужков приехали в Северодонецк...*, 2004).<sup>10</sup>

#### 4.1. Maidan

Social conflicts and divisions escalated again in 2013 and 2014, but unlike the Orange Revolution, they resulted in a war. The refusal to sign the Agreement on Ukraine's accession to the EU in November 2013 led to protests at the central Maidan square.<sup>11</sup> Maidan, unlike the Orange Revolution, is not primarily a political movement regarding the central role of opposition politicians. Moreover, it was precisely the lack of cohesion and communication between opposition leaders and social movement organizations that opened up space for more radical subjects in the process of development of the movement (Onuch & Sasse, 2016). The Maidan was more of a spontaneous and what would be called a bottom-up activity that lacked coordination and central leadership. According to research conducted by KIIS, almost 92% of respondents who participated in the Maidan were not members of any party or other non-governmental organization (KIIS, 2013).<sup>12</sup> The protests on the Maidan began on November 21, after the famous blogger and journalist Mustafa Nayem called for protest activities on the Maidan via social media. Following his calls, several thousand protestors, mostly students, gathered on the Maidan, after which the number grew. Therefore, he can be one of the organizational central figures who encouraged the mobilization. Did the CIA instrumentalize Nayem for mobilization, namely, use him as part of a covert operation? Such perspectives are not exclusive, but therefore, anyone who is an activist and opponent of a regime such as that of Viktor Yanukovych could be considered a foreign agent.<sup>13</sup> The mobilization did not occur in a vacuum but within the context of an unexpected turn in the direction of Viktor Yanukovych's foreign policy. In the first phase, the movement was still known as Euromaidan, i.e. narratives and messages that focused on pro-Western integration politics dominated, and the protests had only a few thousand supporters, far from the massiveness that followed. The first critical moment that gave the protest an element of massiveness in terms of broad social support

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term for revitalizing Ukrainian nationalism (Felštinski & Stančev, 2022). The figure of Bandera is an essential subject of division and conflicting perspectives in the academic, political and social context. For more on Bandera and the politicization of his character and work, see Marples (2006).

<sup>10</sup> Among the guests was also Yuri Luzhkov, the mayor of Moscow, known for his pro-separatist views on southeastern Ukraine. Despite the repeated elections and Yushchenko's victory, the separatist narratives did not materialize. However, nevertheless, they were undoubtedly an incentive for the organizations in the regions and called for separatism. More importantly, in still unclear circumstances, Kuchma's administration did not send security services to the protesters, which prevented bloodshed on the Maidan. According to many Ukrainian officials, a significant number of members of the Security Service of Ukraine (SBU) decided to side with the protesters and encouraged them in various ways (Chivers, 2005), which was the opposite of the repression that followed in 2013 and 2014.

<sup>11</sup> According to a KIIS (2014b) survey conducted in February 2014, in the east of the country, 57% of respondents believed that the Maidan protests were primarily the result of Western interference and encroachment of Ukraine into their sphere of interest, while 20% of them considered the events as protests against Viktor Yanukovych.

<sup>12</sup> A broad majority of the respondents, 70% of them stated that the primary motivation or reason for participating in the protests was against the repressive and corrupt regime (KIIS, 2013).

<sup>13</sup> What distinguishes Nayem from the others is his popularity on social networks and long-term activism, which, in the framework of Ukrainian democracy under Viktor Yanukovych, is hard to imagine without outside help.

occurred on November 30, 2013, when members of the "Berkut"<sup>14</sup> forces used violence and disproportionately repressive methods against the protesters.<sup>15</sup> The violence that was used that day, that is, the repressiveness of the regime, transformed the Euromaidan movement into Maidan. Moreover, as stated by Onuch and Sasse (2016), the activists planned to dissolve the activity based on the development of events in Vilnius, while such violence united the two camps, i.e. political and student Maidan and gave a new impulse to the entire movement. The issue of Western integration was no longer the central element of the narratives. Instead, it became a struggle with a corrupt and repressive regime. In addition to changing narratives, the violence has fueled mass support for the movement from all segments of society and regions of Ukraine. Adoption of the so-called "dictator laws" on January 16, 2014, according to which any form of activity related to protesting is prohibited, i.e. considered a criminal offence (*The dictator laws of January...*, 2018), further escalated the situation on the Maidan, after which citizens were called to defend the public space from dictatorial authorities, setting up barricades, etc. The third critical moment, which also marked the worst day up to that point in terms of victims, occurred on February 20<sup>16</sup>, when snipers opened fire on protesters, after which more than a hundred people died in the clashes, and Viktor Yanukovich was overthrown from power. Still today, the issue of sniper shots is a matter of controversy. According to one narrative, it was radical nationalists who were responsible for the sniper shots and whose goal was to escalate the situation irreparably with such violence.<sup>17</sup> On the contrary, according to the pro-Maidan narratives, it was a deliberate act of violence by the authorities which wanted to escalate the situation to the point of sending the army into the streets, also as a part of a covert operation by the Russian security services.<sup>18</sup> During the Maidan protests in 2013 and 2014, violence played an essential role in transforming the movement in terms of massiveness, narratives and the methods used. The first act of violence transformed the Euromaidan into the Maidan and was committed by the authorities. The second act was the enactment of anti-terrorist laws by the government, while the third act escalated and spiralled the situation and ultimately led to the overthrow of Yanukovich.

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<sup>14</sup> The "Berkut" (Golden Eagle) unit was unpopular because it was made up of Ukrainian officers who had previously been part of the Soviet intervention units. On January 16 (Black Friday), the Verkhovna Rada passed a new Law on Public Order to criminalize protests; thus, the criminal powers of the state were expanded, and Berkut was released from all responsibility. The Venice Commission of the Council of Europe declared this in accordance with European practice (Felštinski & Stančev, 2022).

<sup>15</sup> According to Viktor Yanukovich and Vitaly Zakharchenko (the then Minister of Internal Affairs), they never issued such orders. Instead, Sergey Lyovochkin, then head of the presidential administration and also a close associate of Aresniy Yatsenyuk, one of the heads of the opposition and an opponent of the regime, was responsible for such actions. However, the police officials, in their immediate reactions, justified repressive activities, which, according to them, followed the provocations of the protesters during the Christmas decoration of the square. This again indicates that the repression is a consequence of miscalculation and the lack of institutional capabilities of the authorities (Afineevski, 2015).

<sup>16</sup> It is important to note that this cycle of violence started two days earlier, on February 18, after Maidan protesters organized a march towards the parliament building. The march's goal was to support the opposition parties in their attempt to vote for the return of the old constitution from 2004, according to which the powers of the president would be reduced and the powers of the parliament would be increased. The protesters soon clashed with the cordons of the intervention police, who blocked the road, after which the last cycle of escalation of violence began, in which the Maidan was transformed into the Revolution of Dignity (*Ukraine: Deadly clashes around parliament in Kyiv...*, 2014; Fisher, 2014).

<sup>17</sup> According to the pro-regime narratives, the culprit for the escalation was radical right-wing forces (Afineevski, 2014). According to the regime's narratives, even the police violence on November 30 was the result of provocations by the radicals. However, even if such a narrative is accurate, it does not change the fact that the police forces acted too aggressively, i.e. the repression that was applied was enough to create an image of a brutal regime that crushes protests with excessive force. The issue of proactive action by radicals became much more controversial in the later stages of the conflict, but it was already clear that Maidan was a mass movement and would not disappear from the scene. Therefore, even if there was secretly planned proactive violence, it did not critically affect the movement in its key formative phases of development. Perhaps the end of the Maidan, or of Viktor Yanukovich, came from a spiral of violence in which radical elements played a proactive role, but the Maidan did not come into being; that is, it was not the result of such actions.

<sup>18</sup> According to the same narratives, another piece of evidence to corroborate such claims is that Sergej Beseda, a high-ranking official of the FSB, and a group of other officials visited Kyiv. What particularly calls into question the role of the Russian security services in this context is the fact that the Russian government, in the later stages of the conflict, insisted that the persons suspected of the shootings were part of the exchange of prisoners, as a consequence of the war in Donbas that followed (Karatnycky, 2020).

Despite the authorities' later statements, everything indicates that the first and second acts resulted from the authorities' miscalculations in assessing the strength of the movement and the effectiveness of the applied repression. The third act, or the sniper shots at the protesters, is the most controversial of all due to the fact that it is not entirely clear who the perpetrator was and because it additionally escalated the last phase of violence and led to the overthrow of Yanukovich.<sup>19</sup> Although it marked the end of Yanukovich and the victory of the Maidan protesters, it is not a decisive factor in considering the origin and development of the Maidan itself. The movement had strength and massiveness for three months already, while Yanukovich and opposition representatives signed an agreement on the political stabilization of Ukraine on February 21. Considering the key elements of the political opportunity structure, the Maidan as a movement is primarily the result of miscalculations by the government structures. The opposition was supported by John McCain, Catherine Ashton, Vice President of the European Commission, and Victoria Nuland, US Assistant Secretary of State, who distributed cakes to the protesters. Such activities reinforced pro-regime and Russian narratives about how the protests were organized and led by the US embassy.<sup>20</sup> From the beginning of the 1990s to 2014, the USA invested 5 billion USD in the democratization processes in Ukraine, and already within these frameworks it can be said that it certainly influenced the processes in the form of the Orange Revolution, and therefore, consequently, the Maidan. What also distinguishes the Orange Revolution and the Maidan in terms of mobilization is the media space and communication technologies that enabled and facilitated mobilization. During the Maidan, as in other countries, social media played an indispensable role in mobilization, which was not the case with the Orange Revolution.<sup>21</sup> On November 20, 2013, the independent media company Hromadske.tv was founded, which broadcasted the events from the Maidan and thus gave the protesters the additional media space they needed. Hromadske.tv was officially financed first by the Dutch Embassy, then by the US Embassy and finally by the Open Society Foundation. Therefore, the media channels that were established and actively used during the Maidan were financed by the USA and the Netherlands. Still, from the very beginning, this was publicly available information. Hromadske.tv was an important factor in spreading messages and communications, but social media was a key factor in organization and mobilization.

#### **4.2. Novorossiia<sup>22</sup>**

Continuously to the Maidan protest activities, the movement, or in this case a counter-movement of Anti-Maidan, was mobilized. Anti-Maidan included various subcategories, and similar to the Maidan protest, the key messages and the repertoires of contention differed depending on the period of observance. Considering Anti-maidan in a temporal context, in a simplified sense, it can be observed for the period before and after the departure of Viktor Yanukovich. What characterizes the second phase is radicalization or at least the growing

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<sup>19</sup> Within these frameworks, there are three versions or interpretations: that the shootings are the result of the actions of the radical right, that they are the result of another miscalculation by the government and that they are the result of the activities of the Russian security services whose goal was to sow chaos until the final escalation. Apart from Yanukovich, two categories profited from such developments: the radical right and the Russian Federation. In addition to marginal social support, the radical right overthrew Yanukovich and won seats in the new government. Russia, on the other hand, got an institutionally completely weakened Ukraine without the possibility of preventing further operations, especially in Crimea and Donbas, and a solidified narrative about radical nationalist authorities that pose a danger to the Russian-speaking population.

<sup>20</sup> A particularly critical moment in this context is the recorded conversation between Nuland and US Ambassador Geoffrey Pyatt, where the two officials discuss how Arseniy Yatsenyuk would be the best choice for the country's president. Although not confirmed, everything indicates that the Russian intelligence services were behind the recording and publishing of the conversation.

<sup>21</sup> Before the Orange Revolution, the first independent newspaper, *Ukrainska Pravda* was established and founded by journalist Georgi Gongadze. Gongadze was a strong critic of Kuchma's regime and was found dead in 2000. *Ukrainska Pravda* was funded by NED (McFaul, 2007), and one of its contributors was Mustafa Nayem, one of the leaders of the Euromaidan movement in 2013.

<sup>22</sup> The concept of Novorossiia can be considered a movement, an ideology and a geopolitical imagination. For more information, read at O'Loughlin et al. (2016) and Laruelle (2016).

influence and expression of radical and militant elements. In April 2014, in the form of the Novorussiya movement, these elements assumed primacy in social conflicts in the country's east. The difference between Anti-maidan and Novorussia is also that Novorossyia is a movement with much less social support and a much more pronounced influence of foreigners, that is, people from the Russian Federation. Separatist narratives and tendencies are not entirely unfounded among the population in Donbas but they are far from the majority.<sup>23</sup> On April 12, Igor Girkin and a group of militants, known as the Crimean group, moved from Crimea to Slov'yansk and occupied the government buildings, after which the Ukrainian government declared an anti-terrorist operation (ATO), and the social conflict in Donbas soon escalated into a war. The Crimean group also serves as an operational link with the events in Crimea, which are an indispensable element in considering the dynamics of the conflict at the local, regional, and national levels. What remains a question is the timing and extent of the Russian government's direct involvement in the processes in Donbas, that is, how much of the events in the east of the country were orchestrated by the Russian government, and how much was a reflection of social discontent and a set of circumstances that cumulatively led to the war. In the context of the events of March and April 2014, all key actors believed that the conflict in Donbas was a consequence of the systematic policy of the Russian Government, which operationally follows the logic of actions in Crimea. Igor Girkin crossed into the Donbas and occupied the city of Slov'yansk in anticipation of the Russian army's entry. The Ukrainian government in Slov'yansk saw much more than Girkin and his volunteers. For Kyiv, Girkin's group was part of the "little green men", that is, Russian special forces without insignia who occupy buildings and repeat the Crimean scenario. It is no longer about the instrumentalization of protests but about the loss of Luhansk, Donetsk and potentially Kharkiv regions. Local officials shared such perspectives; therefore, resisting them was pointless, given the opponent's supremacy, which is a precursor to the entry of a much larger army. Such fears are supported by the military manoeuvres east of the border, along with the previous seizure of Crimea. Despite Girkin's hopes, after 85 days of holding Slov'yansk, he had to leave the city because the expected Russian army did not arrive to help, at least not until August 2014. An additional question that arises is how much of such perspectives were shaped by the fact that just a month before Vladimir Putin received the government's approval for military intervention in Ukraine in the event of a threat to the Russian population, and then publicly described Novorossyia as a historical entity and part of southeastern Ukraine. During the entire period, the Russian media actively described the Maidan and the new government as a radical nationalist junta and, therefore, a threat to the Russian population in the east.<sup>24</sup> According to research, the majority of people in Donbas were ready to take up arms to protect their loved ones, and only a small number to protect the region (КМІС, 2014). The question arises, to what extent Putin's narrative was targeted and planned in this sense, i.e. with the desire to sow fear and motivation to volunteers and the local population and with the support of intelligence structures to create a conflict in which he can plausibly deny such endeavours? Regardless of the motivation, the narratives of Russian officials played a significant role in forming the frameworks of resonance and, thus, the rationalization processes of the actors of the conflict. Events in Crimea, Girkin's activities and the illusion of Russian intervention were not enough for mobilization in Donbas, which also required mobilization structures and resources in every phase of the conflict. The transcript of the conversation (Shandra, 2019; Umland, 2016) between Sergei Glazyev, then

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<sup>23</sup> According to a survey conducted by the Kyiv Institute of International Sociology from April 8 to 16, 2014, 27% in Donetsk and 30% in Luhansk Oblast supported the idea that the region should separate and join the Russian Federation (КМІС, 2014); 19% of them support the entry of the Russian army into the regions, while 16% of them in Donetsk and 13% in Luhansk would join the Russian military in such scenario.

<sup>24</sup> Despite such narratives, according to Vyacheslav Likhachev, an eminent expert on extreme right-wing movements in Eastern Europe, radical right-wing elements were a minority on the Maidan as well as within the ranks of the anti-terrorist operation (ATO) (Likhachev, 2016).

adviser to the Russian president, and Konstantin Zatulin, member of the State Duma and director of the Institute for Diaspora and Integration<sup>25</sup>, which was intercepted by the Ukrainian intelligence services, reveals a number of details about the mobilization of social groups and confirms their involvement in all phases. The transcripts, however, do not reveal the cruciality of their action, as well as the official involvement of the Russian government. Two key organizations mentioned in the transcripts are *Oplot* and *Odeska Druzhina*. *Oplot*<sup>26</sup> is a particularly important factor in considering social conflicts and mobilization in Ukraine because, as an organization, it was present at every stage – from the conflict with the Maidan protesters, the occupation of government buildings in Donetsk to the formation of battalions and leadership by Alexander Zakharchenko. Unlike *Oplot*, the *Vostok* battalion was formed from former members of the war in Chechnya, and its first appearance was recorded in May 2014. Mark Galeotti (2017) believes that Vostok is an example of direct military involvement, in this case formed by the Main Intelligence Directorate (*Glavnoye Razvedyvatelnoye Upravlenie*, GRU). The fundamental goal of *Vostok's* activities was practically to bring order to the separatist entities' anarchic military and political structures. This alone indicates the direct secret involvement of the Russian services and the fact that they did not have extensive control over all processes and actors in the first phase of the conflict. The conflict in Donbas would not have been possible without external help and influence in terms of the availability of resources. A key individual associated with the financing of the separatist project is Konstantin Malofeev, a Russian businessman who was included on the EU's sanctions list for financing and supporting separatism.<sup>27</sup> In the first stages of the conflict, protest activities were led by local figures such as Andrey Purgin and Pavel Gubarev, but now foreigners have overtaken that role. Foreigners, that is, Russian citizens, also played a key role in terms of military mobilization, which leads to the conclusion that the conflict in Donbas was indeed the trigger of the Russian Spring movement, as claimed by Anna Matveeva (2018). Southeast Ukraine turned into the base of the fight against the Banderites, which was called the Russian Spring, and the reason for its emergence was the abolition of the Russian language as the official regional language. However, Felštinski and Stančev (2022) claim that the Russian Spring was a subversive campaign carried out by the Russian intelligence services in Ukraine using the local discontent to destabilize the political situation. Mobilization of citizens was facilitated through various organizations such as Cossack organizations and associations of Afghan veterans, but in addition to civilians, employees of the Russian Ministry of Defense have (now already publicly) participated in the war in Donbas. Vladimir Putin described such activities as acting on their initiative during the holidays. The circulation of personnel and military equipment across the border would not have been possible without the Russian security services' deliberate non-intervention. The research conducted by Serhiy Kudelia (2019) proves that the Russian security services did not support military action only through omission. According to his research of the testimonies of 798 persons who were convicted for the activities related to the rebellion and separatism, it is concluded that the activities of the Russian security service in terms of direct material and organizational support were one of the five main factors that facilitated the mobilization. It should certainly be added here the statements according to which the Russian security services facilitated training in training centres in the Rostov region and the delivery of weapons.

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<sup>25</sup> The Institute for Diaspora and Integration, also known as the Institute of the Commonwealth of Independent States, is a non-governmental organization believed to have been, to a certain extent, the ideological and organizational centre for influential individuals of the Novorossiia movement.

<sup>26</sup> Unlike many other organizations, *Oplot* did not emerge during February 2014 but has been active since 2010.

<sup>27</sup> Due to his religiosity and activism, Malofeev is also known as an Orthodox oligarch, and he is one of the central figures when considering the influence of religious structures, that is, the religious aspect of the conflict in Donbas. In addition to financially supporting the separatists, he worked closely with two key figures when considering the political and military leadership of Novorossiia, namely Alexander Borodaj and Igor Girkin (Bugriy, 2014).

Of the mentioned 798, 145 were accused of providing information, that is, providing support in intelligence activities to separatist formations. The insufficient action of the security services of Ukraine in the first stages of the conflict was a factor that enabled the Novorossyian mobilization in the Donbas, but this cannot be considered solely as a consequence of the actions of the FSB but also of the lack of institutional capacity that Ukraine was facing. According to Kudelya's research (2019), police officers in certain situations not only allowed/omitted the activities of separatists but also facilitated their mobilization. However, an important factor in this context is the dissolution of the infamous "Berkut", that is, the special intervention police that was accused of violence on the Maidan. With the dissolution of Berkut, Ukraine was left without an adequate unit to prevent the forcible occupation of buildings. On the other hand, members of the disbanded unit joined the ranks of the separatists, which was an essential factor in terms of human resources, especially considering their previous professional experience. Considering the processes in Donbas from the perspective of the political opportunity structure, it is also necessary to consider the behaviour of local elites. In Donetsk and Luhansk, the political and economic elites strategically calculated between the central authorities in Kyiv and the separatists, thus allowing the necessary space for action. In other regions, such as Dnipropetrovsk and Kharkiv (Portnov, 2016), local authorities and elites decided to suppress separatist activities, which prevented further escalations. In addition, what distinguishes the situation in Kharkiv from that in Luhansk and Donetsk is that on April 6, 2014, special forces from the Vinnitsya region arrived in Kharkiv and cleaned the buildings. In Luhansk, despite the seizure of security buildings, no one came to help, which enabled the separatists to acquire the well-needed weapons in the first stages of the conflict. Because Yanukovich was removed from power, by which Moscow lost the planned control over Ukraine, the Russian Government found itself in a situation where diplomatic activities were no longer feasible, while open war was still not an option. Political, economic, psychological/propaganda and military methods were used to influence another country with the element of plausible deniability. The element of plausible deniability was crucial in differentiating the operation in Crimea and the Donbas, and such operational dynamics reflect the goals and interests of the masterminds of the operation, that is, the main goal of the operation in Crimea was annexation, while in Donbas it was a relatively controlled chaos. This does not mean that the events in the east of the country do not have elements of a social movement, that is, that a part of society did not revolt against the government structures that did not have the political or security capacities to suppress such processes.

## **5. MAIDAN AND NOVORUSIJA – INVERSE PROPORTIONALITY IN TERMS OF SOCIALITY AND SUBVERSIVENESS?**

There is a particular element of inverse proportionality between Maidan and Novorussia. In relation to Novorossiya, Maidan had significantly greater social support, which does not mean that Novorossiya had no support at all; that is, there was a particular element of pro-social activity. While Novorussiya assumed violence as a catalyst for conflict, Maidan emerged reactively as a consequence of the government's repression. When considering social movement organizations that facilitate mobilization, there was some support from external actors in all cases. In both cases, foreign countries actively financed organizations of social movements, but the question is what was the ultimate goal of such endeavours. Unlike Mustafa Nayem, one of the most famous Ukrainians on social media and long-time activists, Pavel Gubarev and Andrei Purgin acted on the political and social margins. This does not mean that they did not act in terms of separatist agitations for years by then, but the Ukrainian government sanctioned their actions. In the case of Novorossiya, a particularly important role was played by foreigners, i.e. persons from the Russian Federation such as Girkin, Boroday and Malofeev.

Although everything indicates that Girkin acted on his own in the process of capturing Slov'yansk, this does not alter the fact that he actively participated in the operation in Crimea and other operations as a member of the FSB before. The Russian security services did not allow the crossing of the borders but actively participated in the military mobilization in Donbas, and this can be considered at least in the form of material aid and training centres. In the case of Maidan, there is no such evidence or facts, but it is also essential to distinguish the character or circumstances of the conflict. In the case of Maidan, this refers first and foremost to the sniper shots that also marked the end of Yanukovych. While sniper shots marked the end of Yanukovych and the Maidan itself, Girkin's actions and Russian mobilization ensured the continuity, i.e., kept the Novorossiya movement alive. In both cases, the lack of institutional capacities of the Ukrainian state played an important role in the dynamics of the origin and development of the movement. In this case, it is particularly important to mention the influence of the Russian security services, especially the FSB, which successfully infiltrated the structures of the security services of Ukraine (Служба безпеки України, 2014). The miscalculation in activities applies not only to the Ukrainian security services but also to all participants in the conflict who, based on previous events and Vladimir Putin's narratives, were convinced of the continuation of the Crimean operation in the Donbas. Such processes were also present on the Maidan, where foreign officials supported the protesters but also solidified the regime's and pro-Russian narratives that foreign countries were behind the protests.

## 6. CONCLUSION

The paper aimed to analyze the concepts of covert actions and social movements, to determine the connection between these two phenomena using a comparative correlation approach, and to apply the extracted insights to empirical cases in concrete case studies to determine whether the indicated movements are really social movements or the product of secret actions. Based on an insight into the available primary and secondary data, an analytical framework was constructed on which basis it is possible to draw certain conclusions at the level of indications. Of course, due to the time distance in relation to the events and the lack of primary empirical secret material, such conclusions are not of a conclusive character. Maidan has all the elements of a social movement, and if the USA acted covertly in the case of Ukraine, then despite the pro-regime and Russian narratives, it can plausibly deny such activities. What remains unanswered is who was responsible for the February 20 sniper shootings that ultimately led to the demise of Yanukovych, but not the creation of the Maidan. Considering the secrecy of the act, we can assume the possibility that it was a covert action in which the perpetrator used the state of violence and chaos for his own purposes; that is, the movement was indirectly instrumentalized. In contrast to Crimea, where the Russian government carried out a systematic and organized operation to take over the peninsula, in Donbas, everything points to the fact that it was a covert operation and a limited intervention, which in terms of the extent of its influence was adapted to the circumstances, and did have a critical impact on the mobilization processes. In Donbas, there was a certain level of support for the occupation of government buildings and separatist goals, so a certain element of pro-social activism is present. However, much evidence points to the fact that the Russian security services played an active and direct role at all stages in facilitating the development of the Novorossiya movement. The violence on the Maidan was reactive to the government's violence, while in Donbas, it was reactive by the government to the proactive actions of Girkin. In this case, it is also essential to take into account other elements at the systemic levels, such as the narratives of Russian officials, military manoeuvres on the border and, of course, the previous occupation of Crimea. What is common in both cases is that the miscalculation and lack of capacities of the state were key factors in considering the dynamics of the development of movements and violence.



In both cases, there is an element of a social movement, but in the case of Novorossiia, unlike Maidan, the element of a covert operation is much more pronounced; that is, there is much more exact evidence that points to such conclusions.

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## HEALTH ORGANISATION STAFF AWARENESS OF THE RISK MANAGEMENT AGENDA - A KEY PREREQUISITE FOR TACKLING COVID-19

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### ABSTRACT

*The pandemic of COVID-19 has provoked the management of hospital medical care facilities to rethink strategies, in the part-risk management program, which is the main task of their risk management. The implementation of these programs is considered an important management tool and a mechanism tested in practice to counteract the unprecedented pressure of risk of such pandemic proportions threatening any healthcare organization (in this case - Multiprofile Hospital for Active Treatment "Heart and Brain" EAD - Pleven). It is of key importance to establish the relationship between the degree of staff awareness of the risk management program and the effective transformation of existing threats into a positive for the healthcare organization, which is also the objective of the study. The thesis asserted in this paper is that only proactive and systematic implementation of a risk management program in the healthcare facility could result positively in ensuring the safety, life and health of patients and staff as well as the organization's assets, market share, accreditation, reimbursement levels, brand value and reputation in the society.*

**Keywords:** awareness, COVID-19, health management, hospital, risks, risk management program, staff

### 1. INTRODUCTION

The COVID-19 pandemic confirmed the key role and need for the development and implementation of risk management plans (including those of a pandemic nature). Based on the application of all the basic principles of risk management (Amelio & Figus, 2021), healthcare organizations, and in particular healthcare facilities, were allowed to prove that they could cope with the COVID-19 pandemic, minimizing its lasting negative effects (Radar Healthcare, 2022). For those hospitals that had a robust risk management program in place, prepared by risk management, this proved to be a routine activity as their corporate mindset, was already focused on risk management. Still, for those who did not have one or underestimated and largely formalised their application, the pandemic became a real crisis (QBrainX, 2022). As for the latter, they are not of scientific interest and the subject of the present study, and for this reason more serious attention deserves the health facilities that have invested (financial, preparation time, organizational resources, etc.) and developed their risk management programs.

### 2. ORGANISATIONAL ALGORITHM FOR OVERCOMING THE COVID-19 CRISIS

In the following lines, we will describe the algorithm related to the design of risk management programs, the implementation of which by the management teams of the organizations, largely contributes to overcoming the crisis. The most general presentation of the mentioned algorithm includes the following steps (Ontario Nonprofit Network, 2020).

## **2.1. Identify your organizational risks**

As is well known, every business entity, including medical institutions, uses risk management, figuratively speaking, to “anticipate the unpredictable” (Gowling WLG, 2020). To navigate the risks (and opportunities) associated with the pandemic, it was paramount to first determine what those risks were. The exceptional circumstances surrounding COVID-19 (Smith, Lee; Pifer, Anne; Fennel, Adam - Higher Education COVID-19 Response: Enterprise Risk Management, 2020) may have triggered the emergence of risks that had not yet been considered by risk management or may have given the risks previously known and identified by risk management - a new sense of urgency and urgency. Regardless of the specific case, before any action is taken and any direction is taken, operational time should be taken to catalogue the risks that the hospital organisation may face during the pandemic period (which may be of unspecified duration month - six months - year(s)). To make this process most effective, the following actions were taken by the health facilities:

- looked at all types of risks - including operational, strategic, financial and reputational;
- gathered necessary input from all levels of employees and a wide range of stakeholders (customers, suppliers, etc.) on gaps in risk identification that risk management may have missed or not considered (or simply underestimated their potential);
- looked at other organisations in the specific country and abroad, and analysed what they faced, starting from the assumption that risks for similar organisations in those countries might be the same as theirs, or that perhaps the risks mentioned could create risks for the healthcare facilities themselves - downstream (as incidentally happened with supply chains).

The more thoroughly, analytically and seriously this first step is taken before moving forward, the more often risk managers will return to it in the next year (two, five, i.e. as long as the COVID-19 pandemic lasts) to be able to implement an update of the organization's risk profile as the world evolves, especially in these dynamic, unpredictable and unprecedentedly challenging times.

## **2.2. Demonstrate organizational flexibility**

The COVID-19 pandemic (Ninova & Ninov, 2023) has called into question everything that was planned at the individual and especially at the collective level. While a period of reorientation towards a new normal is underway, the existing and current plans that each health organization had in place until yesterday are now being labelled as inappropriate, feasible or realistic, today. For risk management (Victorio R. Tolentino JD, Esq., Cassandra DeLaMothe Esq., Suzanne Vick RN, & Luba Chalyavski RN, 2021), this does not necessarily mean abandoning its entire risk management program, but quite the opposite - it should return to its organizational values and redefine how these will be implemented. Organisational discomfort in the wake of the pandemic is guaranteed, but it is at this point that it is necessary to demonstrate 'high flying', seen as navigating through this period with the necessary degree of organisational flexibility and understanding. Management with responsibility for risk management (and not just them, but everyone in the health facility) should have demonstrated creativity in their approach to moving forward, listening to what stakeholders wanted and needed, and as a result considering how the organisation could proceed to make up the gaps.

## **2.3. Personnel as the primary task of risk management**

Undoubtedly, the backbone of any organization lies in its employees. During the COVID-19 pandemic, the latter were extremely stressed, tired, busy, scared and occupied (Gowling WLG, 2020). The organisational risks associated with mismanaging employees at this time could be significant (health and safety, financial, reputational, legal, operational, etc.).

In this regard, as an urgent task within this third step, the management of the health facility needed to focus on its staff. People usually need seemingly simple things - to feel listened to, to be able to trust and to get the information they need. For this reason, the risk management of each healthcare facility informs its employees that it has a risk management plan (RMP), a business continuity plan, and a crisis action plan. Departments have ample time to conduct an awareness campaign explaining what each of these plans includes and how they will evolve. At the same time, their task is to convince staff that their active participation will make a decisive contribution to the implementation of these plans. Risk management plans in healthcare organisations work because they promote and rely on a holistic approach to the identification, analysis, assessment and treatment of risk. RMP also provokes frequent communication between all levels of the organization, which in turn leads to greater transparency and trust within the collective (Gowling WLG, 2020). Going through this pandemic confirms that there are no fewer or more important employees - from the lazy boy drivers to the cleaners, nurses and orderlies, to the healthcare professionals - the top-level doctors - all equally important to the organization. In this line of thought, the hospital management has thought about how it can facilitate their activities, thus helping them in a purely physical and psychological sense. Whether it's introducing flexible working hours or providing additional individual protection, it all starts with asking them what they need to do their job during that time.

#### **2.4. The idea of business continuity**

The purpose of the notion of business interruptibility is to ensure that the business of the medical facility can survive even in the event of a critical incident. It consists of the implementation of a series of plans, implemented in separate stages, to shorten recovery times and mitigate their impact (Gowling WLG, 2020). The situation of the COVID-19 pandemic was a most opportune time to assess the impact of a risk, and one of similar magnitude, on any healthcare organisation (with this process involving both an insider and outsider view). *The internal view*, in turn, involves identifying business-critical functions, equipment and employees and determining how, where and by whom critical services are provided (Gowling WLG, 2020). There was an opportunity to consider temporarily suspending certain aspects of the work to reduce the possibility of risk exposure, to take seriously the idea of social distancing and to reduce unnecessary monetary costs. Risk management ensured that it carefully monitored the availability, health and safety of its employees. And because all people were at risk of being personally affected by COVID-19, a continuity plan had to be developed for all business-critical employees that could be easily triggered if they became unwell and unable to perform their tasks (Gowling WLG, 2020). The chain of command had to be clearly defined, and deputies and designees had to be put in place for all critical functions. *The outside view*, on the other hand, required a detailed analysis of the supply chain and an assessment of the potential risks faced by vendors, manufacturers, suppliers, distributors, buyers and all the organisations and stakeholders with whom the health facility interacted and on whom it relied.

#### **2.5. Consultation with advisors**

The period of the COVID-19 pandemic was practically the moment for everyone to work together. An important organisational decision was to consider the alternative option of the management team seeking advice from:

- an external risk management consultant whose experience and professionalism could help identify, analyse, assess and treat organisational risks in each facility. In the absence of business continuity, incident management, risk management or crisis plan, or if those are in place but have not worked, it is important to seek expert advice for review and improvement;



- legal counsel who can help the healthcare organization more quickly and appropriately navigate new and dynamically changing legislation to assist in managing timely issues related to health and safety, employees, regulations, core hospital services, insurance (Ninova, 2022), travel and contracts, etc;
- an insurance broker (Ninova, 2018) who can help with clarifying the current (underwritten) insurance policies and advise the management of the healthcare organisation whether it has coverage, against what exact risks that can help it, and how this can be done, if objectively necessary;
- a financial consultant with whom can be discussed what financial incentives, loans, government programs, deferrals, etc. are available to the healthcare facility and how it can access and take advantage of them;
- a mental health specialist who, in case of need and as a purely preventive measure, can advise the facility staff if they need support at any critical moments. Finding a way to provide them with this kind of support can prove invaluable to everyone in the healthcare organisation.

## **2.6. Preserving organisational reputation**

A final and often underestimated step, especially in a pandemic state, is the idea of reputation preservation. It was the COVID-19 pandemic that gave individuals and organizations a chance to report on their reputation improvement based on the adequacy of their responses and the effectiveness and efficiency of their actions made public.

For those healthcare organisations (and there are some) that have looked short-sightedly at the pandemic, setting high prices or profiting from people's fears, the long-term negative reputational impact may outweigh the short-term benefits derived (Gowling WLG, 2020).

Ultimately, the key to any healthcare organization's success lies in preserving and developing values, and on that basis - taking the high ground, which we can strongly argue, has brought them dividends in the long run.

## **3. STEPS FOR THE IMPLEMENTATION OF A RISK AND OPPORTUNITY MANAGEMENT PROGRAMME OF THE HEART AND BRAIN MULTIPROFILE HOSPITAL FOR ACTIVE TREATMENT - PLEVEN AT THE TIME OF THE COVID-19 PANDEMIC**

At the core of the guarantee for the provision of quality medical care, respectively - health service in any medical institution, the key is the implementation of the combination of the following five basic requirements: the selection of qualified human resources; the availability of a safe building stock; the guarantee of the safe use of medicines, the provision of equipment and technology; the establishment of an information system; the provision of financial resources that are used to improve quality (World Health Organization, OECD, and International Bank for Reconstruction and Development/The World Bank, 2019). The attribution of the characteristic “quality” (understood as „the degree to which population health services increase the likelihood of obtaining desired health outcomes and are consistent with current professional best practices“ (Busse, Klazinga, Panteli, & Quentin, 2019)), to any health service, corresponds not only to the service itself provided to patients, but as we see from the quoted Institute of Medicine (IOM) definition, has direct relevance to the management and organization of the health facility. Moreover, the IOM (US) Committee on Quality of Health Care in America summarizes that to improve performance, healthcare organizations (including healthcare facilities) should adhere to the following list, including six performance characteristics (Institute of Medicine (US) Committee on Quality of Health Care in America, 2001):

- **Safety** – avoiding patient injury from the care that is designed to help them.

- **Effectiveness** – providing evidence-based services to all who are likely to benefit and refraining from providing services to those who are unlikely to benefit (avoiding underuse and overuse).
- **Patient-centredness** – providing care that respects and responds to patients' individual preferences, needs and values, and ensuring that patients' values guide all clinical decisions.
- **Timeliness** – reducing waits and sometimes harmful delays for both those receiving and those providing care.
- **Efficiency** – avoiding waste, particularly waste of resources, equipment, supplies, ideas and energy.
- **Equity** – providing care that does not differ in quality because of personal characteristics such as gender, ethnicity, geographic location and socioeconomic status.

Ensuring quality and especially safe medical services in a pandemic setting has proven to be a real challenge for any health system (Braithwaite, 2021). At the beginning of the pandemic, the lack of sufficient information and the long process of learning about the infection, its uncontrolled spread and the extreme deterioration of the situation, prevented the implementation of proactive actions by the senior management of national health systems. Instead, the response to the same was rather and to a certain extent haphazard and chaotic, and last but not least - primarily counteractive, i.e. with the character of a primary response (or rather reflection), but in the absence of the specific in such situations - appropriate systemic responses. This fact, logically, became the reason why the announcement of the pandemic of COVID-19, on the one hand, provoked the disclosure of existing weaknesses and defects (Gladilov & Delcheva, 2009) in several areas of the health system, and on the other - activated the management of hospital facilities in the direction - testing their current plans for risk management. Since the announcement of the COVID-19 pandemic in our country, the management team of the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven, has proceeded to update its Risk and Opportunity Management Program. The object of the Risk and Opportunity Management Programme is to define the order and methods for qualitative risk analysis, risk identification and assessment, as well as the order of implementation of planning activities to reduce the impacts of risk factors to an acceptable level. The key to the successful implementation of a Risk and Opportunity Management Programme is the selection stage of determining the method for qualitative risk analysis. The importance of this choice is dictated by the need for the chosen qualitative risk analysis method to have a set of the following characteristics:

- to be the most appropriate one for the specific situation and organization - in this case the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven;
- the results of the assessment help to broaden the understanding of the risk(s) in the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven and provide guidance for impacting on it;
- the chosen method should be traceable, repeatable and verifiable.

The factors (Kachestvoto.com, 2020) that influenced the choice of a specific method for qualitative risk analysis in the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven are:

- Defining the objectives of risk assessment within the medical institution. It is this process that plays a key role, thus predetermining - the level of depth and scope of the method to be applied.
- Specifying the needs of those in managerial positions whose decision-making authority will be involved. Depending on the type and importance of the problem(s) encountered, in some

cases, a higher and more detailed level of detail is required, while in other cases it is not necessary and a more general understanding is sufficient.

- Determine the type, scope and potential consequences of the risks analysed (in this case the risk of COVID-19). Given the nature of the risks, they can be classified into complex and compound risks. This makes it necessary in some cases to assess the risks separately and in other cases to assess their complex impact. This directly corresponds to the determination of the appropriate assessment method.
- Resource endowment, including the knowledge, skills and practical experience of the management team, time constraints or financial capacity. In certain cases, the choice of a simple method applied correctly guarantees much more reliable results than the use of a complex and inappropriately selected method.
- Security of credible information and sufficient data on which uncertainty largely depends. The use of certain methods requires a greater amount of information than the use of others, which is essential when choosing a method. The uncertainty of the data correlates directly with the quality and reliability of the available information. In this line of thought, the lack of reliability of the available data has the consequence of distorting the results obtained as a consequence of risk assessment and uncertainties in predicting the future development of the organisation.

In operational terms, the steps for the practical preparation of a Risk and Capacity Management Programme for the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven include:

*Step 1.* Analysis and identification of possible points of risk to the quality of the services offered.

The identification, definition and assessment of risk points is carried out by the Executive Director of the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven, by:

- all processes in the medical establishment are subjected to a thorough examination;
- all possible impacts on the quality of the facility's services are identified (in the context of COVID-19);
- identify the exact points of impact at entry, exit and during the process itself.

*Step 2.* Determination of risk assessment elements

The risk elements of COVID-19 can be:

- direct, i.e. related to impacts arising from the immediate activities of the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven;
- indirect, i.e. related to impacts from stakeholders (suppliers and subcontractors).
- The identification, quantification, establishment of significance criteria and determination of the significance (severity) of the risk elements are carried out in three stages:
- Identify the possible instances of potential risk for the process/object under consideration.
- The relevant points of impact in the course of the process itself and its outcomes are identified.
- Assessment of compliance of risk assessment elements with:
  - the organisation's quality policy;
  - the requirements set out in the generic and specific quality objectives;
  - regulatory requirements;
  - stakeholder requirements;
  - emergency preparedness.

The first stage determines the range of possibilities, and the risk to influence a particular process. This includes any indirect impacts from:

- the activities (services) of the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven;
- subcontractors;
- suppliers;
- stakeholders.

In the second stage, the risk elements are considered as an integral part of the process flow, whereby a cause-effect analysis is performed.

In the third stage, risk elements are considered in terms of the impact on service and process quality and the possibility of preventing negative consequences using the “Planning - Action - Verification - Correction/Prevention” (Deming Cycle) method (Hristov, 2021)<sup>1</sup>.

### Step 3. Risk calculation

The risk assessment is carried out once a year, and as and when the need arises (as was the case of the pandemic declaration COVID-19), according to the Risk Assessment Methodology outlined below. In assessing the significance of the impact of relevant risks on the Organization's processes, the following values are used:

- A is the Probability of the event occurring;
- B e Probability of detection;
- C is Impact Exposure;
- D e Consequence severity.
- The assessment of the significance of risk on quality (V)

The risk impact significance is calculated for each element using the following formula:

$$V = (A + B + C).D,$$

The values of A, B, C and D are determined according to the following table (see Table 1):

Significance	Values of A, B, C and D			
	Probability of occurrence, <b>A</b>	Probability of detection, <b>B</b>	Impact exposure, <b>C</b>	Severity of consequences, <b>D</b>
Very high	5	1	5	10
High	4	2	4	8
Medium	3	3	3	6
Low	2	4	2	4
Very low	1	5	1	2

*Table 1: The significance of the impact of the risk  
(Source: Information provided by Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven)*

The classification of risks on quality is presented in the following table (see Table 2):

<sup>1</sup> The Deming Cycle is the name of the model developed and popularized in the fifties of the 20th century by William Deming - the father of the so-called Total Quality Management. The model is also known as "Deming's Wheel" and by the abbreviations PDCA (Plan-Do-Check-Act) or PDSA (Plan-Do-Study-Act). Deming himself referred to the model as the “Schuchart Cycle”, in honour of Walter Schuchart, who was Deming's mentor and developed the original idea of the model in the 1920s.

Classification of risk	Significance rating value Impact characteristic	Significance rating value Impact characteristic
Very low significance	up to 20	Very little impact on quality, with little likelihood of occurring.
Low significance	from 21 up to 50	Unusual working conditions that cause low or short-term risk, with little likelihood of occurrence.
Medium significance	from 51 up to 80	The risk occurs under normal working conditions with a predictable outcome. The probability of abnormal conditions occurring is medium.
High significance	from 81 up to 120	The source is frequently monitored and the risk will result in a significant impact on process quality. The elements of risk represent a serious breach of legislation. The likelihood of the risk occurring is high.
Very high significance	121 and over	An impact that leads to a serious impact on quality. Systematic breaches of the law are observed or the risk leads to serious objections and complaints.

*Table 2: Classification of risks*

*(Source: Information provided by Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven)*

Risk elements are ranked according to the assessment of the individual risks - the level of significance is defined as equal to the significance of the impact rated with the highest level of significance.

The classification of quality risks is presented in the following table (see Table 3):

Classification of risk	Number of impacts	Number of impacts with very low significance	Number of impacts with low significance	Number of impacts of medium significance	Number of impacts with high significance	Number of impacts of very high significance	Overall assessment of significance
Very low significance	from 1 to 5	All	0	0	0	0	up to 20
Low significance	from 1 to 10	All	from 1 to 7	0	0	0	from 21 up to 50
Medium significance	from 1 to 15	–	All	from 1 to 6	0	0	from 51 up to 80
High significance	over 15	–	All	All	from 1 to 5	0	from 81 up to 120
Very high significance	<b>over 15</b>	–	–	–	<b>All</b>	<b>1</b>	Over 120

*Table 3: The classification of quality risks*

*(Source: Information provided by Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven)*

The results of the risk assessment are reflected in the Risk Assessment section.

#### Step 4. Risk assessment and management

The risk assessment establishes the acceptability of the identified risk and the need to implement measures to prevent or reduce it to an acceptable level. Consideration should be given to the effectiveness of the risk mitigation measures already implemented.

The main criteria for establishing the acceptability of a risk are:

- compliance with regulatory provisions;
- application of corrective actions by the Management Procedure.

Ways of managing risks include avoiding the risk, taking the risk to take advantage of an opportunity, eliminating the source of the risk, changing the likelihood or the consequences, sharing the risk or retaining the risk based on a reasonable solution.

#### Step 5. Description of the measures to be taken

Within this step, the measures to be taken to eliminate or mitigate the risk must be assessed. This phase of the assessment aims to ensure that the risk is contained. To achieve this, measures should be proposed as high up the prevention hierarchy as possible (see Table 4).

MANAGING RISK	
1.	Risk Avoidance
2.	Taking risks to take advantage of an opportunity
3.	Eliminating the source of risk
4.	Changing the probability or the consequences
5.	Risk sharing or risk retention based on a reasonable decision

*Table 4: Risk management measures at the Multiprofile Hospital for Active Treatment "Heart and Brain" EAD - Pleven*

*(Source: Information provided by Multiprofile Hospital for Active Treatment "Heart and Brain" EAD - Pleven)*

The following table (see Table 5) provides a synthesis of the decisions to which the measures adhere.

DEGREE OF RISK	SOLUTIONS	ACTIONS
Very low	The risk is negligible and is not expected to increase shortly.	No action is required.
Low	The risk has been contained at an acceptable level but there is no evidence that it could lead to an increase.	Existing measures are compared with acceptable practical norms and possible actions are considered.
Medium	Possible risk that could increase in the future.	Look for ways to improve measures and reduce risk.
High	Risk inadequately and ineffectively managed	Measures are taken and implemented immediately.
Very high	Increased risk that is inadequately and ineffectively managed	Activity is suspended. Risk reduction measures are implemented immediately.

*Table 5: Action decisions, according to the degree of risk*

*(Source: Information provided by Multiprofile Hospital for Active Treatment "Heart and Brain" EAD - Pleven)*

**Step 6. Risk Assessment.**

Each Risk Assessment shall identify measures to address risks and opportunities, a statement of the proportionality of actions taken to address risks and opportunities, and their relevance to the potential impact of the risk or opportunity on product and service compliance. The risk assessment shall be reviewed and approved in person by the Executive Director. Measurement of the effectiveness of actions to address risks and opportunities is carried out by the Authorised Management Representative by the Risk and Opportunity Management Programme approved at Management Review. The implementation of the Programme is monitored by the Quality Council and at Management Review.

**Step 7: Revise the risk assessment.**

The management of the Heart and Brain Hospital, Pleven, reviews the Risk Assessment once a year to determine if actions have been effective in reducing risk or realizing opportunities. In the event of an emergency, the Risk Assessment is subject to review and revision.

**Step 8: Actions to address risks and opportunities**

As a consequence of the implementation of the above 7 steps, we come to Step 8 “Actions to manage risks and opportunities”, i.e. identification of the real risks arising from the activities of the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven and the external surrounding environment. These are summarised in the table below (see Table 6). In this respect, the relevant measures for their control are defined, the persons responsible for this purpose are identified and the deadlines for implementation are indicated, as well as an estimate of the resources required for this purpose.

Identified risk	Measures to control the risk	Person responsible	Deadline for implementation	Forecast of required resources
Maintenance of the technical infrastructure	Concluded contracts for subscription maintenance of medical equipment	An authorized representative of the management/Director	According to the register of contracts	
	Carrying out preventive reviews of the technical infrastructure	Chief nurse	Contracts	
	Clinical tests of X-ray machine parameters, according to the contract	Chief nurse	4 times a year	
	Dosimetric control X-ray apparatus, according to the contract	Chief nurse	4 times a year	
	Radiation monitoring X-ray machine, according to contract	Chief nurse	1 time a year	
	Subscription elevator maintenance, according to the contract	Chief nurse	Periodically; inspection State Agency for Metrological and Technical Supervision - until 30.09	
	Maintenance and refilling of fire extinguishers	Chief nurse	1 time a year	
Delivery of medicines and	Contracts concluded	An authorized representative of the management/Director		

consumables of low-quality	Reception control	Chief nurse		
Technical infrastructure - delayed installation and delivery	Contracts concluded	An authorized representative of the management/Director		
	Reception control	Chief nurse		
	Penalties imposed	Ex. director		
The technical infrastructure - purchase	Contracts concluded	An authorized representative of the management/Director	According to the Law on Public Procurement	According to the Law on Public Procurement
	Reception control	Chief nurse	According to the Law on Public Procurement	According to the Law on Public Procurement
	Penalties imposed	Ex. director	According to the Law on Public Procurement	According to the Law on Public Procurement
Loss of qualified personnel	Contracts concluded	HR/Director		
	Training of specialized personnel	HR/Director		
Risk of injuries during the work process	Briefings – initial, periodic and on-the-job training			
	Instructions for working with equipment			
	Fire safety			
High risk of viral infection with COVID-19	Providing psychosocial support to health workers during quarantine or throughout the illness if the health worker has confirmed COVID-19 virus	An authorized representative of the management / HR/Director	periodically, according to the current situation	
	Provision of compensation for the period of quarantine and the duration of the illness (if the worker is not on a monthly salary) or provision of an extension of the contract for the period of the quarantine/illness	An authorized representative of the management / HR/Director	periodically, according to the current situation	
	Provide retraining on infection control and prevention for facility staff, including healthcare workers at high risk of infection after the 14-day quarantine period	An authorized representative of the management / HR/Director	periodically, according to the current situation	

*Table 6: Identified risks, measures, the person responsible and the deadline for implementation of the Program for controlling the risks and opportunities of the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven*  
(Source: Information provided by Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven)



#### **4. A SURVEY ON THE IMPACT OF COVID-19 ON THE ACTIVITY OF MULTIPROFILE HOSPITAL FOR ACTIVE TREATMENT “HEART AND BRAIN” EAD - PLEVEN**

For this study and more specifically to establish the awareness of the staff of the Heart and Brain Hospital EAD - Pleven, regarding the availability, good awareness, knowledge of the action algorithm and the existence of feedback regarding the “Program for managing risks and opportunities” adopted and implemented by the management of the hospital in general and regarding the COVID-19 pandemic in particular, a “Survey on the impact of COVID-19 on the activities of the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven” was conducted. The subject of the survey was the staff of the Heart and Brain Hospital EAD-Pleven, the subject of the same - the awareness of the staff regarding the current “Programme for managing risks and opportunities” and giving a subjective assessment of the adequacy and appropriateness of the set of management decisions and actions taken by the hospital management to minimize the impact and consequences of the COVID-19 pandemic. The whole survey is to obtain reliable and objective data regarding: 1) the relations between the individual members of the staff at the workplace, from the point of view of the team (collective work); 2) the demonstrated level of professional responsibility of the teacher in relation to patient safety and the microclimate, coordination and cooperation between the hospital connection created by the management in this regard; 3) the frequency of reported adverse events or staff errors and the reliability of internal rules; 4) the clarity regarding the degree of detailed knowledge of the “Risk Program for controlling risks and opportunities”, the algorithm for personnel action in the event of a different nature, as well as the actions provided for health and safety at individual workplaces; 5) the speed and adequacy of the hospital management in taking and introducing measures in connection with the COVID-19 pandemic and conducting trainings on the application of standard procedures in the detection of symptoms of infection with COVID-19, the sufficiency and access to personal protective equipment, fix message difficulties; 6) the accumulated work stage in the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven, in the hospital unit and in the health system as a whole, the schedule of the working week, the specific work position held and in this connection - the presence or absence of direct contact with patients. The main thesis of the survey - confirmation of the idea that the key to guaranteeing the continuity and high quality of health services, as well as the safety of patients and medical professionals, is the proactive way to define and manage risks in hospital medical facilities, namely - risk the management. The latter is both a function and a tool for improving the results of the hospital's activity, but only if two key conditions are observed: 1) this should not be done fictitiously, but should become a philosophy of the organization; and 2) all hospital staff, from the ambulance driver to the executive director, are active participants in this process, which guarantees the success of the risk management plan. In the specific case, testing the idea that the efforts made by the management team of Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven, give a real result, which helps them to become a market leader not only on a regional, but also on a national scale. The survey was created using Google Forms - a tool for sharing online forms and surveys and with the ability to analyze responses in real-time. When conducting sample research, it is extremely important to determine the size of the sample, or in this case, the number of persons who will be surveyed and who will fill out the survey card specially created for this study. To determine the sample volume, the standard formula for determining the sample volume was used, subject to the following conditions:

- in this type of research, the variation in the population is not known, i.e. there is no information about the standard deviation and variance from previous studies, therefore in such a case it is assumed that the percentage of persons who would complete the survey and those who would refuse to complete it is 50%;

- the guarantee probability is 95% or the guarantee coefficient is 1.96;
- the maximum permissible (limit) error is 5%.

As a result of the calculations, it was established that the number of completed questionnaires should be 185. To determine the persons who would fall into the sample, a random selection without repetition was applied. The resulting sample is structured by categories of personnel to reproduce the structure of the general population as much as possible, which will allow generalization of the conclusions of the conducted research. The survey was conducted during the period from April 13 to May 2, 2023, applying random non-repetitive selection, as the persons included in the sample were allowed to fill out a survey card with a question of the type: positive - negative. The questionnaire is designed according to the classic structure: introduction, main part and conclusion. Before the actual study was conducted, a test-pilot study was carried out on 10 persons from the staff of the Multiprofile Hospital for Active Treatment "Heart and Brain" EAD - Pleven, to find out how the study is going and to test the questionnaire and, if necessary, to make corrections in it and to remove other identified gaps. The results of the control testing showed that the questions are comprehensible and correctly formulated and do not make it difficult to fill out the questionnaire. The questions in the survey card are of a closed type with 5 possible answer options provided for the respondent to choose from. This type of scale is known as a five-point Likert scale, which allows more precise information to be collected from the respondent. With this scale, it is possible to conditionally mark the answers from 1 to 5 and to calculate some general characteristics. Filling in the survey card is anonymous, and to comply with the requirements for the confidentiality of the information provided, questions characterizing age and gender are not included. Before we proceed to comment on the results of the survey card, named "SURVEY REGARDING THE IMPACT OF COVID-19 ON THE ACTIVITIES OF MULTIPROFILE HOSPITAL FOR ACTIVE TREATMENT "HEART AND BRAIN" EAD – PLEVEN" we will make a brief description of the survey card including - number of questions and their subject matter, as well as what is aimed at with them. For the present study, a survey card structured in six sections was used, in which the following sections are located:

- **Section A. Your workplace, department, clinic or sector.**

A total of 14 questions are included in this section, to present the results related to the work process of a specific workplace, department, clinic or sector. The presence or absence of mutual support in hospital units and the adequacy of emergency staff are considered. The presence or absence of teamwork among the staff in the individual units of the medical facility is established, as well as whether there is mutual respect between the employees. It is determined whether there is overtime and whether employees consider it necessary to assign additional personnel, as well as the subsequent overcoming of errors that occurred in the work process. Through the survey, information is also obtained on whether all employees work actively to improve patient safety and whether, if necessary, the hospital management hires additional staff to improve patient service and to ensure the operation of the respective hospital unit. In this section, information is obtained about the medical facility on the problems related to the reporting of errors by employees to the relevant manager and whether they are taken into account by him. It is also taken into account whether there is mutual assistance between the individual units in the medical facility. Consideration is also given to the sufficiency of resources, the aim of which is to achieve a lot of work in the time technologically established for this purpose and whether this is at the expense of patient safety. It is also established whether the procedures and measures successfully prevent the occurrence of errors.

- **Section B. Your Mentor/Supervisor.**

The section contains a total of 9 questions, based on which it is established what is the staff's assessment of the work of the mentor/head of individual units at the Multiprofile Hospital for Active Treatment "Heart and Brain" EAD - Pleven. Included here are questions that aim to determine the mentor/supervisor's attitude towards staff and whether staff feel that patient safety is being ensured. It is considered whether there is coordination between the individual units in the medical facility, to ensure the best care for patients.

- **Section C. Number of reported adverse events or errors.**

In this hour of the survey, a total of 2 questions are positioned, based on which it is established - the number of unwanted events or errors for which the staff filled in and submitted. Results related to the introduction of the system for voluntary reporting of adverse events or errors (while preserving the anonymity of employees and without retaliatory criminal action) are also reported, and whether they would report adverse events or errors or other information related to patient safety, which is a potential threat to his health.

- **Section D. Information about the Program for controlling risks and opportunities (the risk management program) of Multiprofile Hospital for Active Treatment "Heart and Brain" EAD - Pleven.**

The section contains a total of 9 questions, with the help of which it is assessed - what is the degree of familiarity of the staff with the Program for controlling risks and opportunities (the risk management program) of Multiprofile Hospital for Active Treatment "Heart and Brain" EAD - Pleven, including an awareness of her in detail. Also included here are questions, the answers to which provide information on whether staff have been trained to familiarize themselves with the specifics of the hospital's risk management plan. They are required to share whether staff training has been conducted on how to respond and what protocols to employ in natural and man-made disasters (such as storms, fires, pandemics, loss of power, loss of communications, terrorist attacks or other similar), previously identified as risks for the medical facility. An answer is also sought to the question - has an instruction been carried out regarding the procedure for reporting an event (unwanted) and the form of documenting the response of the organization and the responsible persons about a risk that has occurred? There is an inquiry as to whether a risk assessment has been carried out covering specific work equipment, premises, workplaces, work organisation, use of raw materials and other aspects of the work environment and work processes that pose a hazard or are relevant to safety and occupational health. Also listed here are several statements with which staff express their agreement or disagreement as to whether hospital management has planned appropriate measures to prevent risk and whether protection is provided for both staff and patients and any other persons who might be affected by the hazards identified in the risk assessment; whether the necessary organization has been created for the implementation of the planned measures, as well as for the implementation of effective monitoring and control for the performance of the work by the workers without risk to health and safety; and also whether the necessary measures have been taken to coordinate actions to ensure health and safety at individual workplaces.

- **Section D. Assessment of the impact of COVID-19 on the activities of the staff of the Multiprofile Hospital for Active Treatment "Heart and Brain" EAD - Pleven.**

11 questions were asked, based on which it was established - about the speed of reaction of the management team of the hospital in connection with declaring the beginning of the pandemic of COVID-19, and more specifically about the safety of patients and staff. It is also established whether the hospital management has familiarized its staff with the content of the COVID-19 risk communication guide for healthcare facilities (of the World Health Organization) promptly. Questions related to training on how to apply the standard

procedure for infection with COVID-19 (World Health Organization, 2022) and whether training has been provided on how employees can spot symptoms of potential infection with COVID-19 have also been formulated here. Consider whether staff are familiar with the definition of the condition whether there is a schedule of behavioural steps available and accessible for reference at the triage point and whether, since the beginning of the COVID-19 epidemic, the management of the treatment facility has provided the workplace with sufficient and quality of personal protective equipment of the staff, as well as whether the hospital management has conducted training on the importance, selection and correct use of personal protective equipment. This section seeks an answer to the question of whether clear rules are laid down regarding accommodation management, environmental management and visits (when possible). The degree of involvement of hospital employees in the diagnostic and treatment process of a patient with COVID-19 is determined, and what is the nature of the most serious challenges and difficulties in the work process that employees related to the outbreak of COVID-19 have faced? An assessment of the plan for managing the risk of infection with COVID-19 and the actions taken in this regard by the management team of the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven is presented.

- **Section E. Information about your professional experience.**

A total of 6 questions are included, based on which the professional experience of the staff at the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven is established, as well as the specific unit of the medical facility where the respondent works. The number of weekly working hours of employees, their job title and whether they have direct contact and interaction with patients is reported. The length of service according to the profession of the employees is also established here.

The questions in the survey card are of a closed type with 5 possible answer options provided for the respondent to choose from. This type of scale is known as a five-point Likert scale, which allows more precise information to be collected from the respondent. With this scale, it is possible to conditionally mark the answers from 1 to 5 and to calculate some general characteristics.

## **5. ANALYSIS OF THE RESULTS OF THE CONDUCTED SURVEY**

The presented results of the analysis of the distribution of the respondents' answers give reason to claim that the “Program for mastering the risks and opportunities” adopted at the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven is not just a formal document, but a real functioning program. It should be added, and not without reason, that the staff is well acquainted with it and its algorithm of action, and management decisions related to it are made based on those laid down in it: criteria, standards, scenarios and measures for action. Real positive effects of its implementation have been identified, which are expressed not only in the final medical and financial results of the hospital but also in the creation of a favourable and safe environment for staff and patients, high professionalism at all levels of management and provision of medical services in the health facility. The questionnaire survey confirmed the hypotheses regarding the adequacy, comprehensiveness and comprehensiveness of the Program, as according to the answers of the respondents, they find a direct expression in the many management decisions and measures taken by the hospital management during the COVID-19 pandemic. In confirmation of what has been stated so far are the results of the analysis of the formed two-dimensional empirical distributions obtained based on the answers to pairs of questions, thus forming cross-groupings that allow testing the presence of dependence and measuring its strength. The presence of dependence was tested using the  $\chi^2$  method for the analysis of bivariate distributions, and the strength of the dependence was

determined using the correlation coefficients of Cramer, Tschuprow (Chuprov), and Pearson. The performed hypothesis tests prove the existence of statistically significant relationships between the studied characteristics. Based on the performed analysis, it was found that the key factor regarding the reliability of the assessment of the current “Program for controlling risks and opportunities” during the COVID-19 pandemic on the activity of the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven is the personal participation in the diagnostic and treatment process of a patient with COVID-19 (established through question 9 of section D of the questionnaire).

Based on the analysis, the following summaries were made:

- A significant to strong dependence was established between personal participation in the diagnostic and treatment process of patients with COVID-19 and the high assessment of the adequacy of the reactions of the management team of the hospital at the beginning of the announced pandemic of COVID-19, in terms of the safety of patients and staff - the value squared for  $\chi^2$  for the research relationship is 239.284 and is statistically significant, and Cramer's coefficients are ( $V = 0,5733$ ), Tschuprow's ( $K = 0,5733$ ) and Pearson's coefficients ( $C = 0,7537$ ).
- A significant to strong correlation between personal participation in the diagnostic and treatment process of a patient with COVID-19 and the degree of awareness of the objectives of the risk management program of the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven - the value of  $\chi^2$  for the studied relationship has been proven 218.295 and is statistically significant, and Cramer's coefficients are ( $V = 0,5476$ ), Tschuprow's ( $K = 0,5476$ ) and Pearson's ( $C = 0,7385$ ). The “Risk and Opportunity Management Program” in place during the COVID-19 pandemic, combined with the efforts made to keep staff well informed about their safety and that of patients, has become practically a serious advantage for the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven, giving it a valuable advantage over its competitors.
- The dependence between the participation in the diagnostic and treatment process of a patient with COVID-19 and the degree of satisfaction with the conducted training on getting to know the specifics of the risk management plan at the Multiprofile Hospital for Active Treatment “Heart and Brain” EAD - Pleven, according to Cramer's coefficients, is ( $V = 0,4447$ ) and Tschuprow's ( $K = 0,4447$ ) is moderate, according to Pearson's coefficient ( $C = 0,6646$ ) it is significant, and the value of ( $\chi^2 = 173,968$ ) is statistically significant. This also testifies to the high assessment that the staff of the medical facility gives to the management team and especially to the efforts and excellent organization of explaining the risks, mechanisms and measures of the “Risk and Opportunities Management Program”.
- The dependence between the degree of participation in the diagnostic and treatment process of a patient with COVID-19 and the degree of satisfaction with the attention given and subsequent implementation of the staff's suggestions to improve patient safety is significant according to Cramer's ( $V = 0,5844$ ) and Tschuprow's coefficients ( $K = 0,5844$ ) and strong according to Pearson coefficient ( $C = 0,7599$ ) and the magnitude of ( $\chi^2 = 248,631$ ) is statistically significant. It follows from this that the hospital has built a working system for feedback and a thorough study of the proposals made by the staff for changes to improve the safety of patients and staff, and this proves a high degree of “audience” both by the direct managers, as well as from managers at the highest management level.
- The more direct the degree of personal involvement in the diagnostic and treatment process of a COVID-19 patient, the higher the score for the COVID-19 infection risk management plan and the actions taken in this regard by the management team of the Multispecialty Hospital for Active Treatment “Heart and Brain” EAD - Pleven - Cramer's ratios are ( $V = 0,5447$ ) and Tschuprow's ( $K = 0,5447$ ) show the presence of a significant correlation, and according to Pearson's coefficient ( $C = 0,7367$ ) the dependence is strong. The test of the

hypothesis of the existence of the studied dependence revealed that it is statistically significant ( $\chi^2 = 213,63$ ).

- A statistically significant correlation ( $\chi^2 = 211,3978$ ) was demonstrated between the degree of personal involvement in the diagnostic-treatment process of a COVID-19 patient and the identification of the most serious challenges and difficulties in the work process during the COVID-19 pandemic, which according to Cramer's ( $V = 0,4912$ ) and Tschuprow's ( $K = 0,4912$ ) coefficients, the correlation was moderate, and according to Pearson's coefficient ( $C = 0,6962$ ), the correlation was significant. The presence of this dependence also determines the prevalence of answers identifying the most serious challenges and difficulties faced by respondents during the work process, namely the foregrounding of issues of a health nature, followed by those of an ethical nature, and to a much lesser extent issues of organizational, financial and other nature. All this proves that in terms of organizing the processes in the hospital at every level, during the pandemic of COVID-19, it was at a very high level and the management team strictly followed what was written in the current "Risk and Opportunity Management Programme".
- The correlation between participation in the diagnostic and treatment process of a COVID-19 patient and the patient safety score of the respective hospital unit was statistically significant ( $\chi^2 = 75,1611$ ) and was defined as moderate according to Cramer's ( $V = 0,4544$ ) and Tschuprow's ( $K = 0,3821$ ) coefficients and significant according to Pearson's coefficient ( $C = 0,5406$ )<sup>2</sup>. This once again confirms the conclusion that the management of the hospital has created and maintains the necessary conditions for the safety of staff and patients in the hospital, respectively created and are available - the best possible conditions for the safety of those involved in the diagnostic and treatment process.

## 6. CONCLUSION

The COVID-19 pandemic brought to the fore the importance of the "Program for managing risks and opportunities" of the Multiprofile Hospital for Active Treatment "Heart and Brain" EAD - Pleven not only as a regulatory requirement but also as an integral part of the medical institution's strategy. Hospital risk management takes centre stage as the organization grapples simultaneously with the lingering effects of the COVID-19 pandemic, threats from worsening economic parameters (directly reflecting on the healthcare market as well) and the dynamics of socio-political change. The management team realizes that to keep the hospital competitive in the "new normal" or post-COVID-19 reality, a stronger risk management program is needed – a process that generates value for it as an organization. Implementation of this program ensures that any healthcare organization exposed to unprecedented risk pressures of similar pandemic proportions will proactively and systematically protect the safety, life and health of patients and staff, as well as the organization's assets, market share, accreditation, levels of cost recovery, brand value and reputation in society.

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<sup>2</sup> Cramer's and Tschuprow's coefficients have different values for different numbers of determinations on the factor and the outcome, and in this case, the estimated correlation coefficients never reach 1.

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## **GEOPOLITICS OF ENERGY: WHEN ENERGY CYCLES CHANGING COINCIDE WITH POWER CYCLES CHANGING**

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### **ABSTRACT**

*The neoliberal globalization model symbolizes 20 million containers that transit the oceans every second according to market laws, to which all segments of human activity are subject. The frenetic movement of people and goods is the nexus of human involvement in climate change. Territories (states) fight against them most effectively by diversifying their economies and the energy resources that drive them. Out of concern over strategic dependencies on countries that are rich in fossil fuels, the West has initiated an energy transition. It was not the first change of the energy cycle, but it was announced as the first that, due to climate change, should be completed in a little more than a quarter of a century. The growing hard power of China and the seriousness of its ecological situation related to the "world factory's" economy dynamics, made China master supply chains, rare metals and green technologies before the West. The accelerated energy cycle change (transition) takes place within a five-year turbulent period in international relations (globalization cycle change), and therefore coincides with the change in the power cycle, when war is most likely. Economically strong China, as a potential challenger (contender) to the USA in the fight for the position of the new world hegemon, and militarily strong Russia, as a dissatisfied secondary power, use this situation to expand their strategic interests at the expense of the West. What the West strongly resists. The planet is gripped by war fever.*

**Keywords:** *systemic, new episteme, energy transition, power transition, structural power*

### **1. INTRODUCTION**

The historical moment we are living takes us back to 1919, to the period immediately after the First World War, whose preoccupations at that time were reduced by Paul Valéry to a disturbing equation: «Will Europe become what it really is, that is: a small cape of the Asian continent; or will it remain as it is imagined to be, that is: a precious part of the planetary space, the pearl of the earth's sphere, the brain of its enormous body? ». This equation led him to send the legendary, alarming message to Europeans: "We, civilizations, we now know that we are mortal!"; alluding to sunken empires, worlds that have vanished with all their men and their tools, with their gods and laws, their academies and sciences. Because "civilization is as fragile as life" (Valéry, 1919), Europeans at the beginning of the third decade of the 21st century are once again perceived as a civilization on the edge of the historical abyss. They were gripped by the fear of decadence, a symptom of decline: the gradual loss of creative power due to the excessive enjoyment of luxury and the associated loss of former moral and other principles. It seems that, in just one, past 30-year globalization cycle<sup>1</sup>, Europe has lost its geopolitical compass. The geopolitical compass can be imagined as a cursor of the interstate relations system. It reflects the state of the dominant socio-economic concept - today's financial capitalism, which gives the system development dynamics in a certain time and space (national,

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<sup>1</sup> See Figure 1

regional and international). In the exit phase of the globalization cycle 1990-2020, the geopolitics of energy, i.e. strategic dependence related to energy, played a key role in the loss of Europeans' compass. These dependencies have been shaping international relations for more than two centuries, generating bilateral alliances such as the one between the USA and Saudi Arabia, or leading states to grant generous subsidies to companies from the energy sector. Examples are countless. Thus, for example, the drop-in oil prices in the initial period of the globalization cycle of 1960-1990. (the oil shock of 1986), was a significant factor among those that led to the collapse of the USSR and the reorganization of the system for the regulation of interstate relations, that is, the planetary dominance of financial capitalism. A shining example of the geopolitics of energy is the decisive influence of the electorate of the US shale oil producing states on the election victory of Donald Trump in 2016 and, consequently, the most significant reshaping of international relations in the last 30 years. Moreover, the energy cycles changing often coincides with the power cycles changings (Vujačić, 2020). In such a given context, the current energy transition is presented as a process that should free states from current strategic dependencies related to energy, that is, to states that are rich in fossil fuels. The first energy transition was the transition from wood to coal in the 18th century. Until the latter, energy transitions took place over long periods of time and actually corresponded to the arrival of new energies, rather than real transitions. In other words, they followed the natural evolution of industrial capitalism. Thus, in the 60 years since oil became the primary source of energy in the world, the consumption of coal in the world has almost tripled. On the contrary, the current energy transition should be completed in a little more than a quarter of a century under the pretext of climate change. And with profound changes. Coal is doomed to disappear, and the European Union estimates that hydrogen will provide 20 to 25% of its total energy by 2050. Although hydrogen is the subject of activity and growing ambitions, it currently meets less than 2% of current needs (Yergin, 2021). Which confirms that in the current global energy crisis its strategic aspect is dominant, and explains the planetary war fever.

## 2. THE NEW GEOPOLITICS OF ENERGY

The energy crisis did not start in February 2022 with the invasion of Ukraine, but in the late summer of 2021. It means, in the first crisis period (2020-2025) of the current globalization cycle, when the energy cycle changing could coincide with the power cycle changing, i.e. mark the end of hegemony of the West. The economic recovery that followed the lifting of the quarantine due to COVID-19 increased global energy consumption. In the latter part of 2021, tensions in the oil, natural gas and coal markets increased, pushing prices higher, under the combined effect of rising demand and supply that became clearly insufficient. In November 2021, three months before the invasion, the United States announced the first reduction in its strategic oil reserves (CNBC,2021). The gas war in Ukraine, in which one part of the Ukrainian oligarchs enjoyed the support of the USA (mainly from the Obama administration, whose vice president was the current US President Biden), and the other part from Russia (President Putin), turned into a civil war in Ukraine already in April 2014. The civil war lasted until February 2022. Then Russian President Putin decided to resolve it in his favour with a "special military intervention", and the war in Ukraine officially turned into an interstate and inter-bloc armed conflict: NATO vs. CSTO (The *Collective Security Treaty Organization*<sup>2</sup>). At that moment, it became clear that the European Union had completely "lost its geopolitical compass". Namely, until 2020, i.e. entering the five-year turbulent zone of possible power cycle changing, European states failed to reach a consensus at the regional, European level, neither on strategic autonomy, nor on a coherent common foreign policy concept that would protect their specific interests against competitors; both towards opponents and allies.

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<sup>2</sup> CSTO- an Eurasian political and military alliance consisting of six post-Soviet states: Armenia, Belarus, Kazakhstan, Kyrgyzstan, Russia and Tajikistan.

The war in Ukraine and membership in NATO automatically brought them closer to the views of their transatlantic ally and protector - the USA, the current hegemon, whose hegemony is being challenged by the challenger China and dissatisfied secondary power Russia. With anti-Russian sanctions, after the United States, the Union supported Ukraine in the gas war it is waging against Russia. Some analysts, including Emmanuel Todd, claim that World War III has already begun (Todd, 2023), others refute this claim. In any case, the Union has "lost the geopolitical compass" due to the misjudgement that substitutes for oil and gas are widely available; and it lost its independence due to its firm belief in Fukuyama's "end of history" - which led all European states to significantly reduce their military preparedness (Matelly, 2022). So, not only is their soft power no longer attractive, but they don't even have the hard power to support it. Their future position in the world indirectly depends on the outcome of the balancing of power between the USA and China in the new geopolitical centre of the world, the Indo-Pacific. It is not among the "big players" there either, since France (thus the Union) was not accepted into the new triple alliance AUKUS (Australia, the United Kingdom, the United States), which was created on September 15, 2021. This alliance is focused on maintaining Anglo-American dominance, both in the world and within the NATO alliance - as confirmed by the torpedoing of the Franco-Australian treaty on submarines on September 18, 2021. In the described context, it is understandable the ubiquitous decline (Michelot, 2013) of the former European "great nations", especially France and Germany, who think to "correct" their wrong assessments by committing to the struggle to maintain Anglo-American hegemony, i.e. the concept of financial capitalism on which it rests. Therefore, in this article, we will first investigate the possible evolutions of that concept and check their feasibility, using a systemic analytical grid.

### **3. COMPLEXITY OF 21<sup>ST</sup> CENTURY CAPITALISM**

Beginning in the late 1980s, the multiplication of crises shook the foundations of neoliberal, international and financial capitalism. These crises did not reveal only disorder due to disruption or dysfunction in the capitalist system. At the same time, they brought financial capitalism to "critical states marked by uncertainty between collapse or revival" (Morin, 1977). Until, entering the current globalization cycle of 2020-2050, they introduced it to a state of general crisis. Thus, those crises that foreshadow the possibility of changing the existing world order based on the pattern of financial capitalism. Regardless of different approaches to this issue, contemporary theorists of economic thought mainly identify capitalism with an institution, system or process characterized by the following key tensions: between capital and labor, between accumulation and distribution of wealth, between the power of the state and the power of the market, between industry and finance, between property and solidarity, between shareholding and partnership, between Keynesianism and Ricardianism. At the beginning of this 21st century, contradictions typical of postmodernism, which have the most significant influence on the development of capitalism, should be added to them: globalization/sovereignty, myths/technologies and contradictions between the paradigms of the three industrial revolutions. Theoretically, the contradictory discussions resulting from these contradictions were supposed to generate reforms (self-regulation of the system), that is, the direction that capitalism should take. But they were not, mainly due to the resistance of researchers and rulers towards the adoption of systemic analytical tools, even though they are the only ones capable of encompassing all the complexity of the global contemporary capitalist system: economic and social discourse which is, at the same time, a scientific convention and a social act. So, we are talking about a political discourse that should be simultaneously "explicitly descriptive and implicitly performative" (Geerolf, Zucman, 2012). In other words, it could "perform" (act on) the socio-economic reality, provided that the rulers explain with political discourse and, at the same time, apply in practice advanced theories, models and tools

confirmed by recognized theoreticians. These advanced theories, models and tools are essential in the transition from the logic of wealth accumulation and distribution to the logic of interaction between skills and the regulation of behavior within that interaction. However, their adoption implies overcoming certain fundamental paradigms of the economy of the 20th century. According to Kuhn (Kuhn, 1969) and Lakatos (Lakatos, 1970), a paradigm is "a model recognized by the scientific and professional communities", and through the phenomenon of single-mindedness, the recognition of these models directly affects both rulers and researchers. The paradigm affects the selection of issues that researchers will study and the methods that the rulers will use to solve them. Thus, it affects political choice and practice on the ground. Therefore, it is difficult to encourage the rulers and researchers to work on overcoming the old paradigms, as confirmed by the latest works on capitalism "which resemble catalogs for adaptation to old institutions, systems and practices" (Giraud, Renouard, 2009). It turns out that the problem of the inability to transcend old paradigms is, in fact, the inability of modern man to think about economics as anything other than a technique of action. Therefore, it is predictable that only postmodern man will be able to build a new episteme<sup>3</sup> of capitalism, one that includes the contributions of all other sciences (philosophy, sociology, history, psychology, psychoanalysis, etc.) and is conceived as "a way of thinking about the world in its entirety" (Blanqué, 2008). In this sense, as early as 1951, Schumpeter questioned the usefulness of different schools of economic thought and underlined the importance of interaction between different scientific disciplines. The relevance of Schumpeter's analysis is confirmed by recent research, focused on thinking about the world as a whole and avoiding the trap of single-mindedness through the interaction between different scientific disciplines, with the aim of modeling tools that will enable the rulers to immediately apply the new episteme and new political choices in order to give timely and efficient responses to external threatened and minimized the disturbances or dysfunctions of the capitalist system of the 21st century. The problem is that, given the strong resistance to overcoming the old paradigms and the previously listed contradictions of financial capitalism, there is little chance that the Western postmodern man will emerge by 2025; and to impose its new episteme on the world by the end of the first stage of the current globalization cycle (2030).

#### **4. A CONTRIBUTION TO THE NEW EPISTEME**

In this paper, we contribute to a new episteme. We start from the statement that all the sciences that deal with the regulation of human behavior and actions, from their point of view, observed the same contradictions of the capitalist system of the 21st century that they also studied the economic ones. According to the hologram principle, not only that we find the whole in each part, but we also find each part in the whole. Thus, interactions (work that releases energy) between numerous economic and socio-cultural actors of the capitalist system of the 21st century are contained in one tension in which we find all contradictions, just as in each contradiction we find tension (whole). The tension moves in time and space, and its dynamic movement is dictated by the ego-antagonistic dialogue that imposes contradictions. The nature of tension and its movement are explained by the natural sciences (physics, chemistry and biology), while the formal sciences (mathematics, logic and computer science) simulate its behaviour. If we accept the definition of political science that Reg Whitaker defines "as the systematic study of government mechanisms through the application of scientific methods to political events"<sup>4</sup>, then we also accept the application of Morin's scientific method in the study and regulation of hypercomplex systems (human organizations are the most complex systems).

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<sup>3</sup> According to Foucault, the episteme includes all the questions, hypotheses and research methods that dominate the thought of an era.

<sup>4</sup> WHITAKER in the *Canadian Encyclopedia*: <https://www.thecanadianencyclopedia.ca/fr/article/science-politique>.

Thus, we abandon classical causation, in which the same causes always produce the same effects, and apply complex (circular) causation. In the latter, according to Morin's principle of recursion, not only is there an unbroken loop (connection) between effects that act on causes and causes that act on effects, but there is also the perpetuation of that loop, due to the fact that effects themselves are producers of causes; thus, the product becomes the producer. In other words, politicians are both the product and the producer of politics. Politics taught politicians the political language, making them producers/teachers of that same political language. The fact that the product is the producer, therefore, enabled the inertness of political culture, i.e. the transmission of political language from generation to generation of politicians. Even more because, precisely thanks to the phenomenon of recursion, generations of politicians exist. Reproduction is a manifestation of recursiveness. So how to stop the reproduction of the old episteme? By intervention in the very heart of the system: by mutation towards another pair of basic values of the system. Namely, despite the systemic risks involved in this choice of values, which exacerbates rather than alleviates the contradictions of financial capitalism, the pair of basic values of the modern regulatory system is still "money-information" (Levasseur, 1989). In this pair, money has the function of establishing order, and information is left to fight against disorder. On the one hand, too much information kills information and too much money kills money. On the other hand, according to the theory of complex systems, all serious crises, such as the one we are experiencing, lead to a mutation/revolution of the system. Therefore, time and energy should not be wasted on the struggle to maintain this pair of basic values for 21st century capitalism. It is not clear how it would be possible with the old pair of basic values to ensure a new dynamic of changes, that is, to create a "new world order" - an idea that appears cyclically, every 30 years, as if instantaneously.

## **5. AN IDEALLY BALANCED SYSTEM OF INTERSTATE RELATIONS**

Joël de Rosnay, as long ago as 1995, denounced the short-sightedness of politicians in facing the future, which makes ten years seem like an eternity, in an excessively complex world whose evolution is unpredictable. He denounced a hazy future, limited to discussions that are often focused only on the upcoming elections. No projection seems realistic for more than two or three years. He believed that, thanks to the systemic approach, "the management of evolution will no longer be an exclusive hunting reserve for politicians, economists, industrialists; and not even for journalists or sociologists". As well as that a systemic approach to problems will lead to respect for "natural laws, which are even stronger than those that rule our societies. Those laws to which all organizations in nature are subject - those formed by molecules, cells, insects or humans. A better knowledge of these laws, with which it is impossible to make a compromise, can light our way" (Rosnay, 1995). This system, Figure 1, was conceived in that spirit:

*Figure following on the next page*

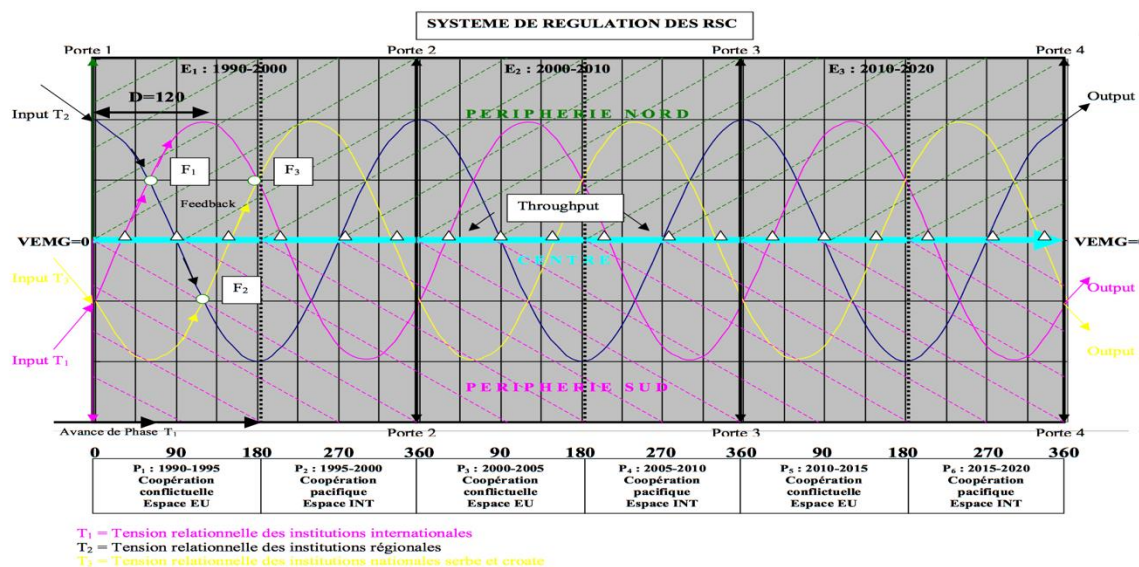


Figure 1: The system of ideally balanced interstate relations for the globalization cycle 1990-2020.  
(Vujacic, 2016: 69)

It represents an ideally balanced system for managing interstate relations (Vujačić, 2016:88) that respects natural laws, theory and regulation of complex systems. It is a systemic<sup>5</sup> that shows the ideal dynamics of international relations. Its work, like the work of any other system, tends to achieve balance. The system consists of 3 tensions in the historical sense, which contain fundamental pluridisciplinary ago-antagonisms (combining one thing and its opposite). They interact with each other in such a way that they meet cyclically. They move through planetary time and space, respecting institutional ago-antagonisms at national, regional and international levels. The graph shows the dynamics of interstate relations, i.e. their clip covering one globalization cycle of 30 years in the European time space. And that, the well-known cycle of 1990-2020, which is behind us. The three tensions are of the same frequency and amplitude. However, they are out of phase, i.e. delayed by  $120^\circ$ . In order to gain an advantage, international tension starts first. It carries the structural power of the hegemon (USA)<sup>6</sup> that imposes the rules of the game in the European area, as well as resistance to those rules at the European and national levels, which gives the European area a developmental dynamic, in which five-year cooperation periods alternate (conflict or pacifist periods, but always cooperation periods). The three tensions together need only one 10-year stage ( $3 \times 120^\circ = 360^\circ$ ) to transform the tensions towards a mean effective value equal to zero, which is a guarantee of the stability of the system for interstate relations regulation. The same, of course, on the condition that it remains open to exchange with its environment, so as not to be subject to entropic death. What worries us today more than disorder in the European space (disorder also has an organizational capacity because it stimulates unexpected meetings and therefore the formation of new organizations) is that the European Union today functions as a closed system; which therefore no longer exchanges with its environment (Russia), and is subject to a gradual entropic death (as a man would be if he stopped exchanging with the environment, at least as much as he needs to feed himself).

<sup>5</sup> See the article on systemic regulation of international relations (Vujačić, 2018).

<sup>6</sup> According to Susan Strange, power is not only related to a state's resources, but also to its will to power. Therefore, Anglo-Saxon supremacy today is based on the structural power of the United States. This power is related to the maximum of resources and the will to supremacy, which is realized through the relationship between the government and the market. On the one hand, since the United States possesses this power, they decide the choice of values. On the other hand, their power has the ability to shape and determine the structures of the global political economy within which other states are located (STORY, JAQUET : 444).

The phenomenon is all the more worrying because, before the fall of the iron curtain by the will of the West, there were analyses of the consequences of the lowering of the curtain by the will of the East. Namely, through a systemic analysis of Gorbachev's perestroika, we come to the conclusion that it intervened to prevent "entropic death" due to the opening of the curtain from the Eastern side. Therefore, today are current projections according to which: "if the modern Western regulatory system is closed, after it has occupied all the available space (the European communist zone up to the borders with Russia), it will risk "entropic death too, as well as the fulfilment of declinist predictions" (Vujačić , 2016:14). The war in the European area, in the predictably turbulent five years period of entry into the new globalization cycle (2020-2025), managed to surprise the Europeans. Even though there was the experience of war in the former Yugoslavia, which took place in the equally turbulent period of entry into the previous globalization cycle in 1990-1995. Why then did the war break out precisely in the former Yugoslavia, and today in Ukraine? Because these are hybrid spaces where American and Russian structural power meet. In 1995, the American one prevailed. What are the chances that it will prevail in 2025?

### 5.1. Zone of possible transition of power

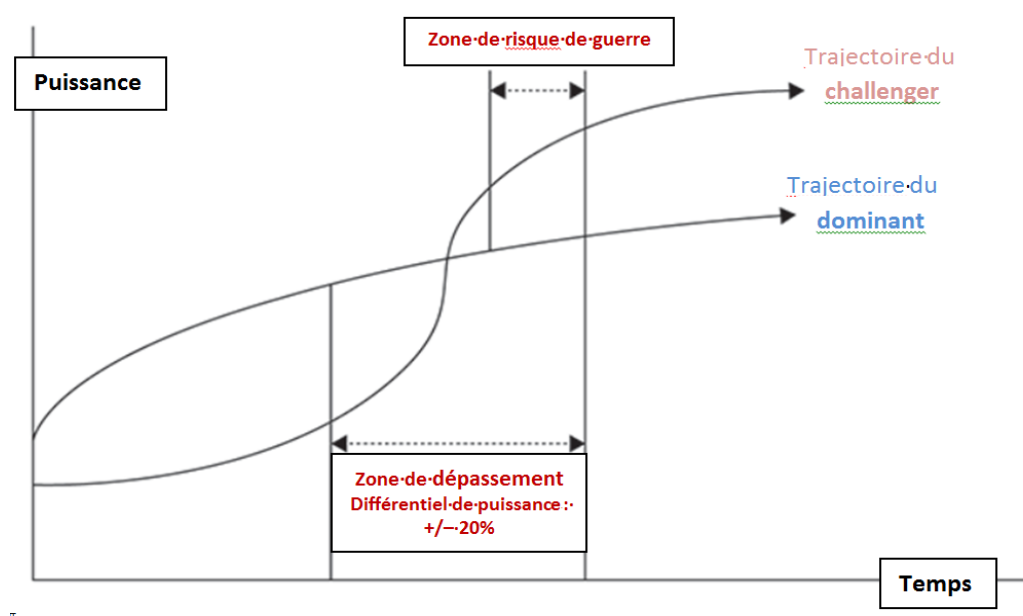


Figure 2: Zone of possible power transition 2020-2025.  
(Vujacic, 2021)

Legend: Coordinates: Puissance (Power) and Temps (Time); Red zones: **Zone de risque de guerre** (Zone of war risk), **Zone de dépassement – Différentiel de puissance +/- 20%** (Zone of excess – Power differential +/- 20%) ; Trajectories: **Trajectoire du challenger** (Challenger's Trajectory), **Trajectoire du dominant** (Dominant's Trajectory).

The world entered a new globalization cycle, a power transition zone in which there was a coincidence between the energy transition and a possible power transition - an interaction that was known to lead the world into a global conflict (hegemonic instability). Namely, the systemic approach to international relations supports the power cycle theory of Gilpin and Organski, according to which a peaceful transition of power is possible. However, only if it is the work of some satisfied secondary power that is satisfied with the status quo of American hegemony.

For example, as was the case after the first and second world wars, after the failure of the German challenger, or contender - as Organski calls the state-challenger. Then the American hegemony appeared as an extension of the British one. Pax Americana followed on from Pax Britannica and thus ensured the last cycle of stability. This cycle also covers the peaceful outcome of the Cold War, which the power cycle theory explains by the fact that Russia was never a contender in the sense of a challenger state whose GDP represents at least 80% of that of a dominant power. Thus, a hegemonic war did not occur. So, only when there is a possibility that the power transition is the work of some dissatisfied power, which managed to reach or even exceed the hegemonic power, the risk of a hegemonic war arises. And this is the case with China, which plays a central role in the energy transition, not only as the country with the most consumers, but also as the largest energy producer since 2009; since 2011 as the largest consumer of energy, and since 2013 as the largest importer of oil and gas ahead of the USA (Seaman, 2014). In China's energy mix, coal meets two-thirds of energy needs, which mainly explains the high level of greenhouse gas emissions and pollution in that country (Carbon brief, 2022). For what reason is the energy transition an existential issue for China? As the new geopolitics of energy generates new strategic dependencies related to the capacity to master energy transition technologies, China has secured itself in the way that it has mastered this capacity best. It is a leader in patents related to renewable energy sources, energy networks or mobility because they enable it to have a good strategic positioning; as well as the ability to rapidly create industrial champions in energy transition technologies. China especially supports the development of an integrated electric vehicle industry. In this sense, it has mastered the supply chain of rare metals, battery production and car construction. Ruthless competition, on a global level, in mastering energy transition technologies is destabilizing countries rich in rare metals. Thus, for example, the Democratic Republic of Congo has been affected by political instability and bloody conflicts since it provides 60% of the supply of cobalt used in the production of batteries (Amnesty International, 2016). Dissatisfied secondary power Russia still cannot be a contender, but it has disruptive capacity. Thus, after Syria, Libya and Ukraine, the energy war is also spreading through the Sahel. Not only is China more and more economically present there, but the Russian paramilitary Wagner in francophone African countries is gradually taking the positions of the French army, which was deployed in Africa in the five countries of the "G5 Sahel" (Mauritania, Mali, Burkina Faso, Niger and Chad) from 2014, as part of "Operation Barkhane". At the express request of African rulers, France is abandoning these positions today. At the same time, tensions are growing between China and the US in the new geopolitical centre (economic epicentre) of the world, the Indo-Pacific. It is a zone in which France (and therefore the EU) has the second free economic zone after the USA - but it is not invited to join the new, purely Anglophone strategic alliance AUKUS, which is the bearer of the Western Strategy for the Indo-Pacific. On the one hand, this situation, and not only the feeling of belonging to the until recently harshly criticized NATO alliance, explains the French and European support for the Ukrainian and American armies in dealing with Russia. As well as nuanced support for the AUKUS alliance in the Indo-Pacific, on the other hand. In the described context, the key question for Europeans today is: how and whether the Union will succeed in incorporating its specific strategic interests into the new American geopolitics of energy?

## **6. THE GEOPOLITICAL CONTEXT OF THE EUROPEAN GREEN DEAL**

In December 2019, the European Commission presented the Green Deal, an ambitious package of reform policies aimed at achieving climate neutrality in the EU by 2050. At the foundations of this program are efforts to transform the European economy, as well as European consumption patterns, in such a way that the energy transition becomes an economic opportunity for the European Union.



Since the Green Deal implies a fundamental revision of the European energy system, it is to be expected that it will fundamentally change the relations between the EU and its neighbourhood (the area of Eurasia / Mediterranean / North Africa) and redefine European geopolitical priorities. It is a foreign policy strategy with deep geopolitical reflections. Namely, the geostrategic tensions between Russia and the EU faced Europe with very delicate decisions regarding the supply of energy sources (oil and natural gas), which was especially actualized after the Western countries-imposed sanctions on the Russian energy sector. Europe thus became "trapped" between limited internal sources of energy and dependence on imports. In addition to the challenge of supplying energy resources, which includes access to sources and control over supply routes, the EU consequently faced the problem of the limits of its own economic growth, which strongly affects the internal stability of the member states. Namely, after 1990, the organization of European energy markets continued to rely on Cold War concepts (Ostpolitik) that focused on developing a stable partnership with Russia (NATO-Russia, EU-Russia agreements). A key input for the revision of the European energy system was the concern for the Union's energy security and its dependence on Russian natural gas. Mainly after the Russia-Ukraine-EU gas crisis in 2006 and 2009, when the energy infrastructure diversification strategy was implemented (Liquid Natural Gas Terminals in Poland and the Baltic; Southern Gas Corridor), which was adapted to legislation including EU safety regulations gas supply, and about risk preparedness in the electricity sector. Nevertheless, the war in Ukraine ended the geopolitical vision of a common Eurasian space, due to which Germany and the EU were forced to revise their relations with Russia, which as part of German Lebensraum provided the European Union with an abundance of cheap energy sources (Polović, 2022). Now, "green" Europe is almost completely abandoning its dependence on Russian energy sources. However, as the Union is a "house without a roof", an unfinished building in economic, defence and foreign policy terms, the Green Deal can be considered as a new EU foreign policy based on the climate change agenda. However, the impact of that policy is consistent with the impact that an "unfinished building" can have. Thus, the influence of the "economic giant and geopolitical dwarf", a phrase that perhaps best defines the EU's current potential. Thus, even the United States, as the American patron of the Union, withdrew from the Paris Climate Agreement in 2017. The Americans returned to the agreement in 2021 - when it was clear that the exit from the sanitary and energy crisis would put climate warming on the back burner. On the one hand, the real influence of the EU is weakening because today the main centres of gravity of economic and population (demographic) growth are outside the European area. On the other hand, after the exit of the United Kingdom from the EU, its share in the total use of primary energy decreased significantly (below 10%). Therefore, a transition from hydrocarbons that would focus only on Europe would not significantly alleviate the problem of global warming. Europe's exit from dependence on fossil fuels will inevitably have a negative impact on numerous regional partners in terms of their economic and political destabilization. So, a huge reduction in that flow will restructure the EU's relations with key energy suppliers. Therefore, the geopolitical context of the Ukrainian crisis strongly influences the objectives of the European Green Plan. It remains an open question whether the EU is prepared to manage the Green Plan with regard to relations with Russia, relations with countries in the immediate neighbourhood (MENA - Middle East, North Africa), the Caspian Sea and Central Asia, as well as relations with global players - the USA, China and the Gulf monarchies. Namely, the comprehensive transformation of the EU's energy system will have different geopolitical consequences for the oil and gas producing countries in the EU's neighbourhood (Russia, Algeria) as well as an impact on global energy markets, thus also consequences for European energy security. All this will undoubtedly provoke a strong geopolitical response from the EU's international partners, which will range from cooperation to completely hostile activities in opposing the effects of the Green Plan, as already proven by the war being waged on the

territory of Ukraine. Ensuring access to critical raw materials that support green technologies is essential for the implementation of the European Green Deal, as well as for securing the potential necessary to build the concept of "strategic autonomy of Europe". Europe is faced with a complex geopolitical crisis, which poses a threat not only to its energy transition strategy but also to the very essence of its own energy independence. A society that does not have access to sufficient, reliable, cheap and clean energy becomes a security threat, and its economic and social progress is questionable. In this context, the European energy transition has become an economic, but also a security challenge.

## 7. CONCLUSION

In 2020, the system of interstate relations found itself in a critical state, in which it finds itself cyclically, every 30 years, and is marked by uncertainty between collapse or revival. The specificity of this transition from one globalization cycle to another is that it overlaps (coincides) the energy cycle change and the power cycle change. For this reason, the struggle for the position of world hegemon is more uncertain than during previous globalization cycles changes. As at the beginning of the previous globalization cycle, in 1990, Europe is experiencing a war crisis, which, however, is intensified by the first energy transition crisis, and is reflected in the asymmetry between supply and demand. If it turns out that this crisis is indeed only the first one, other crises of the same type will create uncertainty, cause major economic problems and weaken public support for the energy transition. What could weaken the soft power of the European Union, which today is structured around the Green Deal and the planetary fight against climate warming. By 2025, it should be clear whether Brussels' assessment of subordinating its foreign policy to the goals of the Green Deal was correct. On the contrary, it is already clear that the Union's security assessments were wrong, due to which its hard power is no longer able to support its soft power. Namely, the EU is today the only region in the world that spends less on defence (a third less even when the statistics include Russia) than it did at the end of the 1980s (Matelly: SIPRI data, 2022). On the contrary, while the Union "spent" the peace dividend, the five key global players on today's world scene (the USA, China, India, the United Kingdom and Russia) had the largest military expenditures. They will structure the new world order, while the Union has left the "big game". For the Chinese economy and for China, maintaining leadership in the energy transition is a double existential issue (solving pollution and maintaining economic growth), and they will not easily bow down under pressure from the West. The war in Ukraine has become equally existential for the rulers, both in Ukraine and in Russia and the USA. Paradoxically, despite suffering and destruction, thanks to external support, financial and military resources, Ukraine found in the war a new kind of internal political balance and hope for a better future - which did not exist before the war. Therefore, its ruling elites must not lose the war. Russia started the war under the pretext of threatened existence, so it cannot end it before securing it. The war is also existential for the USA, because it could threaten the American monetary and financial control of the world (cheap financing of the huge American trade deficit) if the Russian economy continues to resist the sanctions and manages to exhaust the European economy - in such a way that only the Russian economy (supported by China) survives. In other words, the new geopolitics of energy has drawn us all into a confrontation whose only possible outcome is the collapse of one of the opposing sides. The effect of the breakdown can be: either just updating the outdated software of financial capitalism, which rests on the value pair 'money - information', accompanied by new systemic crises; or the conception of new software with a new pair of values, accompanied by a mutation/revolution of the system (deep system reforms), which would be able to produce a new development dynamic. Namely, ultra-liberal financial capitalism achieves very good results in terms of the American values of efficiency and freedom, but very poorly in terms of security and distributive justice (two key systemic risks).

This is the reason why the system for the regulation of interstate relations is shaken by a general crisis. It defends itself with auto-eco-reorganizational reactions (E. Morin). When an antagonistic social dialogue exists, its negative feedback loops have a stabilizing role (e.g. those arising from the dialogue between capitalism and its opposing socialism and communism concepts in Western democracies), and positive ones destabilizing role (e.g. those arising from the communist single-mindedness in the USSR). When social dialogue is dominated by single-mindedness (today Western ultra-liberal financial capitalism), i.e. no one and nothing opposes the basic tenets of an ideology, all human organizations (systems) affected by this phenomenon find themselves in a state of dangerous static equilibrium (all feedback loops of the system are positive). Because it has exhausted all possibilities of exchange with the environment, this system is closing (EU towards Russia). In such a system, entropy reigns (maximum disorder, war), and it risks entropic or "thermal death" (according to Boltzmann). Since the system closed, according to the laws of nature, sooner or later it exposed itself to extinction. It follows that, with the collapse of the USSR, the USA did not emerge from the Cold War as a winner, but rather lost its "best enemy". It means an enemy whose economic power did not allow him (neither then, nor now) to replace the USA in the position of world hegemon; but also, an enemy whose communist single-mindedness - opposed to Western political pluralism, generated the development dynamics in the camp of Western democracies - while keeping the USSR in a state of dangerous static equilibrium. During the Cold War, in order to maintain the balance, the Western regulatory system was permanently auto-eco-reorganizing itself, using negative feedback loops, resulting from ideological conflicts at all regulatory levels (national, regional and interstate), which gradually reduced its weaknesses in terms of security and distributive justice. Then, for the last 30 years, none of the contemporary politics streams that influence agendas or the policy process has managed to reduce these weaknesses of ultra-liberal financial capitalism. Progressive universalism, actually the most influent politics stream in the EU and the USA, and the only one whose focus is (theoretically) fair wealth redistribution and ecological sustainability, unsuccessfully affects the social, ecological and security disaster we are witnessing. As well as main concurrent politics streams which do not encourage the revolution of the system, but the updating of its software, by returning to the foundations of liberalism, focusing on protectionism or on positive identity discrimination. Thus, liberal conservatism focuses on innovation and the free market as social and ecological solutions; identarian nationalism offers economic and environmental policies that protect national interests; while intersectional wokism connects economic and ecological solutions with identity issues. Deep, systemic reforms are not planned, while maximum disorder reigns in the system (civil unrest and armed conflicts). Therefore, today's ultra-liberal financial capitalism risks only entropic death, i.e. falling victim to its own planetary success.

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## ON THE PATH TO CARBON NEUTRALITY: PROBLEMS AND PROSPECTS

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### ABSTRACT

*The energy crisis in the countries of the European Union, which has intensified in recent years, calls into question the achievability of such an ambitious global goal as reducing greenhouse gas emissions. Despite all its importance for future development, the current problem with energy resources does not allow us to maintain the planned pace of reducing greenhouse gas emissions. The authors of the report emphasize the difficulty of achieving this task. Analysis of individual studies allows us to conclude that in fact achieving zero carbon neutrality is impossible either by 2050, or even by 2100! However, this does not mean that this goal should not be strived for.*

**Keywords:** *Carbon neutrality, Climate changes, Green economy, Energy transition*

### 1. INTRODUCTION

In 1972, United Nations Conference on the Human Environment was held, at which the Stockholm Declaration on Problems of the Human Environment was adopted. It established 26 principles to guide the conservation and improvement of the human environment. Global concerns about technological change, as well as environmental disasters and catastrophes in the second half of the XX century, gave the necessary impetus to the movement for sustainable development. At the 1987 General Assembly, the Our Common Future report first defined sustainable development as a manifestation of intergenerational balance: “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. In subsequent years, other important documents were adopted:

- Declaration of United Nations Conference on the Human Environment, known as the Rio Declaration on Environment and Development (1992), Agenda 21 (1992), which established the main international institutional mechanisms for achieving sustainable development;
- Johannesburg Declaration on Sustainable Development (Declaration of the 2002 World Summit on Sustainable Development), which affirmed new views on ways to improve the quality of life;
- Transforming Our World: The 2030 Agenda for Sustainable Development (2015), which is a 15-year plan to achieve the 17 Sustainable Development Goals.

The formulated goals of sustainable development covered three dimensions: economics, social sphere and ecology, although it should be noted that it is the environmental component that comes to the fore. For this reason, some studies highlight levels or areas of sustainable development. The central place (or basic level) of such a hierarchy is occupied by people (health, education, equality, employment, access to housing, water, etc.), and only then human settlements (peace, culture), the economy (welfare, production, economic security, innovation), society (family, effective institutions, social capital), sustaining life (resources, environment), nature (Earth, biodiversity, ecosystems).

Thus, the central element of the concept of sustainable development is the individual, who is embedded in complex systems of relationships. Nature acts as a source of resources. At the same time, it is a source of instability: while contributing to the income of the present, natural resources are depleted, thereby reducing the opportunities of future generations (Ukrainitseva, Ukraintsev, Albekov, 2023e). Climate security issues are becoming increasingly relevant. Particular attention of economic researchers and lawyers is focused on the problem of transition to a low-carbon economy and achieving zero carbon dioxide emissions.

## 2. IS IT POSSIBLE TO ACHIEVE CARBON NEUTRALITY BY 2050?

The most polluted cities in the world are those that host large metallurgical plants: Linfen (China), Bhiwadi (India) with its toxic smog leading to widespread chronic respiratory diseases, Norilsk (Russia), which periodically experiences black snow, and a lot others. Metallurgy (in particular, ferrous) ranks second among industries in terms of the degree of negative impact on the environment. The scale of pollution from waste and emissions here is enormous: soil, water, atmosphere - from rock mining to the production of finished products. It is noted that in 2020, carbon dioxide emissions from the production of steel, aluminum, nickel, copper and cobalt amounted to 4.5 billion tons, which amounted to 13.5% of global emissions of all greenhouse gases (Vovchenko, Andreeva, Dmitrieva et al. 2023f). Greenhouse gas emissions in 2022 are significantly higher than before the COVID-19 pandemic (Figure 1). At the same time, according to experts from the European Commission, the largest emitters among countries are China, the USA, India, Russia and Brazil, and among industries - energy and industry.

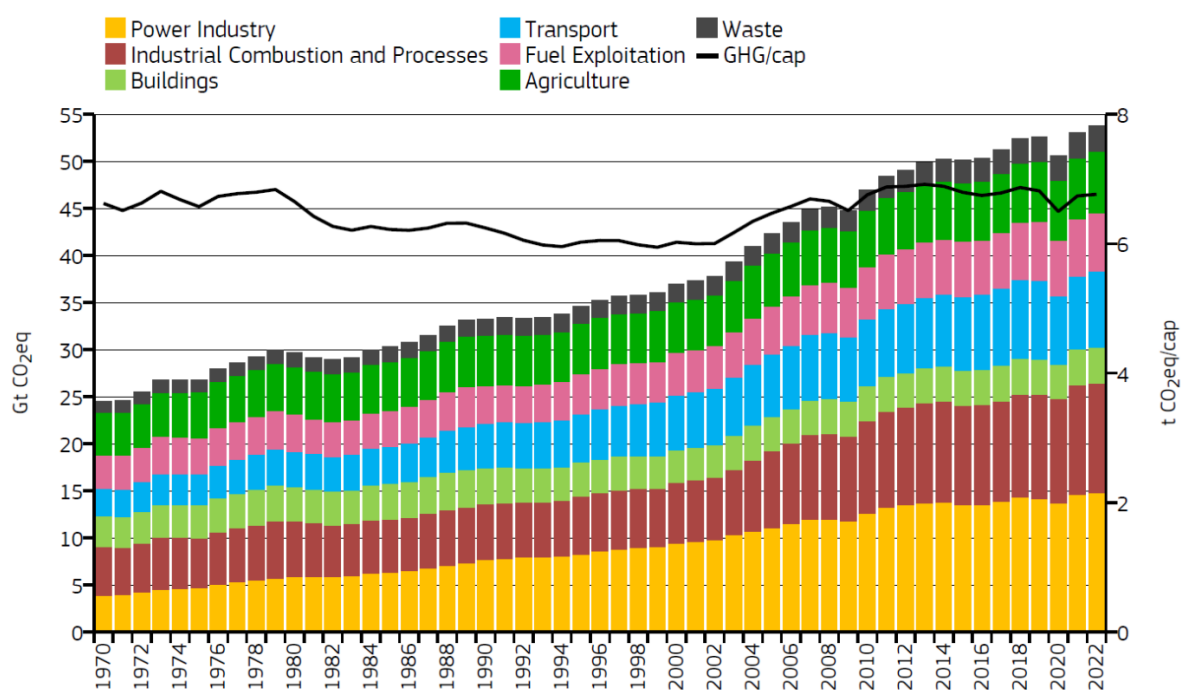


Figure 1: Global GHG emissions by sectors (left axis, bars) and per capita (right axis, black line), 1970-2022.

(Source: Crippa, Guizzardi, Schaaf et al., 2023a))

Note that moving towards carbon neutrality requires replacing solid fossil fuels with natural gas or hydrogen. Having set ambitious emissions reduction targets, developed countries have developed packages of measures aimed at achieving them fully. Thus, for the countries of the European Union, a “Fit for 55” package was developed, including an impressive list of measures aimed at reducing greenhouse gas emissions by 55% by 2030 from 1990 levels.

Here, geopolitical problems and a reduction in supplies of Russian fossil fuels have somewhat changed this the program, however, only towards a more ambitious goal: the reduction of greenhouse gas emissions by 2030 should be 62%! (European Council, 2023b). Interest in hydrogen energy is growing around the world. The largest manufacturing companies (especially metallurgical companies, which produce the largest volumes of emissions) are successfully integrating into the ESG agenda. Most of the industry giants have announced their intention to achieve carbon neutrality by 2050. Among them are the world's largest steel producers China Baowu Group, ArcelorMittal, Nippon Steel, which have developed their own strategies for transitioning to carbon neutrality. Thus, ArcelorMittal invested in an innovative technology for producing hydrogen from water - H2Pro, developed by the Technion Israel Institute of Technology. The advantage of this method is that the resulting hydrogen has a low cost (less than 2 dollars by 2023), which should be less than 1 dollar by 2030. In addition, ArcelorMittal is gradually introducing carbon circular technologies at its plants in the production of Smart Carbon. The need to use hydrogen as the main type of fuel is determined by its environmental friendliness and efficiency (Table 1).

Type of hydrogen	Method of obtaining	Energy source	Presence of harmful emissions	Cost per kg, dollars
Green	Water electrolysis	Power plants	No emissions	2 – 10
Yellow	Water electrolysis	Nuclear power plants	No emissions	min 2
Turquoise	Methane pyrolysis	Chemical industry	No emissions	–
Emerald	Decomposition of biomethane and natural gas using plasma electrolysis	Power plants	No emissions	–
Grey	Steam methane reforming	Chemical industry	Emissions	1 – 2.5
Blue	Steam methane reforming	Chemical industry	Substantial greenhouse gas emissions	1.5 – 2
Brown (brown)	Gasification of brown coal	Chemical industry	Substantial greenhouse gas emissions	2 – 2.5

*Table 1: Classification of hydrogen by color  
(Source: Ukraintseva, Ukraintsev, Albekov, 2023e)*

Several decarbonization strategies can be distinguished, based on different steel production technologies:

- programs to improve the efficiency of blast furnaces and converter furnaces by reducing losses. There are two ways to achieve this goal: firstly, by optimizing the composition of the blast furnace charge by using raw materials with a maximum iron content, which allows the use of less coal as a reducing agent; secondly, by increasing fuel injection through the use of additional reagents (pulverized coal, natural gas, blast furnace gas, plastic, biomass or hydrogen);
- use of biomass (any type of vegetation, agricultural plant waste) as an alternative fuel. McKinsey notes the wide availability of this type of fuel in Russia and South Africa due to the peculiarities of agriculture;
- carbon dioxide capture, burial or reuse (for example, in the chemical industry in the production of ammonia and bioethanol);
- use of electric arc furnaces. They use only high-quality scrap and renewable electricity;



- implementation of programs to increase the efficiency of blast furnaces and converter furnaces through the use of high-quality scrap, direct reduced products and natural gas;
- replacing fossil fuels with hydrogen or renewable energy sources, which should ensure steel production with virtually no harmful emissions, however, is the most expensive technology, as it often involves a complete re-equipment of production.
- The implementation of strategies 1-3, according to experts, leads to a significant reduction in carbon dioxide emissions, while strategies 4-6 should contribute to the complete decarbonization of production.

As experts note, the potential for implementing these strategies depends on many factors, however, achieving carbon neutrality by 2050 looks unlikely (Ukrainitseva, Ukraintsev, Albekov, 2023e):

- according to the authors of the Climate reports Action Tracker (2020) (Climate Action Tracker, 2023) and the International Energy Agency (IEA, 2020) (IEA: Iron and Steel Technology Roadmap: Towards more sustainable steelmaking, 2023d), in order to reduce emissions from ferrous metallurgy to zero by 2050, it is necessary to completely decommission blast furnaces and converter furnaces and switch to electric arc furnaces using high-quality scrap and products of direct reduction of iron, as well as hydrogen, biogas, natural gas as a reducing agent;
- in the report of the International Energy Agency (IEA, 2020) (IEA: Iron and Steel Technology Roadmap: Towards more sustainable steelmaking, 2023d), the process of decarbonization of the ferrous metallurgy (as well as other industries) is delayed over time and is considered on the horizon of 2070;
- in work Xylia, Silveira, Duerinck et al. (2016) indicates that complete decarbonization cannot be achieved by 2100: the use of scrap metal and the transition to new technologies will ensure emissions reduction only after 2050 under any possible industry development scenario. The condition for noticeable changes in emissions should be the introduction of a carbon price at the level of 28-157 dollars per ton of CO<sub>2</sub>-eq. by 2050.

### **3. ACCELERATING THE TRANSITION TO ALTERNATIVE ENERGY SOURCES**

The challenge of achieving carbon neutrality for European countries is greatly aggravated by the fact that, starting in 2022, the European energy system is experiencing an unprecedented crisis. Thus, in 2022, supplies of Russian natural gas, so critical for industry and the production of heat and electricity, were reduced by more than 80% (Zettelmeyer, Tagliapietra, Zachmann et al., 2022a). In May 2022, the European Commission published REPowerEU plan. The plan provides for significant energy savings, diversification of energy sources and promotion of the use of renewable energy sources, the share of which should reach 45% by 2030. This plan has been criticized more than once: firstly, for being unrealistic, in particular with regard to the transition to hydrogen fuel and spending significant public money on large projects for the extraction of fossil fuels in the territory of the European Union, and secondly, for the planned sharp increase in biomethane production, which, according to experts, should create competition in agriculture for the harvest and ultimately threaten to food security. Nuclear power at REPowerEU plan is considered as a secondary source of fuel, often in the context of the dependence of Eastern European countries on Russian nuclear fuel (Siddi, 2022). In the face of sanctions pressure, the energy crisis in Europe and global turbulence, many companies are beginning to reconsider their strategies for transitioning to carbon neutrality. However, the Global report Energy Monitor shows that 57% of the world's steel companies use coal-based BOF blast furnaces, which is 10% less than year before (Feng, Clark, Fralikhina et al, 2023c).

#### 4. CONCLUSION

The transition to hydrogen energy opens up significant prospects for the development of industry and applied sciences, however, having possibly solved the problem of reducing emissions of harmful substances and greenhouse gases into the atmosphere, it will open another one associated with the reduction or cessation of fossil fuel production and, as a result, mass unemployment in this industry and the literal extinction of individual settlements. Notice, that despite given the difficulties in implementing economic decarbonization strategies (it is in fact impossible to achieve targets by 2030 under current conditions of global economic turbulence), it is still necessary to strive for this goal.

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## ANALYSIS OF EMPLOYEE SALARY SATISFACTION IN THE FINANCIAL INDUSTRY IN THE REPUBLIC OF CROATIA

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### ABSTRACT

*Today, more than ever before, different generations of employees are present in the labor market, according to the main characteristics. However, it is harder than ever to find competent employee and even harder to retain them. The subject of this research are the attitudes of employees to the recognition of their work with regard to the amount of their salaries in financial institutions in the Republic of Croatia. The research on attitudes was conducted by an online survey. The responses were processed using the statistical methods "Chi-squared test and "Weight of evidence" based on the answer to the question "I feel valued when I think about my salary". The results of the survey show the levels of satisfaction with the salaries of respondents from the distributions by gender, age, level of education, length of work experience, average net income, the sector in which respondents are employed, the hierarchical structure of management as well as the type, the length of business operation, size and ownership structure of the financial industry in which the respondents are employed, by first showing the group which is most satisfied with the salary and finishing with groups that are least satisfied. The results were interpreted by providing explanation why specific groups were the most or the least satisfied with their salaries.*

**Keywords:** *employee salary satisfaction, financial industry, the Republic of Croatia, Weight of Evidence method*

### 1. INTRODUCTION

There is a common consensus that there is a positive link between a motivated employee and his successful performance in the workplace. In view of this logical thinking, „compensatory models are of great importance for the organization's ability to attract, retain and motivate highly qualified employees, who, as a result, achieve great job performance and carry out demanding tasks. Short-term incentives, based on an individual's business activity/ability, may have a highly positive impact on expanding an organization's business operation “(Lazear & Oyer, 2009). Various factors from the micro and macro environment affect the approach and the functioning of an organization's management (Rakić & Santrač, 2020). The fact that the reward is one of the strongest motivational factors leading to the desired behavior of employees was established by Herzberg and his associates in their research conducted as early as in 1957. In their research conducted in 2018, Kuvaas and his associates found a positive correlation between reward, results achieved and motivation (Kuvaas et al, 2018).

Contrary to the above mentioned authors, Williams (2018) in his research finds that high incentives are a reflection of a higher demand rather than the role of a manager. One of the biggest advantages of incentives at work is increased motivation and more profitable business operation. In their book, Ryan and Deci (2017) discuss two sources of motivation that have been studied in the last century, the first being motivation derived from need and the second cognitive motivation (from process). Theories of motivation which derives from need originate from Maslow, Alderfer, and McClelland who focus on internal factors by means of which they explain an individual's behavior. Contrary to this, cognitive motivation, such as Vroom's expectancy theory, makes people themselves responsible for their decisions. Subsequently, in their book, Ryan and Deci criticize the fact that regardless of the approach to motivation, each has the purpose of controlling human behavior rather than understanding and describing it. Ryan (professor of psychology) and Deci (professor of social sciences) see motivation as self-determination. They advocate the argument that it is the strength of self-determination for an individual activity that accounts for the quality and persistence of the individual's performance of an activity. This is in turn reflected in the will of the individual and the degree of self-determination they are experiencing at a particular moment (Ryan and Deci, 2017). One of the issues that all economies are facing nowadays, particularly after Covid, is an insufficient number of motivated employees in the labor market. Employees are no longer willing to work in "any" conditions, because for them only "the sky is the limit", and they are willing to move to distant countries together with their families if working conditions are more favorable. An employee far more values himself, realizes that he is in a superior position in relation to countries with a demographic deficit of people and workforce, and thus raise the bar in the labor market. This issue of insufficient appreciation of employees' work, specific to financial institutions in the Republic of Croatia (where the survey was conducted) will be studied in more detail in this paper in the form of employee salary satisfaction.

## **2. THEORETICAL OVERVIEW**

The topic of motivating employees with a salary, was recently studied in the banking sector in Serbia by the author Marinović Matović et al., in 2021, where the difference between managers with short-term incentives depending on the hierarchy and age was found. The sample consisted of 26 banks, of which the questionnaire was filled out by 93 managers, and the data was processed and hypotheses tested by multivariate analysis of variance. The result of the research is that incentives motivate all managers without significant differences in short-term manager incentives in relation to the hierarchical structure, but there is a big difference when considering employees' age. Namely, older managers are much more affected by short-term incentives than younger ones. Such research contributes to the better modulation of stimulating compensatory packages for employees in relation to their age and preferences, and the authors believe that the research is limited by sample size but still provides quality qualitative analysis and conclusions (Marinović Matović and Associates, 2021). Furthermore, an interesting study was carried out in 2013 in eastern India, on a sample of 1504 managers from different organizations. The data was collected by an intrinsic motivation questionnaire. Partial least square path model (PLS PM) was used for hypotheses testing when constructing predictive models which contain a lot of collinear factors that create a highly flexible environment for studying multiple block structures of observed variables through the interconnection of latent variables. The result of this research is that leadership, as one of the functions of managers, proved to be the most influential when it comes to motivation at work, more precisely, intrinsic motivation. In addition to that, top managers suggest a strong initiative to improve a manager's abilities as a leader because it is crucial for improving employee intrinsic motivation as well as employee satisfaction. Interestingly, salary and overall well-being in this research have no effect on intrinsic motivation, nor the values of the organization, but they do affect industrial relations.

(Talukdar, 2013) One of the limits of this research is that the questionnaire uses the Likert scale with 4 answers in order to avoid a neutral response in most employees. The two mentioned studies, being distinguished ones in this area in the last decade, when compared, they emphasize the cultural difference that plays an important role in research outcomes. A more similar culture leads to more similar conclusions than does the Indian-Eastern culture, where completely different priorities of employees and their satisfaction in the workplace are visible. In addition to the fact that two completely different statistical methods were used in these two studies, the sample size is also incomparable, so we conclude that both studies make a valuable contribution to science in their own way with certain limitations mentioned earlier. Intrinsic motivation is defined as the activation of an individual's targeted behavior due to internal factors (Deci & Ryan, 1985). Employee job satisfaction is defined as the enjoyment employees experience in the workplace (Brown & Huning, 2011). Intrinsic components of motivation refer to job satisfaction factors such as the nature of work, success, responsibility, salary, safety, as well as working conditions and connection with colleagues (Saleh & Hyde, 1969). All the mentioned theories indicate a positive connection between job satisfaction and intrinsic motivation. Organizational culture is significantly and positively associated with adequate leadership and job satisfaction, and adequate leadership is heavily influenced, and is positively associated with job satisfaction (Tsai, 2011). In his research, Pinto (2011) found that salaries in companies do not significantly affect employee motivation and satisfaction. Such research makes one think that salary and benefits do not have such great significance or influence in encouraging intrinsic motivation in employees. Nevertheless, in the real world, it seems that organizations pay great attention to these components in order to both motivate employees to have better connection with the company and improve their business operation.

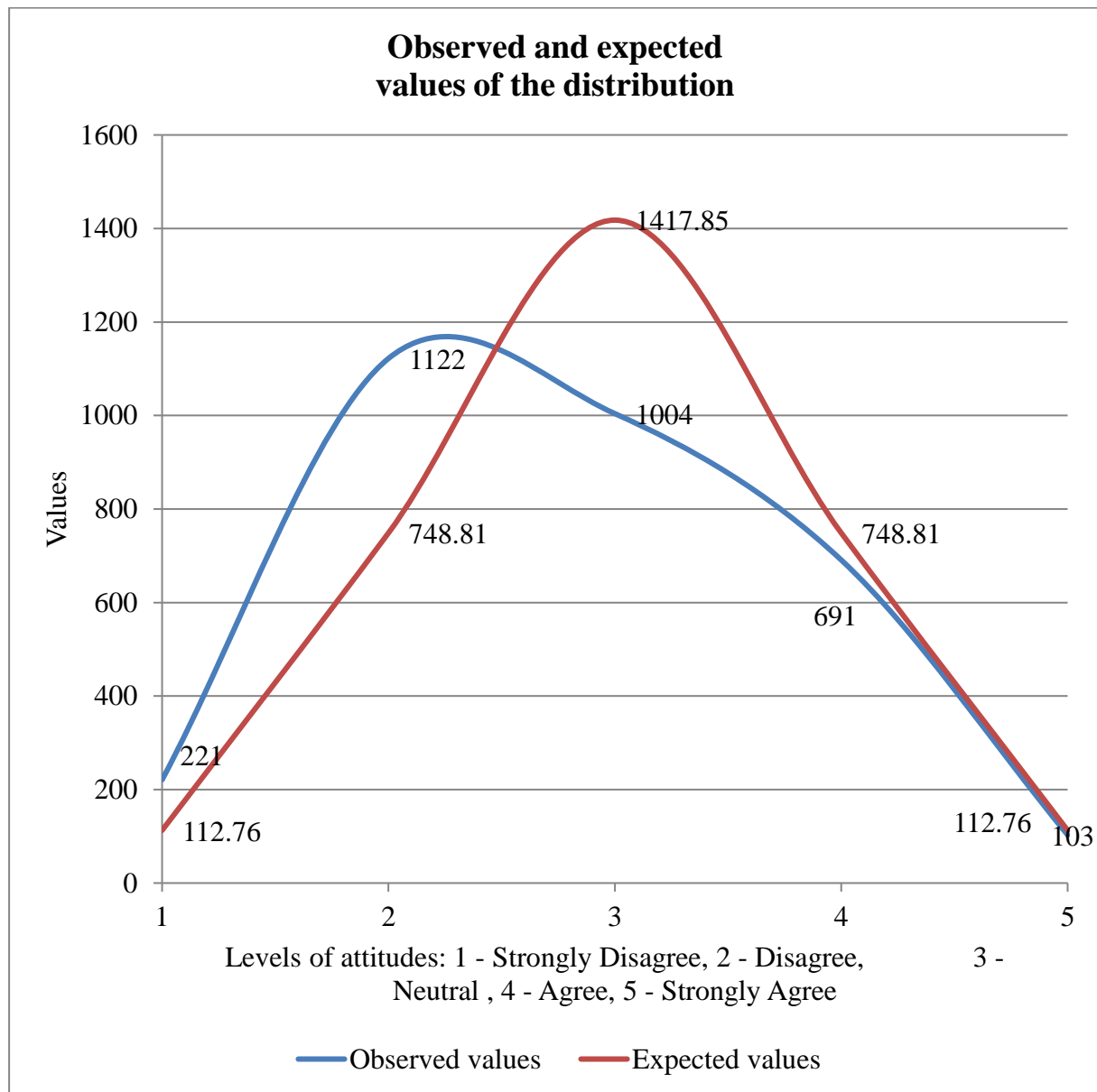
### **3. EMPIRICAL RESEARCH**

Empirical research comprises two units. The first unit presents the results of hypothesis testing and the second unit describes and interprets the level of satisfaction of all groups of subjects in all observed distributions.

#### **3.1. Hypothesis testing**

H Hypothesis: "Employees in the financial industry feel valued when they think about their salary" was tested based on subjects' responses to the survey question: "I feel valued when I think about my salary." The test was conducted in two steps. In the first, the so-called normality of the observed distribution was tested. The existence of a statistical difference between the observed and expected distribution, assuming that the expected distribution is normal, i.e. Gauss's, is a necessary condition for conducting the second step of the test. If this difference is not statistically significant, it would mean that the respondents' responses were distributed in accordance with the distribution most often expected in social phenomena, i.e. around the arithmetic mean. This would mean in this survey that most respondents would respond with the offered answer: "I both agree and disagree. This fact would suggest that the alternative form of hypothesis, in which the hypothesis of this research is formulated, should directly be considered unequivocally rejected because the observed distribution does not differ from that expected in social studies. Graph1 shows the values of the observed and expected distribution. The values of the expected distributions are calculated according to Papić's formula (Papić, 2014, p. 237). Table 1 shows the values of the normality test in the study of the observed distribution. Based on the value of  $\Sigma HI^2 = 415.98$ , it is concluded that the observed distribution differs statistically significantly from the expected distribution because the value of  $\Sigma HI^2$  is higher than the limit value of 13.28 for the selected level of significance  $\alpha = 0.01$  and the degree of freedom = 4 because the respondents in the responses were offered five levels of agreement with the investigated assumption.

The same conclusion is drawn on the basis of the value of the "p value" statistical parameter, which is significantly lower than the selected level of significance  $\alpha = 0.01$  in this study.



*Graph 1: Observed and expected values of distribution of answers to the question:  
"I feel valued when thinking about my salary"  
(Source: Research and processing by authors)*

Because the necessary condition for the existence of a statistical difference between the observed and expected distribution of responses is satisfied, in the second step of the test, the conclusion about the validity of the hypothesis was derived on the basis of the value of the statistical parameter "Mean" = 2.79. This value indicates that among the answers there are more answers "Strongly disagree" and "Disagree" than "Agree" and "Strongly agree". Based on this, it can be concluded, the H1 Hypothesis: "Employees in the financial industry feel valued when they think about their salary" to be rejected. This means that most employees in the financial industry in Croatia, when thinking about salary, have the feeling that they are not appreciated.

Levels of agreement Variables	Strongly disagree	Disagree	Neutral	Strongly agree	Strongly agree	Total
Observed (empirical) values ( $f_e$ )	221	1122	1004	691	103	3141
Formulae for calculating expected values ( $f_t$ )	Total x 0.0359	Total x 0.2384	Total x 0.4514	Total x 0.2384	Total x 0.0359	
Expected (theoretical) values ( $f_t$ )	112.76	748.81	1417.85	748.81	112.76	3141
Differences between observed and expected values	108.24	373.19	-413.85	-57.81	-9.76	
Squared difference values ( $f_e - f_t$ ) <sup>2</sup>	11715.49	139267.49	171269.67	3342.50	95.29	
CHI squared values ( $f_e - f_t$ ) <sup>2</sup> / $f_t$	103.90	185.98	120.80	4.46	0.85	<b>415.98</b>
Significance value	1%	Mean	<b>2.79</b>	p value	<b>9.78 E-89</b>	
Degree of freedom	4	Due to $\Sigma$ CHI square > Critical value → observed and expected values			<b>DIFFERS</b>	
Critical value	<b>13.28</b>	Due to Mean < 3 → alternative hypothesis to be			<b>REJECTED</b>	

Table 1: Results of normality testing of observed distribution of answers to the question:  
"I feel valued when considering my salary"  
(Source: Research and processing by authors)

### 3.2. Analysis of differences in respondents' attitudes to feelings of appreciation when thinking about their salaries

Even though the H hypothesis should be considered rejected, it is an undeniable fact that there are groups of respondents who, when thinking about their salaries, have the feeling that they are valued. The following tables show the values of the statistical "Weight of evidence" parameters for each represented value within all distributions of respondents according to independent research variables. The negative values of this statistical parameter are shown by groups of respondents who, when thinking about their salaries, have a feeling that they are valued, whereas positive values are shown by groups whose feeling is that they are not valued when they think about their salaries. In the tables, the values are sorted in ascending order, from the group that has the most pronounced feeling that they are valued when they think about salary to groups where this feeling is less pronounced. In the group that has the highest positive value of the statistical "Weight of evidence" parameter, the most respondents feel that they are not valued when it comes to salary.



Values	Gender
-0.0836	Male
0.0676	Female

*Table 2: Values of the strength of the sense of appreciation in respondents when considering salary by gender of respondents*  
(Source: Research and processing by authors)

Table 2 shows the values of the strength of the sense of appreciation in respondents when thinking about salary by gender of respondents. Male respondents, although the strength is poorly expressed, find that they are valued when thinking about salary, whereas female respondents feel the opposite. The explanation for such a statistical result the authors see in the fact that women are generally considered undervalued in the labor market, which is also reflected in their salaries. Table 3 shows the values for the strength of the sense of appreciation in respondents when thinking about salary by age of respondents. All groups of respondents, except for those aged 41-56, i.e. Gen X members, find themselves valued when considering salary. The authors see the explanation of such results in the fact that X Generation has been the longest in the labor market, thus having the most experience and believes that their salary does not reflect their abilities or value as employees in the organization.

Values	Age
-0.5845	18-24 (Z generation )
-0.3408	57-75 (baby boomers)
-0.1226	25-40 (Y generation Y)
0.7497	41-56 (X generation X)

*Table 3: Values of the strength of the sense of appreciation in respondents when considering salary by age of respondents*  
(Source: Research and processing by authors)

Table 4 shows the values of the strength of the sense of appreciation in respondents when thinking about salary by their qualifications. All groups of respondents, except for those who have completed primary school, believe that they are not appreciated when considering salary. The explanation for such data is logical, given that it is a well-known fact that in the Republic of Croatia average salaries are rather low and that there are many educated people who work and expect higher salaries than they receive, and believe that given inflation and high standard of living, salaries have not been adapted to the standard of living in their country.

Values	Qualifications
-0.1000	1 <sup>st</sup> level of education – completed primary school
0.2113	4 <sup>th</sup> level of education – completed 3-year high school program, completed 4-year high school program
0.5718	8 <sup>th</sup> level of education - completed postgraduate study: Master's Degree, Doctoral Degree
0.7278	6 <sup>th</sup> level of education - completed undergraduate study and vocational study (180-240 ECTS credits)
1.3423	7 <sup>th</sup> level of education - completed university graduate and specialist graduate professional study (at least 300 ECTS credits) and completed postgraduate specialist studies (60-120 ECTS credits)
1.4796	5 <sup>th</sup> level of education - completed after high school training program, completed vocational study (120-180 ECTS credits)

*Table 4: Values of the strength of the sense of appreciation in respondents when considering salary by qualifications of respondents*  
(Source: Research and processing by authors)

Table 5 shows the values of the strength of the sense of appreciation in respondents when thinking about their salaries by type of financial institution. All groups of respondents, apart from those employed in banks, feel they are valued when thinking about their salaries. The explanation of such devastating data for the banking sector is, according to the authors, the consequence of the fact that banks are (most often) privatized and foreign owners are not that interested in employees but rather in the profitability of the operation of the branch and return of the profit to the parent company (abroad). Since there is a monopoly of foreign banks in the Croatian banking market, people do not have much choice in the financial market when it comes to products offered by the banking sector thus putting the banks in a privileged position where they exploit their employees as well as all the Croatian people.

Values	Type of financial institution
-0.5448	Leasing company
-0.4109	Retirement fund company
-0.1488	Insurance company
0.2942	Bank

*Table 4: Values of the strength of the sense of appreciation in respondents when considering salary by type of financial institution  
(Source: Research and processing by authors)*

Table 6 shows the values of the strength of the sense of appreciation in respondents when thinking about their salaries by business sector in which they are employed. Only those employed in sectors "Administration/Back office", "Claims" and "Marketing" think they are not valued when they think about their salaries. According to the authors, the explanation of these statistical results lies in the unfavorable position of the employees who work in the back office and marketing. Given the fact that in most financial institutions most employees work in the back office, it involves a huge number of employees or the majority which in addition has a negative effect on public perception that employees in financial institutions are satisfied with both salaries and working conditions.

Values	Business sector of the work place
-1.7770	HR
-1.0838	Management
-0.5730	Board of directors
-0.4791	Sales
-0.4597	IT
-0.4192	Finance
-0.3907	Risk management
-0.3602	Accounting
-0.1000	Procurement
-0.1000	Vault
0.4040	Back office/Administration
0.5902	Claims Department
2.2386	Marketing

*Table 5: Values of the strength of the sense of appreciation in respondents when considering salary by business sector in which they are employed  
(Source: Research and processing by authors)*

Table 7 shows the values of the strength of the sense of appreciation in respondents when thinking about their salaries by the total work experience of employees in the financial industry.

Only those employees who have been employed in the financial industry for less than five years feel they are valued when thinking about their salaries. Such devastating statistical situation indicates that most employees in financial institutions are satisfied for only a short period of time. It can be concluded that majority expects promotion after having worked for a few years, but don't get it but rather face salary stagnation and non-promotion, which is then reflected in their general dissatisfaction in the workplace.

Values	Total work experience in the financial industry
-0.9407	0 - 1 year
-0.5683	2 - 5 years
0.0148	6 - 10 years
0.0269	16 - 40 years
0.1515	11 - 15 years

*Table 6: Values of the strength of the sense of appreciation in respondents when considering salary by total work experience of respondents in the financial industry  
(Source: Research and processing by authors)*

Table 8 shows the values of the strength of the sense of appreciation in respondents when thinking about their salaries according to the respondents' monthly net income. Only those whose net income is lower than EUR 800 believe they are valued when thinking about their salaries. The explanation of these results is related to the assumption that those with the lowest income and qualifications such as the completion of the lowest level of education realistically do not expect any major salary increases thus feeling valued when thinking about their salaries.

Values	Monthly net income in euros
-0.5505	1600.00 +
-0.5242	0.00 - 400.00
-0.4847	401.00 - 800.00
0.0126	801.00 - 1200.00
0.3503	1201.00 - 1600.00

*Table 7: Values of the strength of the sense of appreciation in respondents when considering salary by their monthly net income  
(Source: Research and processing by authors)*

Table 9 shows the values of the strength of the sense of appreciation in respondents when thinking about their salaries according to the size of financial institution. Those employed in large companies, believe they are valued when thinking about their salaries even though their feelings of being valued are rather weak.

Authors see the explanation of this weak but still existing result in the fact that employees of large institutions have room to develop and grow more than in smaller institutions and therefore have a better opinion on their salaries.

Values	Size of financial institutions
-0.0382	Large companies (> 250 employees)
0.0901	Medium sized company (51 - 250 employees)

*Table 9: Values of the strength of the sense of appreciation in respondents when considering salary by the size of financial institution  
(Source: Research and processing by authors)*

Table 10 shows the values of the strength of the sense of appreciation in respondents when thinking about their salaries by the ownership structure of the financial institution. All the respondents feel that they are not appreciated when they think about their salaries. The feeling of not being valued enough is the strongest in respondents who are employed in a financial institution where the ownership structure is "Private company in full domestic ownership". The most pronounced feeling of not being valued when considering salary is found in respondents who are employed in a financial institution where the ownership structure is "A company in full state ownership. The explanation is simple according to the authors. In the Republic of Croatia there is a general dissatisfaction of employees in all financial institutions regardless of the ownership structure (as the figures above indicate, the differences are very small, all in the domain of the rank of dissatisfaction, because there is a monopoly on the market in which the employee has little bargaining power. Due to such an unfavorable market situation, every year, an increasing outflow of labor to countries that offer better business and living conditions to people/employees is recorded in Croatia every year.

Values	Ownership structure of the financial institution
0.3365	Private company in full domestic ownership
0.6363	Private company with the majority within domestic ownership
0.6483	Company with the majority under the state ownership
0.7514	Private company in full foreign ownership
1.2686	Private company with the majority within foreign ownership
2.7144	Company in full state ownership

*Table 10: Values of the strength of the sense of appreciation in respondents when considering salary by ownership structure of the financial institution  
(Source: Research and processing by authors)*

Table 11 shows the values of the strength of the sense of appreciation in respondents when thinking about salary according to the hierarchical position of respondents. Only respondents who do not have managerial authority feel that they are not appreciated when considering salary. According to the authors, the explanation of these statistical results is logical and typically "Croatian". Managers pursue their own interest and short-term gains "because they know that they will not hold this position forever". The owner does not have time to deal with it either or he is also "only interested in taking as much of the cake as possible for himself" and an ordinary employee, without managerial authority, the one that makes the daily functioning of the company possible, is in the last place and for him "nothing remains", which is reflected in this survey.

Values	Position within the hierarchical structure
-1.0838	Board of directors/Administration
-0.8928	Middle management
-0.7091	Higher management
-0.4075	Lower management
0.1524	Employee with no managerial authority

*Table 8: Values of the strength of the sense of appreciation in respondents by hierarchical position of respondents  
(Source: Research and processing by authors)*

#### 4. CONCLUSION

This paper discusses the insufficient appreciation of work of employees which is reflected in the amounts of salaries of employees in financial institutions in the Republic of Croatia. Employees' attitudes to their satisfaction with salary amounts are described and interpreted and conclusions are drawn. The differences in attitudes to salary satisfaction are described by the values of the Weight of Evidence variable within the distributions according to independent research variables; gender, age, level of education, length of service, average net income, the sector in which the respondents are employed, the hierarchical structure of management and the type, length of business operation, size and ownership structure of the financial industry in which the respondents are employed. Descriptions and interpretations of salary satisfaction of individual groups of employees represent the scientific contribution of this paper. These results could, and should be used by the boards of directors of financial institutions of the Republic of Croatia to formulate appropriate salary policies because dissatisfied employees do not achieve the goals at the required level of quality. The aforementioned conclusions are relevant as they are derived on the basis of a large sample of respondents.

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## COMPARATIVE ANALYSIS OF ACCIDENTS AT WORK IN SLOVENIA AND SERBIA

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### ABSTRACT

*Accidents at work can result in injuries, disabilities, or even fatalities, profoundly impacting the lives of workers and their families, and having a serious economic impact in terms of productivity loss, increased insurance costs, and potential legal liabilities. Addressing workplace accidents is crucial for protecting workers' health and safety, ensuring economic stability, meeting legislative requirements, reducing the burden on social systems, enhancing the quality of work life, improving international competitiveness, and contributing to sustainable development. Thus, this paper presents a comprehensive comparative analysis of workplace accidents in Slovenia and Serbia, aiming to identify key patterns, underlying causes, and potential prevention strategies. The study analyzes data from the Eurostat database and national occupational safety and health databases covering the period 2019-2021. The research highlights significant differences in the incidence, nature, and severity of workplace accidents in Slovenia and Serbia. The study reveals that Slovenia has a higher rate of severe accidents, as well as a higher frequency of minor incidents. The findings underscore the importance of cross-national studies in understanding and mitigating occupational hazards, thereby contributing to the broader discourse on workplace safety in the European context.*

**Keywords:** *accidents at work, comparative analysis, Slovenia, Serbia*

### 1. INTRODUCTION

Occupational health and safety (OHS) represents a principal aspect of workforce welfare and economic stability in both developed and developing countries. Analysis of accidents at work is important to identify the most common causes that lead to workplace accidents and to consider actions to prevent the negative consequences of unfavorable working conditions. This paper focuses on a comparative analysis of accidents at work in Slovenia and Serbia, two geographically proximate yet distinct European nations. The aim is to determine patterns, frequencies, and characteristics of workplace accidents within these countries, and to understand how socio-economic, legislative, and cultural factors influence occupational safety.

Slovenia, a member of the European Union (EU), has a diverse industrial sector and adheres to strict EU regulations pertaining to worker safety and health standards. In contrast, Serbia, while aspiring for EU membership, operates under different regulatory frameworks, with a distinct economic landscape. This comparative study is vital, as it sheds light on how varying regulatory environments and economic structures influence workplace safety. The analysis is grounded in a comprehensive review of available data, including statistical reports, and research findings from both governmental and non-governmental organizations. This approach ensures a holistic understanding of the phenomena, encompassing both quantitative and qualitative dimensions. The methodology involves cross-national comparisons of accident rates, types of injuries, days lost, and preventive measures. This paper seeks to contribute to the broader discourse on OHS in the European context. By examining Slovenia and Serbia, the study offers insights into the effectiveness of different OHS policies and practices, potentially guiding future legislative and organizational strategies to mitigate workplace accidents. Furthermore, it provides a valuable perspective for EU policymakers, especially in the context of EU expansion and the harmonization of safety standards across member and candidate countries. Ultimately, this comparative analysis aims to underline the importance of robust safety protocols, effective monitoring systems, and ongoing education and training in reducing workplace accidents, thereby enhancing the well-being of workers and the productivity of economies in Slovenia, Serbia, and beyond. To fulfil the set objective, the paper is divided into several sections. After the introduction, the theoretical background and literature review are presented, followed by the data and methodology section, discussion section, and conclusion.

## **2. THE IMPORTANCE OF OCCUPATIONAL HEALTH AND SAFETY**

OHS is a crucial discipline concerned with the safety, health, and welfare of workers. Its significance is multi-layered, impacting individuals, organizations, and society as a whole in various aspects. At the level of workers, OHS aims to prevent accidents and health issues that can arise from work activities. This includes physical injuries, as well as diseases caused by exposure to hazardous materials, poor ergonomics, or stressful work environments. Beyond preventing harm, OHS also focuses on promoting overall well-being, ensuring that workers are not only safe but also healthy, both physically and mentally, in their work environment. When the level of organizations is addressed, several aspects need to be taken into account: human, legal, and economic. Namely, organizations prioritizing health and safety are often viewed as better places to work. This can enhance employee morale and aid in retaining skilled workers. Also, organizations known for strong OHS practices are likely to enjoy a better reputation, which can be beneficial in attracting talent, customers, and investors. Legal and regulatory compliance is very important, as various national and international laws and guidelines mandate certain standards of OHS. Compliance is not only a legal obligation, but also a moral and ethical one, reflecting an organization's commitment to its workforce. Non-compliance can lead to legal actions, fines, and sanctions, which can be costly for organizations both financially and in terms of reputation. Moreover, in terms of economic implications, workplace accidents can lead to significant costs for an organization, including medical expenses, compensation, and potential litigation costs. Effective OHS practices can reduce these expenses. Besides, accidents and diseases result in absenteeism and can decrease productivity. A safe and healthy work environment helps ensure that employees can work efficiently and effectively. Continuous focus on OHS often leads to innovative solutions for improving workplace safety, which can be adopted across industries. Finally, OHS has a significant societal impact. Safe work environments contribute to a better quality of life for employees, as they are less likely to suffer from work-related injuries and diseases. By preventing injuries and diseases, good OHS practices can reduce the burden on public healthcare systems. A strong OHS framework provides a basis for continuous improvement in workplace practices and processes.



In summary, OHS is essential for protecting workers, ensuring legal compliance, minimizing economic losses, benefiting society, improving organizational culture, and fostering innovation. Its role is indispensable in creating sustainable and productive work environments.

### **3. GLOBAL TRENDS IN OCCUPATIONAL ACCIDENTS**

According to the International Labor Organization (ILO) (2023), there are approximately 340 million occupational accidents and 160 million victims of work-related illnesses annually worldwide. This staggering number indicates a persistent and significant issue in workplace safety across different sectors and regions. Work-related deaths have shown a declining trend, with a 14% decrease in work-related deaths per population from 2000 to 2016 (ILO, 2021). This decline suggests improvements in workplace health and safety practices globally. However, it is important to note that deaths from heart disease and stroke, associated with long working hours, have risen by 41% and 19% respectively, indicating emerging health concerns related to occupational environments (ILO, 2021). In the United States (US), specifically in the private industry, there are about 2.6 million non-fatal workplace accidents and injuries each year, where common injuries including sprains, strains, and tears account for 266,530 such injuries in 2020 (Boskamp, 2023). The Bureau of Labor Statistics reported that in 2022, there were 2.8 million non-fatal injuries and illnesses in private industry in the US, marking a 7.5% increase from 2021 (NSC, 2023a). This rise in non-fatal injuries and illnesses, including a 4.5% increase in injuries alone, suggests that while fatal accidents may be decreasing, non-fatal incidents remain a significant concern. In 2021, the EU experienced 3,347 fatal accidents at work, slightly decreasing by 11 deaths compared to the previous year, whereas over a fifth (22.5%) of all fatal workplace accidents occurred in the construction sector (Eurostat, 2023a). Additionally, according to the Eurostat (2023a) statistics, there were approximately 2.88 million non-fatal work-related accidents that resulted in at least four calendar days of absence from work. The incidence rate for non-fatal accidents was 1,516 per 100,000 persons employed across the EU. This rate varied widely, with the highest in Denmark and France, and notably lower rates in Romania and Bulgaria, possibly indicating under-reporting. The number of non-fatal accidents involving men increased, with over two-thirds (68.3%) of these accidents involving male workers, reflecting the gender distribution in higher-risk sectors like mining, manufacturing, and construction. According to the research conducted by EU-OSHA (2017), it has been reported that the global costs of work-related accidents and illnesses are EUR 2,680 billion, which is 3.9% of global GDP, while the European cost is EUR 476 billion, which, at 3.3% of European GDP, is proportionally below the global average. The split of the costs between fatal and non-fatal cases globally and in the EU-28 is almost the same: each category accounts for approximately half of the total costs. According to the NSC (2023b) estimates, the total cost of work injuries in the US in 2021 was \$167 billion, encompassing wage and productivity losses of \$47.4 billion, medical expenses of \$36.6 billion, and administrative expenses of \$57.5 billion, as well as the employers' uninsured costs of \$13.8 billion (value of the time lost by those who are directly or indirectly involved in injuries; the cost of time for investigating injuries, write up injury reports, etc.), damage to motor vehicles in work-related injuries of \$5.4 billion, and fire losses of \$6.3 billion. The NSC estimated that the cost per worker in 2021 was \$1,080, the cost per medically consulted injury was \$42,000, and the cost per death was \$1,340,000. These statistics highlight the ongoing challenges in OHS across the EU and the world, with significant variations among countries. Also, they emphasized the significant economic implications of the accidents, encompassing direct costs like medical care and rehabilitation, as well as indirect costs such as lost workdays and decreased productivity. Understanding these trends is crucial for developing targeted strategies to enhance workplace safety, reduce the incidence of both fatal and non-fatal accidents, and finally reduce the economic burden on individuals, organizations, economies, and societies.

#### 4. METHODOLOGY AND DATA

This study relies on the European Statistics on Accidents at Work (ESAW). The ESAW project, initiated in 1990 under the Framework Directive (89/391/EEC), aims to standardize data collection on workplace accidents across the EU (EC, 2013). According to ESAW, an accident at work is a distinct event in the course of work leading to physical or mental injury. Fatal accidents are those resulting in the death of the worker within a year, while non-fatal accidents, sometimes referred to as "serious accidents", cause at least four full calendar days of absence from work (EC, 2013). These non-fatal incidents, though not resulting in death, can still have profound impacts, including substantial loss of working days, enduring distress for the affected workers and their families, lifelong disabilities, forced career changes, or premature exit from the workforce. In Serbia, OHS is under the responsibility of the Ministry of Labor, Employment, Veteran, and Social Affairs of the Republic of Serbia. The administrative body within this Ministry, particularly the Occupational Safety and Health Directorate (OSHD), is responsible among other things for preparing legislation and producing annual reports about its work containing data about the accidents at work. Since 2019, workplace accidents in Serbia have been analyzed according to a new methodology that is aligned with the ESAW methodology. This methodology allows the comparison of data from member countries and the analysis of workplace accidents for OHS improvement within the EU member states. Access to a unified database not only provides an overview of comparable data on workplace accidents but also enables the monitoring of trends in the OHS field, thereby facilitating the implementation of adequate preventive measures to prevent accidents. This paper analyses data from the Eurostat database on fatal and non-fatal workplace accidents in Slovenia and other EU-27 countries, covering the period 2019-2021, as well as the data for Serbia from the national statistics.

#### 5. DISCUSSION

The evidence shows that there were 2.88 million non-fatal accidents that resulted in at least four calendar days of absence from work and 3,347 fatal accidents in the EU in 2021, a ratio of approximately 860 non-fatal accidents for every fatal accident (Eurostat, 2023a). The number of fatal accidents at work has been reduced in 2021, compared to 2019, and 2020. The average number of fatal accidents has also reduced in the analyzed period resulting in 24 fewer injured workers in 2021 compared to 2019. What is evident from Table 1 is that 9 countries exhibited an increase in the number of fatal accidents: Denmark, Germany, Spain, Italy, Latvia, Lithuania, Malta, Poland, and Sweden, whereas the number of accidents decreased in all other EU countries. In both Slovenia and Serbia, the number of fatal accidents decreased in the analyzed period, whereas the ratio of non-fatal accidents for every fatal accident was 1,014 for Slovenia and 107 for Serbia in 2021. The number of non-fatal accidents at work has been reduced in 2021, compared to 2019, although the number of accidents increased compared to 2020, probably due to the recovery of the activities after COVID-19. The average number of non-fatal accidents has been also reduced in the analyzed period resulting in 18,174 fewer injured workers in 2021 compared to 2019. What is evident from Table 1 is that 6 countries exhibited an increase in the number of non-fatal accidents: Denmark, Ireland, Latvia, Slovenia, Sweden, and Serbia, whereas the number of accidents decreased in all other EU countries.

*Table following on the next page*

Country	Fatal Accidents			Change 2019-2021	Non-fatal Accidents			Change 2019-2021
	2019	2020	2021		2019	2020	2021	
EU27 total	3,408	3,358	3,347	-61	3,140,950	2,735,566	2,886,507	-254,443
Belgium	52	54	47	-5	68,741	56,477	62,038	-6,703
Bulgaria	85	88	70	-15	2,162	1,820	1,953	-209
Czechia	95	108	88	-7	42,321	34,963	36,704	-5,617
Denmark	39	39	43	4	50,179	74,471	85,309	35,130
Germany	416	371	435	19	867,533	766,192	810,127	-57,406
Estonia	15	10	13	-2	6,180	5,222	5,478	-702
Ireland	41	41	34	-7	13,252	12,073	16,505	3,253
Greece	35	33	22	-13	5,127	3,964	4,476	-651
Spain	347	392	376	29	489,643	388,474	457,435	-32,208
France	803	541	674	-129	778,820	623,654	655,024	-123,796
Croatia	43	45	35	-8	10,373	8,566	9,697	-676
Italy	491	776	601	110	289,283	323,683	272,787	-16,496
Cyprus	10	16	5	-5	2,158	1,511	1,428	-730
Latvia	29	22	38	9	2,245	1,994	2,272	27
Lithuania	37	38	49	12	4,666	3,812	4,483	-183
Luxembourg	12	7	7	-5	7,270	5,995	6,474	-796
Hungary	84	64	82	-2	23,802	24,210	23,518	-284
Malta	3	8	9	6	2,202	1,549	1,587	-615
Netherlands	37	23	25	-12	92,838	76,857	82,420	-10,418
Austria	106	85	105	-1	60,909	51,031	55,490	-5,419
Poland	184	190	220	36	81,302	62,148	67,929	-13,373
Portugal	104	131	93	-11	131,717	108,772	113,976	-17,741
Romania	227	179	172	-55	4,709	3,956	2,779	-1,930
Slovenia	15	17	14	-1	13,065	16,872	14,197	1,132
Slovakia	33	32	32	-1	9,666	7,857	8,050	-1,616
Finland	29	24	19	-10	40,103	29,584	36,994	-3,109
Sweden	36	24	39	3	40,684	39,858	47,378	6,694
Serbia	14	11	12	-2	1,233	1,226	1,289	56
EU27 average	126	124	124	-2	224,354	195,398	206,179	-18,174

Table 1: Accidents at work by NACE Rev. 2 activity in the EU countries and Serbia  
(Source: Authors based on Eurostat (2023b, 2023c) and OSHD (2020, 2021, 2022))



Figure 1: The number of non-fatal accidents at work in 2021  
(Source: Authors)

Based on Figures 1 and 2 it is evident that both countries exhibited a smaller number of fatal and non-fatal injuries compared to the EU27 average. Additionally, Serbia has a smaller number of both fatal and non-fatal injuries compared to Slovenia.

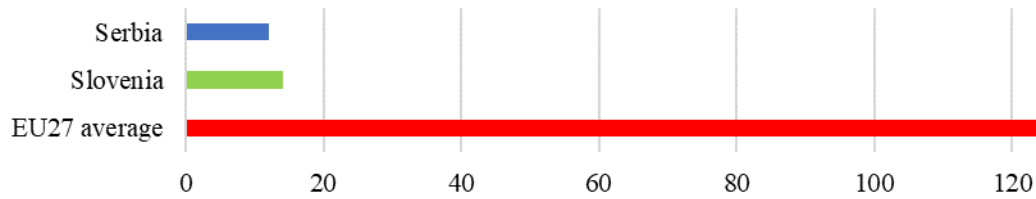


Figure 2: The number of fatal accidents at work in 2021  
(Source: Authors)

Based on Table 2 it is evident that the biggest number of days lost in Serbia is unknown in the analyzed period as this was not estimated by the doctor who first examined the injured person. Most of the injuries for which the days lost were determined lasted from 1 to 3 months. As regards Slovenia, the greatest number of days lost for an injury is from 7 to 13 days, followed by injuries from 14 to 20 days and those from 1 to 3 months.

Accidents at work by days lost	Slovenia			Serbia		
	2019	2020	2021	2019	2020	2021
Unknown	-	-	-	860	848	921
From 4 to 6 days	730	459	613	12	39	2
From 7 to 13 days	2,343	2,022	2,317	13	47	13
From 14 to 20 days	1,920	1,638	1,740	34	43	26
From 21 days to 1 month	1,623	1,231	1,361	59	55	71
From 1 to 3 months	1,866	1,618	1,801	185	55	186
From 3 to 6 months	632	635	763	52	40	45
Permanent incapacity or 183 days or over	327	312	316	3	70	6
Fatal	15	17	14	14	11	12
Not specified	1,417	1,282	936	10	26	15
<b>Total</b>	<b>10,873</b>	<b>9,214</b>	<b>9,861</b>	<b>1,247</b>	<b>1,237</b>	<b>1,301</b>

Table 2: Accidents at work by days lost (NACE Rev. 2 activity A, C-N)  
(Source: Authors based on Eurostat (2023d) and OSHD (2020, 2021, 2022))

## 6. CONCLUSION

Workplace accidents are not merely individual occurrences, but rather manifestations of wider, systemic issues, which are linked to broader organizational or structural problems. Therefore, it is necessary to monitor and analyze the data on accidents at work to be able to mitigate their negative consequences and design preventive measures. This paper has provided a comparative analysis of workplace accidents in Slovenia and Serbia, uncovering notable differences in accident rates and severity. Especially are significant the economic implications of these accidents, encompassing indirect costs reflected in the lost workdays and decreased productivity (Rađenović, 2023). However, the analysis is facing certain limitations, such as potential underreporting and variations in reporting standards between the countries. Hence, future research should aim to standardize reporting practices across the EU, delve deeper into the causes of workplace accidents, and explore their psychological impacts. Continuous evaluation and enhancement of safety regulations are essential to improve workplace safety. Designing preventive measures for accidents at work should involve regularly assessing workplace hazards and implementing measures to mitigate risks, providing comprehensive safety training to employees emphasizing the importance of safety procedures and equipment, developing and enforcing clear safety policies and procedures, ensuring regular maintenance and safety checks of all equipment, preparing and training employees for emergencies, promoting overall employee health to reduce accident-related risks, conducting frequent

inspections to identify and remedy potential hazards, and encouraging employees to report potential hazards and provide feedback on safety measures. Therefore, this research underscores the importance of proactive measures in safeguarding worker well-being and highlights the need for ongoing efforts to maintain a safe working environment across the EU.

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# THE IMPACT OF PROPERTY RIGHTS AND GOVERNMENT INTEGRITY ON THE ECONOMIC FREEDOM: THE CASE OF THE EUROPEAN REGION, THE BRICS COUNTRIES, AND THE USA

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## ABSTRACT

*Individuals have their own interests, and they can use it as they need. It is important that not to attack or abolish the rights of other people, which means people do not have unlimited economic freedom even it is associated with their own property. The point to be investigate on economic freedom is more freedom leads to higher income, thus less unemployment and higher growth or not. Economic freedom has measured on a country basis with the contribution of the Heritage Foundation and the Fraser Institute since 1990s. In this way, it has become easier and more understandable to examine the effect of economic freedoms on economic growth. In this study, the effects of property rights and government integrity on economic freedom for BRICS, European Region Countries, and the USA were tested by panel data analysis method using annual data for the period 1996-2023. Panel unit root tests, Pedroni and Kao cointegration tests; Panel FMOLS, DOLS, and ARDL methods, Pedroni Causality Analysis Vector and Error Correction Model (VECM) were used. According to the results obtained, it can be said that there is a significant relationship between the variables in the long term.*

**Keywords:** *Economic Freedom, Property Rights, Government Integrity, BRICS, European Region, USA*

## 1. INTRODUCTION

Economic freedom is associated with people's own property. It means that individuals can use their own interests as they wish without attacking the rights of other individuals. Also, they do not have the right and authority to have the economic or personal rights of others. As A. Smith mentioned, institutions play an important role in determining the level of output which is still valid today. Despite the importance of institutional structure on growth, the concept of economic freedom is a subject that should be followed in determining how important institutions are in development. In the 1990s, economic freedom began to be measured on a country basis with the contribution of the Heritage Foundation and the Fraser Institute. In this way, it has become easier and more understandable to examine the effect of economic freedoms on economic growth. The common point from the studies on economic freedom is that more freedom leads to higher income, thus less unemployment and higher growth. Therefore, it has emerged that in societies with increasing welfare levels, democracy has further developed,

corruption has decreased, and political and individual freedoms have increased more. In this study, BRICS countries, which are called emerging economies, European Region Countries and the USA were chosen to examine the effect of property rights and state freedom on economic freedom. The reason for the selection of this group in the study is that BRICS countries are accepted as emerging economies worldwide after the 2000s and are in the developing countries class (Dinçsoy, 2022). In addition, it is to be able to make predictions about the situation of economic freedom for European Region Countries and USA countries according to BRICS countries. The reason for using the data published by the Heritage Foundation in the research of economic freedom is that the reports of these institutions are generally used by international official institutions, the reports of these institutions are predominantly used in previous theoretical and empirical studies, they provide detailed information on country performances, and therefore they are reliable. In addition, another reason for using these indices is that data on economic freedom have been regularly published annually for selected countries after 1996.

## 2. LITERATURE REVIEW

There are many studies in the literature on the measurement of economic freedom through indexes. Connors (2011) examined the impact of economic freedom on global poverty for the period 1980-2005. Research results show that a higher level of economic freedom in the 1980-2005 period was associated with a lower level of poverty in 2005 after political and geographical factors were met. The research supports the view that the increase in economic freedom in the early stages of the period (1980-1995 and 1980-1990) has a statistically significant effect on poverty reduction in the 1980-2005 period and in the last fifteen years 1990-2005, and that the increase in economic freedom can reduce poverty over time. Williamson & Mathers (2011), using the data from 1970 to 2014 for 141 countries, investigated the impacts of the culture index, economic freedom index, and growth rate. According to the results, economic freedom has a greater impact on growth than culture. The effect of culture on growth has little effect if not ignored. Pourshahabi et al. (2011) found a positive but statistically insignificant effect of economic freedoms on foreign direct investments in the OECD countries for the period 1997-2007 they emphasized. Adding the level of public consumption expenditures, public investments, and human capital to the model they established, in addition to the variables expressed, the authors concluded that the growth process accelerated independently of economic freedoms. Mahmood and Azid (2011), used data from 2000 to 2006 for 96 countries, 29 of which are in the high-income, 18 in the upper-middle income, 26 in the lower-middle income group, and 23 in the low-income group, they used the panel ARDL and causality tests and found that in high- and lower-middle-income countries, bidirectional; in the countries in the upper middle and low-income groups, they obtained a one-way causality relationship from economic freedom to economic growth. Saha and Su (2012) examined the impact of economic freedom and democracy on corruption for 100 countries. According to the results of the analysis of the study, it has been observed that economic freedoms and democracy have a strong effect in the fight against corruption, but they are still not sufficient on their own. Lytle (2013) used data from 1995 to 2009 for 148 countries in his study in which he examined the relationship between economic growth, human development and poverty, and positive and negative freedom. According to the results of the study, it predicts that when freedom increases (especially positive freedom), poverty will be negatively affected. Razmi and Refaei (2013) examined the effects of economic freedom on economic growth. The data of the Middle East and East Asian countries for the years 2000-2009 were used. The study, which included 17 countries, was tested with panel data analysis. Among the economic freedom indices, only the size of the government and access to hard money are negatively correlated with economic growth. It has been observed that the general economic freedom index has a positive and strong relationship with economic growth.



Borovic (2014) used the data from 1980 to 2014 for Bosnia and Herzegovina, Serbia, Croatia, Slovenia, Montenegro, Bulgaria, and Romania, examining the relationship between GDP growth, Investment, Rule of Law, Limited Government, Regulatory efficiency, Open markets. According to the study results, economic freedom has a positive effect on GDP. Sub-items of economic freedom have different effects on GDP. Zghidi et al. (2016) investigated the relationship between economic growth, economic freedom, and foreign direct investment. For Tunisia, Morocco, Egypt, and Algeria countries, the years 1980-2013 were analyzed by panel data analysis method. Panahi et al. (2014) examined the effect of economic freedoms on economic growth for 13 Middle East and North African countries. Using the panel data analysis method, the data of MENA (Middle East and North Africa) countries for the years 2000-2009 were analyzed. As a result of the analysis, it has been determined that economic freedom has a positive effect on economic growth. Anwar et al. (2017) used the data from 1995 to 2014 for Tunisia, were aimed to investigate the effect of Freedom for Economic activities on economic growth. In South Asian countries, there is a positive relationship between poverty reduction, job freedom, and increased monetary freedom and economic growth. In the long run, job freedom has a negative effect on economic growth and a positive effect in the short run. Oussama et al. (2017) used the data from 1980 to 2014 for South Asian Countries, examining the relationship between financial development, economic freedom, foreign direct investment (FDI), and public expenditure (G). According to the study results, economic freedom has emerged as an important and leading variable for the development of institutions. In the case of economic freedom, financial development also positively affects economic growth. As a result, there is a significant relationship between financial development and the freedom of institutions for economic growth. More economic freedom means more growth and development. Badri and Sheshgelani (2017) examined the effect of the economic freedoms of developing countries on foreign direct investment. In the study, data of 10 countries for the years 2001-2013 were used. It has been observed that economic freedom has a positive and significant effect on foreign direct investments.

### 3. METHODOLOGY AND DATA

In this study, the relations between economic freedom, property rights and government integrity were examined with the help of panel data analysis for a total of 43 countries, including the European Region, BRICS countries and the USA, taking into account the 1996-2023 period. Data on economic freedom, property rights and government integrity criteria used in the analysis were obtained from the official website of the Heritage Foundation. Countries included in the scope of the paper are presented in Annex-1. The generated model equation is shown below:

$$EC_{it} = \beta_0 + \beta_1 PR_{it} + \beta_2 GI_{it} + \phi_{it} \quad (i=1, \dots, N ; t=1, \dots, T) \quad (1)$$

Table 1 shows the abbreviations related to the variables included in the study and the unit values of these variables.

Variable Type	Variable Name	Abbreviation	Unit
Dependent Variable	Economic Freedom	EF	Index
Independent Variable	Property Rights	PR	Index
Independent Variable	Government Integrity	GI	Index

*Table 1: Abbreviations and units for the variables used in the study*

The scores given to the countries on the basis of the relevant criteria are evaluated with the help of a scale ranging from 0-100.

It is thought that economic freedoms decrease as they approach the zero index value and increase as they approach the 100 index value. Property rights can be defined as the assessment of the right to own property of individuals defined by law and protected by the state. It is about the extent to which a country's laws protect private property rights and the extent to which the government strengthens those laws. The more certain the legal protection of property, the higher the country's property rights score. Same way: the higher the government's private property expropriation regime, the lower the country's property rights score (Heritage Foundation, 2023). Property rights are calculated with a score between 0-100 obtained from qualitative indicators. Government Integrity is concerned with how the effects of corruption, defined as fraud, bribery and/or abuse, in the field of jurisdiction and administration, are perceived by the business community. Corruption can affect all parts of an economy. There is a direct relationship between the government's regulations or its intervention in economic activities and the amount of corruption. Transparency is the best weapon for corruption. The Government Integrity Index, which measures the level of corruption, is the primary source for this component. The index is expressed with a 10-point scale that indicates the absence of corruption with 10 full points. Then, this score is multiplied by 10 to calculate the immunity from corruption score. For countries not covered by this index; The anti-corruption component is determined using qualitative information from internationally recognized and reliable sources (Heritage Foundation, 2023).

Before the estimation of the model, Table 2 includes the mean, standard deviation, minimum and maximum values of the variables included in the model, and summary statistics on the number of observations.

	<b>EF</b>	<b>PR</b>	<b>GI</b>
<b>Mean</b>	65.33912	65.38547	56.34718
<b>Median</b>	66.10000	70.00000	51.30000
<b>Maximum</b>	84.20000	100.0000	100.0000
<b>Minimum</b>	0.000000	0.000000	0.000000
<b>Std. Dv.</b>	9.209678	21.71117	22.72323
<b>Skewness</b>	-0.651598	-0.343837	0.154071
<b>Kurtosis</b>	4.553830	1.951208	1.905038
<b>Jarque-Berra</b>	206.3208	78.90513	64.91033
<b>Probability</b>	0.000000	0.000000	0.000000
<b>Sum</b>	78668.30	78724.10	67842.00
<b>Sum Sq. Dev.</b>	102036.2	567064.0	621163.5
<b>Observations</b>	1204	1204	1204

*Table 2: Descriptive stats*  
*H0: The variable is normally distributed.*  
*H1: The variable is not normally distributed*

Jarque-Bera Test Probability (p) value gives information about whether the above (calculated) value exceeds the critical value ( $\alpha=0.05$ ). Low probability values mean that the H0 hypothesis is rejected regarding the distribution of the variable in question. As the result of the test applied, the p values of all variables were found to be greater than 0.05, so the H0 hypothesis was not rejected. As a result of both tests, it was accepted that the distribution of all variables was normal at the 95% confidence level.

### 3.1. Unit Root Test

In order to move on to empirical applications, analyzes were started in unit root tests (Table 3a-c).

Cross-Sectionally Independent			
Test Type	Intercept		
	Variables	Level Value I(0)	1st Difference I(1)
Levin, Lin & Chu (2002)	EF	0.0000	0.0000
	PR	1.0000	0.0000
	GI	0.0000	0.0000
Im, Pesaran and Shin (2003)	EF	0.004	0.0000
	PR	0.9746	0.0000
	GI	0.0000	0.0000
ADF (1981)- Fisher Chi-square	EF	0.0001	0.0000
ADF (1981)- Choi Z- stat		0.0007	0.0000
ADF (1981)- Fisher Chi-square	PR	0.0000	0.0000
ADF (1981)- Choi Z- stat		0.9797	0.0000
ADF (1981)- Fisher Chi-square	GI	0.0000	0.0000
ADF (1981)- Choi Z- stat		0.0000	0.0000
PP (1988) - Fisher Chi-square	EF	0.0001	0.0000
PP (1988) - Choi Z- stat		0.0003	0.0000
PP (1988) - Fisher Chi-square	PR	0.0287	0.0000
PP (1988) - Choi Z- stat		0.7407	0.0000
PP (1988) - Fisher Chi-square	GI	0.0000	0.0000
PP (1988) - Choi Z- stat		0.0000	0.0000
Hadri (2000) Z-stat	EF	0.0000	0.0000
Hadri (2000) Heteroscedastic Consistent Z- stat		0.0000	0.0077
Hadri (2000) Z-stat	PR	0.0000	0.0233
Hadri (2000) Heteroscedastic Consistent Z- stat		0.0000	0.0036
Hadri (2000) Z-stat	GI	0.0000	0.0077
Hadri (2000) Heteroscedastic Consistent Z- stat		0.0000	0.0101

Table 3: Unit Root Test Results (a)

Cross-Sectionally Dependent				
Test Type	Constant			
	Variables	Common Trends	Test statistic	p-value
Bai & Ng (2004)	EF	7	0.08835	0.99990
	PR	8	1.08764	0.99990
	GI	7	15.45637	0.99990

Table 3: Unit Root Test Results (b)

Cross-Sectionally Dependent				
Test Type	Constant			
	Variables	Pooled Statistic	Value	p-value
Bai & Ng (2004)	EF	Pooled Statistic	0.76234	0.44586
	PR	Pooled Statistic	-2.18472	0.02891
	GI	Pooled Statistic	0.23750	0.81227

Table 3: Unit Root Test Results (c)

When the unit root test results in the table are examined, it is seen that the EF and GI series level values are stationary at I(0). PR series values are stationary at I(1).

### 3.2. Cointegration Test

After investigating the unit roots, two different cointegration analysis methods, Pedroni Co-integration analysis, and Kao Co-integration analysis, were used to investigate whether there is a long-term reciprocal relationship between the series. As advised by Pedroni (1999) and Kao (1999), for the variables, Pedroni and Kao panel cointegration tests were used for the purpose of investigating the long-run relationships between the variables. The outcome of the Pedroni panel cointegration test is summarized in Table 4.

Kao Panel Cointegration Test Result				
			t-Statistic	Prob.
ADF			-6.797144	0.0000
Residual variance			4.653958	-
HAC variance			5.195322	-
Pedroni Panel Cointegration Test Result (Weighted)				
Alternative hypothesis: common AR coefs. (within-dimension)				
Panel v-Statistic	-1.750646	0.9600	-1.985786	0.9765
Panel rho-Statistic	1.773138	0.9619	1.122853	0.8693
Panel PP-Statistic	-0.737536	0.2304	-1.601413	0.0546
Panel ADF-Statistic	-1.071924	0.1419	-1.833957	0.0333
Alternative hypothesis: individual AR coefs. (between-dimension)				
	Statistic		Prob.	
Group rho-Statistic	3.224824		0.9994	
Group PP-Statistic	-0.819974		0.2061	
Group ADF-Statistic	-1.443722		0.0744	

Table 4: Kao and pedroni panel cointegration test results

According to the Pedroni cointegration test, in which we investigated the long-term relationship between Economic Freedom, Property Rights, and Government Integrity, prob values are greater than 0.05 significance level. The H(0) hypothesis (there is no cointegration between the series) is rejected. According to the Kao cointegration test, in which we investigated the long-term relationship between Economic Freedom, Property Rights, and Government Integrity, prob values are greater lower than 0.05 significance level. The H (0) hypothesis (there is no cointegration between the series) is rejected.

### 3.3. Panel FMOLS, DOLS, and ARDL Estimators

FMOLS technique, developed by Pedroni (1999) is applied for long-run estimates. While the FMOLS method corrects deviations in standard fixed effect estimators (caused by problems such as autocorrelation and heteroskedasticity), the DOLS method is a method that can also eliminate deviations in static regression (especially caused by endogeneity problems) by including dynamic elements in the model. Panel DOLS approach was developed by Saikkonen (1992) and Stock and Watson (1993) to estimate the long-run linkage, assuming that the variables are cointegrated. The PMG estimator proposed by Pesaran and Shin (1999) and Pesaran et al. (1999, 2001) is used to check the robustness of the estimates. PMG Estimator (proposed by Pesaran, Shin and Smith (1999)) that allows the intercepts, short-run coefficients and error variances to differ across groups while constrains the long run coefficients to be identical. ARDL approach is applicable irrespective of whether the regressors are purely I (0), purely I (1), or mutually cointegrated.

Panel Fully Modified Least Squares (FMOLS)				
Independent Variable	Coefficient	Std. Error	t-Statistic	Prob.
PR	0.079301	0.018877	4.200945	0.0000
GI	0.282011	0.023791	11.85365	0.0000

Table 5: Panel FMOLS, DOLS and ARDL results (a)

R-squared	0.852816	Mean dependent var	65.58122
Adjusted R-squared	0.847013	S.D. dependent var	9.090972
S.E. of regression	3.555807	Sum squared resid	14110.44
Long-run variance	26.65002		

Table 5: Panel FMOLS, DOLS and ARDL results (b)

Panel Dynamic Least Square (DOLS)				
Independent Variable	Coefficient	Std. Error	t-Statistic	Prob.
PR	0.051528	0.024648	2.090505	0.0369
GI	0.299026	0.030593	9.774192	0.0000

Table 5: Panel FMOLS, DOLS and ARDL results(c)

R-squared	0.912887	Mean dependent var	65.80558
Adjusted R-squared	0.878809	S.D. dependent var	8.783920
S.E. of regression	3.057898	Sum squared resid	7218.774
Long-run variance	14.28187		

Table 5: Panel FMOLS, DOLS and ARDL results(d)

Panel ARDL				
Long Run Equation				
Independent Variable	Coefficient	Std. Error	t-Statistic	Prob.
PR	0.041080	0.022392	1.834626	0.0668
GI	0.122459	0.028193	4.343596	0.0000
Short Run Equation				
COINTEQ01	-0.211104	0.017360	-12.16021	0.0000
D(PR)	0.097744	0.017133	5.705052	0.0000
D(GI)	0.103381	0.022118	4.674126	0.0000
C	11.93412	0.988233	12.07622	0.0000

Table 5: Panel FMOLS, DOLS and ARDL results(e)

Root MSE	1.512798	Mean dependent var	0.264427
S.D. dependent var	2.494380	S.E. of regression	1.635594
Akaike info criterion	3.665516	Sum squared resid	2755.423
Schwarz criterion	4.401606	Log-likelihood	-2032.641
Hannan-Quinn criter	3.942750		

Table 5: Panel FMOLS, DOLS and ARDL results(f)

### 3.4. Panel Causality

The panel causality analysis results for both short and long term can be summarized as follows. For the Short Term:

Dependent variable: D(EF)			
Excluded	Chi-sq	df	Prob.
D(PR)	4.831067	2	0.0893
All	4.831067	2	0.0893
Dependent variable: D(PR)			
Excluded	Chi-sq	df	Prob.
D(EF)	1.931289	2	0.3807
All	1.931289	2	0.3807

Table 6: Economic freedom and property rights causality

According to the values in the table, there is no causality from PR to EF and from EF to PR for the short term.

<b>Dependent variable: D(EF)</b>			
<b>Excluded</b>	<b>Chi-sq</b>	<b>df</b>	<b>Prob.</b>
D(GI)	1.095309	2	0.5783
All	1.095309	2	0.5783
<b>Dependent variable: D(GI)</b>			
<b>Excluded</b>	<b>Chi-sq</b>	<b>df</b>	<b>Prob.</b>
D(EF)	0.056048	2	0.9724
All	0.056048	2	0.9724

*Table 7: Economic freedom and government integrity causality*

According to the values in the table, there is no causality from GI to EF and from EF to GI for the short term.

<b>Dependent variable: D(PR)</b>			
<b>Excluded</b>	<b>Chi-sq</b>	<b>df</b>	<b>Prob.</b>
D(GI)	15.81852	2	0.0004
All	15.81852	2	0.0004
<b>Dependent variable: D(GI)</b>			
<b>Excluded</b>	<b>Chi-sq</b>	<b>df</b>	<b>Prob.</b>
D(PR)	17.77112	2	0.0001
All	17.77112	2	0.0001

*Table 8: Property rights and government integrity causality*

According to the values in the table, there is a bidirectional causality from GI to PR and from PR to GI for the short term.

### 3.5. Panel VECM

Panel vector error correction model is used to examine the short- and long-term causality relationship between variables.

For long term:

<b>Error Correction</b>	<b>D(EF)</b>	<b>D(PR)</b>
CointEq1	-0.031037	0.142933
	(0.01334)	(0.02826)
	[-2.32646]	[5.05791]

*Table 9: Error correction between EF and PR*

According to the data in the table, it is possible to make the following inferences ( $|-2.32| > 1.96$ ;  $5.057 < 1.96$ ):

There is causality from PR to EF in the long run. PR is the cause of EF.

There is causality from EF to PR in the long run. EF is the cause of PR.

<b>Error Correction</b>	<b>D(EF)</b>	<b>D(GI)</b>
CointEq1	-0.024959	0.105598
	(0.01183)	(0.02072)
	[-2.11029]	[5.09667]

*Table 10: Error correction between EF and GI*

According to the data in the table, it is possible to make the following inferences:  
There is causality from GI to EF in the long run. GI is the cause of EF.  
There is causality from EF to GI in the long run. EF is the cause of GI.

Error Correction	D(PR)	D(GI)
CointEq1	-0.080030	0.083075
	(0.01477)	(0.01223)
	[-5.41849]	[6.79174]

*Table 11: Error correction between PR and GI*

According to the data in the table, it is possible to make the following inferences:  
In the long run, there is causality from GI to PR. GI is the cause of PR.  
In the long run, there is causality from PR to GI. PR is the cause of GI.

#### ANNEX-1

1	Albania	16	Greece	31	Slovenia
2	Armenia	17	Hungary	32	Spain
3	Austria	18	Ireland	33	Sweden
4	Belarus	19	Italy	34	Switzerland
5	Belgium	20	Latvia	35	Netherland
6	Bulgaria	21	Lithuania	36	Türkiye
7	Croatia	22	Luxembourg	37	Ukraine
8	Cyprus	23	Malta	38	United Kingdom
9	Czech Republic	24	Moldova	39	Brazil
10	Denmark	25	Norway	40	India
11	Estonia	26	Poland	41	China
12	Finland	27	Portugal	42	South Africa
13	France	28	Romania	43	USA
14	Georgia	29	Russia		
15	Germany	30	Slovakia		

#### 4. CONCLUSION

In this study, the relationship between property rights and government integrity and economic freedom was investigated for the period 1996-2023 using data from BRICS, European Region Countries, and the USA. In the study, firstly, a panel unit root test was performed, and it was seen that the government integrity and economic freedom series were stationary at their levels, and the property rights series were stationary at their primary differences I(1). In the second stage, the cointegration test was performed. The long-term relationship between the series was examined with the Pedroni and Kao cointegration tests and it was concluded that while there was a cointegration relationship between the variables according to the Kao cointegration test, it did not exist between the variables according to the Pedroni cointegration test. Finally, the relationship between education, property rights and government integrity and economic freedom variables; Panel FMOLS, DOLS and ARDL methods, Pedroni (2008) causality analysis and Error Correction Model (VECM) methods were used. The causality analysis of Canning and Pedroni (2008), it shows a bidirectional causality relationship between all variables, according to the panel causality results for the overall panel.

As a result, it is predicted that economic freedom may be affected by property rights and government integrity in the long run, regardless of the level of development for the countries used in the study analysis. In this context, it is foreseen that property rights and government integrity are very important in the development of the economy and development policies, and the arrangements to be made for these may also affect economic freedom and development. Again, it can be said that different variables may be effective in determining economic freedom, and using these variables in future studies on the subject may be effective in eliminating uncertainty. For example, these variables may be economic growth, renewable energy, and energy consumption. Economic growth indicators in studies examining these variables can guide country policies and suggest solutions that will affect economic freedom (Can and Korkmaz, 2019; Can and Minkovska, 2020; Dinçsoy and Can, 2023). Apart from this, factors such as migration, population aging, and labor productivity, information technologies may also have effects on economic growth and affect economic freedom (Can and Terziev, 2016; Can and Terziev, 2017; Terziev and Can, 2018). Similar to these studies, the inclusion of different variables that can affect economic growth and economic freedom in studies can contribute to literature studies on determining economic freedom.

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## THE PLACE AND ROLE OF BANKS AS DISTRIBUTION CHANNELS IN THE BULGARIAN INSURANCE MARKET IN THE CONTEXT OF THE COVID-19 PANDEMIC

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### **ABSTRACT**

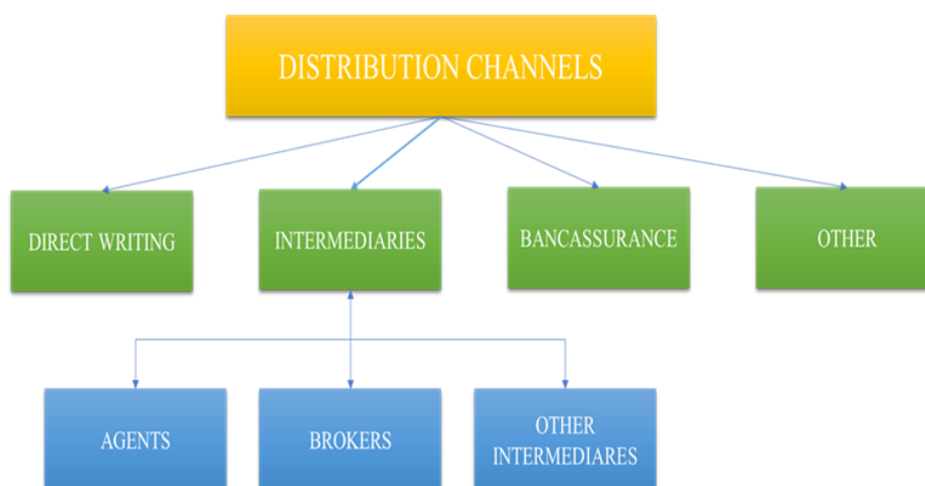
*The COVID-19 pandemic inevitably impacted the insurance business in part - rethinking marketing concepts related to distribution channels to sell insurance products. In the framework of this study, the aim is to examine the Bulgarian insurance market in the context of the trends towards a stronger role of banks in this process. In this regard, the authors' efforts are aimed at substantiating the plausibility of two hypotheses relating to 1) the form in which the distribution of insurance products is carried out by the prevailing number of commercial banks in Bulgaria and 2) the existence and implementation of "bancassurance" - as opposed to the official claims - the result of European institutional studies - that such does not exist in Bulgaria. As a result of the conducted research, causal links between the analysed processes and phenomena have been identified. At the same time, both working hypotheses have been confirmed, thus fulfilling the main research objective.*

**Keywords:** *Insurance, Distribution channels, Insurance agents, Insurance brokers, Bancassurance, COVID-19, Banks*

### **1. INTRODUCTION**

The drive of insurance companies to continuously increase sales, grow market share, and consolidate their position in the insurance market, and hence increase their profits (Staudt & Wagner, 2022), is both a factor and a reason for the continuous demand and launch of innovative approaches to the distribution of insurance products through the use of a variety of distribution channels. The latter, in turn, seen as a time-tested tool for insurers, is becoming increasingly diverse and adaptable to a dynamically changing market environment, whose new order is dictated by a series of events, the most significant of which is the COVID-19 pandemic (Ninova & Ninov, 2023). This study covers the period of the COVID-19 pandemic, which inevitably affected the insurance market in Bulgaria and in particular the state and development of distribution channels. As a starting point for the research, we will use the classification of the European Insurance and Reinsurance Federation Insurance Europe for the main distribution channels of insurance products, illustrated in the following figure (Insurance Europe, 2021).

*Figure following on the next page*



*Figure 1: Distribution channels in the insurance market  
(Source: Authors' design based on Insurance Europe (Insurance Europe, 2021))*

Proceeding from this classification, we can note the following: in the insurance activity there are four main groups of distribution channels - direct writing, intermediaries (including insurance agents, insurance brokers, and other intermediaries), bancassurance, and others. Referring to this theoretical construct, this paper will focus on the distribution channels that occupy a key role in a specific insurance market, namely the one in Bulgaria. Focusing in particular on bancassurance, as well as on insurance agents and insurance brokers, which are part of intermediaries, we aim not only to constitute whether and how these distribution channels are applied in the Bulgarian insurance market, but also to analyse the development of the specific insurance market. The scientific assumptions, whose plausibility is to be established in this study by identifying the presence or absence of certain causal relationships between the analysed processes and phenomena, can be defined in the following two working hypotheses:

- H1: The predominant number of commercial banks in Bulgaria involved in the distribution of insurance products is mainly in the form of insurance agents.
- H2: Contrary to official claims - the result of European institutional research – the so-called “bancassurance” has already entered the Bulgarian practice and is successfully applied (although not yet so widespread).

## 2. LITERATURE REVIEW

For our planned thematic analysis, we are targeting primary and secondary databases, with the idea of 1) making it as comprehensive as possible and 2) ensuring that it achieve the highest degree of reliability and comprehensiveness. Within this study, in support of the author's reasoning, only some of the global and regional studies related to distribution channels are brought up. Referring to the main design of the research, the attention is focused on the insurance market - distribution channels - commercial banks relation (as part of this market and contractors in this process). In support of the stated hypotheses, international scientific publications are studied in detail in the development, about which the author's team introduces the following classification, dividing them into four conditional directions.

### 2.1. Publications on Distribution channels

Insurers increasingly use multiple distribution channels as they balance the needs of different consumer groups with the costs of distributing their products and services (Dumm & Hoyt, 2003). In her study on the coexistence of multiple distribution channels, María Rubio-Misas presents the positive relationship between banks as a distribution channel in insurance and their impact on insurers' cost efficiency (Rubio-Misas, 2022).

Emilia Clipici and Cătălina Bolovan, examine the drivers of bank-insurance systems in European countries to achieve a common goal of optimising the structure and efficiency of distribution channels (Clipici & Bolovan, 2012).

## **2.2. Publications on Insurance agents**

In 2013, Tan Fee Yean and Khulida Kirana Yahya discussed the topic of insurance agents by presenting a study focusing on the career satisfaction of insurance agents and specifically the impact of human resource management practices and career strategy (Yean & Yahya, 2013). A scholarly work on life insurance agents is “Demographic Characteristics of Insurance Agents and Intention to Leave the Life Insurance Business”, 2023. by the authors' team Thi Huu Ai Nguyen Thi Quynh Tran Thi Ha Phuong Phung (Nguyen, et al., 2023), in which they substantiate the thesis that factors such as gender, age, and years of experience directly correlate with insurance agents' intention to leave the insurance business. In another study in the field of insurance, the focus is on the specifics and characteristics of life insurance agents' performance in Vietnam, and the development is by the author team including Thuy Dung DoThi Huong MaiXuan Huong NguyenVan Ban Mai and titled “Aspects of Life Insurance Agents' Performance in Vietnam: A Study from the Impact of Customer-Oriented Behavior” (Mai, et al., 2023).

## **2.3. Publications on Insurance broker**

In a descriptive-relational study, Mark Matthew C. Hervias, and Josel P. Osal, through a survey, concluded that “the limited awareness of clients is a result of their limited extent of utilization and satisfaction with the insurance broker products” (Hervias & Osal, 2023). In 2020, M.A. Latorre Guillem, made his survey in Spain, based on which he found that the advisory service presented by insurance brokers is properly appreciated by insured persons (Latorre Guillem, 2020).

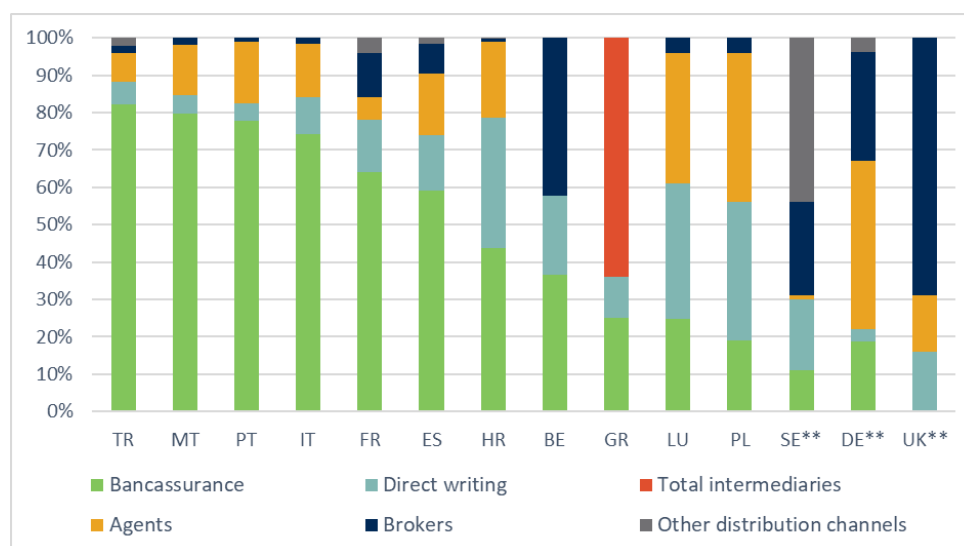
## **2.4. Publications on Bancassurance**

In a study made public in 2011, Pang-Ru Chang, Jin-Lung Peng, and Chiang Ku Fan compared bancassurance and traditional insurer sales channels (Chang, et al., 2011). In 2022, Rubio-Misas, in his research paper “Bancassurance and the coexistence of multiple insurance distribution channels” (Rubio-Misas, 2022), examined bancassurance in search of an answer related to the coexistence of bancassurance and alternative insurance distribution channels in the long run. The same author reports that the success of bancassurance is the result of distribution cost savings for insurers (Rubio-Misas, 2022). In 2023, Linwei Wang, Yixin Hu, and Rong Kong examine “The Impact of Bancassurance Interaction on the Adoption Behavior of Green Production Technology in Family Farms: Evidence from China” (Wang, et al., 2023). In their publication, the following conclusion is reached: “it is necessary to continuously innovate the interaction mode between banks and insurance companies, rationally allocating agricultural production factors and combining the actual situation of each family farm to strengthen the leading role of the bancassurance interaction in adopting green production technologies and promoting high-quality agricultural development” (Wang, et al., 2023).

## **3. MATERIALS AND METHODS**

Referring to the review of the specialized literature and the hypotheses, the author's team will present a detailed picture of the insurance market in the context of its distribution channels. To this end, we intend to carry out a study, synthesis, and reporting of data from a variety of sources, aiming to specify the existing features and the different aspects of this specific type of market, with a particular focus on the distribution channels used.

Next, a study should be carried out on the Bulgarian insurance market, on the practices in the country regarding the distribution channels used. To achieve the set objective, the study refers to publicly disclosed information containing data provided by the Bulgarian National Bank, directly corresponding to a specific topic - Register Of The Licensed Banks And The Foreign Banks' Branches In The Republic Of Bulgaria (Bulgarian National Bank, 2023). In addition, the study refers to: the official websites of commercial banks and insurance companies operating in the Bulgarian financial and insurance market; a reference to the registers (database) of the Financial Supervision Commission - Bulgaria related to the activities of insurance agents (Financial Supervision Commission - Bulgaria, 2023a); and of insurance brokers (Financial Supervision Commission – Bulgaria, 2022). The illustration of the obtained results is done by using visual means - figures and tables. Given the practical focus of this study, information is presented illustrating the place of each of the distribution channels in the European insurance market. The data in this paper are the result of thematic studies already conducted by reputable organizations in the banking and insurance industry. At the same time, the most recently updated statistics on the European insurance market are presented. The following two figures represent these channels by insurance business area - life and non-life insurance market.



*Figure 2: Life distribution channels (% of GWP) – 2019  
(Source: Insurance Europe (Insurance Europe, 2020))*

As evidenced by the information we present in Figure 2 for 2019 (the most recent survey available), the leadership role and contribution to the distribution of insurance products that Bancassurance performs stands out. In some European countries, the distribution of life insurance products reaches more than 80% of the total insurance volume (TR, MT).

*Figure following on the next page*

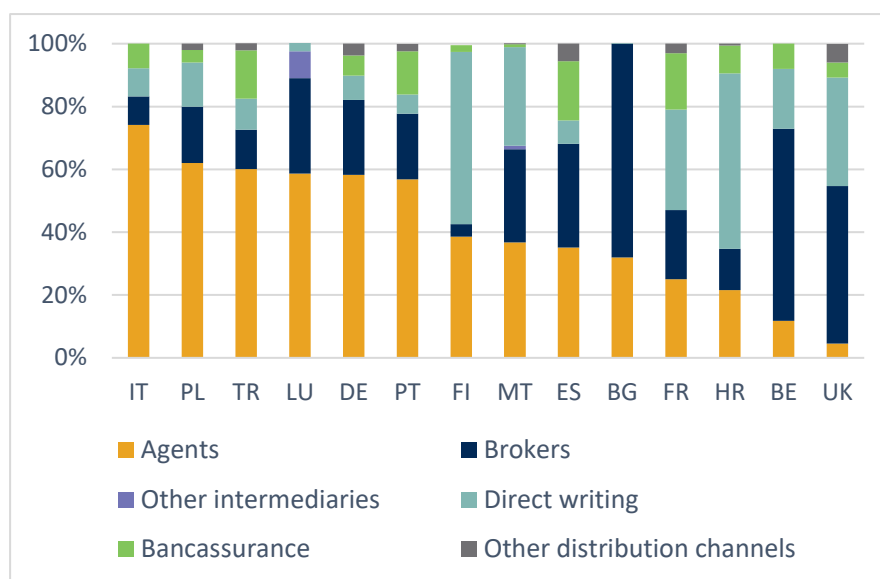


Figure 3: Non-life distribution channels (% of GWP) - 2019  
(Source: Insurance Europe (Insurance Europe, 2020))

In non-life insurance, according to data for 2019, the predominance in the distribution of insurance products is held by insurance agents, being the placement body of insurance companies. To answer the question, “How do licensed banks and branches of foreign banks market their products on the insurance market in Bulgaria”, in this study it is necessary to first present data on commercial banks operating in the Bulgarian insurance market (see Table 1).

Year	Banks Licensed in The Republic of Bulgaria	Foreign Banks' Branches in The Republic of Bulgaria	Total Number of Commercial Banks in Bulgaria	Banks Which as Legal Entities Are Insurance Agents
2023	17	7	24	11

Table 1: Register of the licensed banks and the foreign banks' branches in the Republic of Bulgaria and how many of these banks participate in the Bulgarian insurance market in the form of insurance agents

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission - Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research)

\*Note: The information is as of 26.07.2023

The analysis of the same shows that the number of licensed banks in Bulgaria is higher compared to the banks that operate through branches of foreign banks. After a survey, it was found that as legal entities, 11 of them are also insurance agents in the country, representing 46% of the market participants. Given the specific nature of the activities of insurance agents, which are accountable to the insurance companies and whose insurance products they offer, this study does not present data on the premium income they generate on the insurance market in Bulgaria. A finding that is not relevant for insurance brokers. The Financial Supervision Commission, the body supervising insurance activity in Bulgaria, publishes official statistics presenting data on the premium income generated by insurance brokers in the country. The data are presented in the following table of this study.

Year	Insurance Premiums (BGN)
2013	851 486 113,44
2014	890 680 684,00
2015	1 000 279 918,88
2016	1 071 233 460,74
2017	1 232 847 787,52
2018	1 533 394 791,11
2019	1 686 860 008,78
2020	864 751 818,99
2021	1 808 699 187,61
2022	1 855 546 096,87

Table 2: Data on realized premium income of insurance brokers in Bulgaria for the period 2013-2022

(Source: Financial Supervision Commission - Bulgaria (Financial Supervision Commission - Bulgaria, 2023b))

*\*Note: Insurance premiums in favour of insurers domiciled in the Republic of Bulgaria and insurance premiums in favour of insurers domiciled in another country*

As a result of the analysis of the information presented in Table 2, it can be concluded that there is a clear growth trend in the premium income earned by insurance brokers in the country. The exception to the trend thus presented is the year 2020, which saw the announcement of the COVID-19 pandemic and the resulting lockdown, which hurt both public life and the economy and business, including insurance. As a result of it, a negative effect has been reported – a reduction in demand for insurance products especially in the area of non-life insurance. The conclusion is confirmed by the data demonstrating the percentage change in premium income realized by insurance brokers in the country for the period 2013-2022.

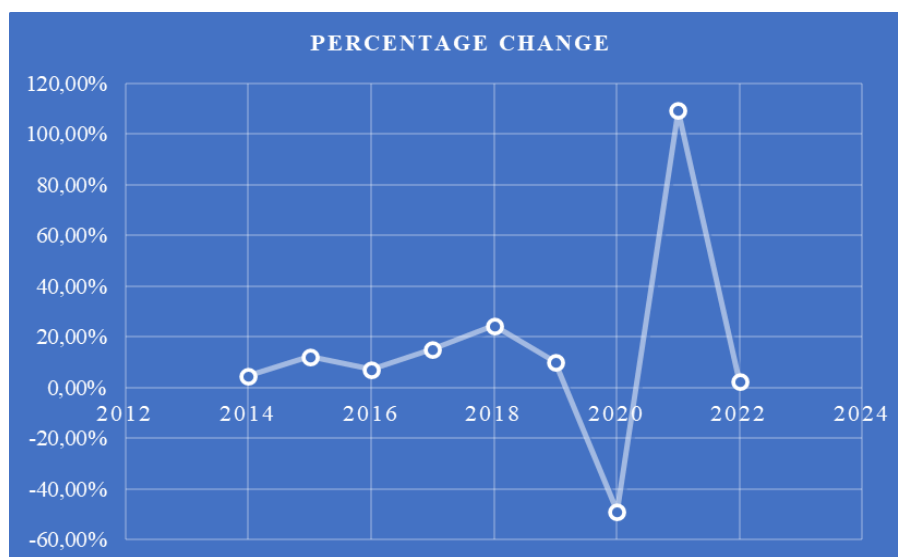


Figure 4: Percentage change in premium income generated by insurance brokers in Bulgaria for the period 2013-2022

(Source: Authors' calculations)

From the information presented in Figure 4, the clear dynamics for the period 2020-2022 are striking. In the pandemic year, there is a decline in terms of premium income realized by insurance brokers in the country.

The reason for the drastic reduction in premium income can be pointed to - the reduced demand for insurance products, mainly related to property insurance of individuals in the country. On the other hand, next year 2021, the growth reported by insurance brokers is significant – over 150%. Persons looking for insurance services are increasingly turning to products marketed through insurance brokers. The reason for this can also be found in the fact that insurance brokers can offer identical insurance products from different insurance companies and thus, in practice, consumers looking to purchase a particular insurance product have the opportunity to find in one place a variety of price options that meet their individual customer needs and especially financial capabilities.

#### **4. THE RELATION BETWEEN COMMERCIAL BANKS-INSURANCE AGENTS-INSURANCE COMPANIES**

In this part of the scientific work, we will present the existing relationship between the Bulgarian insurance market - commercial banks, insurance agents and insurance companies. For this purpose, a conditional grouping of banks is used, analogous to a similar distribution of banks made by the Banking Supervision Department at the Bulgarian National Bank. Within the same, banks in Bulgaria are positioned in three groups, depending on the size of their assets at the end of each reporting period. The presented distribution of banks by groups, prepared by Bulgarian National Bank, is as of 31 August 2021 (Bulgarian National Bank, 2021).

##### **4.1. First Group**

The following 5 commercial banks are included in this group.

These are the commercial banks operating on the Bulgarian financial market, which also act as insurance agents participating in the insurance market in the country. Within the following figures, information is presented on which insurance companies, which banks: 1) act as insurance agents offering insurance products and 2) which are the specific insurances distributed on the Bulgarian insurance market by them. The first commercial bank in this group to offer financial services and to act as an insurance agent, institution, was UniCredit Bulbank AD. After a study, the author's team presents in the form of a figure the information related to this insurance agent.

*Figure following on the next page*



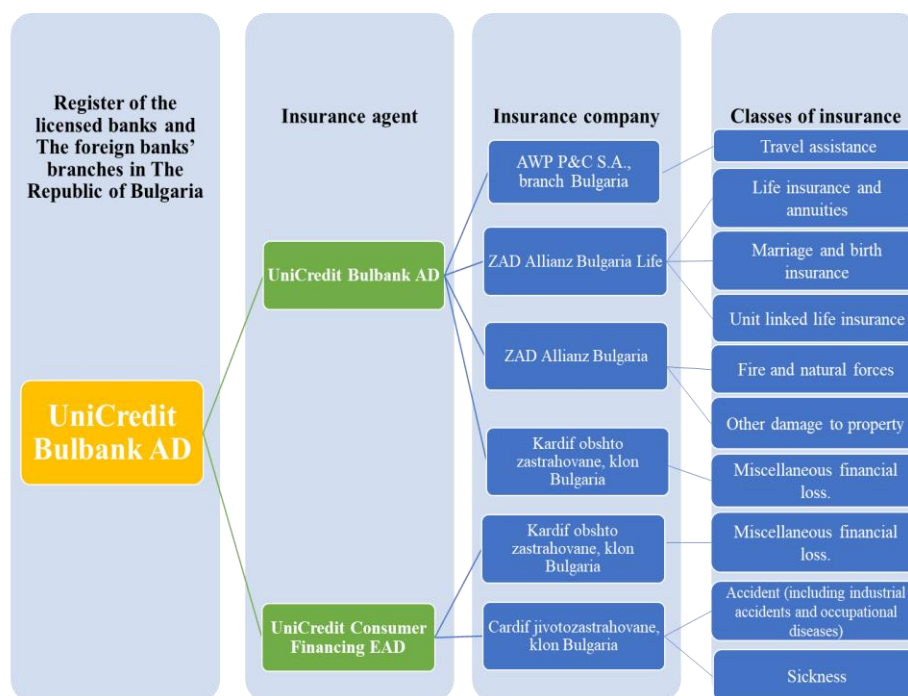


Figure 5: The relationship between commercial banks (Unicredit Bulbank AD) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)

Two insurance agents are presented in Figure 5, as UniCredit Consumer Financing is a closely related company to UniCredit Bulbank AD. As insurance agents, UniCredit Consumer Financing and UniCredit Bulbank AD not only offer different insurance products but also work with different insurance companies offering insurance services in the Bulgarian insurance market. Next, a study was also done on the United Bulgarian Bank, resulting in the relevant facts presented in the following figure.

Figure following on the next page

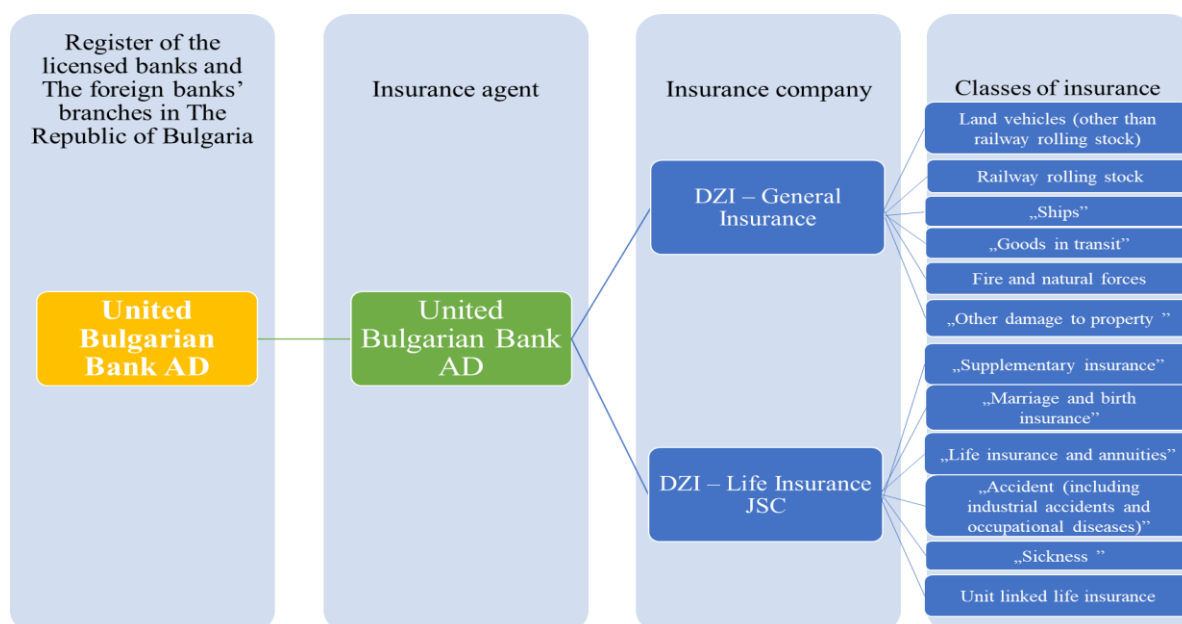


Figure 6: The relationship between commercial banks (United Bulgarian Bank AD) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)

The commercial bank surveyed offers the insurance products of one insurance company in the NonLife insurance line of business and one in the Life insurance line of business. The third commercial bank that is the subject of this study is Eurobank Bulgaria AD (Postbank). After the research, the author's team found the following specifics regarding the participation of the mentioned bank in the insurance market in Bulgaria, in the role of an insurance agent.

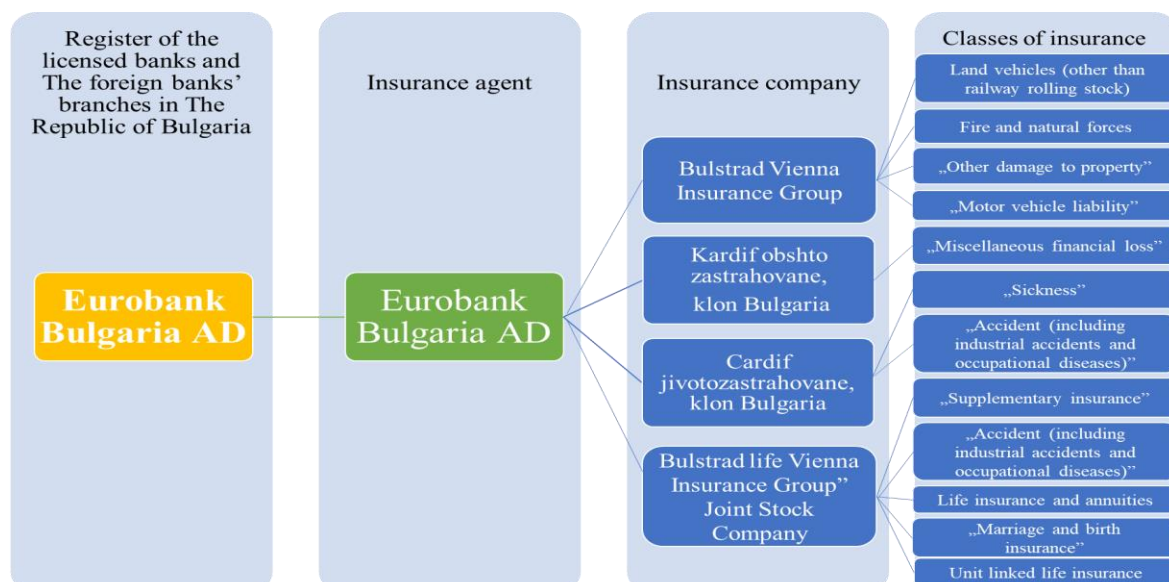


Figure 7: The relationship between commercial banks (Eurobank Bulgaria AD (Postbank)) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)

As an insurance agent Eurobank Bulgaria AD (Postbank), distributes insurance products both NonLife insurance and Life insurance through four insurance companies in the country. The fourth and final bank in this group of commercial banks to be surveyed is First Investment Bank AD, and following the survey the following information relating to the distribution of insurance products by the bank in its role as insurance agent has been identified.

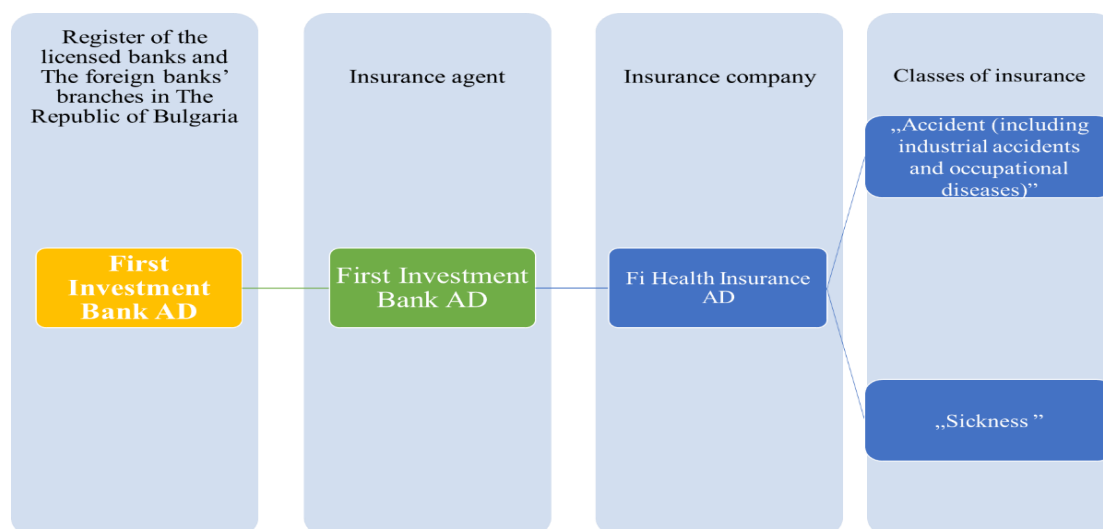


Figure 8: The relationship between commercial banks (First Investment Bank AD) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)

First Investment Bank AD is a bank operating in the Bulgarian insurance market as an insurance agent, distributing the insurance products of a single insurance company, and the products offered are aimed at the health and working capacity of individuals. In summary, from the distribution of commercial banks made by Bulgarian National Bank, we can conclude the following: out of a total of five banks in the first group, four offer insurance products on the Bulgarian insurance market in the form of insurance agents. These commercial banks are UniCredit Bulbank AD, United Bulgarian Bank AD, Eurobank Bulgaria AD (Postbank) and First Investment Bank AD. The only exception in this group is DSK Bank, which participates in the insurance market through an insurance broker (OTP Insurance Broker Ltd).

#### 4.2. Second Group

According to the Bulgarian National Bank's classification breakdown, the following 13 commercial banks are included in this group. The first commercial bank under investigation is Allianz Bank Bulgaria AD.

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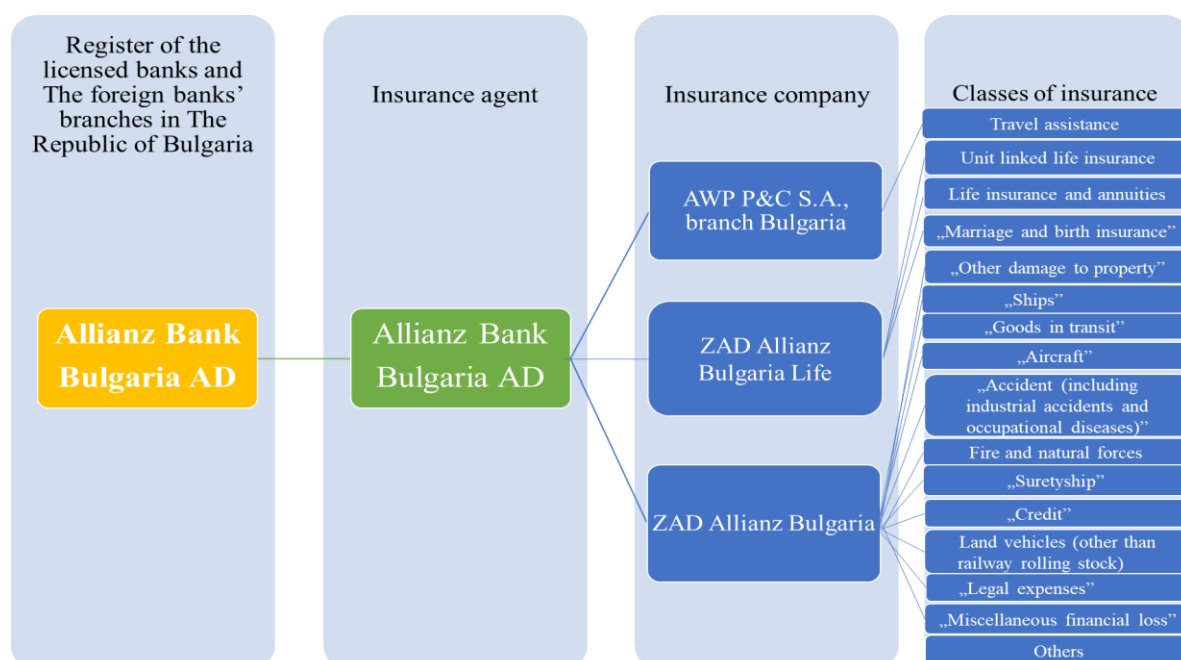


Figure 9: The relationship between commercial banks (Allianz Bank Bulgaria AD) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)

In its role as an insurance agent, this commercial bank offers the insurance products of two insurance companies (ZAD Allianz Bulgaria Life and ZAD Allianz Bulgaria), which are part of the same holding company as Allianz Bank Bulgaria AD, and with one foreign company (“Foreign Trader Branch”) whose main business is insurance. In light of the foregoing facts, the relationship between a commercial bank and insurance companies offering products in the banking, leasing, life insurance and general insurance sectors, all within the same holding company, clearly emerges. As an insurance agent, Allianz Bank Bulgaria AD offers various insurance products to the represented insurers. The second commercial bank of this group that participates in the insurance market in Bulgaria in the role of insurance agent is ProCredit Bank (Bulgaria) EAD. The results of the study are visualised in the following figure.

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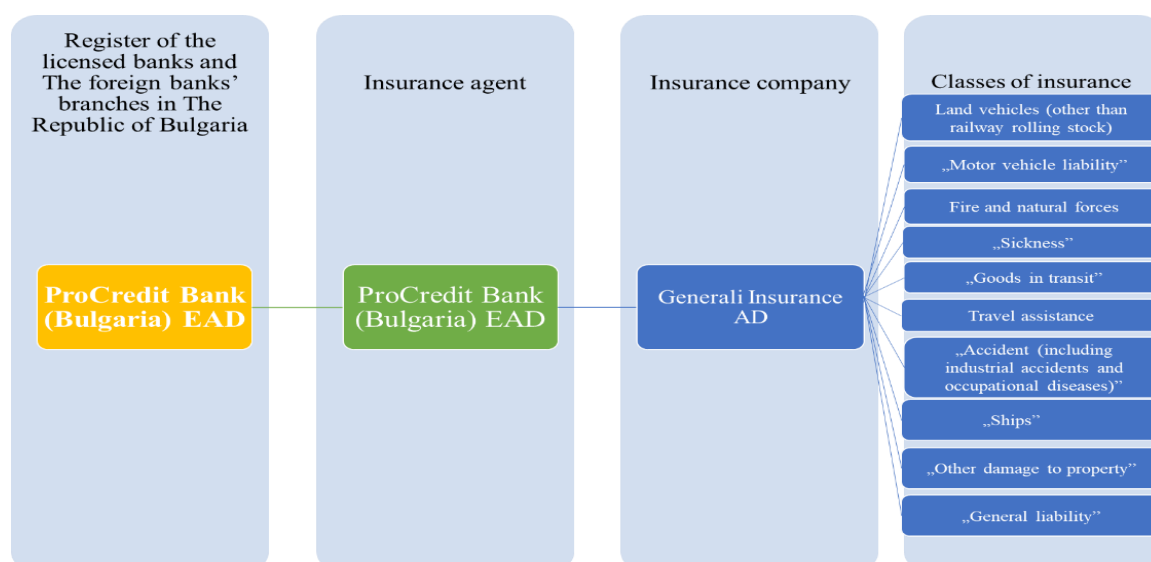


Figure 10: The relationship between commercial banks (ProCredit Bank (Bulgaria) EAD) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)

ProCredit Bank (Bulgaria) EAD is a registered commercial bank and as an insurance agent, distributes the insurance products of an insurance company offering insurance products on the territory of Bulgaria - Generali Insurance AD. Here the products distributed by the commercial bank are in the field of general insurance. The next bank is Investbank AD, a merchant bank which is the distribution channel for the general insurance products of Bulgaria Insurance AD. The information is visualised in the following figure.

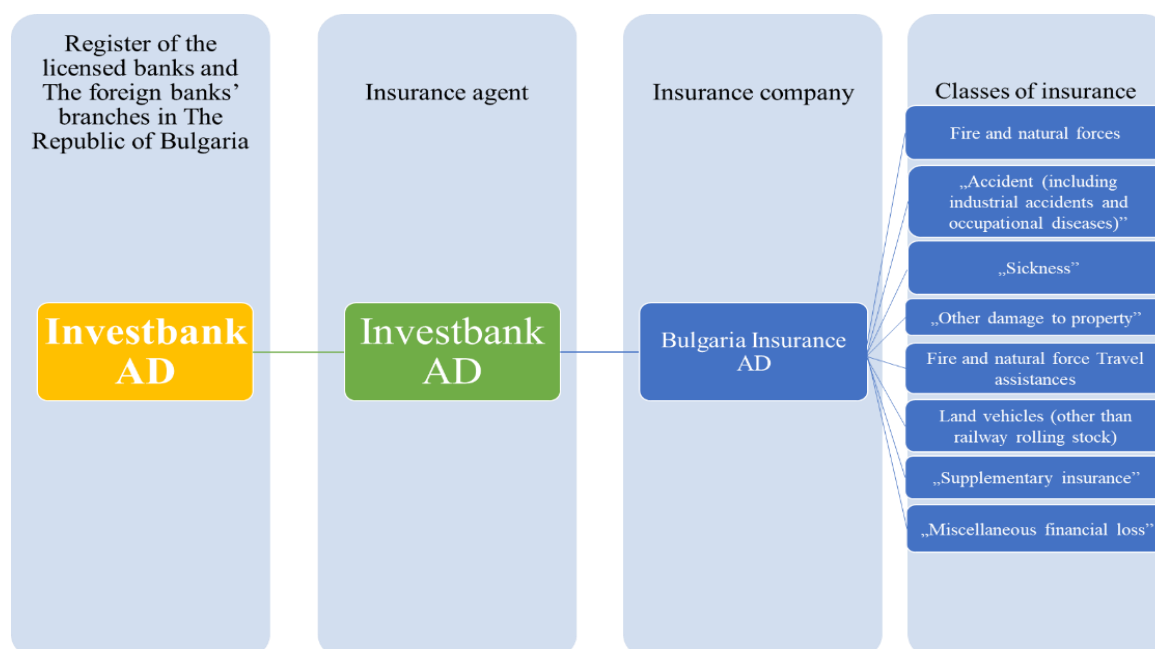


Figure 11: The relationship between commercial banks (Investbank AD) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)

Bulgarian-American Credit Bank AD, as a distribution channel, markets the insurance products of two insurance companies of the same group (Unica) operating in the field of life insurance and non-life insurance, respectively - Unica Life Insurance and Unica Insurance. The results of the survey are illustrated in Figure 12.

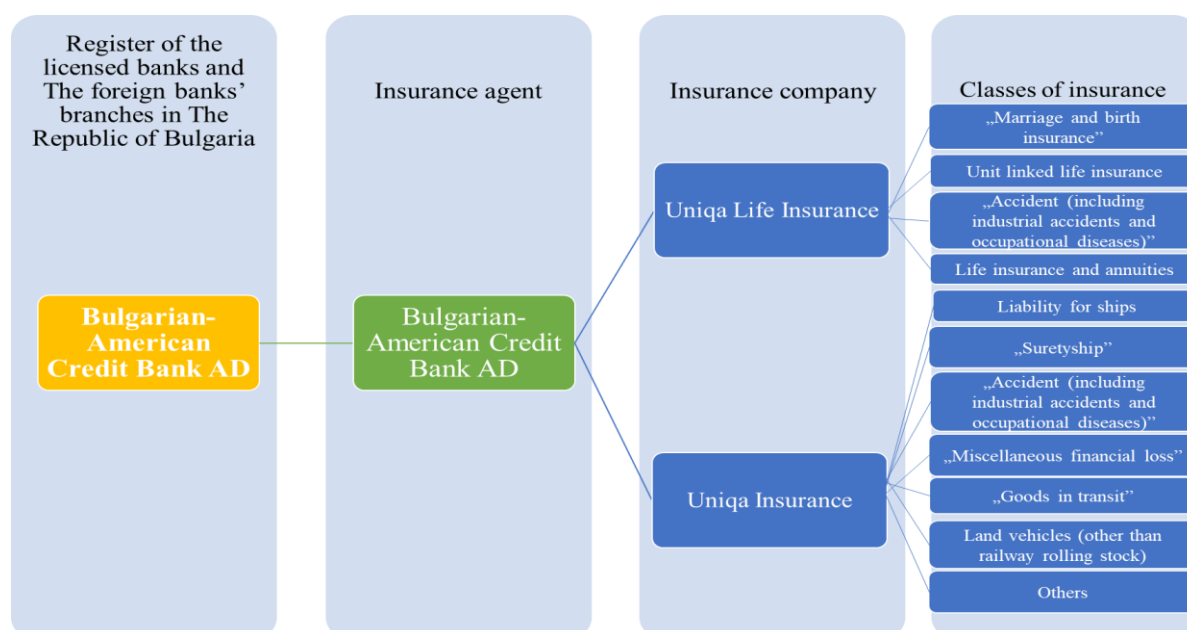


Figure 12: The relationship between commercial banks (Bulgarian-American Credit Bank AD) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)

The next bank in the group is International Asset Bank AD, which distributes the insurance products of a single insurance company offering general insurance products - Insurance Company “ASSET Insurance“AD.

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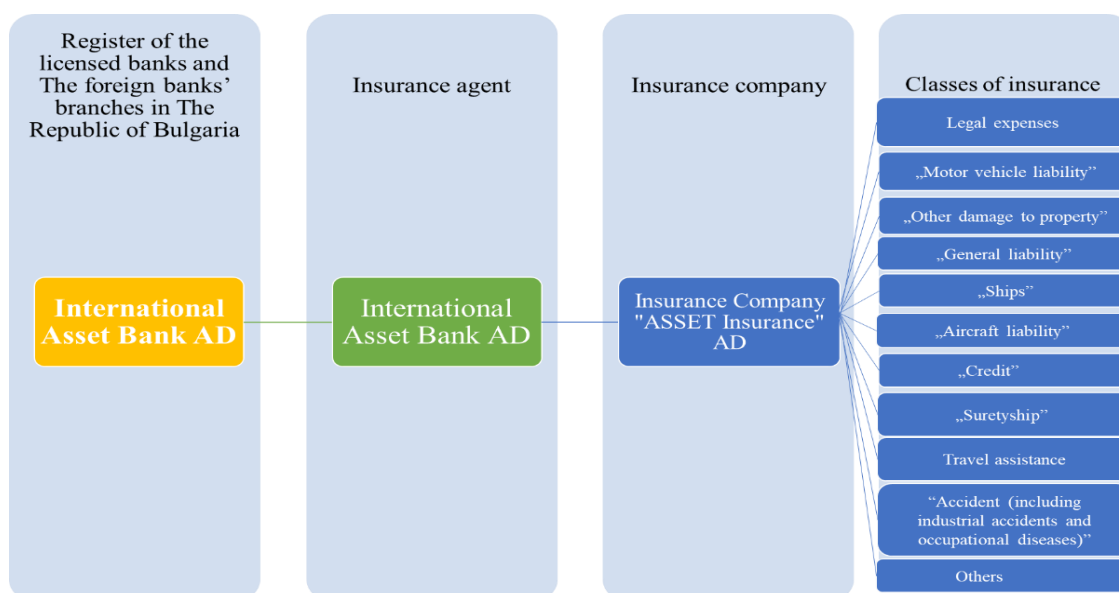


Figure 13: The relationship between commercial banks (International Asset Bank AD) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)

TBI Bank EAD is a commercial bank, included in the registers of insurance agents of the Financial Supervision Commission - Bulgaria, offering insurance products in both life and general insurance. From the information presented in Figure 14, it can be observed that compared to the commercial banks examined so far that distribute insurance products in their role as insurance agents, TBI Bank EAD has a limited portfolio, offering only 1 life insurance and 5 general insurance.

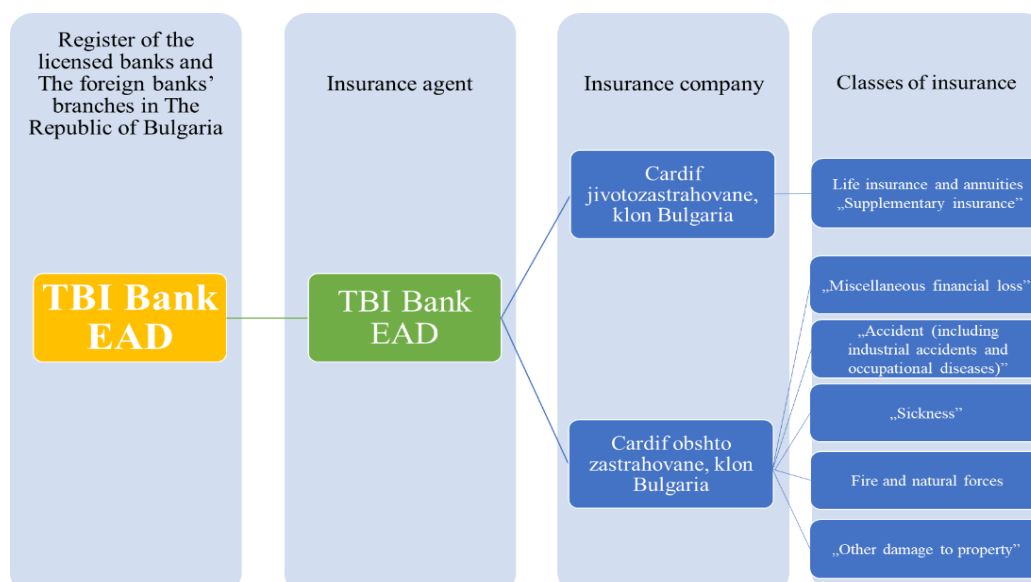


Figure 14: The relationship between commercial banks (TBI Bank EAD) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)



The last bank in this group for which information is presented in this study is Texim Bank AD. In its role as a distribution channel, this commercial bank distributes 3 life insurance products, and only to 1 life insurance company.

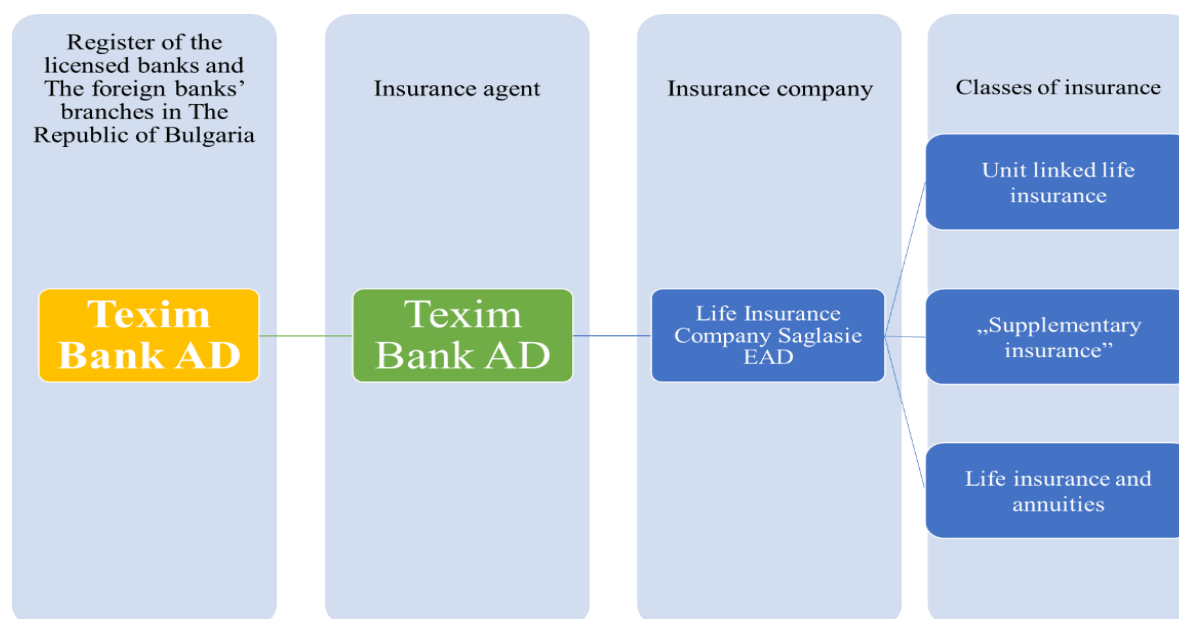


Figure 15: The relationship between commercial banks (Texim Bank AD) and insurance companies

(Source: Bulgarian National Bank (Bulgarian National Bank, 2023), Financial Supervision Commission – Bulgaria (Financial Supervision Commission - Bulgaria, 2023a), and author's research. The information is as of 11.04.2023)

Raiffeisenbank (Bulgaria), Central Cooperative Bank, Bulgarian Development Bank, Municipal Bank, Commercial Bank “D” and Tokuda Bank do not appear in the information registers of the Financial Supervision Commission - Bulgaria as registered insurance agents operating on the insurance market in Bulgaria.

#### 4.3. Third Group

According to the allocation of Bulgarian National Bank, the following 7 commercial banks are included in this group. - Bulgaria Branch, Te-Je Ziraat Bankas - Sofia Branch, Varengold Bank AG, Sofia Branch and Bigbank AC - Bulgaria Branch. Due to the specificity of the licensing regime, in particular Art. 3 of Regulation No. 2 of the Bulgarian National Bank of 22 December 2006 on the licences, approvals and permits issued by the Bulgarian National Bank under the Credit Institutions Act (National Assembly of The Republic Of Bulgaria, 2006) to which the banks in this group are subject, they are “entitled to carry on the business of intermediary in the provision of the services for which the bank is licensed, as well as the business of insurance agent and insurance intermediary” (National Assembly of The Republic Of Bulgaria, 2006). In the information files of the Financial Supervision Commission - Bulgaria, the listed banks do not appear as a placement body in the form of insurance agents on the insurance market in Bulgaria. The remaining banks either have not concluded contracts with insurance companies and are not involved in the distribution of insurance products in the Republic of Bulgaria, or have offered insurance products. However, their contracts with insurers have expired and have not been renewed.



## 5. COMMERCIAL BANKS AND INSURANCE BROKERS IN BULGARIA

Having presented the commercial banks in the country, which are also in the role of insurance agents in the Bulgarian insurance market, this study surveyed the number of commercial banks operating in the country, which participate in insurance distribution through insurance brokers.

<b>Licensed Banks</b>	<b>Insurance Broker</b>
UniCredit Bulbank AD	Unicredit Insurance Broker OOD
United Bulgarian Bank AD	UBB Insurance Broker
Allianz Bank Bulgaria AD	Allianz Leasing Bulgaria EAD
DSK Bank AD	OTP Insurance Broker Ltd.

*Table 3: Partnership relations between commercial banks and insurance brokers in Bulgaria (Source: Source: Financial Supervision Commission – Bulgaria (Financial Supervision Commission – Bulgaria, 2022) and the websites of insurance brokers)*

*Note: Data updated on 22.06. 2022*

In 2022, the number of licensed insurance brokers offering insurance products on the territory of the Republic of Bulgaria is 538 (Financial Supervision Commission - Bulgaria, 2023b) (338 (not including the number of insurance brokers carrying out intermediation activities in favour of insurers domiciled in other countries and reinsurance intermediation)). The results of the survey presented in Table 3 prove that, in addition to being insurance agents, commercial banks operating in the territory of the Republic of Bulgaria are part of the insurance market and work with insurance brokers.

## 6. BANCASSURANCE

This study presents the results of a survey on the availability of bancassurance in the insurance market in Bulgaria and finds the following facts (Bulstrad Vienna Insurance Group in Bulgaria, 2023) (Armeec Insurance Company, 2023) (Groupama Insurance, 2023):

<b>Insurance Company</b>	<b>Bank</b>
Bulstrad Vienna Insurance Group in Bulgaria	N/A
Armeec Insurance Company	Central Cooperative Bank AD
Groupama Insurance	DSK Bank AD

*Table 4: Register of the licensed banks and the foreign banks' branches in the Republic of Bulgaria and how many of these banks participate in the Bulgarian insurance market in the form of insurance agents*

*(Source: Author's research based on information from the websites of insurance companies in Bulgaria)*

If up to now we have found based on data presented by the European Insurance and Reinsurance Federation Insurance Europe (Insurance Europe, 2020) that in Bulgaria the so-called "bancassurance" is not developing, the current practice in Bulgaria proves that the complex financial services resulting from partnership between banking and financial institutions for individuals and bank corporate insurance are already a fact. Insurance companies operating on the Bulgarian insurance market protect the clients of banking and financial institutions. In 2022, Technavio published a report "Bancassurance Market by Product, Type, and Geography - Forecast and Analysis 2023-2027" (Technavio, 2022) covering only one of the distribution channels, namely bancassurance. In the same report, this market is projected to grow at a CAGR of 6.66% between 2022 and 2027 (Technavio, 2022).

## 7. CONCLUSION

The present study focuses mainly on the distribution channels in Bulgaria and the intended goal: to reject or confirm the authors' working hypotheses is ultimately achieved. As a result of the research and the analysis, the following conclusions were reached:

- the majority of commercial banks in Bulgaria that are involved in the distribution of insurance products do so primarily in the form of insurance agents, while a significantly smaller number of commercial banks in the country work with insurance brokers;
- in Bulgarian practice "bancassurance" is no longer just a theoretical concept, but an established practice that is currently underdeveloped, but in the context of a dynamically changing economic and market environment, indicates serious potential for development.

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## THE NEW SOCIAL LEADERS AND THEIR INFLUENCE ON THE FORMATION OF THE NEW SOCIAL SYSTEMS

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### **ABSTRACT**

*In this publication we set an objectively complicated task to analyse the opportunities of strategic decision-making during crisis by attempting to make a partial analysis of the ongoing crisis caused by the COVID 19 pandemic and the emerged military conflict between the Russian Federation and Ukraine. Crisis circumstances require societies to quickly rethink and develop adequate strategies and respectively to formulate strategic goals and plan processes. In many cases preliminary analysis and assessment are practically impossible /especially when it comes to natural disasters or crises/ and this requires a different operational order of problem solving, which includes formulating new unconventional goals and then implementing planning not objectified by a particular and accurate analysis. All this puts whole systems and societies to the test, and those who are empowered to manage the process – under high pressure from unforeseen circumstances and not always objective judgments. Which, in turn, creates a number of subsequent critical issues in the management process. The role of socially dominant leaders is of particular importance in societies, as well as in making various decisions. Their role in strategic decision-making is also examined.*

**Keywords:** *Strategic management, Global crisis, Strategies, Management process*

### **1. INTRODUCTION**

Setting goals and planning process actions in process management, and on a larger scale – strategic management during crisis is even more challenging. In accordance with the definitions of “crisis”, in the broadest sense, crisis management is of strategic importance, as it is always a matter of rescuing and surviving of people, territories, sites, etc. On the one hand, crisis management corresponds to the principles of general management, but on the other hand, it is complex enough, which derives from the fact of rapidly and dynamically changing environment – both national and international. This is most often and clearly observed during crisis circumstances that affect a very large part of the population of a country, region, continent or even the whole world. Crises have a diverse nature, both in scope and in nature, and their management is correlated with this. Different options are considered for the development of strategies in crisis situations, depending on whether they relate to one administrative area, country, group of countries or cover the world.

### **2. STRATEGIC MANAGEMENT IN TIMES OF GLOBAL CRISIS**

Global crises are usually large-scale, both in terms of territory and their nature, and challenge many countries, existing alliances of different nature –political, economic, military or others. In every crisis, people are most affected, i.e. the individual, regardless of which of the above structures they belong to and what their obligations are. Linus Carl Pauling, an American chemist born in German, winner of the Nobel Prize in Chemistry and Nobel Peace Prize winner, said: “Nations keep agreements, keep their treaties so long as they continue to do them good”. Unfortunately, however, when crises emerge, especially global ones, keeping certain contractual relations is not always doing good. Crises are characterized as risks with a high degree of uncertainty, disruption of the interaction between the factors of each system and high dynamics. Violation of the values of all social groups is also an important part of the development of the crisis.

The development of any crisis does not begin from the moment of the violation of the respective balances, but from the moment when the society prepares for it in its organizational structure. The principles that are followed in crisis management are related to speed, risk assessment, analysis, planning and impact. The implementation of all strategies and the achievement of all goals must definitely pursue the preservation of maximum values for the good existence of the people. The assessment of actions and possible perspectives is objectified by certain criteria and indicators. The fairness and accuracy of each assessment may be different, as well as different in accuracy and correctness for different groups of people, even for a particular individual. This questions or at least creates discomfort in the formation and implementation of each step of the strategy, regardless of whether it is implemented on a limited scale without significant fluctuations in the internal or external environment or in a situation of general and active dynamics. In every case or in any specific situation, the use of objective, measurable and realistic goals in the implementation of strategic management is of paramount importance and a task with a high degree of complexity. This directly corresponds to the planning of certain actions and activities in order to be able to meet the strategic goals to the maximum extent. Crisis circumstances require societies to quickly rethink and develop adequate strategies and respectively to formulate strategic goals and plan processes. In many cases preliminary analysis and assessment are practically impossible /especially when it comes to natural disasters or crises/ and this requires a different operational order of problem solving, which includes formulating new unconventional goals and then implementing planning not objectified by a concrete and accurate analysis. All this puts whole systems and societies to the test, and those who are empowered to manage the process – under high pressure from unforeseen circumstances and not always objective judgments. Which, in turn, creates a number of subsequent critical issues in the management process. All this definitely does not define this process as non-strategic, but puts it in a different environment. The strategic nature is determined at least by the fact that it directly or indirectly concerns a very large group of people, and that it determines the actions of one or more systems. In the last few years, such global crisis has become the pandemic caused by COVID-19. It has forced societies to make certain decisions of strategic nature to overcome the situation that threatens the lives and health of people around the world. It is more than obvious that the applied strategic approach includes many factors that change in the different periods of the crisis and seems to decompose the crisis itself into smaller elements in nature and scope. This does not change the strategic goal that is protecting human life and health. Undoubtedly, each country has its own crisis response programmes and plans, but it is important whether those states with power to govern societies are able to quickly and accurately assess the changing environment, to implement these programmes and plans adequately, and last but not least to reformulate their strategic goals and plans and put them at the service of the respective community. The implementation of any crisis management strategy is directly dependent on the capacity of its managers, both administratively and financially. The realities of the last few years have shown that not everyone can cope with this critical governance process in a relatively complex and difficult situation. Everyone determines their actions for the benefit of their community, but not everyone has the financial and material ability, and last but not least, the intellectual scientific capacity to achieve all this. Imbalances, even without using the specific statistics, are present and show significant differences. Even in global crises, some societies cope faster with the specific crisis circumstances, while others more slowly. For some societies the consequences are quite severe, and for others – relatively acceptable. All of them have faced certain consequences, which must be assessed after the crisis situation in order to take appropriate corrective actions. It would be difficult to explain the speed of corrective action in different societies. This, in turn, corresponds to the ability to reformulate certain goals, as well as the ability to achieve them effectively.

Linus Carl Pauling said: “If you want to have good ideas you must have many ideas. Most of them will be wrong, and what you have to learn is which ones to throw away”. The world-famous chemist drew his conclusions based on the accumulated knowledge, experience and sufficient information, which helped him define the problem that the lack of a sufficiently large set of ideas from which to select those worth implementing leads to significant difficulties. The transfer of ideas, algorithms or the copying of entire processes from one society to another has historically shown that it does not always or at least in most cases does not mean good outcome. Scientifically based approbation of something or a process is too complicated when we talk about strategic management of social processes. Social processes practically include all management systems and their management has its high complexity at almost all stages, as well as a very complicated mechanism of influence. The second example of a high scale crisis that is currently taking place is the situation in Ukraine. By its nature, it is political, but accompanied by economic and social issues. It is regional in scope, but with signs of becoming global. The complexity of the political situation because of the military conflict between Russia and Ukraine puts societies in another crisis situation. Again, it cannot be defined as normal, so the existing crisis management plans cannot be implemented or even if it is possible – only partially. This places certain restrictions on societies when reformulating their strategic decisions and implementing effective strategic management. Analyses of this crisis are divergent and at this stage do not allow to develop a unified strategy for resolving it, precisely because political and military crises are among the most complex in the world. In addition, this crisis is multipolar and besides the two countries directly involved, it effects many other countries, alliances, each with its own strategic goals, inconsistent with the others or without any diplomatic rapprochement so far. I would like to draw attention to an analysis of the Bulgarian professor Marusya Lyubcheva dated February 25, 2022, published on the Internet portal Pogled.info, which describes a certain chronology of this conflict and tracks the change of certain relations from strategic partnership to military conflict (2023a). "In the years when Bulgaria joined the European Union, the European Union was developing documents for a strategic partnership with Russia. Until 2009, the Strategic Partnership Report with Russia went through discussions in the European Parliament and was structured on trade, economy, energy, climate change, research, education, culture, security, including the fight against terrorism, non-proliferation of nuclear weapons and conflict resolution in the Middle East. Discussions covered Russia's accession to the World Trade Organization, which took place several years later. Russia was part of the Black Sea Synergy, the comprehensive report that placed not only the six Black Sea countries but also the wider Black Sea region in an important region for the European Union. Until the moment the European Union made a reorientation towards the Eastern Dimension or Partnership. The Black Sea region was forgotten and until 2018 it remained with only one report after the Synergy, delayed in its implementation. Everyone had high hopes for the Eastern Partnership. The signing of declarations of closer co-operation between the European Union and Ukraine, Belarus, the Republic of Moldova, Georgia, Armenia and Azerbaijan organized their relations. It was also part of the neighborhood policy, defined by J.M. Barroso as “forming a circle of friends” and was implemented for the purpose of mutually beneficial economic and political relations between the European Union and the neighboring countries. The discussion also covered the South Caucasus region. The Eastern Partnership together with the Strategic Partnership between the European Union and the Russian Federation, offered a new approach to East-West relations, based on cooperation and mutual support for building a more secure and sustainable world order. Until it became clear that the idea was not purely European. The limit was in 2013 - Ukraine. When the aspirations of the Eastern Partnership countries for NATO membership began to dominate and displace the principles of the original idea. Many of the iconic politicians in the European Union at the time began to talk about modifying the Eastern Partnership.

However, the events in Ukraine took place. Today we call them a “revolution”, but in 2013 they were not named that. Only a few MEPs waved the Ukrainian flag in plenary and set out on a revolution in that country. There were also different opinions. And no one has the right to forget that. Personal archives also speak. Artificial and one-sided support of these events, without trying to solve the arisen problems through diplomacy. One conflict always involves at least two sides. And this conflict involved many countries. So, resolutions to impose sanctions were issued, one after the other, negotiations took place, certain pawn candidates were imposed in the elections in Ukraine, the government was financed without proper control as to what for and how the funds are used, funding of foreign NGOs that pursue policies not typical even for Ukrainians. Surely these backstage schemes will come to light one day, because the documents proving it are still there. Tension that has transformed the strategic partnership into a constantly evolving sanctions regime, in which the European Union has participated more and more. Economic crisis, energy security strategies that went wrong, difficult negotiations on climate change, not very successful foreign policy, complicated negotiations on the migrant crisis, etc. Despite attempts to come to an agreement, incl. Minsk agreements (which Ukraine has long refused to fulfill), the European Union has not done everything necessary to save itself. Surely, not all countries are democratic, according to officials in the European Union or the United States, but nowhere can democracy be imposed by force or behind the scenes. If it is necessary to force it, the risk of identity destruction or removal of dissidents is particularly high. Many people today are contemplating and looking for the ones to blame. For years, Europe, including Ukraine, has been guided by various desires, incl. the desire to bring back the attitudes to certain groups of people characteristic for the years of fascism. Who condemned or sanctioned them? Who condemned the so-called Maidan? Did the truth about the so-called Maidan come out? It turns out that we, Europeans, have not only supported the imposition of democracy and freedom. We imposed someone's interests, along with other external forces. The situation required a lot of strategic vision and assessment, which was the possible outcome. It required leadership devoid of the black and white thinking. There are at least two sides in a conflict, but this conflict involved more than two countries. We are all in this conflict. Now no one has the right to just blame”. The complexity of this situation is determined by the special dynamics, as well as by the fact that societies and countries have different assessments of what is happening. Making quick decisions in this case is necessary, although there is a high risk that they would be ineffective. The strategic goals for overcoming this crisis are inconsistent due to the fact that the societies determine their strategic policy first of all in terms of national interests and then their belonging to certain political unions. The development of the crisis seems to be on parallel axes, and the complexity of the development of the economic and information component changes the attitudes and interests of the respective societies, as well as the consequences of certain strategic decisions. The restriction of certain freedoms related to access to reliable information is reminiscent of the Cold War. And this is an element of implementing the strategies of all participating countries. This objectively dooms the people from the respective community to the one-sidedness of the received information and the lack of at least partial objectivity for its comparison. Probably such deep military crises create conditions for shifting the democratic conditionality and applying the elements of the tactical military art. Whether they give the appropriate result is difficult to predict when you are part of a crisis situation. All political leaders who are called to govern societies carefully determine or rather justify good or bad decisions and strategies they prepare for crisis management, with the national security of their societies. In any case, this has the greatest weight in determining the relevant strategic decisions, but they are not always adequate to the respective realities inside and outside the respective societies. Last but not least, the preparedness of the various levels of government is a response to the crisis.

According to Linus Carl Pauling, “Science is the search for truth, the effort to understand the world: it involves the rejection of bias, of dogma, of revelation, but not the rejection of morality.”(2023b). Do scientists play a part in crisis management and what is their role? They definitely do! The role and mission of scientists is not only to support this process, but to be part of the process of developing such strategic decisions in management, which would as much as possible and as quickly as possible meet the expectations of societies. This raises expectations about whether scientists are able to generate good enough ideas to convince societies about their usefulness and to suggest ways to effectively implement them. Due to the knowledge of the processes, the analytics with which scientists work and the ability to analyze databases, as well as the facts about each crisis, scientists can be at the forefront of the crisis management model. Another question is whether management elites rely on scientists or crisis management is done with other tools that do not involve scientists that much. It is a question of relevance, of conformity assessment, of systematicity, of justification and of the application of two principles which are applied in the technological sciences, namely the “principle of reasonable sufficiency” and the “principle of synergy”. Their implementation can “alleviate” evolving crisis situations, even the one we quoted above (2023b). All this is a task of paramount importance and it must be carried out constantly, especially in times of crisis. Today, when societies are divided and set precedents for public judgement of one party or another, give certain qualifications, I believe that international scientific forums are the time and place for such discussion to suggest solutions and proposals. Restricting the participation of both (depending on who organizes the scientific forum) is unacceptable and rather offensive and does not create opportunities for the best prepared and most informed environment to fulfill its mission as an innovator (2023b). And because I am a chemist, I will still use the words of Linus Carl Pauling, who said: “I recognize that many physicists are smarter than I am - most of them theoretical physicists. A lot of smart people have gone into theoretical physics, therefore the field is extremely competitive. I console myself with the thought that although they may be smarter and may be deeper thinkers than I am, I have broader interests than they have”. Objectively good strategic decision-making requires, above all, good preparation of the people whose responsibility is to make them, and especially of the teams that provide essential scientific and intellectual resources for making the same.

### **3. THE ROLE OF SOCIALLY DOMINANT LEADERS IN THE EMERGENCE OF CRISES**

The fear of happening realities turns out not to be exaggerated not only in our realities but also in our accompanying being. The confusion of conflicting and ambiguous messages that put us in a state of disarray as people who have clear and coherent logical thinking increasingly feeds our fears. Although we are used to the half-baked and even sometimes lyrical political messages that are thrown as messages on the political market in Bulgaria and Europe, lately we feel more and more a strong concern from the more balanced and more diplomatic political leaders. Their personal and political prudence has put us in the extremely unattractive position of waiting a long time for something to happen, and this against the background of their becoming public knowledge of their wanderings in search of certain solutions for which they have proved to be quite unprepared. Personal and collective living in yet another political system has exhausted its significance both for those who consume it and for those who observe it from the outside. The inability to self-preservation and to react to the changing world is an unequivocal answer that she is looking for her new and completely different transformation. These periods of transformation are usually accompanied by severe and painful transitional states, which are accompanied by many and varied conflicts. No matter how simplistic all this sounds, it has a definite and strong logical, and not only, basis - we should not underestimate our historical memory in this direction, which would prove these statements of ours with a high degree of



relativity. The immediate question would be - how and what happens to the political reality? The next one is not at all useless - but what happens to ourselves? And if the answer to the second question is relatively easier, then the answer to the first is of a much more complex nature, both in substance and process nature. Eventually, we will have to go through periods of active transformations of our entire social system in one way or another, which will also include a change in political models of existence. If by a social system, we understand the whole set of relations, it would be practically more grounded and more realistic. The failures and ups and downs of existing political realities are many and have their essential differences. Comparing and explaining them is important, as it can bring some benefits in our movement forward, as well as explaining the new processes taking place. These processes will bring elements that we know well and even read and explain well, but also elements that will surprise us and will be new with their high sensitivity. The defective political reality will try to preserve some of its elements, which it will successfully carry over into future periods. This is of course quite uncertain, even unlikely, because these elements exist in one relationship with all others, and even if some of them survive in one form or another, they will have a different relationship with others that are now created. If we are in the position that the defects in these political realities have already passed the possibility of being repaired or tamed in the sense of the accumulated grievances of the people, then their destruction will occur at an avalanche speed. The consequences of the defective political reality will be felt with different strengths and to different degrees. This is quite reasonable because they will be at different distances from the source of these processes. These influences will have a set of fluctuations that will be misunderstood by those involved because they are new and unpredictable in nature and consequences. Giving organic examples of these processes in specific concreteness as signals of what is happening can be found even now. We have built up a certain sensitive tolerance to different processes because we do not know them, and we do not have enough time to explore them. All of this comes against a background of numerous emerging signals from different places. Their power is increased by the ability of those who create them and those who transmit them. Certainly, those with the best array of active elements are the best and fastest at creating and transmitting these signals. Their creators are in a process of struggle not for survival, but for dominance. This process will form groups that will try to create new dependencies that will define the new social reality. Determining the zones of influence will also give rise to the social importance of those who are contenders for certain leadership in this environment. More important will be how these new socially dominant leaders will determine or create the system of social relations that will determine the creation of new social systems. Political realities or systems will be the consequence of these new social relations. Turbulences in these formed new social systems will last from a historical point of view for a very short time and from the point of view of the participants in them - for a very long time. These processes have a high complexity and are almost unpredictable as a final result. Even if we have information and sufficient data about their progress, the power of influence of certain elements cannot be accurately and faithfully defined and measured, which will generate frequent and unpredictable changes. That the social system is changing under the pressure of the multitude of social defects is almost visible to all, and is felt in certain and varying degrees. Much more interesting is how we will manage to pass through this long and sufficiently unpredictably difficult period, which we can unequivocally define as a process. It is unlikely that we will be able to have the kind of preparedness that would put us in a sufficiently favorable position so that everything happens in a certain acceptability for all participants. Anxiety grows with the constant multi-directionality of signals and with the succession of emerging social defects in the system. We know that a system - whatever it may be - must have a certain efficiency, which is also associated with a particular financial significance.

Whether those trying to be the leading elements in the creation of the new social system have the knowledge and willingness to accept the dependencies that have existed so far is difficult to predict. It is obvious that this system of social efficiency also creates problems in its existence. The problems that can be defined are behavioral. As unacceptable as all this may sound, all too often the behavioral patterns of a particular individual have so altered a particular social system that it has been preserved long enough without interest in any effective relationships. It is possible that certain behavioral elements again sensitively influence the already started process and bring it to a certain stage in which the new realities will have a different meaning. The easiest conclusion would be to wait and see what happens in the end. But whether and how we will have this opportunity and whether as direct participants we will be able to evaluate this process? It is best to make some effort to ensure some preparedness for all of this. Even if we appreciate and realize that the signals that we will create and transmit will be relatively small in strength, perhaps we should consider that it would be much greater if there is an essential content that is a response to these ongoing processes. Historians with a dose of authoritative academic conviction argue that history always moves forward. There is a certain timidity in their current messages, combined with an unintended sense that history may be repeating itself in one form or another. If you answer at least part of the questions asked, or at least think deeply and unprejudiced about them, it can protect us from those repetitions that we would not like to happen (Terziev, 2022a; 2022b; Terziev, Lyubcheva, 2022c; Terziev, 2022d; 2022e; Terziev, Solovev, 2022f; Terziev, 2022g). From a historical point of view, there are enough examples in which transformations and changes in social systems were mostly influenced by new social leaders. This has drastically changed the social systems themselves and created qualitatively new and different conditions for their existence and development. Another issue is their sustainability over time. A characteristic example is the social system of socialism. Despite the knowledge of its theoretical foundations, its leaders in the Union of Soviet Socialist Republics exerted a major influence. Such are Vladimir Ilyich Lenin, Chairman of the Council of People's Commissars of the Union of Soviet Socialist Republics, Joseph Vissarionovich Stalin - General Secretary of the Central Committee of the Russian Communist Party (Bolsheviks), Chairman of the Council of Ministers of the Union of Socialist Republics (from March 15, 1946), Nikita Sergeevich Khrushchev - First Secretary of the Central Committee of the Communist Party of the Soviet Union, Leonid Ilyich Brezhnev - General Secretary of the Central Committee of the Communist Party of the Soviet Union, etc. Socialism is a political philosophy and movement encompassing a wide range of economic and social systems (Busky, 2000a) which are characterised by social ownership of the means of production (Busky, 2000a), as opposed to private ownership (Horvat, 2000b; Arnold, 1994a; Hastings, Mason, Pyper, 2000c). As a term, it describes the economic, political, and social theories and movements associated with the implementation of such systems (The Free Dictionary, 2023c). Social ownership can be public, community, collective, cooperative (Sherman, Zimbalist, 1988; Rosser, Rosser, 2003a; Badie, Berg-Schlosser, Morlino, eds, 2011a), or employee (Horvat, 2000b; O'Hara, 2003b). While no single definition encapsulates the many types of socialism (Lamb, Docherty, 2006a), social ownership is the one common element (Arnold, 1994a; Hastings, Mason, Pyper, 2000c). Socialism is traditionally placed on the left-wing of the political spectrum (Left, 2023d). Different types of socialism vary based on the role of markets and planning in resource allocation, on the structure of management in organizations, and from below or from above approaches, with some socialists favouring a party, state, or technocratic-driven approach. Socialists disagree on whether government, particularly existing government, is the correct vehicle for change (Nove, 2008a; Docherty, Lamb, eds., 2006b). Socialist systems are divided into non-market and market forms (Kolb, 2007). Non-market socialism substitutes factor markets and often money with integrated economic planning and engineering or technical criteria based on calculation performed in-kind, thereby producing a different economic

mechanism that functions according to different economic laws and dynamics than those of capitalism (Bockman, 2011b). A non-market socialist system seeks to eliminate the perceived inefficiencies, irrationalities, unpredictability, and crises that socialists traditionally associate with capital accumulation and the profit system in capitalism (Nove, 1991). Market socialism retains the use of monetary prices, factor markets and in some cases the profit motive, with respect to the operation of socially owned enterprises and the allocation of capital goods between them. Profits generated by these firms would be controlled directly by the workforce of each firm or accrue to society at large in the form of a social dividend (Marangos, 2004; O'Hara, 2003b; Pierson, 1995). Socialist parties and ideas remain a political force with varying degrees of power and influence on all continents, heading national governments in many countries around the world. Socialist politics have been both internationalist and nationalist; organised through political parties and opposed to party politics; at times overlapping with trade unions and at other times independent and critical of them, and present in both industrialised and developing nations (Newman, 2005a). Social democracy originated within the socialist movement (Ely, 1883), supporting economic and social interventions to promote social justice (Merkel, Petring, Henkes, Egle, 2008b; Heywood, 2012). While retaining socialism as a long-term goal (Roemer, 1994b), since the post-war period social democracy came to embrace a mixed economy based on Keynesianism within a predominantly developed capitalist market economy and liberal democratic polity that expands state intervention to include income redistribution, regulation, and a welfare state (Badie, Berg-Schlosser, Morlino, eds., 2011c). Economic democracy proposes a sort of market socialism, with more democratic control of companies, currencies, investments, and natural resources (Smith, 2005b). The socialist political movement includes a set of political philosophies that originated in the revolutionary movements of the mid-to-late 18th century and out of concern for the social problems that socialists associated with capitalism (Lamb, Docherty, 2006a). By the late 19th century, after the work of Karl Marx and his collaborator Friedrich Engels, socialism had come to signify anti-capitalism and advocacy for a post-capitalist system based on some form of social ownership of the means of production (Gasper, 2005c; Giddens, 1998). By the early 1920s, communism and social democracy had become the two dominant political tendencies within the international socialist movement (Newman, 2005d), with socialism itself becoming the most influential secular movement of the 20th century (Kurian, ed., 2011d). Many socialists also adopted the causes of other social movements, such as feminism, environmentalism, and progressivism (Sheldon, 2001). While the emergence of the Soviet Union as the world's first nominally socialist state led to socialism's widespread association with the Soviet economic model, several scholars posit that in practice, the model functioned as a form of state capitalism (Chomsky, 1986; Howard, King, 2001; Fitzgibbons, 2002). Several academics, political commentators, and scholars have noted that some Western European countries have been governed by socialist parties or have mixed economies that are sometimes called “democratic socialist” (Barrett, ed., 1978; Sanandaji, 2021). Following the end of the Cold War and the revolutions of 1989, many of these countries have moved away from socialism as a neoliberal consensus replaced the social democratic consensus in the advanced capitalist world (Sanandaji, 2021), while many former socialist politicians and political parties embraced “Third Way” politics, remaining committed to equality and welfare, while abandoning public ownership and class-based politics (Socialism, 2023e). Socialism experienced a resurgence in popularity in the 2010s, most prominently in the form of democratic socialism (Judis, 2019a; Cassidy, 2019b). A vivid example of a new social leader who, through his personal views, changes and even helps to cease the existence of a social system. This is Mikhail Sergeevich Gorbachev - General Secretary of the Central Committee of the Communist Party of the Soviet Union and President of the Union of Soviet Socialist Republics.

In implementing his domestic policy, Mikhail Gorbachev tried to implement economic reforms that would contribute to a change in the standard of living. This is the so-called "perestroika" policy. His reforms were ineffective and failed to achieve substantial direct results and change the existing system of planned and command economy. It would be important to study the ongoing modern processes that require rapid and sudden changes in social systems. Whereas in the recent past, there were certain indications of the changes taking place that could be examined and analyzed, now the changes that are occurring are sudden and rapid. The emergence of new social leaders creates conditions through their behavior, ideas, interests, and even a set of irrational views to transform the existing social systems. The influence of the new social leaders can be presented as sensitive and in many cases decisive for the transformations taking place. It is necessary to identify a new criterion apparatus that objectively and quickly enough gives us true and accurate information. The reliability of this venture is rather difficult to determine. Social processes in a period of severe crisis situations are accompanied by a high speed of their progress. Their detailed and systematic description and subsequent analysis are almost impossible. The search for specific research approaches is mandatory in these situations. The study of the behavioral patterns of dominant social leaders is of particular importance. Here any researcher would face two sets of problems. The first is related to obtaining sufficiently accurate and true information, which is handled by statistical methods of analysis, as well as sociological methods. This will create a particular difficulty in using both of them. The accessibility of this type of information and data is difficult to collect, but even if they succeed somewhere, it will be filtered in a special way by the relevant state-engaged security services. The second group of problems will arise when assessing the development of the behavioral model of the respective individual who has acquired the role of a socially significant and dominant leader. Knowledge and his personal characteristics will have undergone various transformations during the period of his rule, namely, these characteristics will not have been public enough, and the information we will get will be from the mass media or other public meetings. Overcoming the two groups of difficulties may in certain situations be insurmountable and the use of similar approaches for the implementation of research activity – is impossible. Regardless of the research situation in which we will find ourselves, it is necessary to look for opportunities to study the influence of socially dominant leaders on social processes. Similar and analogous examples from a historical point of view can be cited with quite success. Even if we conditionally accept the two world wars as such severe crises, the actions of the leaders who participated in these processes cannot always be explained logically and do not carry their economic, political, and other arguments. Conditionally, these are also social processes that have changed both their direction and their speed as a result of socially dominant leaders. Here we should make one important clarification, namely, that they took place too slowly, according to the current social processes. The factors of the external and internal environment have changed both in their essential characteristics and their quantitative dimensions. Some of the researchers would pay particular attention to the study of environmental factors that undoubtedly have and will continue to have an impact on ongoing social processes. Another question is to what extent they influence the decisions and behavior of the new socially dominant leaders. This can be established too late and only at the end of a certain stage of a certain social process. The tendency but socially dominant leaders who are empowered to make decisions and have sufficient resources (political, economic, financial, etc.) tend to make decisions of an operational nature in crises, in which decisions exclude consideration of the environment but rather represent motives other than political and economic logic. Usually, when a crisis occurs, the power tools focus on a small group of people who follow and have to bear the burden of decision-making in an extreme situation. In a cursory analysis of the social processes that are taking place in the world at the moment, one can make a relatively true conclusion that they are predominantly managed by the new socially dominant

leaders. The use of the concept "the new socially dominant leaders" has a sacred convention, because the individuals we now define as dominant social leaders may have been leaders of states, corporations, unions, etc. in previous periods, but only now have acquired such importance. Undoubtedly, ongoing social processes are due to active changes in recent decades in political, economic, military, and financial aspects. The results of all this will be manifested to the greatest extent in the imposition of new social rules in the new social systems. The inevitability of imposing new regulatory functions in the structure of new social systems is almost obvious. Resistance to change is also evident. Evolutionary social processes currently dominate revolutionary social processes. Perhaps we should make a stipulation that these social processes are inevitably associated with local military conflicts, financial cataclysms, or political instability of certain regions, but not with a continental or worldwide presence of social discomfort. The imposition or the possibility of the establishment of a new social system with new rules cannot help but be accompanied by certain negative actions as well as consequences. Unfortunately, the scientific community will study, analyze, and predict all this too late. The utility of such an undertaking at a later stage of time will have its significance, but it will be far less than if it happened now. The importance of such action and research in this direction is of particular importance to each human individual as well as to different communities. Even if these studies mark little progress at the present stage, they must seek their place, serving as an element for the preparation of our societies for a new interaction in the new social environment. The understanding that everything should be left at the current level of preparedness could prove disastrous for some of our societies. Moreover, there is sufficient reason to believe that some of the leaders of the smaller communities, or those who will not play a dominant role, will prove to be too unprepared, even unsuited to the new social situation.

#### 4. CONCLUSION

Crisis management is too complex in today's dynamic and rapidly changing environment. In the last few years, we have lived in an environment of uncertainty and many ongoing processes that have a significant impact on the environment. The presence of these processes requires serious attention to the decision-making process in severe crises. This turns out to be a particular challenge both for the people who are empowered to make these management decisions and for the experts who study these processes. The certain social importance of the consequences of making the relevant decisions places them with a high priority of importance. All this implies new preparation and qualitatively different expertise. That leads to the creation of new technology for making such decisions. Scientists, researchers, managers, and policymakers must make additional and focused efforts to create such technology and a set of related procedures (Terziev, Georgiev, Ivanov, 2022h; Terziev, 2022i; 2022j; 2023f; Terziev, Georgiev, 2023g; 2023h; Terziev, 2023i).

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## INVESTORS' PERCEPTION OF SUSTAINABLE INVESTMENTS

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### **ABSTRACT**

*Sustainable investing (ESG) encourages companies to embrace sustainable principles that ensure long-term social and financial benefits. The implementation of triple bottom line means that companies should measure their social and environmental impacts in addition to focusing on financial performance and profit generation. Developing sustainable investment products has created an opportunity for investors—individuals, corporations, or institutional investors—to achieve financial benefits by making their investments more sustainable. Investors can invest in ESG stocks, ESG bonds, ESG index funds, or ESG ETFs. The focus of investors is on investment returns and increasing their wealth. Therefore, the main goal of this study, based on a sample of Croatian companies through a questionnaire, was to investigate participants' perceptions of: 1) sustainability, as one of the key elements of the business model and impact on the financial performance; 2) investments in sustainable financial products; 3) plans for the new green or sustainable financial instruments; 4) sustainable investments like short-term or long-term investments. The survey was a tool for investigating investor perception of sustainable investment. The main hypothesis that incorporating sustainability aspects into the company's business model enables the creation of a balanced business model that increases positive company performance measured by shareholders' wealth and ESG criteria is accepted. The main contribution of this paper is an empirical study of 105 respondents on practices and the perception of sustainable business and investments in Croatian companies. The capital market in Croatia is slowly adapting to global sustainable trends with the first sustainable bonds. More and more companies are incorporating ESG criteria into their business models and promoting sustainability.*

**Keywords:** *ESG business, ESG financial products, ESG investors, sustainable bonds, sustainable investments*

### **1. INTRODUCTION**

Sustainable investing involves considering environmental, social, and corporate factors (ESG factors) when making investment decisions in a company. Sustainable investing does not necessarily mean a reduction in financial returns. Investors can employ various strategies to build and diversify their portfolios to ensure financial success. Sustainable financial products, such as European Green Bonds (EU, 2023/2631) marketed as environmentally sustainable and sustainability-linked bonds, can support companies in financing their transition toward sustainability. In today's world, facing increasing environmental, social, and economic (ESG) challenges, it has never been more crucial for society as a whole, especially for companies as leaders in economic prosperity, to take a more active role in addressing ESG issues. Companies need to incorporate ESG criteria into their business models and strategies. While Friedman in 1970 (Elrick & Thies, 2018) asserted that the primary task of a company is to create wealth for shareholders, this can be applied to investors in any financial product. However, in the face of current ESG challenges, it is undeniable that companies expect to operate well and do good for the community. Science-based solutions to achieve Net Zero by 2050 require substantial investments. Sustainable or socially responsible investing has become a global trend, reflected in the increasing number of products offered to investors. The rate of sustainable investments (MSCI ESG research, 2023) has steadily increased, reaching two and a half times the total primary market value of USD 1.5 billion by 2022, with announcements covering an additional

USD 20 billion up to 2030. Taking care of stakeholders can focus on environmental and social responsibility, reducing environmental footprints, supporting initiatives to protect natural resources, communities, and workers in the supply chain, and advocating for human rights and social justice causes. Sustainable finance (Ziolo et al., 2022) impacts building a sustainable economy, and the sustainable finance model enhances the alignment of the financial sphere with the real economy. Intensive climate change monitoring began in 1992 in Rio de Janeiro, adopting the Sustainable Development Goals (United Nations, 2015). The European Union established the European Green Deal as a foundation for a green transition, with goals including climate neutrality by 2050, strengthening the economy through green technology, creating a sustainable industry, and reducing pollution (European Commission, 2019). The Paris Agreement of 2015 created investment opportunities in emerging markets by 2030. Private investors and businesses can benefit financially by making their investments more sustainable. Some 75% of organizations (Deloitte, 2023) have increased their sustainability investments over the past year, nearly 20% of whom say they have increased investments significantly. As of June 2023, there were over 850 registered (active) nature-based projects in the voluntary carbon market, focusing on protecting and enhancing natural carbon stocks in forests, farmlands, and coastal ecosystems. Another 2,100 projects were already in development. Sustainable investing encourages companies to embrace the triple bottom line as a business concept. The triple bottom line (profit, people, and the planet) states that firms should commit to measuring their social and environmental impact rather than solely focusing on generating profit (Elkington, 1997). The main goal of this study, based on a sample of Croatian companies through a questionnaire, was to investigate participants' perceptions of (i) whether sustainability, as one of the key elements of the business model, can positively impact the increase in the financial indicators of the company; (ii) investments in sustainable financial products; (iii) plans for new issuances of green or sustainable financial instruments; (iv) whether sustainable investments are short-term or long-term investments in sustainable economic activities and projects. The contribution of this paper lies in empirical research on the practices and preferences of Croatian companies. ESG criteria pose challenges but also opportunities for all companies and investors.

## 2. LITERATURE REVIEW

The implementation of Regulation 2019/2088 (European Commission, 2019) on disclosures related to sustainability in the financial services sector and Regulation 2020/852 (European Commission, 2020) establishing a framework for facilitating sustainable investments are significant for financial services. In all investments, it is crucial to define sustainability risks—environmental, social, or governance events that, if they occur, could have a significant negative impact on the value of the investment. Successful investing relies on a correct assessment of the investment. However, the problem (Richardson, 1996, p.13) arises as most investors need to differentiate between price and value, a distinction crucial in ESG investments. For long-term investments, it is essential to buy quality (Richardson, 1996, p.19) and avoid what lacks value. Information on ESG criteria includes corporate ESG management disclosure, ESG ratings by rating agencies, news about corporate ESG activities, and more. Divergence in ESG ratings introduces uncertainty in decision-making (Berg et al., 2019). The lack of standardisation in ESG disclosures, reporting frameworks, and measurements, highlighted by Amel-Zadeh and Serafeim (2018), is addressed with the new Directive 2022/2464 (European Commission, 2022) and the adoption of European Sustainability Reporting Standards (European Commission, 2023). The number of organisations declaring responsible investment increased significantly from 63 in 2006 to 1714 in 2017, with assets owned or managed rising from \$6.5 trillion to \$68.4 trillion during this period (Daugaard, 2020).

Numerous studies explore the relationship between sustainability and various aspects, such as the economy (green, sustainable, circular), finance, green financing, or climate finance. The financial model for a sustainable economy (Ziolo et al., 2022) involves a comprehensive analysis of the factors and relationships between sustainability, economy, and finance. It proposes a triple-layered finance model for a sustainable economy, considering governance, society, and the environment from a sustainable perspective. The model of financing for the circular economy is in terms of sustainability, along with the model of sustainable finance 4.0. For Sustainable Finance 4.0 (Ziolo et al., 2022, p.932), sustainable value must meet the following relationship:  $T \text{ (total value)} \neq SV \text{ (sustainable value)} \neq F \text{ (financial value)}$ . According to Ryszawska (2016), sustainable finance's role is evolving from profit maximisation for shareholders to supporting sustainable development, a low-carbon economy, a green economy, and climate change mitigation. Through meta-analysis, Xu et al. (2020) found a significant positive correlation between green finance and enterprise green performance, with a moderate impact of region and company type on this relationship. Sustainable Finance 3.0 sees increasing investments in sustainable companies and projects to create long-term value for the broader community (Schoenmaker, 2018). Environmental risk, including climate risk, ESG risk, and financial risk, are regarded as equal risks in the decision-making process of investors and capital donors (Ziolo et al., 2022). Environmental implications, especially risks, have an impact on the financial system. Today, the ecological aspect is not the only important consideration; social aspects, especially bonds or guarantees typically allocated to the social finance category, are gaining significance. Zainullin et al. (2021) report explores the application of digitalisation methods in corporate culture to enhance the attractiveness of energy industry enterprises for ESG investment. However, individual investors, despite the differences, often need more financial literacy (Alaaraj & Bakri, 2020) and incur high costs for information awareness and acquisition (Blankespoor et al., 2019). ESG information integration is a new trend in investment decisions. ESG investing stimulates mainstream interest from individual investors (*Broadstock et al., 2021*), actively promoting ethical investment practices and being considered a way to improve portfolio performance, increase returns, and reduce portfolio risk. When creating a stock portfolio (Garrido-Merchán et al., 2023), it is crucial to consider financial performance and compliance with ESG criteria. Companies and individual investors can create portfolios of green shares or bonds, sustainable shares or bonds, ESG index funds, or ESG ETFs. By introducing financial products or corporate bonds to the market as environmentally sustainable, green bonds become a crucial financial instrument for funding environmentally sustainable projects. The proceeds from European green bonds should finance economic activities with a lasting positive environmental impact. Unlike green bonds, ESG-linked bonds do not limit the use of proceeds to eligible green categories but allow the borrower to apply the funds for general corporate purposes. Proceeds from social bonds should finance social projects, and by the end of 2019, the share of social bonds and sustainability bonds in total issuances of sustainable bonds reached almost 20%. The current market perspective suggests that social and sustainable bonds are becoming increasingly crucial for issuers and investors. ESG funds are investments evaluated based on environmental, social, and governance principles. Morningstar (Morgan Stanley Institute, 2023) classifies funds as sustainable if they focus on sustainability, impact investing, or ESG factors in their prospectus. The world market for sustainable (ESG) investment funds is continuously evolving, with the number of ESG UCITS funds in Europe and their net asset value steadily increasing over the past five years in response to a growing demand for sustainable investment. ESG mutual funds (Raghunandan & Rajgopal, 2020) invest in firms with stakeholder-friendly track records. Differences in traditional and alternative ESG ratings (Hughes et al., 2021) result from ESG theorisation variations, data sources analysed, weighting structures for rating aggregation, and controversy analysis.

ESG investments have attracted mainstream investors, with evidence suggesting that companies implementing ESG principles outperform others. Kumar et al. (2016) demonstrated the link between ESG factors and investment risk-adjusted performance. Integrating ESG considerations in investment decisions can mitigate uncompensated portfolio risks, making it a significant driver of shareholder engagement. Investment potential at the EU level was around 10.4 trillion EUR in 2019, making insurers necessary providers of investments needed to finance the transition to a low-carbon economy and achieve climate change goals (Mihelja Žaja & Tica, 2020). Borokova and Wu (2020) highlight the ongoing debate between those who believe ESG actions sacrifice financial returns and those who believe ESG practices ensure lower risk and better returns in the long run. An IPO (Hu et al., 2023) is essential for a venture capitalist to gain income, impacting resource allocation efficiency in the capital market. ESG investing is not a simple yes or no answer; it focuses on long-term risk-adjusted investment returns. Investors in European countries (Gavrilakis & Floros, 2023), except Italy, do not jeopardise their returns by investing in highly ESG-scoring firms.

### 3. METHODOLOGY

The main objective of this research was to explore respondents' opinions on several key aspects of sustainable investments and business models. The first was to investigate whether sustainability, as a crucial element of the business model, has a positive effect on increasing a company's financial indicators. Next was to investigate investors' perceptions of plans and investments in sustainable products. In the end, it investigates the perception of respondents on sustainable investments, long- or short-term investments. An online survey was conducted from June to the end of October 2023. The research sample consists of 105 respondents who answered the survey. The questionnaire consisted of three parts: a general part that referred to respondents' characteristics, a second part that referred to information on non-financial reports, and a third part that related to respondents' opinions about ESG investments. The first part included questions about respondents' characteristics, such as activity, size, and ownership. The second part included questions about non-financial reports, guidelines, and sustainability policies. The third part of the research questions the elements of ESG activities, plans and investments. Respondents used a five-point Likert scale: 1- do not agree at all, 2 - do not agree, 3 - neither agree nor disagree, 4 - agree, and 5 - always agree to answer some questions. The non-parametrical Kruskal Wallis H Test tested the hypotheses in the SPSS program. The research sample included 27% of micro-enterprises, 20% of small enterprises, 24% of medium-sized enterprises, and 29% of large enterprises. Regarding the sample structure, according to the activities, 25% are from the wholesale and retail and motor vehicle repair industry, 13% of the companies are from the manufacturing industry, and 51% are from professional, scientific, technical and services activities. Furthermore, 67% of the companies are private ownership with more than 50% domestic ownership, 25% the companies are private ownership with more than 50% foreign ownership, 5% are in mixed ownership with more than 50% private ownership, and 3% are companies in mixed ownership with more than 50% state ownership. In this survey, 34% of respondents must publish non-financial reports, 26% of them have been obliged to do so since 2017, 5% of respondents published voluntarily even before the introduction of the obligation in 2017, and 3% voluntarily published reports. 42% of respondents do not publish non-financial reports. The main variable is the Balanced Business Model in the Kruskal Wallis H Test. The Balanced Business Model consists of key aspects of sustainability, profitability, liquidity, and market growth (table 1). The highest grade, 3.90, got its key aspects of market growth, and the lowest grade got its key aspects of sustainability, 3.35. Balanced Business Model got an average grade of 3.75.

### Descriptive Statistics

	N	Minimum	Maximum	Mean
Business model	Statistic	Statistic	Statistic	Statistic
Key aspects of sustainability	105	1.00	5.00	3.35
Key aspects of profitability	105	1.00	5.00	3.83
Key aspects of liquidity	105	1.00	5.00	3.87
Key aspects of market growth	105	1.00	5.00	3.90
Balanced Business model	105	1.00	5.00	3.75

*Table 1: Key aspects of the balanced business model  
(Source: Author)*

### 4. RESULT OF RESEARCH AND DISSCUSION CONCLUSION

A non-parametrical Kruskal Wallis Test confirms the set hypotheses. Cronbach's alpha was calculated for each variable to test the scale's reliability. According to the general rule of thumb, the result above 0.8 is very good. Companies can measure their success in different ways. In this research, respondent rate how their company's measured success with the following variables: (i) profit, (ii) dividend or share of profit, (iii) taking care of the environment, (iv) taking care of the economic and social impact on the environment, (v) profit realized from a socially responsible business and (vi) donation and sponsorship to the community. The Kruskal Wallis Test does not work with the mean but with the rank of the variable. Table 2 shows the Kruskal Wallis Test for measuring the company's success.

Test Statistics a.b			
Success measured	Chi-Square	Df	Asymp. Sig.
Profit	14.207	4	.007
Dividend/share of profit	10.503	4	.033
By caring for the environment	27.173	4	.000
By taking care of the economic and social impact on the environment	28.542	4	.000
Profit realized from a socially responsible business	23.812	4	.000
Donations and sponsorships to the community	20.664	4	.000

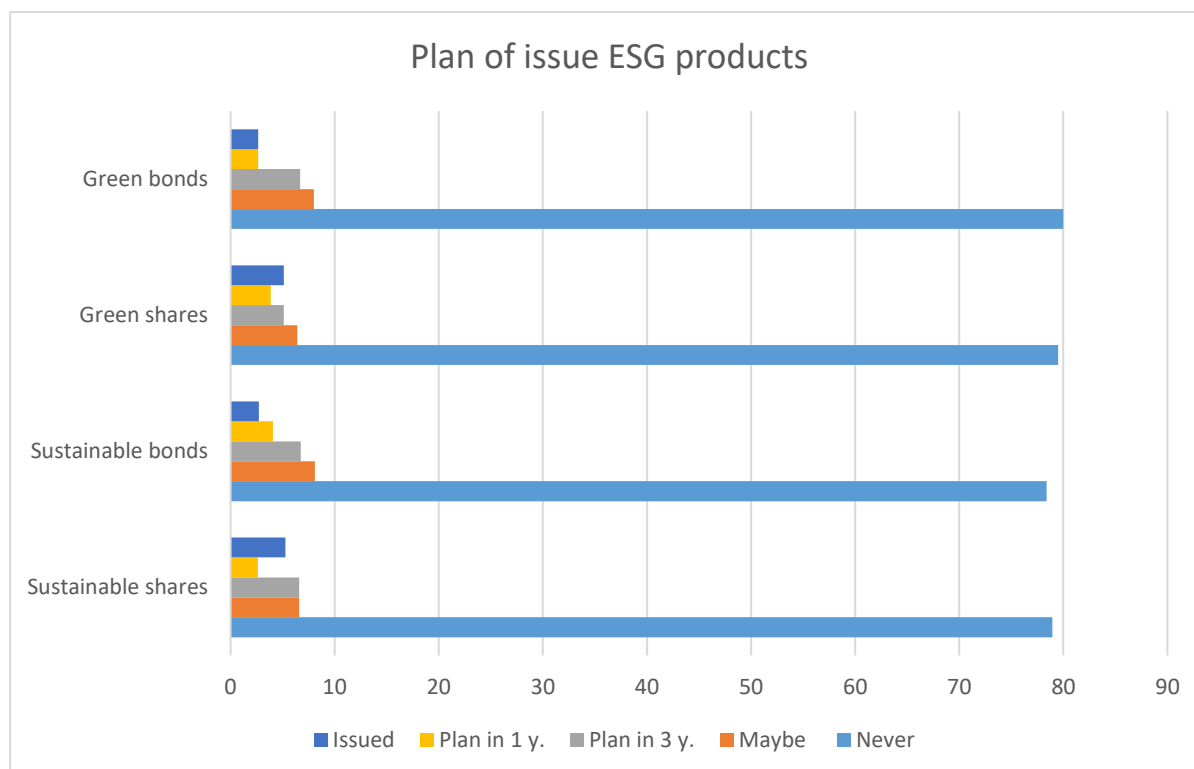
a. Kruskal Wallis Test

b. Grouping Variable: Balanced Business Model

*Table 2: Test Statistics Kruskal Wallis H Test  
(Source: Author)*

Results of the Kruskal-Wallis H test in Table 2 indicate a significance level of less than 0.01 for the variables: taking care of the environment, taking care of the economic and social impact on the environment, profit realized from a socially responsible business and donation and sponsorship to community (sig = 0.000), profit (sig = 0.007) and less than 0.05 for the dividends or shares in profit (sig = 0.033). According to the Kruskal-Wallis H test, hypothesis 1: The sustainability aspects incorporated into the company's business model enable the creation of a balanced business model that increases the positive company performance measured by shareholders' wealth and ESG criteria is accepted. Research confirms that a company's engagement in ESG practices often affects its returns. The G factor (Parikh et al., 2023) plays a significant role in increasing equity returns.

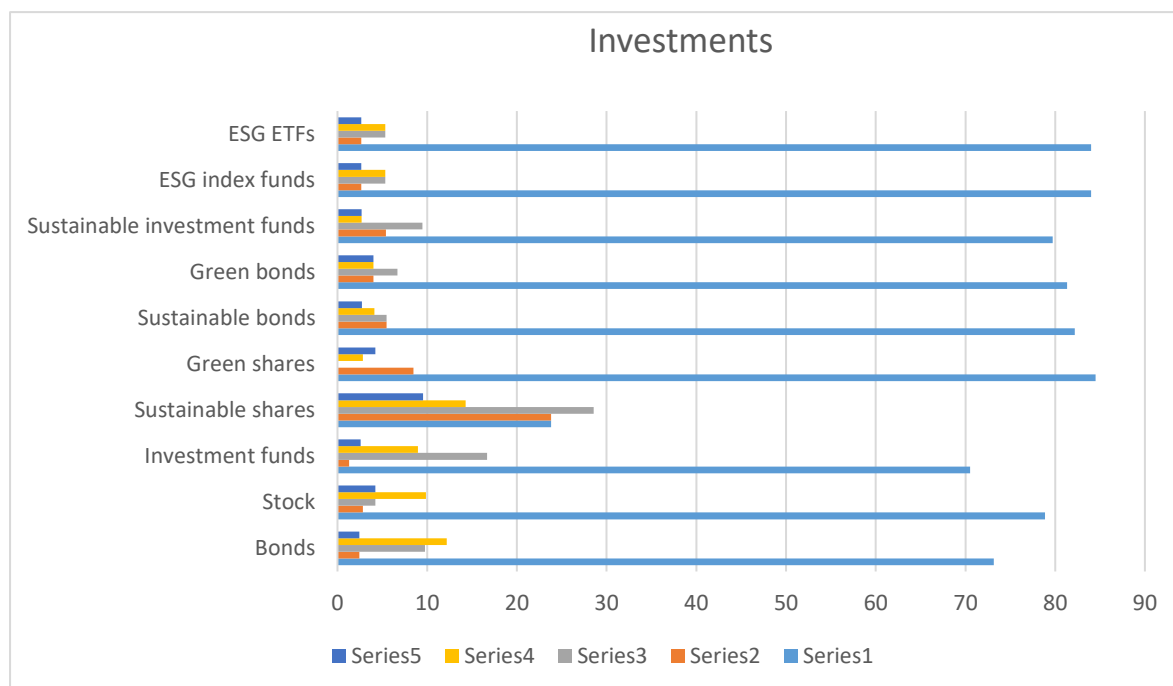
The G factor positively impacts returns, while the E factor negatively impacts returns. The S factor is essential in short-term investments. The same conclusion of the impact of the G factor on improving equity returns has been reached in a study by Broadstock et al. (2021). Companies in Croatia are increasingly embracing a green and sustainable agenda, initiating a robust investment cycle in green and sustainable projects valued at over one billion euros. The investment cycle focuses on the segment of renewable energy sources, primarily solar and geothermal energy. In addition to renewable energy, companies are actively investing in various ecological, social, and governance projects as part of their sustainable agenda. Many companies plan to issue green stocks or bonds, as well as sustainable stocks or bonds, depending on their investment plans. Graph 1 illustrates the plans of issuing green or sustainable stocks and bonds.



*Graph 1: Plan of issuing ESG financial products  
(Source: Author)*

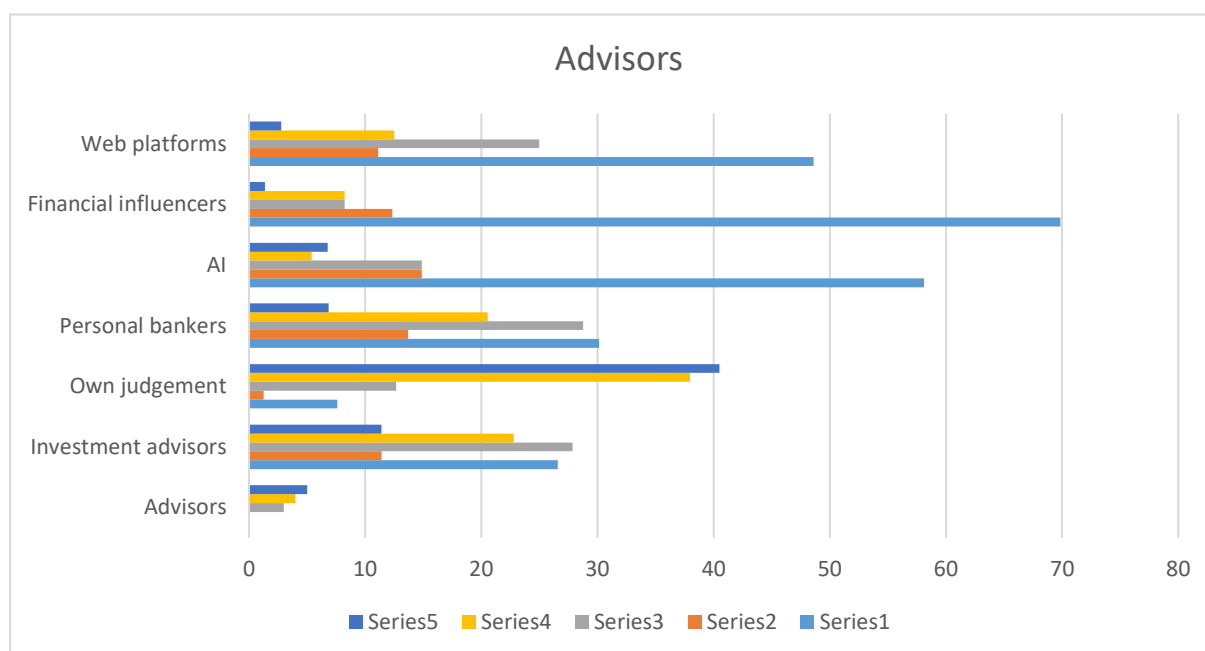
Graph 1 shows respondents' plans for the issuing of ESG financial products. Most of them, 78% to 80%, said they have yet to plan to issue some ESG financial products. Only 5 % of respondents said they issued sustainable and green shares, and 3% said sustainable and green bonds. In Croatia, a significant number of companies currently do not engage in the practice of investing in financial products. The Zagreb Stock Exchange offers diverse financial instruments, providing opportunities for investors to participate in the financial market. The available financial products (zse.hr, 2023): 89 ordinary and preferred shares of financial and non-financial institutions, 31 bonds are available, comprising 13 corporate bonds, 17 government bonds, and one municipal bond. Investors can trade four Exchange-Traded Funds (ETFs) shares, providing diversified exposure to various market segments. The market offers 17 issuances of treasury bills, contributing to the overall fixed-income landscape. There are two ESG bonds among the corporate bonds where issuers have committed to reducing CO2 emissions. Additionally, the first ESG bond (zse.hr, 2023) committed to increase the representation of women in management to 51%.

Investment in financial products present in graph 2.



*Graph 2: Investments in financial products  
(Source: Author)*

Graph 2 shows the respondents' investment practices. Most respondents said they never invest in financial products like shares, bonds, funds, or ETFs, regular or ESG. Only the sustainable stock shows some investment activities of respondents, from rarely 24% to always 10%. The rest of the categories of financial products are from rarely 1% to always 5%. Graph 3 shows which source respondents use in their investments.



*Graph 3: Advisors  
(Source: Author)*

Graph 3 shows that most respondents use their judgment or investment advisors to help them invest. Also, the respondents use less than 70% of financial influencers, AI, or advice from different web platforms. According to respondents, 95% think that investment in ESG products is a long-term investment, and only 4% think it is a short-term investment. Sustainable funds (Morgan Stanley Institute, 2023) focus on long-term opportunities. Demand for sustainable funds remained strong (Morgan Stanley Institute, 2023), evidenced by positive inflows throughout the year (\$115 billion), in contrast to steady outflows in traditional funds. By year-end, sustainable funds' assets under management (AUM) totalled nearly \$2.8 trillion, continuing to grow as a proportion of overall AUM (7%, growing steadily from 4% five years ago).

## 5. CONCLUSION

The result of this study shows that Croatian companies are well on their way to adopting ESG aspects of business. The research also showed that the supply and demand for ESG financial products must increase. In Croatia, a crucial emphasis needs to be on increasing the financial literacy of investors and stakeholders. Financial literacy is identified (Grozđanić, 2022, p.99) as one of the contributing factors to the insufficient representation of sustainable investment funds and the weak demand for this type of investment. Respondents are aware that investing in ESG financial products is a long-term investment. Considering the long-term opportunity, nineteen per cent of those surveyed cited the cost of climate initiatives as a barrier to increased action; yet, research from Deloitte (2023) has found that climate inaction could cost the global economy US\$178 trillion over the next 50 years. On the other hand, it could gain US\$43 trillion over the same period by rapidly accelerating the transition to net zero. Although investing Deloitte (2023) in the necessary change today may cause temporary financial discomfort, effective investments will pay off significantly in the long run as demand for sustainable products and services increases. Portfolio managers (Parikh et al., 2023) need to focus on the G practices of companies by including them in ESG-based portfolios before the ESG score announcement by the credit rating agencies. In that case, they will likely gain additional returns that will improve investors' wealth. The recommendation for the protection of the wealth of investors and all stakeholders is that the government need to assist companies with a lower competitive advantage via tax incentives, financial support, and training (Jallai, 2020), specifically for E-factor activities (Parikh et al., 2023). The main limitation of this work is the small number of respondents, and further research should research the practice and perception of different ESG financial products. The paper's contribution is empirical research conducted on 105 respondents about the current practice of investing in sustainable business activities and financial products. Since investors focus on increasing their wealth, the respondents' perception researched the importance of introducing elements of sustainability into the company's business model, creating a balanced business model with which they can do good and do well. In Croatia, the ESG concept is positively accepted and affects various aspects of the economy, society, the environment, and corporate operations. There is a perception belief among respondents that ESG will not be a passing trend (Grozđanić, 2022) but will establish itself as a future reality. Croatian investors are optimistic about the future of sustainable investments. The positive views expressed by respondents suggest a growing interest in ESG principles and a willingness to integrate them into investment strategies for long-term sustainability. Education and better financial literacy of all participants in investment processes is a prerequisite for success. Despite short-term fluctuations in the capital market, sustainable investing remains successful for long-term investors.



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## THE INTERCONNECTION BETWEEN EDUCATION AND TAX REVENUE

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### **ABSTRACT**

*The aim of this paper is to show the importance of education, whose level varies in each country, and its significance to prosperity, as well as the contribution of tax revenue as a percentage of gross domestic product. Education has many benefits for society in general, giving young people the chance to start creating a more beneficial world for themselves. Most schools and educational institutions are public and in the hands of the government. This suggests that governments worldwide should strive to ensure public funds are spent on their citizens education, starting from a young age. Education is the basis of every human right in many areas. This research used descriptive and comparative research methodologies to examine levels of education worldwide and their correlation with state tax revenue levels.*

**Keywords:** *Education, worldwide, literacy rate, level of education, years, tax revenue, government, HDI*

### **1. INTRODUCTION**

The nation's development is closely intertwined with its education system. Developed nations have made education free and available for everyone, and in addition to that, they have made the first and sometimes the second level of education obligatory for their citizens. The state is visible in the literacy rate of citizens living in the more developed countries, most of whom have at the very least a basic high school education. In contrast to that, the least developed countries have the lowest literacy rate, making it difficult for people to be educated since many do not have access to education or it is only available to certain groups of people. If we look at the historical aspect of literacy and education itself, we are able to note that the world had a great expansion in education in comparison to centuries before. The global literacy rate has been ascending, mainly through an increasing rate of enrollment in primary education. Drastic growth also took place in secondary and tertiary education, with higher average years of schooling. Education, as previously mentioned, is the basis of human rights. It brings benefits both to the individual in regards to growth and expansion in the field of betterment and, finally, to society as a whole since it ensures competent citizens and taxpayers.

### **2. EDUCATION AS A TOOL TO ENSURE FUTURE TAX REVENUE**

In comparison to various non-formal and informal methods of socialization, education is a field that is concerned with techniques of teaching and learning in schools or environments that are similar to schools (e.g., rural development projects, education through parent-child relationships, etc.). Education may also be seen as the dissemination of a society's values and corpus of accumulated understanding. The issue of economic and social development is becoming an increasingly important topic of discussion in international organizations that are involved with development, the subject of national development policies, and the subject of scientific development research as a result of globalization and international competition. The developmental role of education, or its potential contribution to specific facets of social

development, is taken into consideration in this context. It is nonetheless undeniable that education has a significant, even decisive, impact on development and that, as science and new technologies advance, this impact is increasing to the point that education is now viewed as one of the primary engines of progress. Over the past few decades, there have been changes in developmental expectations in connection with education. The aspirations that were incited in the 1960s by American education economists' discoveries about the contribution of educational investments to the USA's economic growth did not materialize in nations that thought they could overcome their economic backwardness by making generous investments in their population's education. In some areas of the educational environment, exits from school were not utilized to their full potential. The best educated individuals left these settings and immigrated to nations where they could pursue high-quality higher education, making them more valuable to the development of industrialized nations than undeveloped ones. Reforms in education without social ones fall short of expectations since education is obviously so extensively contextualized that its impacts depend on the cooperative activity of other facets of society. Around 90<sup>1</sup> % of the world's population had completed primary education in 2020, whereas only 66% had attained secondary education. Tertiary education had even lower numbers, with roughly 40% of the global population having some kind of tertiary education, with the majority of those being female. Adult males are on average more literate than females, although the literacy gender gap has shrunk among the world's younger generations in recent years. Unfortunately, education is not available equally in Sub-Saharan Africa, with some countries having a literacy rate of less than 50% among youth. Underdeveloped and least developed nations generally have the lowest literacy rates and offer the lowest quality educational programs—in fact, many people in these nations may not have access to education at all. In developed nations, educational opportunities are plentiful and often affordable. Most adults are literate and have at least a basic high school education.<sup>2</sup> The advantages of education are immense. Access to education alone supplies a person with the ability to grow both personally and professionally, subsequently securing a higher income and an increase in employment possibilities. With the effort the government puts into education, considering their expenses for education alone, the states' economies receive significantly more from taxpayers. They are aware of their role in the prosperity of the country and their overall contribution to society. Educated people, far more often than not, will take care of themselves. With a high level of education, it's more likely they will never need social support programs. Tax revenue, as a means of income, is the basis for public funding, and therefore educated people affect the all-around prosperity of the country.

### 3. LITERACY IN NUMBERS

Literacy, in simple terms, is the ability to read and write. This is one of the main reasons for the country's low development level. On a global scale, primary education has risen from 72% in 2015 to 76% in 2020, and the lower secondary education level has risen from 49% to 53% in the same period of five years.<sup>3</sup> As a whole, the global literacy rate is high. The literacy rate for all males and females over the age of 15 is 86.3%. At 15 and over, males have a literacy rate of 90%, while females lag only slightly behind at 82.7%. However, it is important to be mindful of the massive country-to-country differences that exist. Adult literacy rates in developed countries are almost always 96% or higher. In comparison, the least developed countries have an average literacy rate of only 65%. Direct country-to-country comparisons of literacy tend to be inexact.

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<sup>1</sup> World Population review (2022), <https://worldpopulationreview.com/country-rankings/literacy-rate-by-country>

<sup>2</sup> World Population review (2022.) <https://worldpopulationreview.com/country-rankings/most-educated-countries>

<sup>3</sup> Global Partnership for Education (2021.), Final results report on GPE's 2016-2020 strategy, <https://www.globalpartnership.org/sites/default/files/docs/results-report-2021/en/2021-10-GPE-Results-Report-2021-v2.pdf>

This is due mainly to two confounding factors: Many countries do not report their literacy every year, and many countries have mismatched definitions as to what qualifies as literacy. To be able to closely see the link between the two parameters, the following is the T-test for literacy and tax revenue (as a percentage of GDP) worldwide.

*Table 1: T-test - Literacy and Tax Revenue (as % of GDP) worldwide*

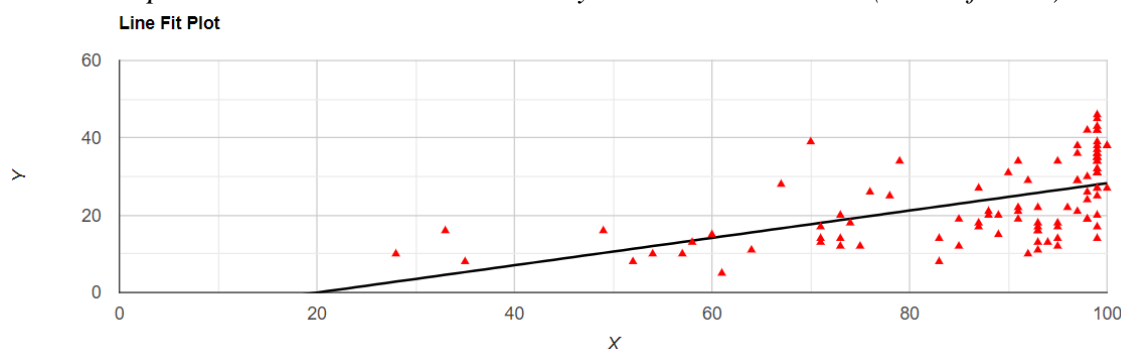
t-Test: Two-Sample Assuming Equal Variances		
	tax revenue as % of GDP <sup>4</sup>	tax revenue as % of GDP
Mean	34,66044039	14,50858184
Variance	64,27234608	30,65265446
Observations	21	21
Pooled Variance	47,46250027	
Hypothesized Mean Difference	0	
df	40	
t Stat	9,478387271	
P(T<=t) one-tail	4,42266E-12	
t Critical one-tail	1,683851013	
P(T<=t) two-tail	0,00	
t Critical two-tail	2,02107539	

*Source: calculated using data from <https://www.worldpopulationreview.com/country-rankings/literacy-rate-by-country>.*

The difference in tax revenue is visible between countries with a high literacy rate and those with the lowest literacy rate. According to the analysis, the difference is quite significant. The average tax revenue in the most literate countries is around 35% of GDP tax revenue. In comparison, tax revenue in the countries with the lowest literacy rates is just over 15% of GDP. The countries that have the highest level of literacy are (up to 100%): Finland, Liechtenstein, Luxembourg, Norway, Cuba, Estonia, Latvia, Barbados, and Kazakhstan. The least literate countries are (less than 65%): Madagascar, Nigeria, Togo, Mauritania, Bangladesh, Pakistan, Bhutan, Senegal, Chad, Mali, and Niger.

Furthermore, the graph demonstrating the relationship between literacy rate and tax revenue (as a percentage of GDP) is successful.

*Graph 1: Correlation between literacy rate and tax revenue (as % of GDP)*



*Source: Author's calculation*

The correlation between literacy rate and tax revenue as a percentage of GDP revealed a significant and large positive relationship between X and Y ( $r(94) = .558$ ,  $p.001$ ).

<sup>4</sup> OECD (2022), [https://stats.oecd.org/Index.aspx?DataSetCode=RS\\_GBL](https://stats.oecd.org/Index.aspx?DataSetCode=RS_GBL)

#### 4. AVERAGE YEARS OF SCHOOLING

The average number of completed years of education in a country's population is 25 years or older, excluding years spent repeating individual grades. The indicator reflects the level of education of the population aged 25 and above, and thus the stock and quality of human capital within a country, in order to assess needs and develop policies to improve it. This indicator also informs us about the performance of the education system and its accumulated impact on human capital formatio.<sup>5</sup>

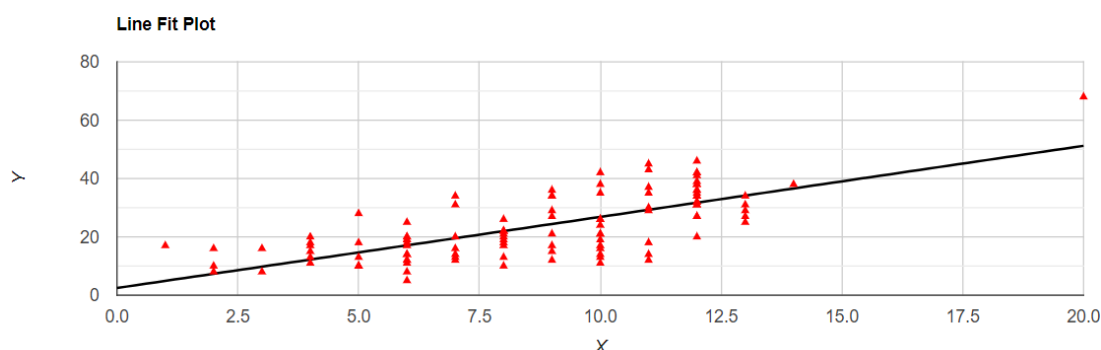
*Table 2: T-test – Average years of schooling and Tax Revenue (as % of GDP) worldwide*

t-Test: Two-Sample Assuming Equal Variances		
	Tax revenue as % of GDP	Tax revenue as % of GDP
Mean	33,38854881	14,06957
Variance	38,31582615	26,33357
Observations	21	21
Pooled Variance	32,32469742	
Hypothesized Mean Difference	0	
df	40	
t Stat	11,01061385	
P(T<=t) one-tail	5,59525E-14	
t Critical one-tail	1,683851013	
P(T<=t) two-tail	0,00	
t Critical two-tail	2,02107539	

*Source: calculated using data from <https://ourworldindata.org/grapher/mean-years-of-schooling>*

The total average schooling within the analysis of selected countries (109) is a little above 9 years in total. The highest rates of schooling are in Estonia (12,70), Japan (12,80), Latvia (12,80), Australia (12,90), the United Kingdom (12,90), Israel (13,00), Lithuania (13,30), Canada (13,30), Switzerland (13,40), the United States (13,40), and Germany (14,10), with average tax revenue just above 34% (in GDP). The lowest number of years spent in schooling is present in Burkina Faso (only 1,5), Niger (2,0), Chad (2,30), Mali (2,30), Senegal (3,0), Bhutan (3,10), Rwanda (4,10), Malawi (4,50), and Papua New Guinea (4,60), with average tax revenue just above 14% (in GDP).

*Graph 2: Correlation between average total years of schooling and tax revenue*



*Source: Author's calculation*

<sup>5</sup> UNESCO (2022), <http://uis.unesco.org/en/glossary-term/mean-years-schooling>

The results of the Pearson correlation indicated that there is a significant and large positive relationship between X and Y, ( $r(106) = .715$ ,  $p < .001$ ).

## 5. TERTIARY SCHOOL ENROLLMENT

A country's education levels are usually divided as follows: below upper secondary (preschool up to high school), upper secondary (high school), and tertiary (college/university onward). In addition to the previous tests, the following is the T-test that connects the relationship between tertiary education and median income.

*Table 3: T-test – Tertiary school enrollment and median income*

t-Test: Two-Sample Assuming Unequal Variances		
	<i>School enrollment, tertiary</i>	<i>School enrollment, tertiary</i>
Mean	77,98866667	8,911333333
Variance	417,6071981	33,50631238
Observations	15	15
Hypothesized Mean Difference	0	
df	16	
t Stat	12,59616312	
P(T<=t) one-tail	5,08011E-10	
t Critical one-tail	1,745883676	
P(T<=t) two-tail	0,00	
t Critical two-tail	2,119905299	

*Source: calculated using data from <https://worldpopulationreview.com/country-rankings/median-income-by-country> and <https://data.worldbank.org/indicator/SE.TER.ENRR>*

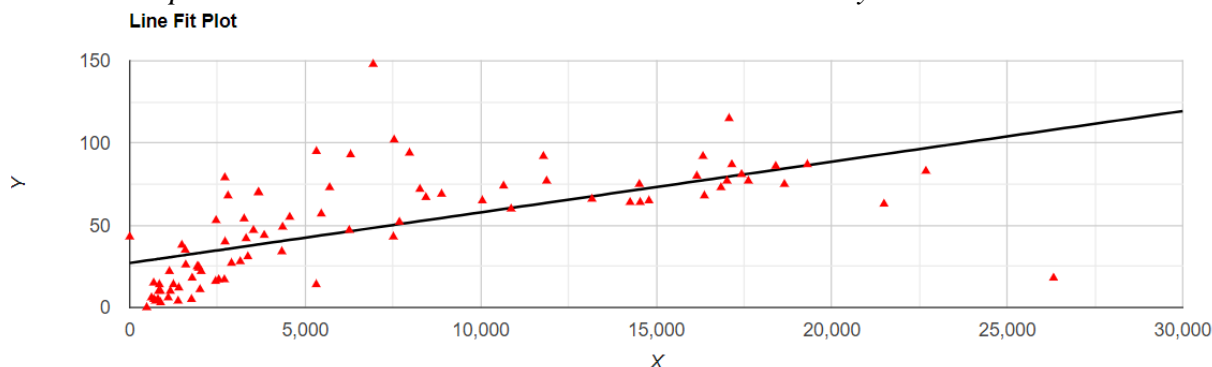
This indicator examines the relationship between education and median income. Median income is a metric used to identify the midpoint of a given nation's income distribution. The better educated individuals are, the more likely they are to have a higher median income.<sup>6</sup> Additionally, the gross enrollment ratio refers to the ratio of all enrollment, regardless of age, to the age group whose population is deemed to formally correlate to the degree of education displayed. Tertiary education, whether or not to be an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.<sup>7</sup> Luxembourg, Norway, Switzerland, the United States, Canada, Austria, Sweden, Denmark, the Netherlands, and Australia have the highest median incomes. The lowest rates are in Congo, Madagascar, Burundi, Malawi, Mozambique, Zambia, Uzbekistan, Rwanda, Angola, and Mali. A significant correlation can be seen in terms of the relationship between the median income (in USD) and the tertiary school enrollment. From the results of the T-test, it can be concluded that as an individual's education level is higher, so is their median income.

*Graph following on the next page*

<sup>6</sup> World Population Review (2022), <https://worldpopulationreview.com/country-rankings/median-income-by-country>

<sup>7</sup> Worldbank (2022), <https://data.worldbank.org/indicator/SE.TER.ENRR>

*Graph 3: Correlation between median income and tertiary school enrollment*



*Source: Author's calculation*

In graph 3, the correlation between median income and tertiary school enrollment shows a significant large positive relationship between X and Y ( $r(83) = .636$ ,  $p.001$ ).

*Table 4: T-test – Tertiary school enrollment and Tax Revenue (as % of GDP)*

t-Test: Two-Sample Assuming Equal Variances

	<i>Tax revenue</i>	<i>Tax revenue</i>
Mean	76,11777778	21,32744681
Variance	200,7584995	199,9877368
Observations	45	47
Pooled Variance	200,3645541	
Hypothesized Mean Difference	0	
df	90	
t Stat	18,55900757	
P(T<=t) one-tail	0,00	
t Critical one-tail	1,661961084	
P(T<=t) two-tail	0,00	
t Critical two-tail	1,986674541	

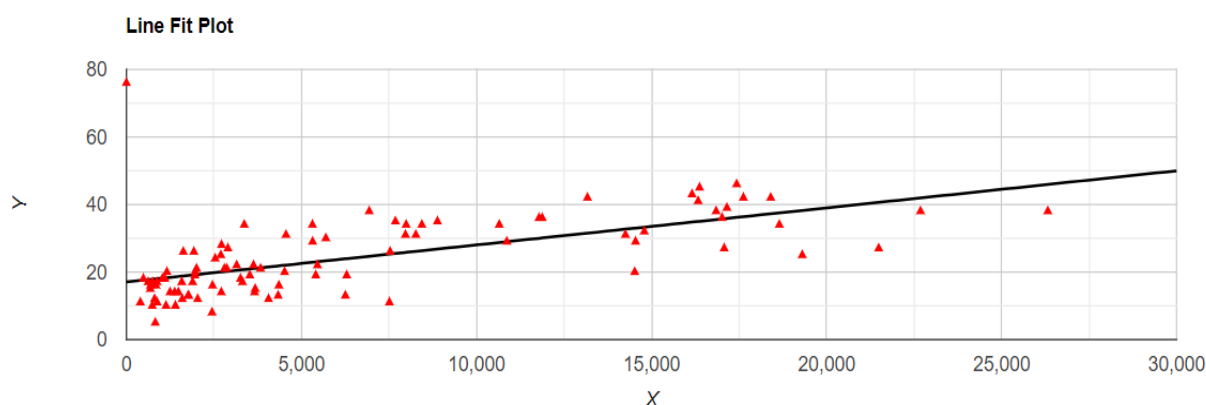
*Source: calculated using data from <https://data.worldbank.org/indicator/SE.TER.ENRR> and <https://www.oecd.org/tax/tax-policy/global-revenue-statistics-database.htm>*

From the data derived from the data analysis, we are able to deduce that the highest rates of tertiary education enrollment are in the following countries: Greece, Australia, Uruguay, South Korea, Argentina, Latvia, Chile, Finland, Spain, Singapore, and the United States. The countries with the least tertiary education are: Eswatini, Congo, Rwanda, Mauritania, Madagascar, Mali, Uganda, Vanuatu, Niger, Chad, and Malawi. A significant difference can be seen between tax revenues when comparing the highest rated countries with tertiary education and the least rated countries with tertiary education. When we are examining the average tax revenue (as a % of GDP), the average tax revenue is 31,22 in higher tertiary school enrollment countries, and only 18,46 in the lowest.

*Graph following on the next page*



*Graph 4: Correlation between tertiary school enrollment and tax revenue (as % of GDP)*



*Source: Author's calculation*

Graph 4 depicts the relationship between tertiary school enrollment and tax revenue (as a % of GDP), demonstrating a significant large positive relationship between X and Y ( $r(93) = .616$ ,  $p.001$ ).

## 6. THE CORRELATION BETWEEN HDI AND TAX REVENUE (AS % OF GDP)

The Human Development Index, or HDI, is a metric compiled by the United Nations and used to quantify a country's "average achievement in three basic dimensions of human development: a long and healthy life; knowledge; and a decent standard of living." The HDI varies from country to country. It can be summarized as a composite measure of a country's average achievements in three basic aspects of human development: health, knowledge, and standard of living. It is a measure of a country's average achievements in three dimensions of human development: The HDI sets a minimum and a maximum for each dimension, called "goalposts," then shows where each country stands in relation to these goalposts. This is expressed as a value between 0 and 1. If we were to look at the correlation between the HDI and tax revenue, the higher a country's human development, the higher its HDI value.

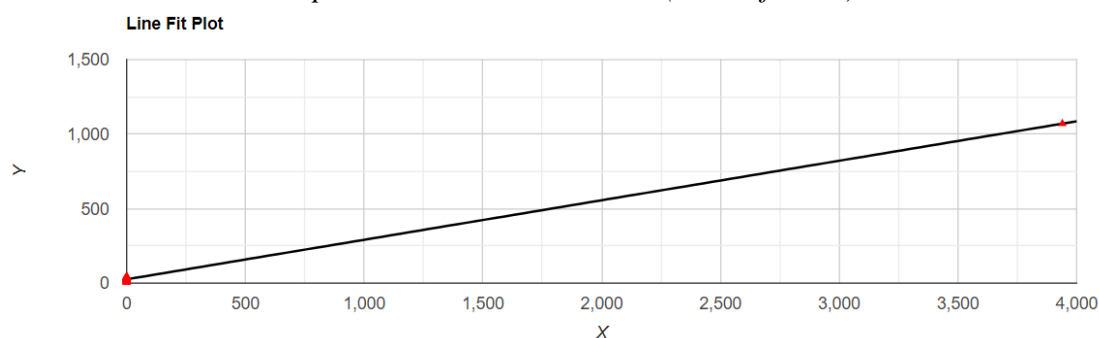
*Table 5: T-test -Relations between countries HDI and Tax Revenue (as % of GDP)*

t-Test: Two-Sample Assuming Unequal Variances		
	tax revenue	tax revenue
Mean	30,78853537	13,75574887
Variance	87,42890402	17,5524034
Observations	46	15
Hypothesized Mean Difference	0	
df	53	
t Stat	9,719876447	
P(T<=t) one-tail	1,12536E-13	
t Critical one-tail	1,674116237	
P(T<=t) two-tail	0,00	
t Critical two-tail	2,005745995	

*Source: calculation based on data collected <https://worldpopulationreview.com/country-rankings/hdi-by-country> and <https://www.oecd.org/tax/tax-policy/global-revenue-statistics-database.htm>*

In accordance with the data, the following countries had the highest HDI in the year 2019: Norway, Ireland, Switzerland, China, Iceland, Germany, Sweden, Australia, the Netherlands, and Denmark. In contrast to that, Niger, Central African Republic, Chad, Burundi, South Sudan, Mali, Burkina Faso, Sierra Leone, Mozambique, and Eritrea had the lowest HDI in 2019. The calculation reveals significant differences in tax revenue as a % of GDP between countries with the highest HDI and countries with the lowest GDP. In other words, countries that have a higher HDI have more tax revenue.

*Graph 5: HDI and tax revenue (as % of GDP)*



*Source: Author's calculation*

The correlation between HDI and tax revenue (as a %age of GDP) reveals a significant large positive relationship between X and Y ( $r(59) = .997$ ,  $p.001$ ).

## 7. CONCLUSION

The higher the level of education, the higher the tax revenue in a country. As the analysis shows, literacy rate is the highest in Finland, Liechtenstein, Luxembourg, Norway, Cuba, Estonia, Latvia, Barbados, and Kazakhstan, with an average tax revenue of 35 % (as a percentage of GDP). The least literate countries are Madagascar, Nigeria, Togo, Mauritania, Bangladesh, Pakistan, Bhutan, Senegal, Chad, Mali, and Niger, with an average tax revenue of just a little over 15% (as a percentage of GDP). The duration of years of schooling worldwide is different, at an average of around 9 years in total. The highest rates of schooling are in Germany, the United States, Switzerland, Canada, and Lithuania, with average tax revenue just above 34% (as a percentage of GDP). The lowest number of years spent in schooling is present in Burkina Faso, Niger, Chad, Mali, and Senegal, with average tax revenue just above 14 % (as a percentage of GDP). The highest rates of tertiary education enrollment are in Greece, Australia, Uruguay, South Korea, Argentina, and Latvia, with average tax revenue a little above 31% (as a percentage of GDP). The lowest rate of tertiary education is in Eswatini, Congo, Rwanda, Mauritania, and Madagascar, with an average tax revenue of above 18,5 % (as a percentage of GDP). The better educated nations have a higher median income. The highest rates are in Luxembourg, Norway, Switzerland, the United States, Canada, and Austria. In addition to this research, the authors used HDI (which includes health, knowledge, and standard of living) in comparison with tax revenue. HDI is the highest in Norway, Ireland, Switzerland, Iceland, and Germany, and its tax revenue is higher than in countries with lower HDI. The overall rates of tax revenue in different countries can vary depending on a number of additional factors that play a role in a country's standard of living as a whole. Even though the world is becoming more and more connected through the process of globalization, there are still a number of countries in which some children and/or young people are never given the opportunity to change their life paths through education since they are not given the possibility to access basic education. In addition to the previously mentioned, it can be seen that countries with a higher education level, although having a higher tax revenue, will have a greater income per capita.

Nowadays, numerous people could look at taxes as a negative instrument, it should be noted that the higher the level of taxes is, the country is at liberty to ensure its citizens the best lives and opportunities they could possibly have.

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# DIGITAL TRANSFORMATION: THE FUNDAMENTAL CONCEPT OF TRANSFORMATION OF BUSINESS ACTIVITIES

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## **ABSTRACT**

*The aim of this paper is to define the basic concept of the process of digital transformation of the organization. The transformation process begins with the digitization of individual business activities, and the final goal is the digital transformation of the entire business process. The process of digitization of business activities is a continuous process that harmonizes business processes in the organization with changes in the environment. Complete digital transformation implies digitization of business activities at all levels and in all forms. Digital transformation is always part of the managerial strategy, and all changes are exclusively the responsibility of the management of organizations. Once the level of digital transformation of the organization has been reached, it is the basis for further adjustments to changes in the environment. Digital transformation is based on digital optimization of business processes, and digital optimization is aimed at building competitive advantages of the organization.*

**Keywords:** *digitization, digitalisation, digital optimization, digital transformation, digital environment*

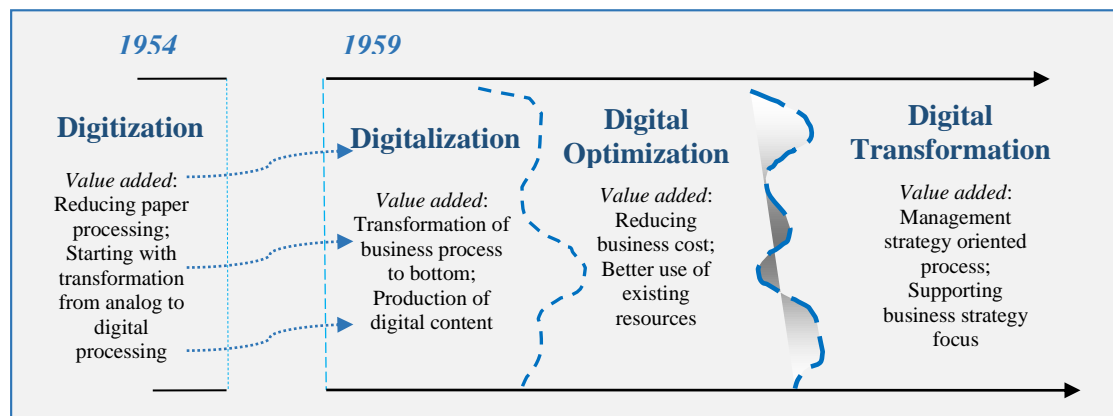
## **1. INTRODUCTION**

Digital transformation has become a fundamental concept in the development of organizations with a direct impact on changes in social communities. The development of technology has opened up multiple opportunities for disruptive innovations that have created market niches for financially uninteresting incumbents on the market. However, digitization alone would not produce long-term financial results without the use of other management strategies. It follows from this that man is always at the centre of every transformation, and only then is technology building the infrastructure for change (Vial 2019). However, the changes that come with digital transformation are sometimes so dramatic that they do not have enough understanding for the human side of the perception of that process (Dąbrowska et.al. 2022). Some companies have taken advantage of the digital transformation, such as Uber and Spotify, and some have lagged behind: Kodak, Blockbuster, Nokia, Xerox and Tower Records. These examples show that as the business environment changes, companies must adapt to these changes to ensure value creation (Skog 2019). Danielly et. al. (2023) point out that technology is not a silver bullet that solves all problems, and it can be added that without the use of correct management strategies, the goals will not be fully met. Digital transformation was preceded by digitization processes, and the fundamental goal of digital transformation is directed towards digital optimization. The paper analyses the process from the digitization of analog data to the establishment of digital optimization, with an emphasis on digital transformation. Digitally transformed production processes directly affect digital changes in the environment of organizations.

## **2. FROM DIGITIZATION TO DIGITAL TRANSFORMATION**

Digital transformation as a business process, but also as a term used for the activities of organizations related to the IT sector, has its roots in the middle of the last century.

The appearance and development of the first computers, and the transformation of analog data into digital content, will turn the wheel of history in the segment of technological progress. The term digitization first appeared in 1954, and defined the conversion of analog data into digital content. Data has been transformed from records in physical form to digitized form. Boratyńska (2019) points out that digitization is the process of representing information as '0' or '1' which computers use to store, process and transmit as information. Digitization determines the change of analogue to digital activities, that is, it can be conceptualized as the integration of IT into the existing business process. Digitization directly affects the facilitation of the implementation of existing activities and effectively affects resource costs (Verhoef et al. 2019; Khanra et.al. 2020). Digitization defines the process of converting information from analog to digital form, which can result in changes in the existing business model in order to provide value to all process stakeholders (Heilig et.al. 2017).



*Figure 1: History of digital transformation  
(Source: Lozić, 2019.)*

Digitalization is a broader term than digitization, and it came into widespread use only a few years after the term digitization. While digitization meant converting analog data into digital content, digitalization introduced changes to existing production processes, i.e. business activities. Digitization refers to the socio-technical method of adopting digitization techniques to improve social and institutional contexts (Seth et al. 2020). Therefore, digitalization has not only focused on cost savings, but also includes developing processes that improve citizen experiences (Verhoef et. al. 2019). While digitization is the process of transforming analog technology into a digital format, digitalization defines the impact of digital technology on the existing process, that is, it defines the way in which it transforms the existing business process (Verhoef 2021). Digitalization is the integration of digital technologies, platforms and services and their consumption. The literal meaning of digitalization gives the obvious idea of a world dependent on development and technology (Surender, Khan 2022). While digitalization is aimed at changes in existing production and business activities, digital optimization is the opposite process. Digitalization brings changes and new ways of using modern technologies, and digital optimization is moderated to stabilize the system, reduce production costs, better use existing resources, and build long-term competitive advantages. Once the digital optimization of the system has been achieved and the optimization of the use of existing resources is the basis for the digital transformation of the entire model of business activity. The principles and processes of digital optimization and digital transformation are described in more detail in the following chapters. The process that encompasses the transformation from digitization to digital transformation is shown in Figure 1.

### 3. DIGITAL OPTIMIZATION

Digitalization of production processes is an introduction to digital optimization of production. Production organizations that were under pressure from changes in the environment were the first to come under attack. Optimization requirements came as a result of requirements for sustainable business, changing consumer habits, and unstable environments that were increasingly under pressure from socio-economic crises (Abiodun et.al. 2022). The process of digital transformation implies a connection between the development of technology, that is, new technological solutions in the business process and the development of the market. The relationship between the development of technology and the growth and development of the market, i.e. the increase in the number of users of the organization's products and services, is shown in Figure 2.

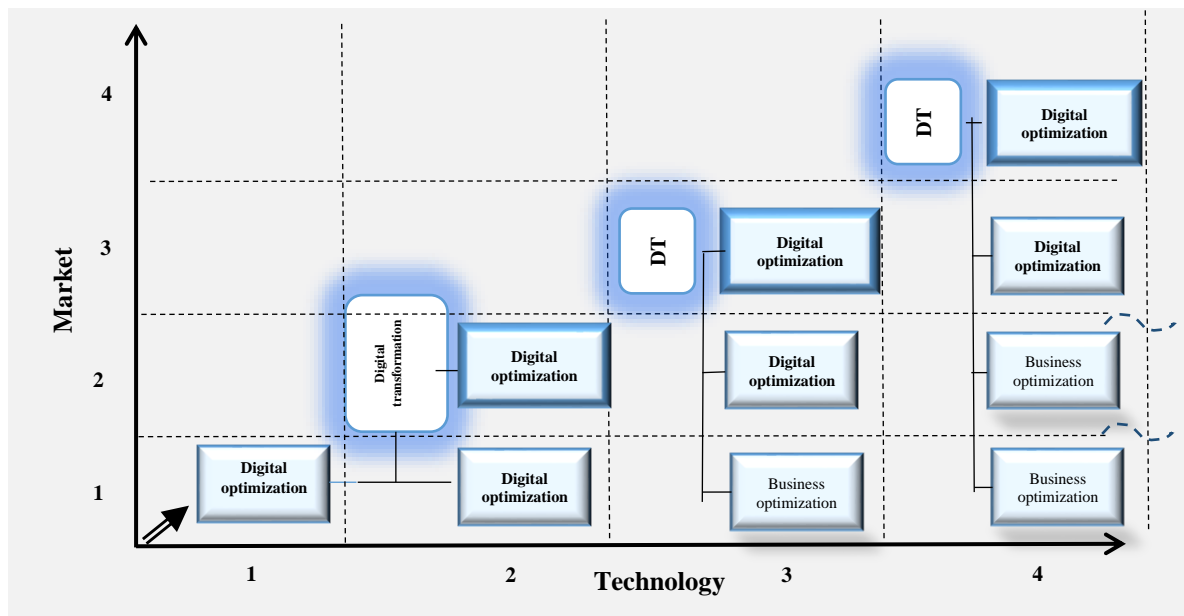


Figure 2: Stages of digital optimization  
(Source: Own illustration)

The process is divided according to growth stages, and each subsequent stage provides a new level of digital optimization. Digital transformation is the basis of digital optimization of the business process, which is the basis of future digital transformations. It can be concluded that digital optimization is a direct result of digital transformation that ensures the business stability of the organization, that is, builds the foundations of competitive advantage in a particular phase of the organization's development. In the first phase of development, the digitalization of the production process achieves the initial level of digital optimization. In Figure 2, it is shown in area 1.1. Digital optimizations from phase 1.1. is the basis of digital transformation for level 2.2. One part of the business process is digitally transformed and moves to stage 2.2, while part of the business process has stabilized and has sustainable competitive advantages in stage 2.1. In the next phase of development, digital transformation is the basis for digital optimization in phase 3.1. Part of the business process has sustainable competitive advantages that it transfers to area 3.2. while part of the business process is stabilized and does not require further transformation and optimization processes. In the picture it is part of Business optimization in phase 3.1. Part of the business process in phase 3.1. introduces incremental innovations to remain viable but lacks significant market growth. The business process at that stage is stabilized, the profits are lower, but they are continuous, and there are no longer significant investment costs in that part of the business process.

With each further process of digital transformation, the development, growth and division of business activities are repeated into the part that is the result of digital transformation, which is digitally optimized, the part that is transferred with minimal interventions of digital transformation, and the part that is further managed as Business optimization. The global music industry is one of the first industries to undergo this process. The initial stages of digitization involved recording music content in digital format on memory discs. Music was still distributed on physical audio carriers, but the content was recorded in digital format. This phase could be shown in the figure as area 1.1. The product is digitized in a digitized production model, and the distribution and use of the product is in the phase of digital optimization in the same model and market size. With the digital transformation of the content, from the physical sound carrier, to MP3 format, the transition to phase 2.2 is made. The process has been digitally transformed and a new demand and a new market has been created. Digital transformation enabled a model of income generation by selling digitized content on the Internet, which until then only came from "brick-and-mortar" stores. One part of the market, for physical audio carriers, remains in area 2.1, that is, in the area of the same level of market development. Digital transformation enables the transition to phase 3.3. that is, the development of technology enabled the use of streaming platforms, which directly influenced the development of the new market. Streaming platforms very quickly reached the level of digital optimization of business activity and assumed complete dominance in terms of income compared to other monetization models (Lozić, Čiković 2023). Phase 4.4. it implies the digital transformation of the process and the building of income from Synchronization. In phase 4.3. the streaming model is transferred as part of already existing digital optimization, while the other processes are transferred as Business optimization. The process evolves with each new digital transformation process that is the basis of digital optimization.

#### **4. DIGITAL TRANSFORMATION**

Digital transformation is the process of increasing productivity, value creation and social well-being by adopting disruptive technologies. It changes organizations by digitizing business processes using information systems (Imran et.al. 2021). Digital transformation is a process that completely changes the model of business activity, creates a new way of monetizing products and services, significantly affects long-term savings in production, and precedes the process of digital optimization. Once achieved, the degree of digital optimization is the basis for future digital process transformations. Digital transformation should be about building a competitive advantage through the continuous implementation of large-scale technologies, with the ultimate goal of improving user experience and reducing costs (Lamarre 2023). Digital transformation implies the incorporation and use of new technological improvements in the organization's products, processes and strategies. In unstable organizational environments, operational efficiency and cost optimization are one of the goals of digital transformation (Moor 2023). Technological advances often make it easier to combine existing products and services to create new digital offerings. While these changes bring new opportunities, they also create uncertainty. High levels of technical uncertainty mean that digitally transformed projects must immediately adapt their activities to cope with more complex and new technologies (Xu, Youngyuan 2018). Digital transformation focuses on increased efficiency and greater agility, and as the ultimate goal is aimed at creating new value for employees, users and shareholders (Accenture 2023). It includes the use of new technologies such as artificial intelligence and cloud computing to drive growth, streamline operations and increase competitive edge (Marr 2023).



<b>Xu &amp; Yongyuan 2018.</b>	Technological advances often make it easier to combine existing products and services to create new digital offerings. While these changes bring new opportunities, they also create uncertainty. High levels of technical uncertainty mean that DT projects must immediately adapt their activities to cope with more complex and new technologies.
<b>Matt et.al. 2015.</b>	One of the key factors for realizing long-term benefits is managing multiple DT projects to achieve the desired results and transformation
<b>Gilli et.al. 2017.</b>	is characterized by velocity and a holistic nature
<b>Mitki et al. 2019.</b>	As digital transformation is driven by advanced digital and hyper-connected technologies, it requires a rethinking of how people and technology interact within the organization.
<b>Bockshecker et.al. 2018.</b>	Researchers and practitioners use both terminologies, i.e. digital transformation and digitization, when talking about the same phenomenon; however, some researchers have tried to distinguish the meaning of both terms.
<b>Bohnsack et.a. 2018.;</b> <b>Strohmeier 2020.;</b> <b>Vial 2019.</b>	Digital transformation affects not only the product and service offerings of organizations, but also their organizational processes, systems, and operations.
<b>Vial 2019.</b>	Therefore, we define the success of the digital transformation of the project as the scope of benefits for the digitally transformed project teams and the achievement of the strategic goals of the digital transformation. Digital transformation must consider how digital technological advances can change business models, organizational structures and processes.
<b>Vial 2019.</b>	defined as “a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies
<b>Vial 2019.</b>	"Digital transformation" is defined as a process in which companies face changes in their business and economic environment by adopting technologies to improve their performance.
<b>Rueckel et al. 2020.</b>	Transformational change initiatives require a lot of time and expertise across multiple business units. Complex DT requires holistic planning, clear realization of benefits and continuous monitoring of multiple projects.
<b>Barthel &amp; Hess 2020.</b>	Digital transformation is driven by significant streams of digital innovation that can cause a significant shift in organizational value.
<b>Singh et al. 2019.</b>	The digital transformation of sales can also be defined as "the application of digitization and AI technologies to company assets as a means of improving competencies and rethinking the company's value proposition".
<b>Imran et.al. 2021.</b>	However, digital transformation requires a holistic approach that can address the entire organization to implement technology-driven change. Therefore, sociotechnical theory is considered.
<b>Du, X., &amp; Jiang 2022.</b>	According to Du and Jiang (2022), there are three main determinants that lead companies towards the digital transformation process, namely changes in the macro environment, a high level of competitive intensity (Kohli & Melville 2019) and changing customer requirements (Verhoef et al. 2021).
<b>Abiodun et.al. 2022.</b>	Digital transformation is the process of increasing productivity, value creation and social well-being through the adoption of disruptive technologies. It changes organizations by digitizing business processes using information systems.
<b>Butollo et.al. 2022.</b>	By choosing the term 'digital transformation', we do not focus on the analysis of technologies as such, but on the economic and social consequences of technological changes, which are always socially mediated.
<b>Tsai et.al. 2022.</b>	In measuring the performance of multiple projects, they should take into account the achievement of business objectives and the degree to which the objectives have been established to ensure the expected benefits.

*Table 1: Digital transformation  
(Source: Own illustration)*



Digital transformation refers to a “process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and technologies” connectivity (Vial 2019). Digitalization and digital transformation are very often used in the context of the same meaning. Digital transformation is a broader term than digitalization, that is, digitalization is a part of digital transformation, which led scientists to study these two terms in order to determine the differences in meanings (Bockshecker 2018). Digitalization is the process of introducing digital forms and technologies into business activities. Digital transformation is driven by significant flows of digital innovation that can cause a significant shift in organizational value (Barthel & Hess 2020; Demlehner & Laumer 2020; Wessel et al. 2021). As digital transformation is driven by advanced digital and hyper-connected technologies, it requires rethinking the interaction of people and technology within the organization (Mitki et al. 2019). Digital sales transformation can also be defined as "the application of digitization and AI technologies to a company's assets as a means to improve competencies and rethink the company's value proposition" (Sing et.al. 2019). For digital transformation to be successful, a program of change at the level of the entire organization is needed, which includes all influencing factors from new strategic initiatives to detailed human resource management measures such as personnel selection, incentives or specialized training (Gilli et.al. 2022). The key task of digital transformation manifests itself as a thorough change in the monetization model of the business model. Bosch and Olsson (2020) break down the fundamental stages of the transformation of the revenue monetization model, analyzing the automotive industry. The digital transformation process is shown in Figure 3. The initial phase of customer relations is based on transaction theories, that is, sellers try to sell as many products as possible to customers. In Figure 2, it is phase 1.1. in which organizations strive to introduce digitization of production processes and optimize business activities. By digitizing the business process, organizations strive to create a deeper and continuous relationship with consumers instead of the classic relationship between the seller and the buyer of a physical product. The next phase involves starting to provide services in areas that have traditionally been sold as products. At this stage, the organization begins to develop relationships that diversify and develop monetization models such as subscription or usage-based fees. The advantage of this model is that it complements the service, that is, the process of cannibalization of income does not occur. The development of the product as a service has been brought to an end in the streaming platform model. What used to be sold as a physical carrier of sound or images is now monetized on the platform as digital content. The two largest platforms for music and video content in the subscription model are Netflix and Spotify (Lozić 2020). In the third phase, the organization develops complementary services that complement the core product. The basic product is enriched with added services, but there is a risk of non-acceptance of these services and the deterioration of the basic product. The development of completed products can also be connected with the development of additional projects of digital transformation of the production process. Tsai et.al (2022) point out that performance measures of multiple projects should take into account the achievement of business goals and the degree to which goals are established to ensure expected benefits. One of the key factors for realizing long-term benefits is managing multiple digital projects to achieve the desired results and transformation (Matt et al. 2015).

*Figure following on the next page*

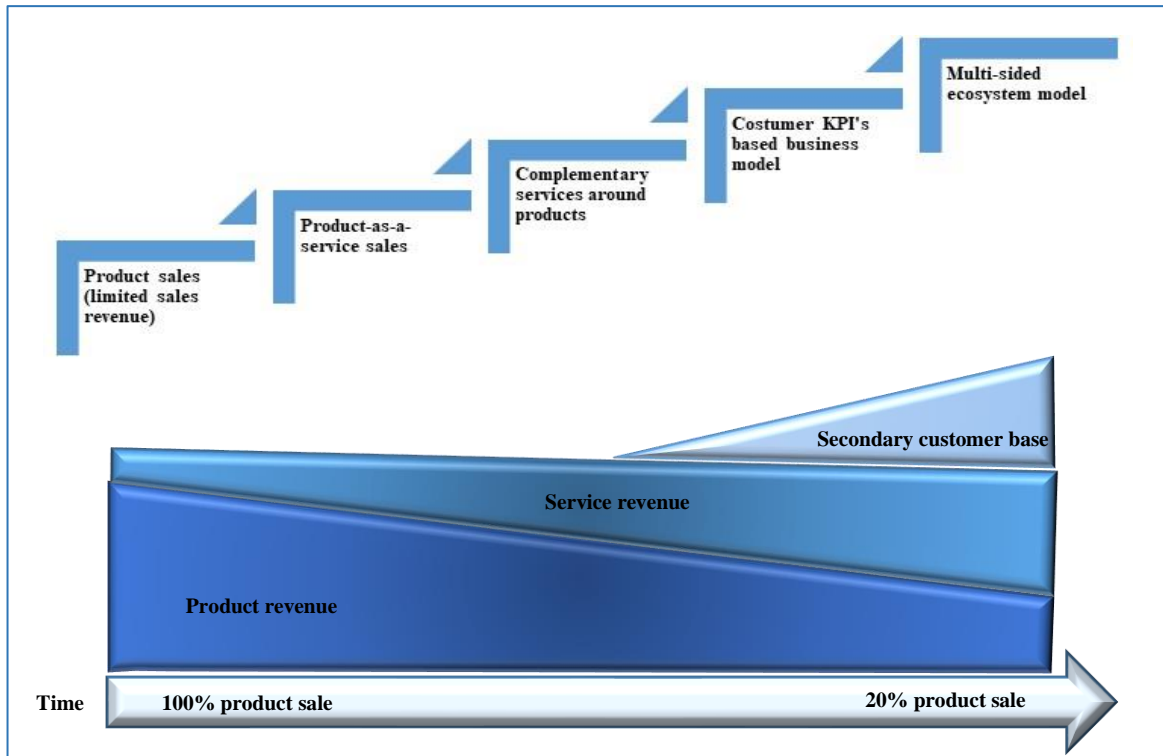


Figure 3: Evolution from a traditional to a digital company: The product upgrade dimension  
(Source: Bosch, Olsson, 2020.)

The fourth phase implies the transition to the use of customer KPIs as target results. In this phase, KPIs determine how well the product meets the needs that the customer considers to be key. In addition, digital transformation affects not only the product and service offerings of organizations, but also their organizational processes, systems and operations (e.g. Bohnsack et al., 2018; Strohmeier, 2020; Vial, 2019). In the fifth stage, the organization uses technological capabilities to develop secondary databases that it offers to the primary group of customers for a certain fee. Revenues are generated from activities related to the core business, but a completely new model of revenue generation is being developed. This phase implies the development of a business activity or one major part of a business activity to the platform economy model (Parker et.al. 2016, Moazed, Johnson 2016). Digital transformation requires a holistic approach that can address the entire organization to implement technology-driven change (Imran 2021). Therefore, we define the success of a DT project as the extent of benefits for the DT project teams and the achievement of the strategic goals of the DT. Digital transformation must consider how digital technological advances can change business models, organizational structures and processes (Vial, 2019).

## 5. DIGITAL TRANSFORMATION OF THE ENVIRONMENT

Processes related to digital transformation take place in business activities, and are supported by the development of information technologies. At the same time, as Butollo (2022) emphasizes, digital transformation processes do not only affect the development of technologies, but also economic and social processes directly caused by technological changes. It can be concluded that changes in the technological structure and the development of technological solutions directly affect social changes and the cultures of societies. According to Jiang and Du (2022), there are three main factors that lead companies towards the digital transformation process, namely changes in the macro environment, a high level of competitive intensity (Kohli & Melville, 2019) and changing customer demands (Verhoef et al., 2021).

It is the changes in the macro environment that are both the cause and the consequence of the digital transformation of organizations. Digital transformation, in addition to directly leading to sociotechnical changes, indirectly leads to broader socioeconomic changes (Ekbj et al., 2015). Changes refer to organizations, but also to individuals in organizations and the environment of organizations that adopt new technologies and changing the culture of societies. We define digital transformation as a socioeconomic change that encompasses individuals, organizations, ecosystems and societies, and is shaped by the adoption and use of digital technologies (Dabrowska et.al. 2022). Imran (2021) highlights the results of scientific research that proved that digital transformation encourages the purchase of products that customers previously did not show interest in or considered unnecessary. On the one hand, digital transformation opens up new markets for complementary products, and on the other hand, it directly affects changes in habits and the sale of more and more services that go with the core product. Social changes caused by digital transformation prove a strong connection between the development of complementary products in the form of services and the demand of digitally transformed societies for such products and services. Figure 3 shows the transformation of organizations' income. At the beginning of the process, the only income comes from the sale of physical products, and at the end of the process, that income would only make up one fifth of the income. The digital transformation of business processes directly affects radical innovations and the construction of entirely new industries. An example of this is the exponential growth of the OnlyFans platform, where revenues in the last four years have grown at an average annual rate of 369% (Lozić 2023). Digital transformation changes the culture of the organization, but also society and the environment of the organization, which directly affects the models of value creation. The development it encourages is in the direction of the development of new services (servitization) (Kryvinska, Bickel 2020), which are directly related to the development of new competitive advantages (Linde et.al. 2021). The wider adoption process at the industry level proves the easier acceptance of changes in the industries and environments of creative industries compared to old industries (Sivarman 2020). Digital transformation processes bring with them some negative consequences for organizations and society, and the most significant impact is on employees who are affected by the loss of jobs due to the digitization of processes. Such processes are immanent in technological development and occurred in all phases of technological progress. Employees are worried about losing their jobs because digitization leads to cost reduction and automation of production processes (Rampersad 2020, Cortellazzo et.al. 2019), and all this leads to fatigue and problems with the mental health of employees (Nadkarni, Prügl 2021). Digital transformation is a continuous process that leads to greater business efficiency using advanced IT technologies.

## 6. CONCLUSION

Digital transformation is a process that has affected all types of production systems as well as all pores of society and social relations. The development of cybernetics in the middle of the last century opened a new horizon of industrial and social development. That what was a possibility then, is now an inevitability, and there is no alternative to the digital transformation of the process. Research and analysis of changes related to digital transformation processes are divided into analysis of the transformation of technical systems and analysis of the transformation of social systems. Regardless of which of these two processes scientists put more emphasis on, today they are inseparable and interpenetrate each other. The process of digital transformation, as a complete change of the management paradigm and income generation model, is preceded by the stages of digitization and digital optimization. Digital optimization is precisely the target point at which the organization achieves competitive advantages and tries to maintain that position in relation to competitors for as long as possible in order to take advantage of all the possibilities of cost optimization, i.e. the cost structure of

the process. With the digital transformation of the process and once established digital optimizations, they move to a new business phase in which one part of the process is digitally transformed with all the attributes that follow the digital transformation of the process, and other parts are transferred as digital optimization from the previous phase. One of the ultimate goals of digital transformation is the creation of new forms of monetization and the predominance of income from services over income from the sale of physical products.

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# COMPARATIVE EVALUATION OF MACHINE LEARNING TECHNIQUES FOR RISK ASSESSMENT IN FINANCIAL MARKETS

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## ABSTRACT

*The paper investigates the robustness of classical financial models, comparing these with machine learning models for market risk and volatility prediction. The performance of classical Sharpe-Markowitz portfolio optimization against k-means clustering is investigated. The study assesses VaR and GARCH(1,1) vice versus machine learning algorithms, including linear regression and artificial neural networks. At the same time, machine learning offers advanced analysis tools, and more investigations are needed to outperform traditional approaches conclusively. The research underlines the need for further exploration into hybrid models that blend machine learning's adaptability with the foundational strengths of portfolio theory.*

**Keywords:** *Artificial Neural Networks, Clustering, Financial Risk Assessment, GARCH(1,1), Linear Regression, Machine Learning, Market Volatility, Portfolio Theory, Predictive Analytics*

## 1. INTRODUCTION

In the world of large volumes of data, risk management problems are becoming increasingly relevant. The difficulties of collecting and processing data affect the choice of models and methods for assessing possible losses. This problem has become especially important for financial investors when the volatility of the global and European financial markets increases. That is why it is advisable to consider new risk assessment models and methods. The paper by El Hajj & Hammoud (2023) sets integrating AI and machine learning in financial markets, as discussed, as a foundation for understanding the current landscape of technology in finance. This result is complemented by Tsai et al. (2023) research on using machine learning for stock selection, emphasizing the practical applications of these technologies in market analysis. Bagheri et al. (2023) describe using machine learning for VaR estimation in stock market forecasts, further cementing the critical role of predictive analytics in financial risk management. The theme of risk assessment is expanded by Suhadolnik et al. (2023) and Noriega et al. (2023), who delve into credit risk classification and prediction, demonstrating the versatility of machine learning across different financial contexts. The novel approach of Liu and Desheng Wu (2023) in using machine learning for regressing price movement during stress testing in commodity futures provides insights into the adaptability of these technologies in varying market scenarios.

This is paralleled by the hybrid approach discussed in the ESG investment risk paper Lei Li et al. (2023), showcasing how machine learning integrates into financial networks and impacts sustainable investments. In the research paper by Pawaskar (2022) the author delves into the application of machine learning in the financial domain, explicitly focusing on predicting stock market returns. The research emphasizes the crucial role of high accuracy and precision in forecasting models, which is particularly challenging in the stock market's complex and dynamic nature. The article by Baranovskyi et al. (2021) analyses the relationship between cryptocurrency market trends and various economic indicators. The paper utilizes classical regression methods to explore correlations, providing insights into cryptocurrency market dynamics and risk assessments. The study highlights the effectiveness of traditional statistical techniques in understanding complex financial markets, particularly in the context of emerging digital currencies. This approach is instrumental in uncovering fundamental economic factors influencing cryptocurrency trends, contributing valuable perspectives to financial analysis and digital asset management. Amal Al Ali et al. (2023) GALSTM-FDP's innovative combination of GA and LSTM for predicting financial distress highlights the advanced capabilities of hybrid models in financial predictions. Lastly, Alsharif & Fernández-Veiga's (2023) work on securing online financial transactions using machine learning underlines the importance of security in the digital finance era. Therefore, these papers provide a comprehensive background, informing the proposed paper's exploration of machine learning in assessing investment risks, focusing on price, volatility, and rate of returns in EU stock market assets. The overarching theme is the transformative impact of machine learning tools in enhancing the accuracy, efficiency, and security of financial operations and risk assessments. The research studies contribute to the growing body of knowledge demonstrating the potential of machine learning algorithms to provide more accurate and reliable predictions in the stock market, which is invaluable for stock market institutions and investors. However, it is very important to understand whether machine learning methods are more effective than traditional methods. Thus, the paper aims to apply traditional statistical methods and contemporary machine-learning techniques to risk assessments.

## 2. METHODS AND DATA SOURCES

The paper's methodology integrates traditional financial analysis methods with advanced machine learning techniques. Traditional methods employed include the calculation of the log rate of return volatility, Value at Risk (VaR), Average Value at Risk (AVaR), and the application of the GARCH(1,1) model, Sharpe or Sortino ratios for portfolio optimization. These established financial models provide a basis for comparison with machine learning approaches. The market data utilized in this research encompasses various financial instruments and metrics from two significant stock indices: the DAX PERFORMANCE-INDEX (^GDAXI) and the EURONEXT 100 Index (^N100). The DAX PERFORMANCE-INDEX, a key benchmark of the German stock market, includes 30 major blue-chip companies trading on the Frankfurt Stock Exchange. This index is a barometer of the German economy, reflecting the performance of prominent companies such as BMW, Siemens, and Volkswagen. It provides a comprehensive view of the market movements within one of Europe's largest economies. On the other hand, the Euronext 100 Index represents a pan-European landscape, covering major companies across the Eurozone. This includes a diverse range of sectors, offering a broader perspective on the European market as a whole. Companies in this index are from various countries, such as France, Belgium, and the Netherlands, making it a crucial indicator of the overall health of the European market. The data collected for this study include daily closing prices, volume, and other relevant financial metrics of the top 30 assets from each index. This data is crucial in calculating the log rate of return, a key measure of asset performance over time.



The volatility of these returns, crucial for risk assessment, is analyzed using traditional statistical methods such as GARCH(1,1). The machine learning methods used in the study are integral in advancing financial risk assessment techniques. Linear regression, a foundational method in machine learning, is applied for its simplicity and effectiveness in understanding relationships between variables. It's particularly useful for predicting a continuous outcome based on one or more predictor variables, making it suitable for financial market analysis. XGBoost and LightGBM, a more advanced and efficient version of gradient boosting, are known for their speed and performance. Their ability to handle non-linear relationships and interactions between variables makes them a powerful tool for predicting market trends and risks. Artificial Neural Networks (ANNs) represent a more complex and sophisticated approach. Mimicking the workings of the human brain, ANNs can learn and make intelligent decisions. In the context of financial markets, ANNs are employed for their ability to discern patterns and trends that might be too complex for traditional statistical methods. These machine learning techniques, implemented via Python and the scikit-learn library, represent a spectrum of approaches from simple to complex, each offering unique strengths in analysing and predicting financial market risks. Combining these methods provides a robust framework for understanding the dynamics of financial markets and enhancing the precision of risk assessment models.

### 3. RESULTS

The research is focused on exploring two hypotheses to assess the effectiveness of different financial risk management strategies. The hypotheses are formulated as follows:

- H0: The classical Sharpe-Markowitz portfolio theory is significantly less effective than the modern machine learning methods for diversifying investment portfolio risks.
- H1: The risk assessments using VaR, GARCH(1,1), and other classical financial models are inferior to machine learning regression models.

The research methodology includes several key steps. Firstly, a comprehensive evaluation of financial investment portfolios is conducted, utilizing data from European stock markets. This involves a detailed analysis of portfolio performance and Sharpe ratio risk assessment. Next, the study focuses on forecasting and assessing volatility indicators using logarithmic rates of return. This is a critical aspect as it provides insights into the fluctuating nature of the markets and the associated risks. Finally, the research applies machine learning models to predict near-term price movements, particularly looking at the likelihood of price drops based on historical data, a technique rooted in technical analysis.

#### 3.1. Risk assessment and diversification of a portfolio of financial assets

Pursuing an optimized portfolio that balances risk and return is a fundamental objective in financial investment strategies. The portfolio optimization models apply traditional Sharpe and Sortino ratios optimization and clustering methods to the top 30 assets within the DAX PERFORMANCE-INDEX and the EURONEXT 100 Index. The results are encapsulated in Table 1.

*Table following on the next page*

DAX PERFORMANCE data				EURONEXT 100 data			
Ticker	Sharpe W (%)	Sortino W (%)	Cl1	Ticker	Sharpe W (%)	Sortino W (%)	Cl2
BEI.DE	0	0	0	JMT.LS	0	0	0
HNR1.DE	0	0,04	0	RAND.AS	0	0	0
ALV.DE	2,45	0,07	0	<b>CAP.PA</b>	<b>62,64</b>	<b>72,37</b>	<b>0</b>
AIR.DE	0	0,03	0	EDEN.PA	0	0	0
<b>BMW.DE</b>	<b>25,61</b>	<b>15,99</b>	<b>0</b>	EN.PA	0	0	0
DTE.DE	0	0,03	0	LR.PA	0	0	0
HEI.DE	16,72	15,11	0	VIE.PA	0	0	0
EOAN.DE	0	0,01	0	<b>EDP.LS</b>	<b>12,3</b>	<b>10,34</b>	<b>0</b>
DTG.DE	0	0	0	TTE.PA	0	0	1
ENR.DE	0	0,04	1	SHELL.AS	0	0	1
<b>FRE.DE</b>	<b>2,88</b>	<b>4,69</b>	<b>2</b>	SW.PA	0	0	1
P911.DE	0	0,01	2	<b>IPN.PA</b>	<b>16,74</b>	<b>17,29</b>	<b>1</b>
VOW3.DE	0	0,01	2	KER.PA	0	0	1
SHL.DE	0	0,04	2	GALP.LS	0	0	1
SIE.DE	0,02	0,84	3	HO.PA	0	0	1
ADS.DE	3,59	0,1	3	<b>ALO.PA</b>	<b>8,3</b>	<b>0</b>	<b>2</b>
IFX.DE	0	0,09	3	ASM.AS	0	0	3
DBK.DE	3,69	5,05	3	ASML.AS	0	0	3
<b>DHL.DE</b>	<b>16,67</b>	<b>22,61</b>	<b>3</b>	PRX.AS	0	0	4
1COV.DE	0	0,07	3	BN.PA	0	0	5
CON.DE	0	0,01	3	GBLB.BR	0	0	5
BAS.DE	0	0,03	3	SAN.PA	0	0	5
MRK.DE	0	0,01	4	ABI.BR	0	0	6
<b>BAYN.DE</b>	<b>25,79</b>	<b>30,21</b>	<b>5</b>	PHIA.AS	0	0	6
DB1.DE	0	1,67	6	BNP.PA	0	0	7
SY1.DE	1,76	2,53	6	INGA.AS	0,03	0	7
MTX.DE	0,82	2,69	6	AIR.PA	0	0	7
RWE.DE	0	0,01	6	ERF.PA	0	0	7
VNA.DE	0	0,05	7	KBC.BR	0	0	7
ZAL.DE	0	0,01	8	TEP.PA	0	0	8

*Table 1: Optimal portfolio structure by using Sharpe and Sortino ratio optimization and the numbers of clusters by k-means clustering method results  
(Source: authors' results based on data from Yahoo Finance)*

Table 1 presents a comparative performance analysis of the top assets within the DAX PERFORMANCE-INDEX and the Euronext 100 Index, based on financial metrics such as the Sharpe and Sortino ratios, which measure risk-adjusted returns. The table clusters the assets into clusters (Cl1 and Cl2) according to their respective indices. The performance data for each asset is detailed, with the Sharpe (Sharpe\_W) and Sortino (Sortino\_W) ratios weighted by percentages. The clustering model (Table 1) utilizes a multifaceted approach, incorporating various statistical measures to analyze asset performance and volatility. This includes mean, standard deviation, skewness, kurtosis, 5th and 95th percentiles, maximum drawdown, and ratios such as Sharpe and Sortino, which are indicative of risk-adjusted returns.

Additionally, the method employs moving averages over 30 and 60 days, the Relative Strength Index (RSI), and Bollinger band width, providing a comprehensive view of the market's momentum and volatility, crucial for optimizing investment portfolios. The centroid values of the clusters are represented in Table 2.

DAX PERFORMANCE data				EURONEXT 100 data			
Cl_1	mean, %	std, %	Sharpe ratio	Cl_2	mean	std	Sharpe ratio
<b>0</b>	<b>0,13</b>	<b>1,22</b>	<b>0,1044</b>	<b>0</b>	<b>0,04</b>	<b>1,82</b>	<b>0,0194</b>
1	0,00	4,54	0,0011	<b>1</b>	<b>0,02</b>	<b>2,20</b>	<b>0,0078</b>
<b>2</b>	<b>0,04</b>	<b>1,68</b>	<b>0,0220</b>	<b>2</b>	<b>-0,11</b>	<b>2,80</b>	<b>-0,0382</b>
<b>3</b>	<b>0,13</b>	<b>1,96</b>	<b>0,0659</b>	3	0,13	2,62	0,0511
4	-0,02	1,78	-0,0093	4	-0,03	2,74	-0,0095
<b>5</b>	<b>-0,11</b>	<b>1,89</b>	<b>-0,0594</b>	5	0,00	1,48	0,0003
6	0,03	1,45	0,0189	6	-0,04	2,13	-0,0188
7	0,04	2,69	0,0152	7	0,03	2,43	0,0135
8	-0,01	3,17	-0,0030	8	-0,03	2,54	-0,0134

*Table 2: The centroid values of the average rate of returns and volatility  
(Source: authors' results based on data from Yahoo Finance)*

Table 2 outlines the data grouped by clusters for assets within the DAX PERFORMANCE-INDEX and the EURONEXT 100 Index. Each cluster is analyzed in terms of mean percentage return, standard deviation (as a percentage), and Sharpe ratio — a measure of the excess return per unit of deviation in an investment asset or trading strategy. Clusters are designated as Cl\_1 for DAX and Cl\_2 for Euronext, enabling a clear comparative view between Table 1 and Table 2. An analysis of Tables 1 and 2 reveals critical insights into portfolio optimization using traditional and machine learning methods. Although the data in the two tables are generally the same, there are apparent differences. Table 1 shows the assets BAYN.DE and ALO.PA assume a significant share in the optimal portfolio (considering risk). However, the corresponding clusters (Table 2) show that this group contains securities with negative returns. Thus, the traditional approach will indeed provide limited estimates of investment portfolio diversification performance. At the same time, the use of, for example, cluster analysis will allow risk reduction and greater diversification to be achieved.

### 3.2. Variance estimation and prediction

Traditional approaches to risk assessment of individual financial assets include Value at Risk (VaR) analysis and GARCH modelling. This section explores these models alongside predictive tools based on regression models from machine learning (linear regression and ANN). The corresponding analysis results, which reflect comparative volatility risk estimates for the top 30 assets of the DAX PERFORMANCE-INDEX, are presented in Table 3. Table 3 contrasts traditional risk assessment methods with machine learning techniques across various financial metrics. For each ticker, the table assesses volatility using the GARCH(1,1) model (square root by the model's variation metric) alongside other traditional measures such as overall volatility, Value at Risk (VaR) percentages and actual variance observed, and actual VaR for test data of the machine learning algorithms. Machine learning techniques are evaluated through metrics including Mean Absolute Percentage Error (MAPE) for linear regression and Artificial Neural Networks (ANN) for actual variance of the test subsets, predicted VaR from linear regression, and ANN-predicted VaR, offering a modern approach to predicting market risk.

Ticker	Traditional Methods			Machine Learning Teqniques					
	Vol. by GARCH (1,1)	Vol.	VaR, %	Actual Variance	Actual VaR	Linear Reg. MAPE	Linear Reg. Predicted VaR	ANN MAPE	ANN Predicted VaR
<b>1COV.DE</b>	0,019	0,020	0,03	0,97	0,25	<b>0,26</b>	0,26	<b>0,49</b>	0,23
<b>ADS.DE</b>	0,023	0,025	0,03	2,11	0,55	0,44	0,57	0,34	0,64
<b>AIR.DE</b>	0,013	0,014	0,02	0,79	0,21	0,40	0,22	0,96	0,29
<b>ALV.DE</b>	0,010	0,011	0,02	0,92	0,24	0,27	0,24	0,43	0,25
<b>BAS.DE</b>	<b>0,016</b>	<b>0,016</b>	0,02	0,39	<b>0,10</b>	<b>0,60</b>	<b>0,37</b>	<b>0,78</b>	<b>0,38</b>
<b>BAYN.DE</b>	0,026	0,019	0,03	0,94	0,25	0,73	0,25	0,51	0,28
<b>BEI.DE</b>	0,009	0,010	0,01	0,83	0,22	0,39	0,23	0,57	0,25
<b>BMW.DE</b>	0,013	0,013	0,02	1,27	0,33	0,12	0,35	0,18	0,35
<b>CON.DE</b>	0,019	0,021	0,03	1,36	0,36	0,28	0,39	0,40	0,41
<b>DB1.DE</b>	0,012	0,012	0,02	0,94	0,24	0,25	0,26	0,45	0,24
<b>DBK.DE</b>	0,017	0,020	0,03	0,90	0,24	0,29	0,27	0,62	0,29
<b>DHL.DE</b>	0,014	0,015	0,02	0,92	0,24	0,80	0,30	1,33	0,36
<b>DTE.DE</b>	0,009	0,009	0,01	1,28	0,33	0,39	0,32	0,55	0,33
<b>DTG.DE</b>	0,014	0,014	0,02	1,29	0,34	0,21	0,34	0,30	0,33
<b>ENR.DE</b>	0,045	0,045	0,03	3,50	0,91	0,49	1,23	0,64	1,43
<b>EOAN.DE</b>	<b>0,011</b>	<b>0,011</b>	0,02	0,88	<b>0,23</b>	<b>0,25</b>	<b>0,25</b>	<b>0,68</b>	<b>0,34</b>
<b>FRE.DE</b>	0,017	0,018	0,03	1,24	0,32	0,46	0,36	0,80	0,40
<b>HEI.DE</b>	0,014	0,015	0,02	0,88	0,23	0,45	0,26	0,64	0,24
<b>HNR1.DE</b>	0,012	0,013	0,02	1,92	0,50	0,22	0,49	0,34	0,54
<b>IFX.DE</b>	0,022	0,023	0,03	1,61	0,42	0,23	0,45	0,27	0,45
<b>MRK.DE</b>	<b>0,018</b>	<b>0,018</b>	0,03	1,23	<b>0,32</b>	<b>0,36</b>	<b>0,30</b>	<b>0,53</b>	<b>0,58</b>
<b>MTX.DE</b>	0,017	0,018	0,02	1,08	0,28	0,38	0,32	0,52	0,26
<b>P911.DE</b>	0,016	0,018	0,03	0,16	0,04	<b>1,04</b>	0,14	<b>3,17</b>	0,30
<b>RWE.DE</b>	<b>0,013</b>	<b>0,013</b>	0,02	0,97	0,25	0,18	0,28	0,28	0,28
<b>SHL.DE</b>	0,015	0,016	0,02	0,64	0,17	0,54	0,22	1,26	0,39
<b>SIE.DE</b>	0,015	0,016	0,02	1,30	0,34	0,48	0,36	1,72	0,43
<b>SY1.DE</b>	<b>0,015</b>	<b>0,015</b>	0,02	2,64	<b>0,69</b>	<b>0,25</b>	<b>0,69</b>	<b>0,27</b>	<b>0,75</b>
<b>VNA.DE</b>	0,026	0,027	0,05	2,61	0,68	0,29	0,65	0,34	0,71
<b>VOW3.DE</b>	0,014	0,015	0,02	0,70	0,18	0,31	0,17	0,71	0,26
<b>ZAL.DE</b>	0,034	0,032	0,05	4,29	1,12	0,18	1,11	0,21	1,10

Table 3: Comparative estimates of volatility risks for the TOP 30 assets of the DAX PERFORMANCE index

(Source: authors' results based on data from Yahoo Finance)

The data analysis from Table 3 indicates that machine learning methods provide little advantages in market risk assessment compared to traditional analysis techniques. For example, with assets like BAS.DE, EOAN.DE, MRK.DE, RWE.DE, and SY1.DE, the disparity between the actual volatility and that predicted by the GARCH(1,1) model is minimal. However, machine learning models based on the related test samples exhibit considerable errors. Consequently, the hypothesis that traditional models are significantly inferior to machine learning tools in predicting market volatility has yet to be confirmed. However, the inability to reject this hypothesis because there are a variety of other machine learning models and parameter tuning may ultimately yield comparable results to traditional methods. Yet, this process is labour-intensive and needs to be more universal, affirming traditional methods' ongoing relevance and importance in this domain.

#### 4. CONCLUSION

The actuality of integrating advanced computational methods in financial risk assessment remains a pivotal aspect of market analysis, particularly with the increasing complexity and data volume in today's financial world. Hypothesis H0, which posited that classical Sharpe-Markowitz portfolio theory is significantly less effective than the modern machine learning methods for diversifying investment portfolio risks, was evaluated rigorously. The results suggest the machine learning methods offer a novel approach and may significantly outperform the traditional models in terms of portfolio risk diversification. Hypothesis H1 has yet to be confirmed concerning the inferiority of traditional financial models like VaR and GARCH(1,1) to machine learning regression models. The results obtained, although they showed a low error level, did not demonstrate significant advantages of machine learning models for the problems considered. Therefore, traditional treks remain reliable and will continue to be very popular with investors. The direction for future research is evident. There remains a substantial avenue to explore in fine-tuning machine learning algorithms, harnessing a more comprehensive array of models, and integrating hybrid approaches that combine the predictive strength of machine learning with the established robustness of traditional financial models. This future work aims to establish a more definitive comparison and possibly craft a more unified and efficient model for financial risk assessment.

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## EDUCATION FOR SUSTAINABLE DEVELOPMENT AND AVAILABILITY OF STUDY PROGRAMS AT CROATIAN UNIVERSITIES

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### ABSTRACT

*This article addresses the expanding field of education for sustainable development (ESD) and evaluates its presence and role in Croatian higher education institutions. Education for sustainable development (ESD) is a globally recognized concept that integrates the principles and practices that help individuals and communities to make choices and live lives that benefit both, the environment and future generations. Recognizing the importance of this paradigm, Croatian universities have gradually incorporated ESD into their curricula. This research aims to answer two main questions: (1) How is ESD integrated into Croatian universities? (2) What specific study programs exist that emphasize or incorporate sustainable development principles? A comprehensive analysis revealed that while many Croatian universities recognize the importance of ESD, full integration is not yet complete. Many faculties and academic departments have initiated special courses, seminars and workshops. The example of the Faculty of Tourism and Hospitality Management, which implements study programs focused on sustainability at all levels of study, is highlighted. There are tangible efforts being made at the national level to embed ESD in Croatian higher education. Collaboration between universities, policy makers and the business sector has been observed, paving the way for a structured approach. In summary, Croatian universities are making progress towards education for sustainable development, but there is still much room for further progress. Continued collaboration and engagement from both educational and governmental bodies is crucial to ensure that future generations acquire knowledge, skills, and values that promote a sustainable future.*

**Keywords:** Education, Sustainable development (ESD), High education institution (HEI), Courses, Croatia, University

### 1. INTRODUCTION

In a time of rapid technological progress, environmental threats, and social crises, the global community is grappling with numerous challenges. In these turbulent times, the way we educate our youth has a special responsibility. The concept of Education for Sustainable Development (ESD) emerges as a positive light in these turbulent and exclusively materially oriented times (Hallinger and Chatpinyakoo, 2019; Kopnina, 2020; Alam, 2022). ESD is a paradigm shift that emphasizes holistic, interdisciplinary learning for the development of an inclusive and tolerant society. It is about much more than imparting knowledge about environmental issues or sustainable business practices. ESD integrates a broader set of values, attitudes, and behaviours that promote building a sustainable future. The strength of ESD, therefore, is that education is not only a tool for empowering individuals, but also a driver of social change. It aims to enable individuals to critically assess the challenges of our time, from climate change and biodiversity loss to social inequalities and economic imbalances (Purcell et al, 2019; Nhamo and Mjimba, 2020; Ahel and Schirmer, 2023). ESD fosters a shift from traditional rote learning to a more holistic approach, integrating critical thinking, multidisciplinary perspectives, and active citizenship.

Equipped with a holistic understanding, these individuals are prepared to innovate and find solutions that encompass the three fundamental pillars of sustainability: Environment, Society and Economy (McKeown et al., 2002; Chiba et al, 2021; Ferguson et al, 2021; Acosta Castellanos, 2022). At the global level, numerous strategic plans recognize the need to integrate education for sustainable development into curricula. In the context of the global education agenda, the United Nations 2030 Agenda for Sustainable Development has highlighted the role of ESD as an integral part of Goal 4, emphasizing the need for quality education that promotes sustainable lifestyles, human rights, and a culture of peace (Rieckmann, 2017; Agbedahin, 2019; Franco et al, 2019; Chankseliani and McCowan, 2021). This is consistent with Tilbury's (1995) assertion that the new focus on environmental education in the 1990s and beyond is firmly rooted in the principles of sustainability. The path to integrating ESD into regular education is a challenging and complex process that requires a review of traditional curricula of educational institutions. Sterling (2001) argued that sustainable education requires a reorientation of learning and change, necessitating reforms in curricula and pedagogy in educational institutions. It requires teachers who can move beyond the comfort zone of traditional teaching and institutions that can adapt to the needs of society and global challenges. While the global emphasis on ESD is evident, its actual integration into national education systems varies. The Croatian education system, like many others, faces the challenges and opportunities of ESD integration. Traditional curricula need to be revised to include components of sustainability. While some Croatian universities and schools have already recognized the importance and need for this approach, systematically incorporating ESD throughout the country is a long-term process. Croatia, with its rich history and unique cultural heritage, has the opportunity to use these challenges to create a better society. Within the national framework, basic frameworks such as the "School for Life" educational reform at lower levels and the integration of numerous programs and courses at higher education institutions are recognized. As a member of the European Union, Croatia can use numerous financial and professional resources to advance its educational initiatives in the field of sustainable development. At the same time, cooperation with local communities, non-governmental organizations and industry can ensure that education for sustainable development reflects the country's real needs and opportunities. This paperwork includes a review of the academic literature in the field of ESD and a research section on the integration of ESD in study programs, discussion, and concluding thoughts.

## **2. THEORETICAL BACKGROUND**

Education for Sustainable Development (ESD) has its roots in the environmental education movements of the 1970s, which grew out of concerns about environmental degradation and the urgency of protecting the environment. In 1987, the World Commission on Environment and Development produced the concept of "sustainable development" as development that meets present needs without compromising future generations (WCED, 1987). The Decade of Education for Sustainable Development (2005-2014) from UNESCO emphasized the importance of embedding sustainability principles in global education systems (UNESCO, 2005). With the conclusion of the Decade in 2014, the focus shifted to the United Nations 2030 Agenda. ESD plays a critical role in achieving Sustainable Development Goal #4, which provides for quality education (UN, 2015). UNESCO launched the "ESD for 2030" framework, which highlights the role of ESD in achieving all 17 social development goals and emphasizes its importance for global education (UNESCO, 2020). Below in table 1 is an overview of recent research in the field of education for sustainable development.



Title	Authors	year	citations
Physical education for sustainable development goals: Reflections and comments for contribution in the educational framework	S Baena-Morales	2023	29
Classical paradigms versus complexity thinking in engineering education: an essential discussion in the education for sustainable development	TFAC Sigahi, IS Rampasso, R Anholon	2023	12
Education for sustainable development through research-based learning in an online environment	O Ahel, M Schirmer	2023	5
Mapping a sustainable future through conceptualization of transformative learning framework, education for sustainable development, critical reflection, and responsible citizenship: an exploration of pedagogies for twenty-first century learning	A Alam	2022	278
Framing the role of higher education in sustainable development: a case study analysis	S Elmassah, M Biltagy, D Gamal	2022	31
Sustainable Development of Higher Education Institutions in Developing Countries: Comparative Analysis of Poland and Vietnam.	NH Tien, NM Ngoc, TTT Trang, NP Mai	2022	80
From “education for sustainable development” to “education for the end of the world as we know it”	S Stein, V Andreotti, R Suša, C Ahenakew, T Čajkova	2022	72
From environmental education to education for sustainable development in higher education: a systematic review	PM Acosta Castellanos	2022	55
Higher education and the sustainable development goals	M Chankseliani, T McCowan	2021	184
Designing XR into Higher Education using Immersive Learning Environments (ILEs) and Hybrid Education for Innovation in HEIs to attract UN’s Education for Sustainable Development (ESD) Initiative	A Alam	2021	265
Investigating effective teaching and learning for sustainable development and global citizenship: Implications from a systematic review of the literature	M Chiba, M Sustarsic, S Perriton	2021	30
Teachers' perspectives on sustainable development: the implications for education for sustainable development	T Ferguson, C Roofe, LD Cook	2021	54
Opportunities and challenges of digitalization to improve access to education for sustainable development in higher education	O Ahel, K Lingenau	2020	59
Competencies in education for sustainable development: Emerging teaching and research developments	G Cebrián, M Junyent, I Mulà	2020	148
Education for the future? Critical evaluation of education for sustainable development goals	H Kopnina	2020	293
Education for sustainable development in Germany: Not just desired but also effective for transformative action	J Grund, A Brock	2020	44
Sustainable development goals and institutions of higher education	G Nhamo, V Mjimba	2020	54
Education for sustainable development: A systemic framework for connecting the SDGs to educational outcomes	V Kioupi, N Voulvoulis	2019	292
Universities as the engine of transformational sustainability toward delivering the sustainable development goals: “Living labs” for sustainability	WM Purcell, H Henriksen, JD Spengler	2019	227
Higher education for sustainable development: Actioning the global goals in policy, curriculum and practice	I Franco, O Saito, P Vaughter, J Whereat, N Kanie	2019	203
Sustainable development, Education for Sustainable Development, and the 2030 Agenda for Sustainable Development: Emergence, efficacy, eminence, and future	AV Agbedahin	2019	234
A bibliometric review of research on higher education for sustainable development, 1998–2018	P Hallinger, C Chatpinyakoo	2019	204

*Table 1 Overview of recent research in the field of education for sustainable development  
(Source: author)*

## **2.1. Conceptual Framework**

ESD builds on the triad of environmental, economic, and social dimensions of sustainability. This interconnectedness highlights the interdependence of global challenges (World Commission on Environment and Development, 1987). ESD aims not only to impart knowledge but also to change the way individuals think and act, emphasizing values, behaviors, and lifestyles that are oriented toward sustainability (Sterling, 2001; Hallinger and Chatpinyakoo, 2019; Acosta Castellanos, 2022). This approach harnesses local cultural and environmental resources for more meaningful learning experiences (Gruenewald, 2003; Wiek et al., 2011; Chankseliani and McCowan, 2021). ESD is moving away from traditional passive learning toward learner-centered, participatory methods that promote skills such as critical thinking and problem solving (Tilbury & Wortman, 2004; Ahel and Schirmer, 2023). Hazas and Nathan (2017) discuss the opportunities and challenges digital platforms present in promoting sustainable thinking. Miller (2015) address the concept of 'future thinking' and emphasize the importance of preparing learners for different plausible future scenarios. Varga et al. (2007) examined the gaps in teacher education for ESD and proposed a more integrated approach to teacher education and training. With the advent of digital technologies in education, researchers have explored their potential to improve ESD (Ahel and Lingenau, 2020; Chiba et al, 2021; Baena-Morales, 2023). While global initiatives provide a framework, implementing ESD requires a balance between global standards and local relevance (Tilbury, 1995; Kioupi and Voulvoulis, 2019; Tien et al, 2022; Alam, 2022). With the increasing global pursuit of inclusivity, the integration of diverse cultural narratives has been explored in ESD. Senanayake (2006) discuss the intersection of indigenous knowledge systems with ESD and emphasize mutual respect and understanding. Some critics argue that ESD often prioritizes environmental over socioeconomic issues, which can be counterproductive (Jickling & Wals, 2008). There are also concerns that ESD can sometimes become a tool for political or economic agendas, distracting it from its core educational values (Bonnett, 2002; Kopnina, 2020; Stein et al, 2022).

## **3. EDUCATION FOR SUSTAINABLE DEVELOPMENT IN CROATIAN HIGHER EDUCATION: REVIEW OF PUBLIC UNIVERSITIES FROM THE FIELD OF ECONOMICS**

As a member of the European Union and the United Nations, the Croatian approach to ESD has been shaped by global and regional strategies. One of these is the National Strategy for Sustainable Development, which sets out sustainability principles that permeate various sectors, including education (Republic of Croatia, 2016). In addition, the Croatian Ministry of Science and Education has been proactive in ensuring that the principles of ESD are incorporated into higher education. In a study of education in Croatia, Mladenović (2022) discusses the embedding of sustainable development principles and analyses students' perspectives. Croatian universities have committed to integrating the principles of sustainability and ESD HEI such as the Universities of Zagreb, Rijeka, Osijek, and Split have offered courses on sustainability in various faculties (Perić and Delić, 2016; Dryjanska et al, 2022; Jeknić, 2023). The impact of sustainability is evident not only at the institutional level, but also in student enthusiasm and engagement. A special study on tourism education in Croatia showed the great interest of students in integrating sustainable development into their curricula (Krbec, 2009). Anđić (2020) discusses the professional development of teachers in education for sustainable development. In addition, numerous initiatives to promote sustainability have emerged at universities throughout Croatia, ranging from waste management campaigns to energy efficiency measures.

University/ Faculty	Undergraduate study	Graduate study	Postgraduate study
<b>University of Zagreb Faculty of Economics and business</b>	No	No	Specialist study Energy and environmental economics
<b>University of Rijeka 1) Faculty of Economics and business</b>	No	No	No
<b>2) Faculty of Tourism and Hospitality Management</b>	Management of sustainable development	Master of sustainable outdoor hospitality management Sustainable tourism development	Doctoral: Sustainable development management
<b>University of Split Faculty of Economics, business and Tourism</b>	No	No	No
<b>University of Osijek Faculty of Economics in Osijek</b>	No	No	No
<b>University of Pula</b>	No	No	No
<b>University of Zadar</b>	No	Sustainable tourism management	No
<b>University of Dubrovnik</b>	No	No	Specialist Quality and Sustainable Development Management in Tourism
<b>University North</b>	No	No	No
<b>University of Slavonski Brod</b>	No	No	-

*Table 2: Study programs of education for sustainable development in the field of economics at public universities in the Republic of Croatia  
(Source: author's analysis of official websites)*

- **University of Zagreb**  
The University of Zagreb, as the Croatia's largest university, recognizes the need to introduce education for sustainable development. At the Faculty of Economics and Business, education for sustainable development is integrated mainly through numerous courses. However, there are no specialized programs at undergraduate and graduate studies, but there is a program 'Specialist study Energy and environmental economics' at the university's specialist postgraduate study. At the undergraduate level, the Environmental Economics and Business Ethics courses stand out. At the graduate study of Corporate social responsibility; Environmental protection management; Demographic and Social Development. The specialist postgraduate study includes the following courses: Sustainable development; Environmental economics; Pollution market; Environmental policies and strategies; Sustainable waste management; Sustainable development as a competitiveness strategy; Resource management in the sustainable development of tourism.
- **University of Rijeka**  
The University of Rijeka includes two faculties in the field of economics, Faculty of Economics and business and Faculty of Tourism and Hospitality Management.

Faculty of Economics and business does not have specialized programs at any level of study, but integrates education for sustainable development through several courses. Economy and environment at the undergraduate level, Environmental policy and Corporate social responsibility at the graduate level and Analysis of corporate social responsibility at the doctoral level. Faculty of Tourism and Hospitality Management is the only faculty in the Republic of Croatia that has specialized education programs for sustainable development at all levels of study. At the undergraduate studies, the program 'Management of sustainable development' is carried out with courses on Sustainable marketing; Sustainable tourism; Sustainable tourism development; Sustainability reporting; sustainable nutrition; Personalistic ethics and social responsibility. The graduate studies 'Sustainable tourism development' and 'Master of sustainable outdoor hospitality management' offer courses in Economics of sustainable development; Economic sustainability of tourism; Impact of climate change on the economy; Sustainable management of tourist resources; Ecotourism; Management of sustainable development in outdoor catering. Courses offered at the doctoral study program 'Sustainable development management' are Economics and politics of sustainable development; Planning the sustainable development of tourism; Entrepreneurial management of sustainable development; Sustainable marketing; Environmental accounting; Quality management and sustainable development; Management of sustainable development of nautical tourism; Ethics of sustainable development; Managing the sustainability of traffic in tourism; A sustainable food chain; Sustainable energy management and renewable energy sources; New environmental protection technologies; Management of water systems and environmental protection; Cultural heritage and sustainable development; Knowledge management in the function of sustainable development; Sustainable development as a prerequisite for quality of life; Tourism and sustainable economy; Administrative legal protection of space and nature.

- University of Split  
There are no specialized education programs for sustainable development at the Faculty of Economics, Business and Tourism, but sustainability is recognized through several graduate study courses: Environmental economics; Coastal economy and environment; Tourism and environment and at postgraduate level: Social marketing; Sustainable development.
- University of Osijek  
There are also no specialized programs at the Faculty of Economics in Osijek, but several courses are recognized. Undergraduate studies: Economy and society and Business ethics and graduate studies: Fair trade and sustainability and Business ethics.
- University of Pula  
At the University of Pula, numerous courses focused on education for sustainable development are recognized, although there are no specialized programs. At undergraduate studies, it is possible to take the following courses: Sustainable development management; Sustainable development of tourist destinations. At graduate studies: Environmental economics; Corporate social responsibility; Sustainable tourism; Sustainable marketing; Socially - responsible business in culture and tourism. And in postgraduate studies: Socially responsible business in the public sector; EU environmental protection policy; Business ethics and sustainability.
- University of Zadar  
At the University of Zadar, the graduate study 'Sustainable tourism management' is conducted with courses: Sustainable tourism; Ecology and natural heritage; Traffic in the

function of sustainable development of tourism; Managing the sustainable development of a tourist destination; Ecology of the coastal zone of the sea and underwater; Environmental economics. At the undergraduate study, the following courses were recorded: Ecology; Valorisation and protection of natural heritage and at postgraduate level: Information ethics.

- University of Dubrovnik

At the University of Dubrovnik, there is a course on Sustainable tourism at the graduate level. In addition, there is a postgraduate specialist study "Specialist Quality and Sustainable Development Management in Tourism" for which no course list was available. Information is available that it is the first specialist postgraduate study programme in the Republic of Croatia that tackles the topics of work processes quality management and sustainable development process management in tourist companies. It facilitates and develops the methods and procedures how to solve difficult managerial problems and transfers this knowledge to students. The goal of this study programme is to increase the awareness that it is important that tourist destination products have an integral quality.

- University North

At University North, there is a Corporate social responsibility course at the undergraduate level and at the graduate level the courses: Public relations and socially responsible business. Specialized programs for sustainable development exist, but not in the field of economics.

- University of Slavonski Brod

The University of Slavonski Brod, as the youngest Croatian university, has only the Business ethics and social responsibility course at the specialist graduate study.

### **3.1. An example of good practice of the University of Rijeka, Faculty of Tourism and Hospitality Management**

According to the Strategy of the University of Rijeka 2021-2025, there are four strategic areas within which development goals are defined: (1) Learning and teaching: open education (2) Research: innovations and economy and community development (3) Regional involvement: knowledge transfer and social responsibility for sustainable development (4) Internationalization: expanding horizons and strategic partnerships. The Faculty of Tourism and Hospitality Management, as part of the University of Rijeka, pays great attention to sustainability and education for sustainable development. This results from the basic strategic document, which states: vision: 'The Faculty of Tourism and Hospitality Management is a leader in higher education, scientific and professional research in the field of tourism, hospitality and sustainable development in Croatia and the wider region' and mission: 'The Faculty of Tourism and Hospitality Management of the University of Rijeka, as a scientific research and educational institution, is the creator of knowledge about tourism, hospitality and sustainable development'. The result of such a development direction is that Faculty of Tourism and Hospitality Management is the only faculty in the Republic of Croatia that offers specialised educational programmes for sustainable development at all levels of study and with numerous courses that support this. Interesting research on students' attitudes towards education for sustainable development was conducted at the University of Rijeka in 2010 and 2016 (Buzov et al, 2020). The aim of the research was to analyze the attitudes of students at the University of Rijeka and to determine whether there are differences in their attitudes towards education for sustainable development in 2010 and 2016, i.e. to investigate whether the attitudes have changed in the mentioned period.

It was of particular importance to investigate the students' views on the possibilities of implementing education for sustainable development in study programs. The obtained results show that students believe that the implementation of the program should include knowledge, values and skills for sustainable living in the community, and the attitude that the sustainable development issues are important for their profession and future work and knowledge about them would be useful during their studies. Slightly less than half of the students (45.3%) took a course during their studies that covered the issues of sustainable development. Both students from 2010 and those from 2016 mention similar courses, i.e. topics related to sustainable development. Some of the students point out that they do not have enough knowledge about sustainable development, and some think that sustainability topics need to be integrated into previous education. Students cite the scope of degree programs, which are overloaded, as an obstacle to implementation. Students attribute most of the responsibility for promoting and implementing education for sustainable development to the ministry, then the government and the media, and in some ways show a misunderstanding of the autonomy of universities in creating study programs and the importance of motivating teachers.

#### 4. DISCUSSION AND CONCLUSION

The transition to sustainable development in all areas of society, including education, is an imperative of modern times. At the institutional level, Croatian public universities are increasingly turning to the integration of ESD into their programs, which represents a significant change in the perception of sustainability as an integral part of education. The University of Rijeka is leading in this. Also, the University of Zagreb and the University of Zadar, Dubrovnik and Pula show a significant step forward in ESD. The universities of Osijek and Split include ESD in their economics faculties with a few courses, but there is still plenty of room for improvement. The University of the North and Slavonski Brod, as young Croatian universities, should also focus more on ESD. Despite this progress, there are still significant challenges for the future. There is a need for ongoing training of professors to ensure greater student interest in the subject and to improve the quality of education. Given the pace of change in sustainability, there is a need to establish mechanisms to continuously monitor and evaluate the impact of ESD initiatives to ensure a sustainable future. With this approach, Croatia not only contributes to the achievement of the global sustainable development goals, but also promotes the development of awareness and responsibility among younger generations. As Croatia moves towards a sustainable future, it is crucial to maintain a dynamic approach in which policies and strategies are regularly revised to reflect the latest findings and trends in sustainable development. In this way, Croatia will not only meet its national goals, but also contribute to global efforts to create a better and more sustainable future for all. The limitation of this study is that it focused only on the field of economics. In the future, it would be advisable to conduct a more comprehensive investigation in order to obtain an overall picture of the situation of ESD in the Republic of Croatia.

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## STATE OWNERSHIP AND FIRM PERFORMANCE – EVIDENCE FROM LARGE CROATIAN ENTERPRISES

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### **ABSTRACT**

*Despite numerous privatization programs and efforts to reduce state ownership in enterprises, state-owned enterprises continue to play a significant role in various economies and contribute substantially to their gross national products. In different countries and at different times throughout history, the role and significance of state-owned enterprises have often changed influenced by four broad groups of reasons: historical, economic, political, and ideological. Consequently, various reasons justify state ownership in enterprises. However, they are most commonly found in the achievement of specific economic and social objectives, as well as in addressing market failures and information asymmetry. A key disadvantage of state-owned enterprises is their lower efficiency, theoretically grounded primarily through agency, property rights, and public choice theories. Each of the theories mentioned above focuses on the behaviour of politicians and managers of state-owned enterprises and the incentives that guide them in achieving the goals of state-owned enterprises and their personal goals. The inefficiency of state-owned enterprises has also been confirmed in numerous empirical studies, which have used varied methodologies and different efficiency measures. Despite significant efforts in privatization, state-owned enterprises continue to play an essential role in Croatian economy. This can be substantiated by data showing that in 2021, state-owned enterprises generated 51 billion HRK in revenue, managed assets worth 232 billion HRK (which represents 53% of the GDP), realized more than 7 billion HRK in investments (accounting for 23% of total investments) and employed over 47 thousand workers (comprising 5% of the total workforce). This paper evaluates the efficiency of state-owned enterprises compared to private ones using a sample of large Croatian companies from 2018 to 2022. It analyzes return on assets and return on equity, confirming the hypothesis of the lower efficiency of state-owned enterprises.*  
**Keywords:** Firm performance, Efficiency, Return on Assets, Return on Equity, State Owned Enterprises

### **1. INTRODUCTION**

In different countries and at different times throughout history, the role and significance of state-owned enterprises have often changed, influenced by four broad groups of reasons: historical, economic, political, and ideological. Despite numerous privatizations since the 1980s, according to La Porta et al. (2002), state-owned enterprises play a significant role in many economies, even on a global scale, with a growing trend in some sectors. Toninelli (2000) classifies state-owned enterprises into four main groups: utility services, base products, financial services, and social services. Megginson (2005) highlights how the role of state ownership has changed over time and that contemporary economic theory supports state ownership for three key reasons: balancing economic and social goals, responding to market failures and in situations of information asymmetry. The existence of state-owned enterprises is the subject of numerous debates, analyzing their purpose and cost-benefit analysis, considering business indicators and broader social and economic impact. The literature often mentions state-owned enterprises' lower efficiency than private ones, focusing mainly on business indicators. This paper aims to contribute to the research on the performance of state-owned enterprises in Croatia. The paper includes an analysis of theoretical considerations on the lower efficiency of state-owned enterprises and the latest empirical studies testing this

problem. An analysis was conducted on a sample of large enterprises in state and private ownership in Croatia. The scientific contribution of the paper is reflected in the systematic presentation of existing theoretical knowledge, evaluation of current empirical research, and analysis of the performance of state and private enterprises in the Croatian economic context.

## **2. LITERATURE REVIEW**

### **2.1. Theoretical Considerations**

In the 20th century, the study "The Modern Corporation and Private Property" by Berle and Means (1932) initiated an extensive discussion on corporate governance, particularly the relationship between ownership, ownership structure and business performance. The authors suggested that modern enterprises require the inclusion of a more significant number of people (shareholders) due to the size and complexity of operations. With the development of financial markets, the number of shareholders increases, and control is often delegated to management. According to the authors, there is a negative relationship between ownership dispersion and business performance. Following that study, many researchers expanded this thesis to various aspects of ownership (state, private, insider, outsider, employee stock ownership, etc.). A critical study, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure" by Jensen and Meckling (1976), uses agency theory to explain the inverse relationship between ownership and performance. The research by Shleifer and Vishny (1997) proposed shareholder protection laws and ownership concentration as solutions to the conflict of interest between shareholders and managers. Furthermore, based on these theories, a debate has developed on state ownership's (in)efficiency. Boycko, Shleifer, and Vishny (1994) believe that state-owned enterprises are inefficient due to political decisions, where politicians use enterprises to favour their supporters (voters). Continuing on these foundations, a theoretical discussion on the issue of (in)efficiency of state ownership has also developed. Thus, Boycko, Shleifer, and Vishny (1994) consider that state-owned enterprises are inefficient due to deliberate political decisions of governments because politicians use state-owned enterprises to favour their political supporters through employment, targeted regional investments and deliberate unrealistic reductions in product prices or imposing excessive prices for purchased goods (through politically connected suppliers). Politicians have a motive for "bribing managers" – to cater to their voter base and achieve their own political goals – and managers have a motive for bribing politicians – to allocate or retain management positions. Thus, corruption endogenously appears in the model. The analysis of the inefficiency of state-owned enterprises can be viewed through the problems of incentives and contracts at the microeconomic level. La Porta and Lopez-de-Silanes (1997) distinguish two causes for the lack of adequate incentives for efficiency. First, it is believed that supervision in public enterprises is weaker, leading to weaker incentives for efficiency. (Vickers and Yarrow 1988) Secondly, political interference distorts the goals and constraints of managers in state-owned enterprises. (Shleifer and Vishny 1994) According to Shapiro and Willig (1990), the lower efficiency of public ownership results from distorted managerial goals. Managers of state-owned enterprises often answer to politicians and sometimes strive for a political career, thus neglecting efficiency in favour of maximizing employment and political prestige. (Kornai 1986) This approach is supported by soft budget constraints, where the state budget covers poor business decisions of state-owned enterprises due to the high political cost of enterprise failure. Weak supervision is a common reason for poor incentives. Managers of state-owned enterprises are under weak supervision because their companies are not traded on the market like private companies, eliminating the possibility of hostile takeovers and shareholder influence on company performance. According to Yarrow (1986), the capital market does not play a role in disciplining managers because the debt of state-owned enterprises is part of the public debt.

Agency theory, one of the fundamental approaches for understanding the efficiency of state versus private ownership, has been developed in the works of many authors, including Megginson (2005), Shapiro and Willig (1990), Laffont and Tirole (1990), Bos (1991), Yarrow (1989), De Fraja (1993), Boycko, Shleifer, and Vishny (1994, 1996), Shavell (1979), and Williamson (1975). This theory focuses on the relationship between principals (owners) and agents (managers) and explores how principals can effectively supervise agents to act in their interests. In the case of state-owned enterprises, there is a dual principal-agent relationship: citizens as principals entrust management to politicians, and politicians as principals entrust the management of state-owned enterprises to managers. Agency theory emphasizes the challenges of citizens supervising politicians and the supervision of managers in state-owned enterprises by politicians. The theory asserts that both managers and politicians, like all individuals, maximize their own goals. The inefficiency of state-owned enterprises arises from information asymmetry, incomplete contracts, and lack of clear goals, leading agents to pursue their goals. In contrast, in private ownership, control mechanisms are more effective. Private enterprises' managers are disciplined by various external and internal control mechanisms, including the managerial labour market and rewards based on performance. Such mechanisms are often lacking in state enterprises, leading to less efficiency. The theory of property rights, developed in the works of authors such as Veljanovski (1987), Starr (1989), Furubotn and Pejovich (1972), Pejovich (1990), Demsetz (1967), Zeckhauser and Horn (1989), Bos (1991), Barnes (1985), Cowling (1980), Alchian (1965), Fama (1980), Grossman (1980) and Yarrow (1986) argues that public enterprises are economically less efficient due to the way ownership affects systems of rewards and punishments for managers. Dispersed property rights reduce the motivation for efficient use of assets. Although shareholders in large corporations cannot supervise management as owners in smaller enterprises can, there are compensatory mechanisms. State ownership needs better-defined property rights with the threat of takeover or bankruptcy to prevent managers from "relaxing" and becoming less efficient. Public choice theory, developed by Parker (1998), De Alessi (1969, 1974), Cook and Kirkpatrick (1995), Starr (1987), Borcherting, Bush, and Spann (1997), Self (1994), Stretton and Orchard (1994), Boston (1991), Osborne and Gaebler (1993) and Lane (1991) also has clear views on state ownership. Political motives prevail over economic efficiency in state ownership, leading to higher costs. As a representative of citizen-owners, the government focuses on re-election instead of the common good, and managers of state-owned enterprises aim to strengthen power and prestige. There is a problem of information asymmetry between voters (principals) and politicians (agents), leading politicians to set goals not aimed at the common good but at short-term objectives such as maximizing employment for re-election.

## **2.2. Empirical Studies**

Numerous empirical studies have confirmed the theoretical assumptions about the impact of state ownership on firm performance. According to Laporšek et al. (2021), this literature usually focuses on two approaches: comparing performance of enterprises before and after privatization and comparing the concurrent performance of state-owned and private enterprises. The historical approach, which compares performance before and after privatization, is often applied to a small sample, which carries problems of sample selection and generalization, as noted by Tandon (1997). Moreover, it is difficult to determine the impact of changing ownership structure from the impact of the changing economic environment. Frydman et al. (1999) emphasize the importance of financial investments and restructuring before privatization, which can affect results after privatization. Both approaches face the problem of measuring performance. Chang and Singh (1993) point out two conceptual problems with using profitability as an indicator of the performance of state-owned enterprises: short-term impacts on profitability that are not necessarily related to long-term performance and the fact that state

enterprises often have broader goals beside profitability. Researches usually include indicators of profitability, but also others such as investments, output and employment. Boardman and Vining (1989) point out the importance of defining appropriate performance measures, emphasising that private sector criteria cannot always be applied to state-owned enterprises due to different goals and constraints. Empirical research on the performance of public versus private and privatized enterprises uses various methodologies, criteria for measuring performance and data samples. The literature assessing the performance of the private and public sectors often favours private sector indicators, assuming the same performance criteria regardless of ownership type and performance measures used are often more applicable for the private sector. This presents a challenge in analysing the performance of different enterprises in different countries, where the reasons for the existence of state-owned enterprises can vary. Most works from the first group confirm privatization's positive effects, i.e., better performance of private-owned enterprises. Notable works include Megginson (1994), Boubakri and Cosset (1998), Marthue (2007), Claessens and Djankov (1999), Frydman, Gray et al. (1999), Claessens, Djankov, and Pohl (1996), Megginson and Netter (2001), Djankov and Murrell (2002), Martin and Parker (1995), D'Souza and Megginson (1999), D'Souza, Nash, and Megginson (2000), Earle and Estrin (1996). In the second approach, which compares state and private enterprises concurrently, better performances are found in the private sector. Notable studies include Borchering et al. (1982), Millward and Parker (1983), Boardman and Vining (1989, 1992), Sappington and Stiglitz (1987), Laffont and Tirole (1990), De Fraja (1993), Boycko, Shleifer, and Vishny (1994, 1996), Hart, Shleifer and Vishny (1997).

### **3. ANALYSIS OF THE PERFORMANCE OF STATE-OWNED ENTERPRISES IN CROATIA**

According to Crnković et al. (2011), the development of the current state portfolio owned by the Republic of Croatia should primarily be viewed through the lens of the transformation and privatization of former social enterprises, which began with the transition process. Privatization was complex due to transitional and war conditions and the aspiration to achieve economic, political and social goals. The process began in 1991 with the Law on the Transformation of Social Enterprises and continued with the Law on Privatization in 1995, covering almost 3,000 enterprises. Despite significant efforts in privatization, state-owned enterprises still play an essential role in the Croatian economy. According to MPUGDI (2022), state-owned enterprises in 2021 generated 51 billion HRK in revenue, managed assets worth 232 billion HRK (53% of GDP), realized more than 7 billion HRK in investments (23% of total investments) and employed over 47 thousand workers (5% of the total workforce). Therefore, state-owned enterprises are an essential part of Croatia's GDP and national economy and can be an effective tool of economic policy, provided they are efficiently managed. State-owned enterprises in Croatia can generally be divided into two groups: those owned by the central state and those owned by regional and local government units. Central government-owned enterprises can be divided into two groups: enterprises of particular state interest currently not intended for privatization and other enterprises remaining in the portfolio after privatization. Given the specificities of local and regional self-government enterprises, which are typically companies established to provide utility services and are mainly micro, small and medium enterprises, the analysis will compare large state-owned enterprises with large private enterprises. The number of large enterprises by ownership from 2018 to 2022 is shown in Table 1. According to the data, it is evident that state-owned enterprises make up 12.1% to 12.7% of the total number of large enterprises in the Republic of Croatia each year, once again showing their importance and significance in the economy. Also, it is noticeable that the number of state-owned enterprises remains constant, primarily due to the non-implementation of privatization processes.

	2018	2019	2020	2021	2022
SOE <sup>1</sup>	52	52	52	52	52
POE <sup>2</sup>	375	372	371	363	357
Total	427	424	423	415	409

*Table 1: Number of enterprises by type of ownership  
(Source: Prepared by author based on FINA<sup>3</sup> data)*

	2018	2019	2020	2021	2022
SOE	17.382	17.880	18.160	18.681	20.056
POE	35.337	40.273	40.722	43.955	49.519
Total	52.719	58.153	58.883	62.637	69.575

*Table 2: Total assets of enterprises by type of ownership (in million Euros)  
(Source: Prepared by author based on FINA data)*

Table 2 shows the total assets managed by enterprises in the Republic of Croatia, indicating that depending on the year, state-owned enterprises manage 28% to 32% of the total assets of large enterprises, reconfirming their significance in the national economy. Given that the share of state-owned enterprises in total assets is significantly larger than their share in the total number of enterprises, it is clear that state-owned enterprises, on average, manage up to 3 times larger assets per enterprise than private ones, which is also confirmed by the data in Table 3. This can be explained by the specific role of state-owned enterprises, typically infrastructural companies managing large network systems (electricity supply, roads, gas pipelines, oil pipelines, etc.)

	2018	2019	2020	2021	2022
SOE	334.27	343.85	349.24	359.26	385.69
POE	94.23	108.26	109.76	121.09	138.71
Total	123.46	137.15	139.20	150.93	170.11

*Table 3: Mean assets per company by type of ownership (in million Euros)  
(Source: Prepared by author based on FINA data)*

In order to conduct a comparison of the performance between state-owned and private companies, the average values for the Return on Assets (ROA) and Return on Equity (ROE) indicators were calculated for each group of companies for each of the observed years. ROA and ROE were selected as the key indicators that determine the efficiency of a enterprise in generating profits concerning its total assets and equity capital, respectively. From the data presented in Tables 4 and 5 and Figures 1 and 2, it is evident that private companies have significantly higher profitability as measured by ROA and ROE indicators in all the years observed. Specifically, in the pre-pandemic period (up to 2020), private companies achieved almost the double return in terms of ROA. The difference in ROE is even more significant, reaching up to three times. In the post-pandemic year of 2021, private companies achieved almost five times better results in both ROA and ROE, indicating the sluggishness and unpreparedness of state-owned companies for recovery after the pandemic. In 2022, state-owned companies recorded negative ROA and ROE, primarily as a consequence of the Croatian government's decision to control energy prices (especially electricity), leading to substantial losses for Hrvatska Elektroprivreda d.d. and consequently negative returns for the entire group of state-owned enterprises.

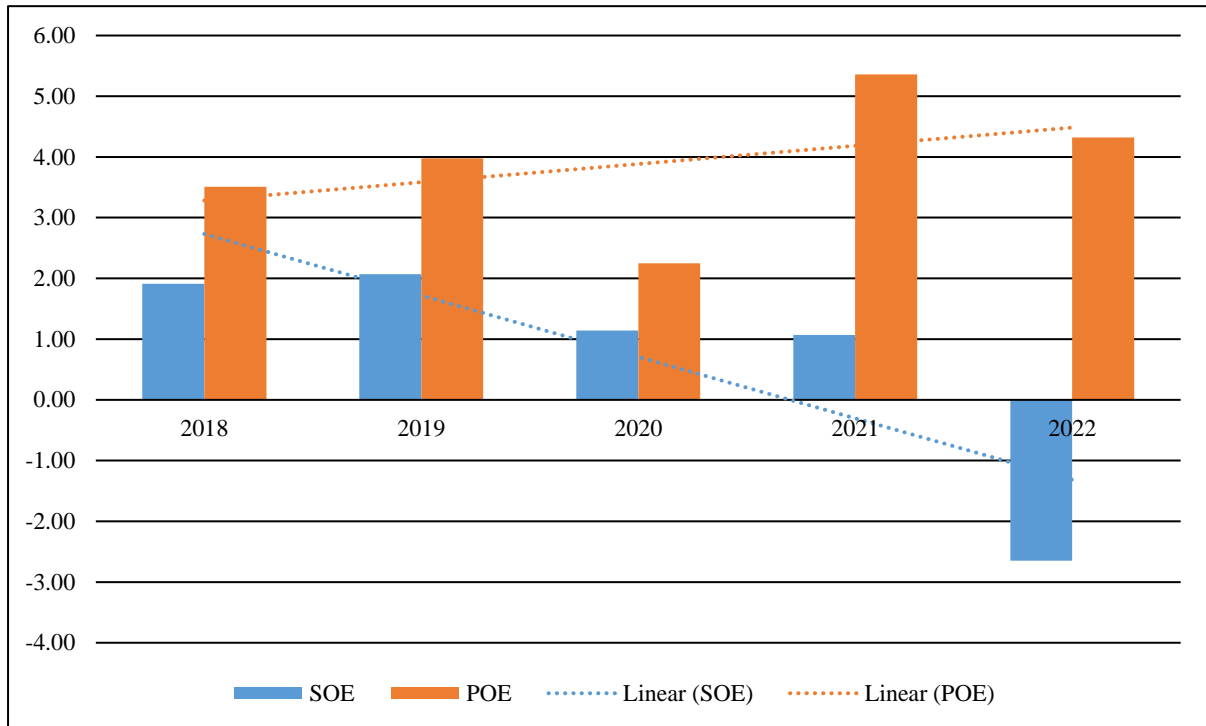
<sup>1</sup> State Owned Enterprises

<sup>2</sup> Private Owned Enterprises

<sup>3</sup> Croatian Financial Agency - <https://infobiz.fina.hr/>

	2018	2019	2020	2021	2022
SOE	1,91	2,07	1,14	1,07	-2,65
POE	3,51	3,98	2,25	5,36	4,32

*Table 4: Mean return on assets (ROA) by ownership type  
(Source: Prepared by author based on FINA data)*



*Figure 1: Mean return on assets (ROA) by ownership type  
(Source: Prepared by author based on FINA data)*

Based on a sample of large Croatian companies, the results confirm the general hypothesis of the lower efficiency of state-owned enterprises compared to private ones. It is important to note that this research has limitations, which also imply directions for future research. Specifically, only two measures of profitability are used and to get a complete picture of the performance, it would be necessary to analyze other indicators from both the balance sheet and the profit and loss statement, which was impossible in this study due to its scope. Additionally, it is essential to mention that large state-owned enterprises in Croatia, as previously noted, are mainly companies that provide so-called network goods. Therefore, they typically manage significantly more assets than private companies, affecting the ROA and ROE indicators calculation. Also, the mentioned fact about the nature of large state-owned enterprises indicates the goals for which they exist: infrastructural goods used by both the population and entrepreneurs. Therefore, their primary goal is not profitability but the provision of infrastructural goods. However, even in fulfilling these goals, it is essential to be guided by the motive of efficiency and rational use of resources.

	2018	2019	2020	2021	2022
SOE	3,93	4,29	2,40	2,34	-6,61
POE	12,63	9,37	5,24	12,17	9,73

*Table 5: Mean return on equity (ROE) by ownership type  
(Source: Prepared by author based on FINA data)*

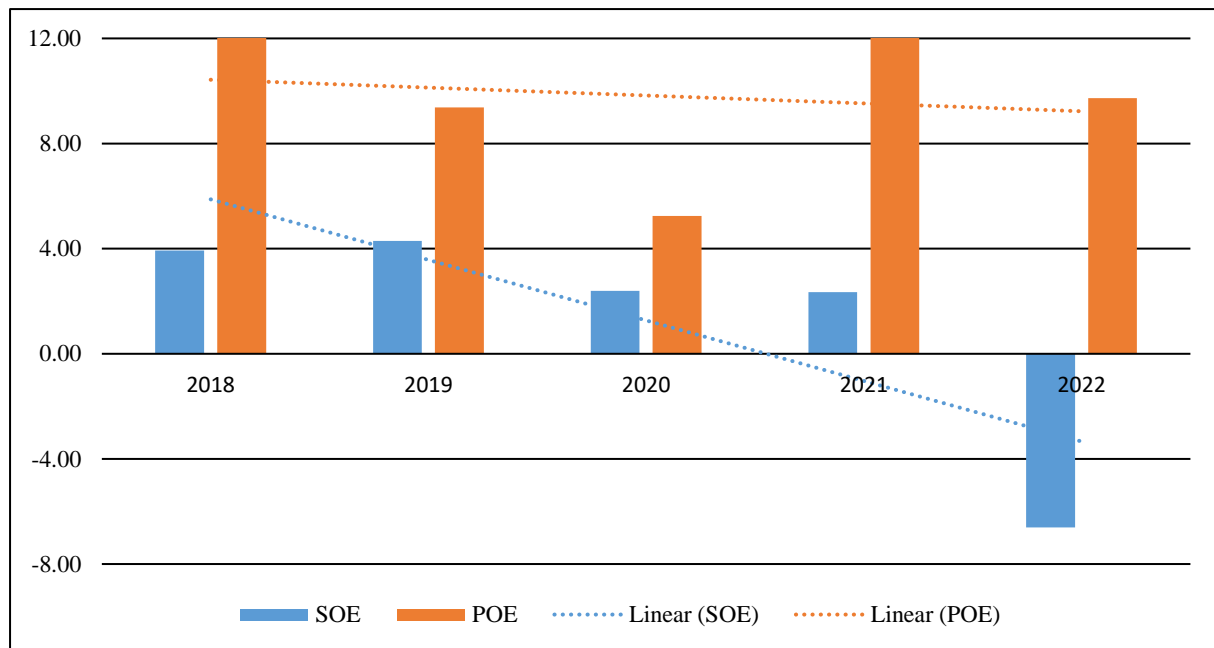


Figure 2: Mean return on equity (ROE) by ownership type  
(Source: Prepared by author based on FINA data)

#### 4. CONCLUSION

Despite numerous privatization programs and efforts to reduce state ownership in enterprises, state-owned enterprises continue to play a significant role in various economies and contribute substantially to their gross national products. In different countries and at different times throughout history, the role and significance of state-owned enterprises have often changed, influenced by four broad groups of reasons: historical, economic, political, and ideological. Consequently, various reasons justify state ownership in enterprises and they are most commonly found in the achievement of specific economic and social objectives, as well as in addressing market failures and information asymmetry. A key disadvantage of state-owned enterprises is their lower efficiency, theoretically grounded primarily through agency, property rights, and public choice theories. Each of the theories mentioned above focuses on the behaviour of politicians and managers of state enterprises and the incentives that guide them in achieving the goals of state-owned enterprises and their personal goals. The inefficiency of state-owned enterprises has also been confirmed in numerous empirical studies, which have used varied methodologies and different efficiency measures. Despite significant efforts in privatization, state-owned enterprises continue to play an essential role in Croatian economy. This can be substantiated by data showing that in 2021, state-owned enterprises generated 51 billion HRK in revenue, managed assets worth 232 billion HRK (which represents 53% of the GDP), realized more than 7 billion HRK in investments (accounting for 23% of total investments) and employed over 47 thousand workers (comprising 5% of the total workforce). This paper analyzed the efficiency of state-owned enterprises compared to private ones using a sample of large Croatian companies from 2018 to 2022. According to the data, it is evident that state-owned enterprises make up 12.1% to 12.7% of the total number of large enterprises in the Croatia each year, once again showing their importance and significance in the economy. Depending on the year, state-owned enterprises manage 28% to 32% of the total assets of large enterprises, reconfirming their significance in the national economy. Given that the share of state-owned enterprises in total assets is significantly larger than their share in the total number of enterprises, it is clear that state-owned enterprises, on average, manage up to 3 times larger assets per enterprise than private ones.



To compare the performance of state-owned and private enterprises, the average values of Return on Assets (ROA) and Return on Equity (ROE) were calculated for each of the observed years. The results show that private companies achieve significantly higher profitability as measured by the ROA and ROE indicators across all the years observed. Consequently, the results of this analysis confirm the initial hypothesis of the lower efficiency of state-owned enterprises, even in the sample of large Croatian companies. Results also suggest a need for further analysis, considering state-owned and private enterprises' different objectives and capital structures.

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## REGULATORY FRAMEWORK AND INVESTIGATION OF THE MONEY LAUNDERING

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### **ABSTRACT**

*There is a causal relationship between high levels of crime, corruption, money laundering, tax and other financial fraud, and growing economic and social inequalities in the world. The state of capitalism and the market economy in today's societies, as well as the gross violations of human rights, poverty and low standards of billions of people, make it necessary to examine the criminal and illegal economy, as objects of anti-money laundering measures, in the context of the effectiveness and expanding the scope of countermeasures. The purpose of the present research is to analyze the modern approaches to limiting latent (hidden) crime, the criminal, gray and black economy, through the methods of risk assessment, intelligence, evidence in the process of investigation and prevention, as well as to propose new ones for improvement of anti money laundering.*

**Keywords:** Money laundering, Criminal economy, Investigation

### **1. INTRODUCTION**

On October 27, 2023, at a plenary session in Paris, the Financial Action Task Force (FATF)<sup>1</sup> announced that it had added Bulgaria<sup>2</sup> to its "grey list"<sup>3</sup> of countries for which there should be enhanced controls. The reason for the decision is money laundering, which, according to the group, is at too high a level. At the same meeting, the FATF decided that Albania, the Cayman Islands, Jordan and Panama<sup>4</sup> would no longer be part of the gray list (*see Appendix 1.*). At the previous meeting, Croatia was also added to it, which, unlike Bulgaria, was admitted to Schengen and the Eurozone at the beginning of the previous year. According to the organization, the countries on the gray list suffer from "strategic deficiencies" in their efforts to combat money laundering and terrorist financing. However, they are cooperating with the FATF to fix the problems and are subject to increased monitoring. The FATF also has a "blacklist", and the organization recommends not to invest in these countries. Currently, North Korea and Iran are part of it, with special attention being paid to Myanmar.

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<sup>1</sup> The organization was created at the initiative of the G-7 in late 1989 with the task of influencing individual countries to fight against money laundering the financing of terrorism. Its offices are in the OECD building in Paris. Outcomes FATF Plenary, 25-27 October 2023 (fatf-gafi.org)

<sup>2</sup> On June 02, 2021, the Office of Foreign Assets Control (OFAC) of the US Department of the Treasury imposed sanctions on three Bulgarian nationals for their significant role in corruption in Bulgaria, as well as for their networks covering 64 organizations. The named individuals and companies have been sanctioned under Executive Order 13818, which supplements and implements the Magnitsky Global Act on Accountability for Human Rights Violations and targets perpetrators of serious human rights abuses and corruption worldwide. Treasury Sanctions Influential Bulgarian Individuals and Their Expansive Networks for Engaging in Corruption | U.S. Department of the Treasury

<sup>3</sup> Jurisdictions under Increased Monitoring - 27 October 2023 (fatf-gafi.org)

<sup>4</sup> This jurisdiction was often associated with the so-called Panama Papers scandal since 2016.

The Panama Papers refer to a leak of 11.5 million of documents, uncovered by the International Consortium of Investigative Journalists (ICIJ), of confidential financial and legal documents from the Panamanian law firm "Mosack Fonseca" which offered corporate services and became one of the largest entities to provide offshore financial services worldwide (Joaristi et al., 2019).

The Panama Papers 2016 divulgence is the largest disclose of offshoring and tax avoidance documentation. The documents with a volume content of approximately 2.6 terabytes, involves more than two hundred thousand enterprises in more than two hundred countries. From this information, the offshore connections of individuals and companies are constructed and aggregated using their countries of origin. In a recent study (Dominguez et al, 2020) the top offshore financial regions and countries of the network are identified, and their intra- and inter-relationship are mapped and described.

## 2. CRIMINAL ECONOMY AND UNDERGROUND MARKETS: TENDENCY

A first general categorization, adopted in the early 1990s by the national statistical institutes of the OECD countries, introduced four definitions of the economy depending on and graded according to legality and observability: official white economy, informal economy, shadow economy, criminal economy<sup>5</sup>. The financial relationships between the criminal economy and the white economy, as well as the frequent penetration of dirty money flows into the shadow zone of the economy, before the start of their legalization, can be linked to all three phases of money laundering - placement, stratification and integration, all of which actually falls within the scope of the present scientific study. It should be mentioned here that the financing of terrorist organizations in many cases is also linked to the proceeds and resurces of criminal activities, but this is not the main subject of the present research and therefore only some facts will be inserted. Overlaps between the world of crime (be it organised or petty) and terrorism have been documented, albeit in a non-systematic fashion, for years. In the past, the attention of experts and researchers focused on organisational “convergence” between criminal and terrorist groups. Nowadays, the focus has shifted towards individuals who move on the crime-terror continuum as both criminal groups and terrorist organisations. Some Austrian, or Austria based, foreign fighters who travelled to Syria or Iraq are said to have backgrounds in organised crime (GLOBSEC, 2017). Belgium has witnessed the development of a phenomenon referred to as “gangster jihad”, a phenomenon which is also potentially present in France, the Netherlands (more than 40% of its foreign fighters have previous criminal backgrounds) and Germany (up to 2/3 of its foreign fighters have a criminal past). It was also expected this phenomenon to become even more pronounced in France, where an estimated 60% of incarcerated radicals are predicted to return criminal-infested terrorist networks by 2020. With up to 1/3 of its convicted terrorists having previous criminal backgrounds, Spain has a long standing tradition of individuals shifting between ordinary criminal and terrorist milieus, dating back to at least the 2004 Madrid attacks. Significant traces of the nexus can also be found in the UK, where it is also mindful of evidence suggesting peer-to-peer recruitment into jihadism of individuals without criminal pasts. Finally, there exist a number of seemingly odd, and to an extent outlier cases, in Italy (where traces of an old school nexus on an organisational level are still to be found), Ireland (where ordinary crime seems to have long overtaken terrorist networks), Greece (where the crime-terror nexus better fits left-wing rather jihadi terrorism) and Bulgaria<sup>6</sup> (where the threat of terrorism is now considered to be largely connected to foreigners residing, passing through or eventually expelled from the country). The criminal economy is not directly determined by the processes of economic development or by public attitudes, but aims at the realization of illegal turnover, sometimes committing serious crimes, including through violent methods.

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<sup>5</sup> There is another widely known concept whose definitions can include both the gray (shadow) economy and the criminal economy. The black economy is a segment of a country's economic activity that is derived from sources that fall outside of the country's rules and regulations regarding commerce. The activities can be either legal or illegal depending on what goods and/or services are involved. The black economy is related to the concept of the black market. In the same way that an economy is made up of many related markets considered as an integrated whole, the black economy is made up of the collection of various black markets in an economy. Black Economy: AKA Black Market, Overview and Examples (investopedia.com)

A black market is an economic activity that takes place outside government-sanctioned channels. Illegal market transactions usually occur “under the table” to let participants avoid government price controls or taxes. The goods and services offered in a black market can be illegal, meaning their purchase and sale are prohibited by law, or they can be legal but transacted to avoid taxes. Black Market Definition (investopedia.com)

<sup>6</sup> In the period 1984-1987, during the so-called Revival process, 42 illegal pro-Turkish groups were discovered in Bulgaria; acts of terrorism and acts of sabotage have been committed. The bombings escalated the Arab-Turkish name forcible change campaign, which ran from 24 December 1984 to 19 January 1985 (Gruev, 2008).

In a report by Gen.-Col. Grigor Shopov, Deputy Minister of Internal Affairs, presented at the Conference of Security Services from the fraternal socialist countries, held from November 21 to 27, 1987 in Varna with the participation of the First Deputy Chairman of the KGB of the USSR Arm. gen. F. D. Bobkov., it is stated that:... the created illegal groups and organizations have established, through temporarily resident foreigners, embassy or consulate employees, connections with expatriate organizations and through them - with MIT.

Activities are subject to the penal code, and some are prohibited by law (eg human trafficking, smuggling, drug trafficking, illegal arms trade, economic crimes etc.). Organized crime can be registered and statistically reported, with a criminal conviction in force, or under investigation and in the pre-trial phase, or it can be hidden (latent) crime, which is often on a much larger scale and with significant threats to society, but it could be countered and exposed on the money trail. The exploitation of the underground economy by OCGs (Organized criminal groups) has received relatively little attention in the literature. To address this gap, it is conducted interviews with experts and stakeholders to identify economic sectors that are prone to underground activities – namely, transport and logistics, entertainment, construction, finance and labour (European Commission, Migration and Home Affairs, 2021). The results of these interviews inform targeted literature searches to explore in greater depth the mechanisms of the underground economy, and the particular vulnerabilities of each sector to OCG exploitation. OCGs are in a particularly good position to exploit underground economy practices in sectors that are closely connected to many economic activities, and have a relatively centralised position in existing economic networks. The key findings of this analysis are summarised in Table 1. below.

Economic sector	Underground economy mechanisms	Vulnerabilities of the sector	Nature of OCG exploitation
<b>Transport and logistics</b>	<ul style="list-style-type: none"> <li>Undeclared cargo and freight</li> <li>Work performed by People without sufficient vetting</li> </ul>	<ul style="list-style-type: none"> <li>Inadequate screening of cargo and freight</li> <li>Insider threats</li> <li>New technologies and digital infrastructures increase anonymity of customers and are vulnerable to intrusion</li> </ul>	<ul style="list-style-type: none"> <li>Trafficking of illicit goods like drugs, tobacco, firearms, counterfeit goods</li> <li>THB (Trafficking in human beings) and migrant smuggling</li> <li>MTIC (Missing Trader Intra-Community) fraud</li> <li>Theft of cargo</li> <li>Attacks from firearms and explosives</li> </ul>
<b>Entertainment<sup>7</sup> (may include tourism and hospitality, gambling and other)</b>	<ul style="list-style-type: none"> <li>Undeclared work</li> <li>Undeclared provision of services</li> <li>Provision of services by agents lacking authorisation</li> </ul>	<ul style="list-style-type: none"> <li>Grey zones within existing regulatory regimes</li> <li>Existence of interconnected ‘ancillary’ industries</li> <li>Absence of an aggrieved party inclined to report ‘vice’ offences</li> </ul>	<ul style="list-style-type: none"> <li>Provision of ‘ancillary’ services to entertainment operations</li> <li>Organisation of entertainment services Money-laundering</li> </ul>
<b>Construction</b>	<ul style="list-style-type: none"> <li>Unreported work</li> <li>Work performed by individuals lacking authorisation</li> <li>Work performed in violation of existing health and safety standards</li> </ul>	<ul style="list-style-type: none"> <li>Complex economic activity requiring many types of specialised input</li> <li>High personnel turnover and temporary nature of work</li> <li>Connection to other economic activities (e.g. real estate trade)</li> </ul>	<ul style="list-style-type: none"> <li>Supply of personnel, incl. certification and qualification</li> <li>Provision of ancillary services, e.g. site security</li> <li>Money-laundering THB</li> </ul>
<b>Finance (particularly informal value transfer systems, like hawala)</b>	<ul style="list-style-type: none"> <li>Hidden transactions</li> <li>Provision of services by agents lacking authorisation</li> </ul>	<ul style="list-style-type: none"> <li>Weak regulation of financial services</li> <li>Anonymity of virtual currencies</li> <li>Untraceable transactions through informal value transfer systems</li> </ul>	<ul style="list-style-type: none"> <li>Money-laundering and concealment of criminal finances</li> <li>Doing business on crypto markets</li> </ul>

*Table 1. Underground economy exploitation by organised crime groups  
(Source: European Commission, Migration and Home Affairs, 2021. Mapping the risk of serious and organised crime infiltrating legitimate businesses. Final Report)*

<sup>7</sup> This term encompasses, but is not limited to tourism and hospitality, gambling, or even prostitution. A number of entertainment sectors, such as prostitution and gambling, are subject to a variety of possible regulatory regimes – ranging from complete legality and official regulation to complete prohibition – which determines the scope and susceptibility of a given sector to underground economy practices (Ponsaers et al., 2008).

According to the scientific study of Ponsaers et al. (2008) is considered that the words “informal economy” is a very broad, plural concept. The words “informal economy” have different resonances for each one of us. For some, it may conjure up images of seasonal agricultural workers in the fields. For others, house work, or market stalls, or drug dealing round the railway station. The informal economy is the reverse side of the official economy, the boundary between which is drawn by legislation and regulation. As governments decide to regulate or prohibit activity, so it may be drawn out of the official economy and into the informal economy. If governments decide to deregulate or decriminalise – not a very common occurrence in the last few decades – then activity may again become legal, taxable and within the formal economy. Moreover, the size of the informal economy also necessarily depends upon the fiscal and social policies of governments. *This definition in the context of present report does not apply in the same sense.*

Organized crime financing rarely comes to the attention of investigative authorities and prosecutors in individual member states, although Council Framework Decision 2008/841/JHA<sup>8</sup> requires all member states to criminalize and prosecute it accordingly. Criminal groups, whether operating within an entirely illegal market (drugs) or competing in the market with legal players (cigarette market), at some point in their existence face the same dilemmas and financial constraints typical of legal business in relation with access to finance.

### **3. INEFFICIENCY - RISK TRANSACTIONS AND PARTICIPANTS IDENTIFIED AND REPORTED, BUT LACK OF PROVEN PREDICATE CRIMES AND ACTING CRIMINAL GROUPS UNLINKED WITH MONEY LAUNDERING**

#### **3.1. Counteraction mechanisms and methodology**

Financial monitoring and policies introduced through various legislative mechanisms have a significant place in the prevention of money laundering and terrorist financing. The development and implementation of public policies and programs is a complex and multifaceted process, proceeding through various phases, which generally include the following elements:

- 1) Strategic planning
- 2) Development of the policy and programs for its implementation
- 3) Implementation of the policy and programs
- 4) Monitoring
- 5) Assessment.

The monitoring of public policies and programs can be defined as a process of systematic and continuous collection and analysis of information on the progress of the implementation of the policy/program and the achievement of the set goals/results. As a result of the ongoing monitoring, timely corrections can be made in the way of implementation. The integration of the controlling concept in the process of building public policies would lead to the optimization of the process and the achievement of better final and desired results. The practical implementation of the controlling concept is carried out through a system of mechanisms, the most important of which are:

- Early-warning mechanism – the content of this mechanism focuses on the hypothesis of the preliminary connection and the anticipatory action, which enables preventive optimization of the management process;
- Prerequisites control mechanism – preconditions control is directly dependent on the early warning system;
- Feedback mechanism;
- Mechanism of the logical connection - on this basis, a system of logical connections is formed, where as a result of the integration between the two main management functions - planning and control, effective optimization of the management function of coordination is reached.

#### **3.2. Methods of investigation**

The detection and investigation of money laundering can go through some of the points of the following scheme (Belensky, 2010):

1. Formation of pre-trial proceedings on a legal basis and sufficient data
- 1.2. Notification to the authorities of pre-trial proceedings about a committed crime
- 1.2. Immediate disclosure by the authorities of the pre-trial proceedings of party members for an offense committed

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<sup>8</sup> EUR-Lex - 32008F0841 - EN - EUR-Lex (europa.eu)

- 1.3. Information about a committed crime, disseminated through mass media
2. Preliminary inspection
  - 2.1. Typical indicators of money laundering
  - 2.2. Circumstances provided for clarification in the course of the preliminary examination
3. Subject of proof
  - 3.1. Circumstances to be established regarding the objective side of the composition of the crime
  - 3.2. Circumstances to be established regarding the perpetrator of the crime
  - 3.3. Circumstances related to clarification of damages
  - 3.4. Other circumstances relevant to criminal liability
4. Investigative situations
5. Investigative versions
6. Investigative actions in relation to the predicate/accompanying crime
7. Initial and urgent investigative actions in relation to money laundering
  - 7.1. Request and seizure of documents and information data
  - 7.2. Examination of witnesses
  - 7.3. Appointment of forensic economic expertise
  - 7.4. Appointment of handwriting examinations
  - 7.5. Special intelligence tools
  - 7.6. Interrogation of the accused
8. Organizational and methodological actions relevant to the investigation:
  - request to remove bank secrecy;
  - undertaking actions to search for, freeze and secure property acquired from money laundering.

Money laundering never always happens in exactly one way, there are various and countless ways. What path the money will take, how many times it will be transformed and through what, depends on the type of predicate crime with which it was connected, as well as on the professional competencies of the financial specialists, accountants and lawyers involved in concealing the origin of the funds. This requires some creativity and good logical thinking in the stage of gathering evidence of laundering. The cognitive side of the criminal investigation process is the investigator's creative activity, through which the investigated event becomes known, or to put it another way - to reach reliable knowledge about the event itself or other related circumstances (Pavlov, 2014). The specifics of the transition from probability to the reliability of knowledge in the penal process, especially the peculiarities of the thought process in relation to the construction and verification of aversions, is a prerequisite for the relationship between the version and heuristics<sup>9</sup>. The latter investigates those complex mechanisms through which a person reaches original decisions, based on the use of intuition, imagination, inner voice and self-conviction in his own life and professional experience.

#### 4. CONCLUSION

By interpreting the methods of controlling, and thus improving the coordination of operational activity and the exchange of information between institutions in the fight against money laundering, on a national and international level, it would be possible to have a parallel impact

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<sup>9</sup> A heuristic or heuristic method in informatics is a method for solving logical or mathematical problems for which there is no algorithm. The method involves stepwise narrowing of the area of search for solutions through inductive reasoning based on accumulated experience. Heuristic methods (for example, when searching in a decision tree) often shorten the time for solving the problems, but cannot guarantee completeness and optimality.



on the different levels of the criminal economy, as and to increase the extent and scope of preventive impact, incl. and through heuristic methods as part of the information flow system of controlling.

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## APPENDIX

*Extract from up-to-date overview of the ratings that assessed countries obtained for effectiveness and technical compliance (last updated on 9 November 2023), FATF*  
[Consolidated assessment ratings \(fatf-gafi.org\)](https://www.fatf-gafi.org)

Updated  
9 November 2023

### Effectiveness

Ratings that reflect the extent to which a country's measures are effective. The assessment is conducted on the basis of 11 immediate outcomes, which represent key goals that an effective AML/CFT system should achieve. For more information see:

[FATF Methodology](#)

Jurisdiction	Report Type	Report Date	Assessment body/bodies	IO 1	IO 2	IO 3	IO 4	IO 5	IO 6	IO 7	IO 8	IO 9	IO 10	IO 11
<a href="#">Albania</a>	MER+FURs	May/23	MONEYVAL	ME	ME	ME	SE	ME	SE	ME	ME	LE	ME	LE
<a href="#">Albania</a>	MER	Dec/18	MONEYVAL	ME	ME	ME	SE	ME	SE	ME	ME	LE	ME	LE
<a href="#">Albania</a>	FUR	Dec/19	MONEYVAL	ME	ME	ME	SE	ME	SE	ME	ME	LE	ME	LE
<a href="#">Albania</a>	FUR	May/23	MONEYVAL	ME	ME	ME	SE	ME	SE	ME	ME	LE	ME	LE
<a href="#">Bulgaria</a>	MER	Jul/22	MONEYVAL	ME	ME	ME	ME	LE	LE	LE	LE	ME	ME	LE
<a href="#">Cayman Islands</a>	MER+FURs	Feb/21	CFATF	ME	ME	LE	LE	ME	LE	LE	ME	LE	ME	ME
<a href="#">Cayman Islands</a>	MER	Mar/19	CFATF	ME	ME	LE	LE	ME	LE	LE	ME	LE	ME	ME
<a href="#">Cayman Islands</a>	FUR	Feb/21	CFATF	ME	ME	LE	LE	ME	LE	LE	ME	LE	ME	ME
<a href="#">Cayman Islands</a>	FUR	Nov/21	CFATF	ME	ME	LE	LE	ME	LE	LE	ME	LE	ME	ME
<a href="#">Croatia</a>	MER	Feb/22	MONEYVAL	ME	SE	ME	ME	ME	ME	LE	ME	ME	LE	ME
<a href="#">Jordan</a>	MER+FUR	May/22	MENAFATF	ME	SE	ME	ME	LE	ME	LE	ME	SE	LE	LE
<a href="#">Jordan</a>	MER	Jan/20	MENAFATF	ME	SE	ME	ME	LE	ME	LE	ME	SE	LE	LE
<a href="#">Jordan</a>	FUR	May/22	MENAFATF	ME	SE	ME	ME	LE	ME	LE	ME	SE	LE	LE
<a href="#">Panama</a>	MER+FURs	Aug/19	GAFILAT	LE	ME	ME	ME	LE	LE	ME	ME	ME	SE	SE
<a href="#">Panama</a>	MER	Jan/18	GAFILAT	LE	ME	ME	ME	LE	LE	ME	ME	ME	SE	SE
<a href="#">Panama</a>	FUR	Jan/19	GAFILAT	LE	ME	ME	ME	LE	LE	ME	ME	ME	SE	SE
<a href="#">Panama</a>	FUR	Aug/19	GAFILAT	LE	ME	ME	ME	LE	LE	ME	ME	ME	SE	SE

Mutual  
Evaluation  
Report  
Follow-Up  
Report

**MER**

**FUR**

**HE**

High level of effectiveness - The Immediate Outcome is achieved to a very large extent. Minor improvements needed.

**SE**

Substantial level of effectiveness - The Immediate Outcome is achieved to a large extent. Moderate improvements needed.

**ME**

Moderate level of effectiveness - The Immediate Outcome is achieved to some extent. Major improvements needed.

**LE**

Low level of effectiveness - The Immediate Outcome is not achieved or achieved to a negligible extent. Fundamental improvements needed.

### Immediate Outcomes

#### IO1

Money laundering and terrorist financing risks are understood and, where appropriate, actions coordinated domestically to combat money laundering and the financing of terrorism and proliferation.

#### IO2

International co-operation delivers appropriate information, financial intelligence, and evidence, and facilitates action against criminals and their assets.

#### IO3

Supervisors appropriately supervise, monitor and regulate financial institutions, DNFBPs and VASPs for compliance with AML/CFT requirements commensurate with their risks.

#### IO4

Financial institutions, DNFBPs and VASPs adequately apply AML/CFT preventive measures commensurate with their risks, and report suspicious transactions.

#### IO5

Legal persons and arrangements are prevented from misuse for money laundering or terrorist financing, and information on their beneficial ownership is available to competent authorities without impediments.

- IO6** Financial intelligence and all other relevant information are appropriately used by competent authorities for money laundering and terrorist financing investigations.
- IO7** Money laundering offences and activities are investigated and offenders are prosecuted and subject to effective, proportionate and dissuasive sanctions.
- IO8** Proceeds and instrumentalities of crime are confiscated.
- IO9** Terrorist financing offences and activities are investigated and persons who finance terrorism are prosecuted and subject to effective, proportionate and dissuasive sanctions.
- IO10** Terrorists, terrorist organisations and terrorist financiers are prevented from raising, moving and using funds, and from abusing the NPO sector.
- IO11** Persons and entities involved in the proliferation of weapons of mass destruction are prevented from raising, moving and using funds, consistent with the relevant UNSCRs.

#### Assessment Bodies

The body or bodies who conducted the mutual evaluation. Click on the links for more information.

<a href="#">APG</a>	Asia/Pacific Group on Money Laundering
<a href="#">CFATF</a>	Caribbean Financial Action Task Force
<a href="#">EAG</a>	Eurasian Group
<a href="#">ESAAMLG</a>	Eastern and Southern Africa Anti-Money Laundering Group
<a href="#">GABAC</a>	Task Force on Money Laundering in Central Africa
<a href="#">GAFILAT</a>	Financial Action Task Force of Latin America
<a href="#">GIABA</a>	Inter Governmental Action Group against Money Laundering in West Africa
<a href="#">MENAFATF</a>	Middle East and North Africa Financial Action Task Force
<a href="#">MONEYVAL</a>	Council of Europe Committee of Experts on the Evaluation of Anti-Money Laundering Measures and the Financing of Terrorism
<a href="#">IMF</a>	International Monetary Fund
<a href="#">WB</a>	World Bank



REPUBLIKA HRVATSKA  
Ministarstvo znanosti i  
obrazovanja



REPUBLIKA HRVATSKA  
Ministarstvo  
unutarnjih poslova



REPUBLIKA HRVATSKA  
Ministarstvo gospodarstva  
i održivog razvoja



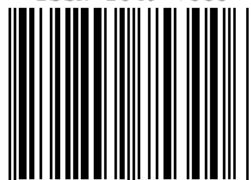
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