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Contents

HAS THE GLOBAL PANDEMIC OF 2020 LED TO PERSISTENCE IN THE SHARE PRICES OF LARGE GLOBAL COMPANIES?

Hortense Santos[1]
Rui Dias[2]
Cristina Vasco[3]
Paulo Alexandre[4]
Paula Heliodoro[5]

DOI:

Abstract: *This paper aims to analyze the predictability of the stocks of Apple, Microsoft Amazon.com, Tesla, Facebook, Samsung, Electronics, Johnson & Johnson, Walmart, in the period from October 1, 2019 to January 11, 2021. To carry out such an analysis, it is intended to answer two research questions, namely: (i) is there predictability in the stock prices of the companies under analysis? (ii) Can investors diversify risk by incorporating these companies' shares into their portfolios? The results of the Exponents Detrended Fluctuation Analysis (DFA) show that Apple (0.51) Microsoft (0.49), Amazon.com (0.53), Samsung Electronics (0.53), Johnson & Johnson (0.53) do not have long memories in their time series, that is, investors cannot obtain abnormal profitability without incurring additional risk. Walmart (0.41) has anti-persistence, while Tesla (0.60), Facebook (0.55) indicate some predictability, meaning investors adjusting their trading strategies to the necessary missteps may have some above-average profitability, which partly rejects the first question of the research. To answer the second research question, we estimated the Detrended cross-correlation coefficient (pDCCA) model, which indicates 17 mean correlation coefficients (≈ 0.333 → ≈ 0.666), 7 strong cross-trend correlation coefficients (0.666 → ≈ 1,000), 4 weak correlation coefficients (≈ 0.000 → ≈ 0.333). These results show that investors should be careful to incorporate the shares of these companies into a single portfolio; the suggestion would be to group only the shares of companies that do not present predictability and have low rhoDCCA. The authors consider that this evidence will be important for institutional investors when carrying out trading strategies based on maximizing profitability, but also mitigating risk when diversifying.*

Keywords: *Covid-19; Predictability of stock prices; Diversification of portfolios.*

1. INTRODUCTION

The market efficiency hypothesis is a very relevant concept for international investors who want to have their portfolios diversified, with the purpose of mitigating the inherent risk of global financial markets. With the global economy increasingly integrated, international investors have sought to diversify their portfolios into more exotic markets in different ways, with the aim of the synchronization of their assets being low. Testing market synchronizations and deducing the existence of assumptions of portfolio diversification when markets are not integrated may lead to distorted indications. We have seen a strong correlation between past and future data series, which makes it possible for the investor to have anomalous profitability when selecting an appropriate trading strategy. The possibility of investors being able to pre-

[1] School of Business and Administration, Polytechnic Institute of Setúbal, Portugal
[2] School of Business and Administration, Polytechnic Institute of Setúbal, Portugal and CEFAGE-UE, IIFA, University of Évora, Portugal
[3] School of Business and Administration, Polytechnic Institute of Setúbal, Portugal
[4] School of Business and Administration, Polytechnic Institute of Setúbal, Portugal
[5] School of Business and Administration, Polytechnic Institute of Setúbal, Portugal

dict future price changes may lead to imbalances in financial markets, making it difficult to implement efficient portfolio diversification strategies (Alexandre, Dias, and Heliodoro, 2020; Alexandre, Heliodoro, and Dias, 2019; Dias, R. and Pereira, 2020; Dias and Carvalho, 2020; Dias, Alexandre, & Heliodoro, 2020; Dias, da Silva, and Dionysus, 2019; Dias, Heliodoro, and Alexandre, 2019, 2020b, 2020a; Dias, Heliodoro, Alexandre, Santos, and Farinha, 2021; Dias, Heliodoro, Alexandre, and Vasco, 2020a, 2020b; Dias, Heliodoro, Alexandre, et al., 2020a, 2020a; Dias, Heliodoro, Teixeira, and Godinho, 2020; Dias, Pardal, Teixeira, and Machová, 2020; Dias, Teixeira, Machova, et al., 2020; Heliodoro, Alexandre, and Dias, 2019; Heliodoro, Dias, and Alexandre, 2020; Heliodoro, Dias, Alexandre, and Vasco, 2020; Sparrow, P., Dias, R., Šuleř, P., Teixeira, N., and Krulický, 2020; Santos and Dias, 2020).

The efficient market hypothesis (EMH) explains the random walk hypothesis, suggesting that stock prices are independent of each other, so it is impossible to achieve abnormal profitability without incurring additional risk. The positive effect of a well-functioning and highly efficient financial market in the global economy is largely due to massive modernization initiatives (Jr. and Camba, 2020).

Speculation in financial markets has been a process that aims to discover asset prices by investors in international financial markets. However, measures taken to mitigate this speculation have significantly reduced informational efficiency in those markets. Given these events, this paper aims to analyze the predictability of the quotations of Apple, Microsoft Amazon.com, Tesla, Facebook (CLASS A), Samsung Electronics, Johnson & Johnson, Walmart, in the period from October 1, 2019 to January 11, 2021. To carry out such an analysis, it is intended to answer two research questions, namely: (i) is there predictability in the stock prices of the companies under analysis? (ii) Can investors diversify risk by incorporating these companies' shares into their portfolios? The results show, for the most part, that the shares of companies do not present predictability, that is, investors are unable to obtain anomic profitability without incurring the additional risk, except for Tesla (0.60), Facebook (0.55) which rejects in part the first question of the research. To answer the second research question, we estimated the *Detrended cross-correlation coefficient* (*pDCCA*) model, which indicates 17 mean correlation coefficients (≈ 0.333 → ≈ 0.666), 7 strong cross-trend correlation coefficients (0.666→ ≈1,000), 4 weak correlation coefficients (≈ 0.000 → ≈ 0.333). These results show that investors should be careful to incorporate the shares of these companies into a single portfolio; the suggestion would be to group only the shares of companies that do not present predictability and have low *rhoDCCA.*

In terms of structure, this test is organized in 5 sections, including the introduction. Section 2 shows the characteristics of companies. Section 3 describes the methodology and data. Section 4 contains the results. Section 5 concludes.

2. COMPANY CHARACTERIZATION

Apple is an American company with a market capitalization of 2,340T that produces and sells computers, personal electronics, peripherals and computer software. It presented its first product in 1976 at the hands of its founders Steve Jobs and Steve Wozniak. In the last 20 years, it popularized devices such as iPod, iPhone and iPad, thus creating new market segments where it became the leader and target of its competitors, making design and status its main commercial flag. As it can be seen in figure 1, Apple has shown a constant revenue and net income; however, the profit margin fell in the years 2019 and 2020, from approximately 22.5% to 21%. The value of assets

and liabilities has also been stable; in the year 2020 the percentage of debt grew significantly (37.75%). With an increasing operating cash flow of 80,674M in 2020, we found that the cash flow of financial activities was approximately (-87,000M), representing a significant reduction of 4.5% compared to 2019. Cash flow investing fell from approximately 46,000M in 2019 to a negative cash flow investing of 4,000M in 2020 (Apple, 2021; Bloomberg, 2021; Reuters, 2021).

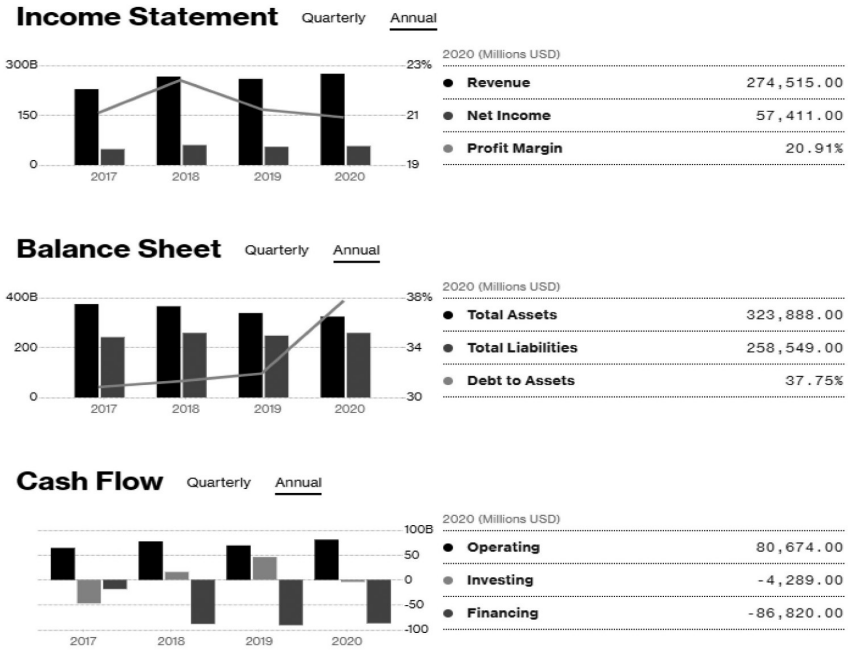

Figure 1. Financial data of the Apple company
Source: https://www.bloomberg.com/quote/AAPL:US

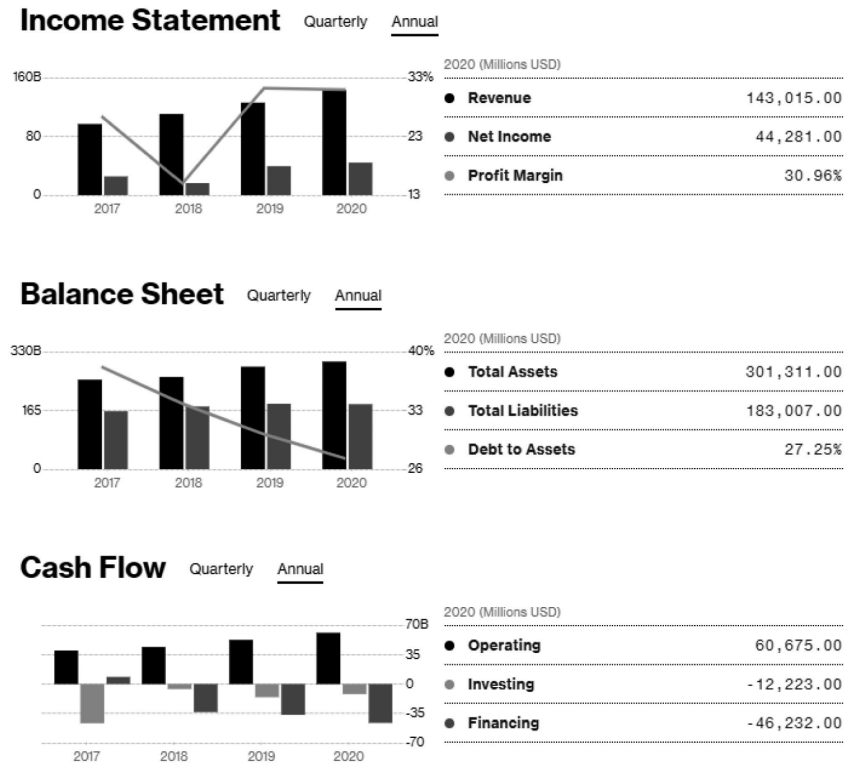

Figure 2. Microsoft company financial data
Source: https://www.bloomberg.com/quote/MSFT:US

Microsoft has a market capitalization of 1,708T and is the world's leading producer of personal computer software and applications. Founded in 1975 by Bill Gates and Paul Allen, its genesis was the creation of an operating system at the request of the giant, IBM, then MS-DOS was born. It was in the late 1980s that it had exponential growth, dominating the world market entirely. In the 2000s Microsoft diversified its offering, specifically in video games (Xbox ecosystem) and smartphone markets. Currently, they maintain the domain on personal computers with the Windows operating system and the Office productivity suite. However, it focuses a lot on cloud services and business solutions, where its main competitor is Google. According to Figure 2, Microsoft has shown a revenue with the constant growth of approximately 15% per year; the net result in 2018 shows losses of 35% when compared to the year 2017, recovered in consecutive years, rising from 2018 to 2019 (136%). With a view to total assets, this figure has grown steadily from 3.5% to 10%, total liabilities increased between 2017 and 2019, and remained stable in 2020, with a debt percentage of 27.25%. With an increasing operating cash flow of 60,675M in 2020, we found that the cash flow of financial activities was negative (- 46.232M) also in 2020. Cash flow investing increased compared to 2019 and was negative in 2020 at -12.223 million dollars (Microsoft,2021; Bloomberg, 2021; Reuters, 2021).

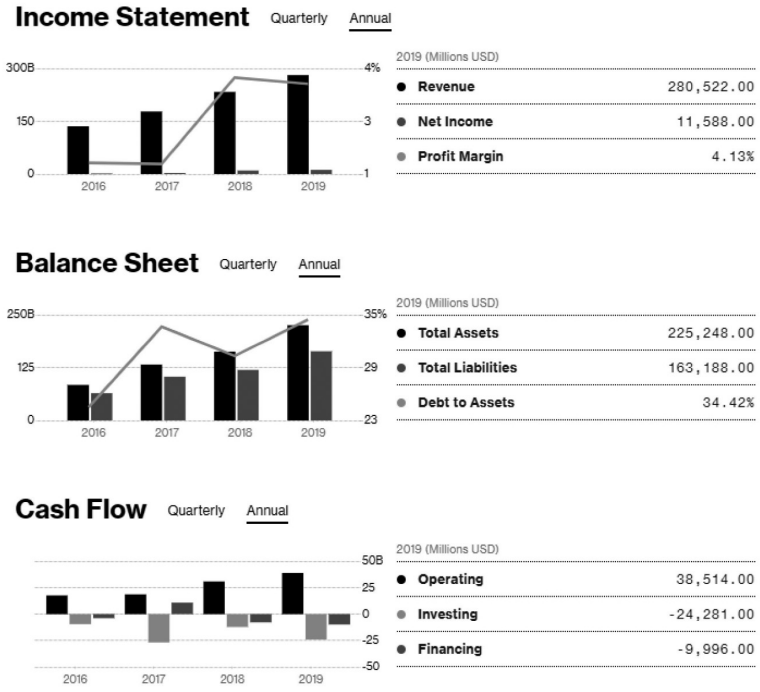

Figure 3. Amazon financial data

Source: https://www.bloomberg.com/quote/AMZN:US

Amazon is an American company with a market capitalization of 1,652T and is now the leading online retailer available worldwide. Founded in 1994 by Jeff Bezos, it was year 1995 when it stood out as an online bookstore; after 2 months of its launch, the company ensured service to all 50 U.S. states and 45 countries (Amazon, 2021).

Since the year 2000, Amazon has diversified its product, expanded from selling books to basically everything from electronics to consumer goods. In the last decade, the accent was on the mobile market with the launch of smartphones, tablets, e-readers of own brand, streaming multimedia content, with Amazon Prime and the Echo ecosystem that promises the virtualization and automation of housing. According to Figure 3, Amazon has achieved an increasing revenue in the

years under the analysis of approximately 30% per year; the net result shows equal behavior, and in the year 2018 it raised 232% compared to the previous year; the profit margin also had an exponential growth from 2017 to 2018. As for total assets and liabilities, there has been recorded a growth in both headings in the same order of magnitude, and the share of the debt was 34.42% in 2019. It had an increasing operating cash flow of 38,514M in 2019; we found that the cash flow of financial activities was approximately -9,996M, remaining at the same value as in 2018; the cash flow from investing reduced to -24. 281M (Amazon, 2021; Bloomberg, 2021; Reuters, 2021).

Walmart is a U.S. company with a stock market capitalization of 414,009B, founded in 1962 by Sam Walton in Texas, soon realized that only massive growth would bring profitability. So, it opted for the strategic opening of establishments in rural areas, and 1967 already owned 24 stores. In the 1990s, it expanded its activity to China, Canada and the United Kingdom. Currently, they remain one of the world's leading retail players, with sustained expansion in countries that are not yet present and with an increasingly solidified online position (Walmart, 2021).

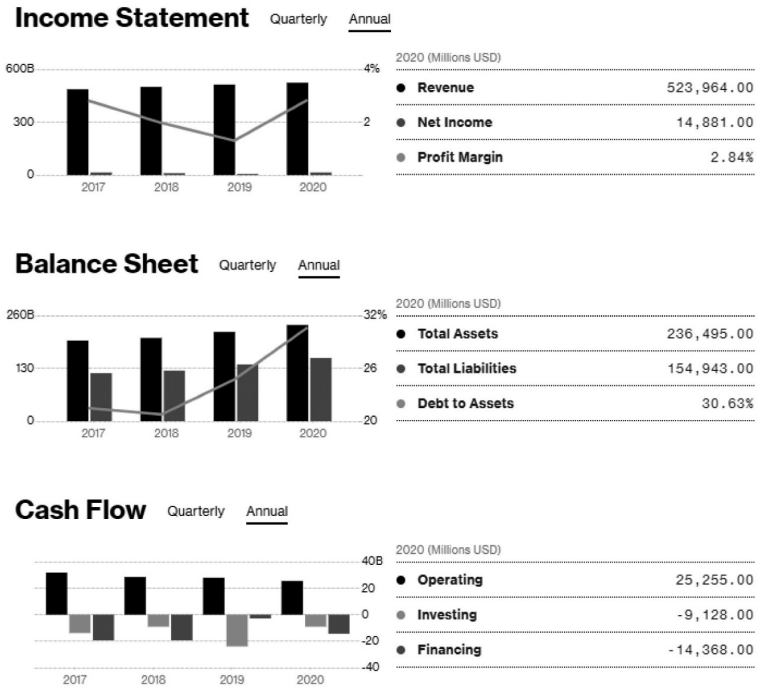

Figure 4. Financial data of Walmart

Source: https://www.bloomberg.com/quote/WMT:US

Figure 4 shows some financial data from Walmart, which has shown stable revenue over the years, with an increase of approximately 2% per year. The net result has similar ratios (2%), having decreased in the years 2018 and 2019, and in 2020 it recovered (15,000M); the profit margin fell in the years 2018 and 2019, following the movement of net income (2.84%) in the year 2020. Total assets and liabilities show growth in both headings, with the growth of total assets between 7-10% and total liabilities of 10%; the percentage of debt was 30.63% in 2020. With an operational cash flow to decline, the value was 25,255M in 2020, so it turns out that the financial cash flow was -14.368M. Cash flow from investing was -9,128M in 2020 (Walmart, 2021; Bloomberg, 2021; Reuters, 2021).

South Korea's Samsung Electronics, with a market capitalization of 518,177T, founded in 1969 by Lee Byung-Chull, began its activity as a producer of electronic and semiconductor compo-

nents. In the 1980s it achieved globalization by establishing its position as one of the world's 5 largest electronics producers. Between 1990 and 2000 it adjusted its offer, entering convincingly in markets such as personal computers, peripherals and smartphones. In the last 20 years, it consolidated this position, being one of the main players in personal and industrial technology. Figure 5 shows that Samsung Electronics has a stable revenue over the years; however, the net result shows a sharp drop in the years 2018 and 2019, with a recovery in 2020; the profit margin tracks the performance of net income, showing in 2020 a value of 11.02%. Total assets and liabilities show proportional growth in both headings, the share of debt was 5.22% in 2020. With an operational cash flow to decline, but in line with that recorded in 2017, the value was KRW 45,382.92B in 2019; it turns out that the financial cash flow increased in 2019, being -8,829.25B KRW. Cash flow from investing was also growing at -39,948.17B KRW (Samsung, 2021; Bloomberg, 2021; Reuters, 2021)

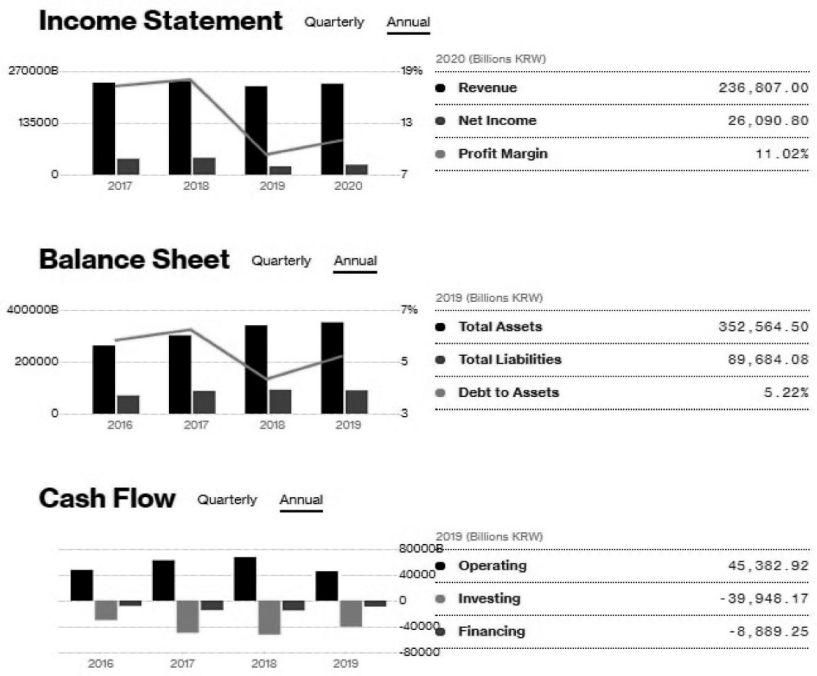

Figure 5. Financial data of Samsung Electronics
Source: https://www.bloomberg.com/quote/005930:KS

Johnson & Johnson was founded in 1886 by three brothers: Robert Wood Johnson, James Wood Johnson and Edward Mead Johnson, and currently has a stock market capitalization of 430,552B. At the foundation, it produced and marketed medical supplies, home products and medical guides. The sale of first aid kits had the first commercial success. Since then, research has played a key role in the development of the company's business model, with the acquisition of scientifically relevant laboratories being the focus of its strategy. Figure 6 shows some financial data from Johnson & Johnson, which has seen slight growth in its revenue in recent years, e.g. revenue of 82,584M in 2020; however, net results in 2018 grew by more than 1000%, the profit margin tracks the performance of net income, with a value of 17.82% in 2020. Total assets and total liabilities increased in 2018 and have remained stable since then, the share of debt was 18.18% in 2020. With an increasing operating cash flow (23,416M) in 2020, it turns out that financial cash flow increased slightly (-18,024M), with cash flow from investing in 2020 of 6,194M. (Bloomberg, 2021; Reuters, 2021).

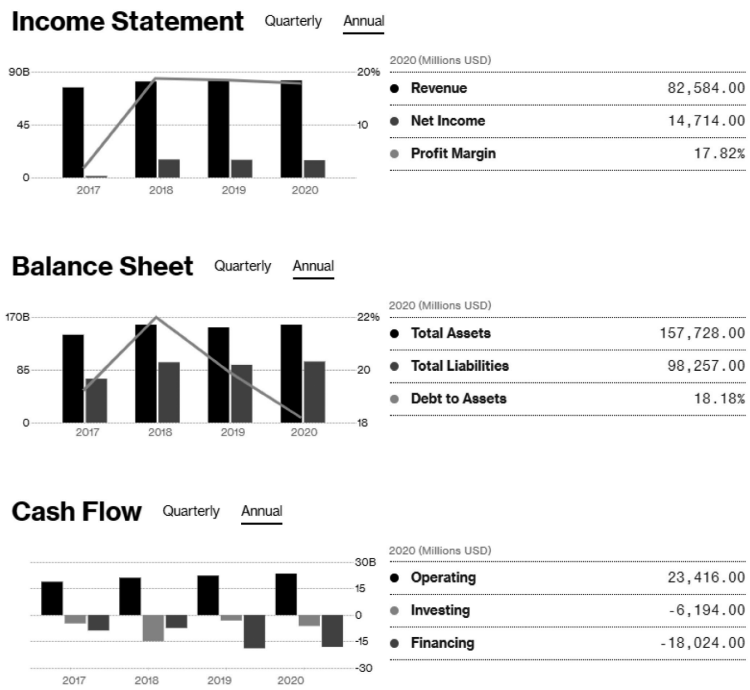

Figure 6. Financial data of Johnson & Johnson
Source: https://www.bloomberg.com/quote/JNJ:US

3. METHODOLOGY

3.1. Data

The data used for the preparation of this paper were the stocks of Apple, Microsoft Amazon. com, Tesla, Facebook (CLASS A), Samsung Electronics, Johnson & Johnson, Walmart, in the period from October 1, 2019 to January 11, 2021, and the data were extracted from the *Thomson Reuters* platform. The prices index has daily scales and is found in local currency to mitigate distortions arising from exchange rates.

3.2. Methodology

The development of the research took place through several stages. In the first phase, we chart the evolutions of exchange rates in levels. The characterization of the sample was performed through descriptive statistics, the adherence test of Jarque and Bera (1980). To validate extreme market volatility we carry out stability tests on waste, as well as tests for structural breakdowns, through the model of Clemente, Montañés, and Reyes (1998). To answer the first research question, we will use the D*etrended Fluctuation Analysis (DFA)* methodology. DFA is an analysis method that examines temporal dependence on non-stationary data series. This technique by assuming that time series are non-stationary avoids spurious results when the analysis focuses on the relationships of the data series in the long term. This methodology was developed by Peng et al. (1994) , having the same origin in the study of the behavior of *DNA*. Later this method was used to examine the behavior of financial series. DFA has the following interpretation: $0<\alpha<0,5$ anti-persistent series; series features $\alpha=0,5$ *random walk;* $0<\alpha<1$ persistent series. The function of this technique is to examine the relationship between values x_k and x_{k+t} and in different moments (Dias, da Silva, and Dionysus, 2019; Santos and Dias, 2020; Dias, Heliodoro, and Alexandre, 2020a; Dias, Heliodoro, Alexandre, Santos, and Farinha, 2021).

Consider a dataset x_k, with $k = 1,..., t$ equidistant observations. DFA's first step is the construction of a new series:

$$x(t) = \sum_{k=1}^{t} x_k \quad (1)$$

The second step is to obtain the trend of each fraction $z(t)$, through the least squares method, obtaining the subtracted series from the trend (detrended), i.e.

$$x_s(t) = x(t) - z(t) \quad (2)$$

The original application assumes that the trend present in each of the boxes is a linear trend, i.e. $Z(t) = at + b$ subsequent applications indicate that it is likely to contain other polynomial tendencies (Kantelhardt, Koscielny-Bunde, Rego, Havlin, and Bunde, 2001). For each box, the value of the trend equation is obtained by the least squares method and later the root of the mean square deviation between the series is estimated $x(t)Z(t)$ and, the DFA function being given by:

$$F(s) = \sqrt{\frac{1}{2N} \sum_{t=1}^{2N} [x_s(t)]^2} \quad (3)$$

Estimating the average $F(s)$for all centralized boxes in s generates the value of fluctuations $\langle F(s) \rangle$, depending on s. This estimation will be repeated for all distinct values of s, expecting a process of a power-law, i.e.

$$\langle F(s) \rangle \sim s\alpha^{\alpha} \quad (4)$$

To answer the second research question, we will use the Detrended cross-correlation coefficient model, *pDCCA*. The cross-correlation coefficient depends on the length of the box (time scale). One of the advantages of this cross-correlation coefficient is centered on the possibility of measuring the correlations between two non-stationary time series at different time scales. The sdcca cross-correlation coefficient varies $-1 \leq \rho DCCA \leq 1$ within the logical range; 1 means perfect cross correlation, –1 means perfect cross-correlation and 0 means that there is no correlation (Podobnik and Stanley, 2008). Table 1 shows the interpretation of the exponent *pDCCA*.

Table 1. Detrended cross-correlation coefficient, *pDCCA*

Weak	Medium	Strong
≈ 0,000 → ≈ 0.333	≈ 0.333 → ≈ 0.666	≈ 0.666 → ≈ 1,000

Source: Own elaboration.

4. RESULTS

Figure **7** shows the fluctuations, in levels, in the stocks of Apple, Microsoft, Amazon.com, Tesla, Facebook (CLASS A), Samsung Electronics, Johnson & Johnson, Walmart. The sample comprises the time horizon from October 1, 2019 to January 11, 2021, and it is a period of great complexity, due to understanding the global pandemic (Covid-19). The actions of these companies clearly reveal the instability experienced in these markets in the first quarter of 2020.

Tables 2 and 3 show the main descriptive statistics of Apple, Microsoft, Amazon, Tesla, Facebook, Samsung Electronics, Johnson & Johnson, Walmart, as well as the Jarque-Bera adherence test. The analysis of descriptive statistics allows us to measure profitability, present positive daily averages,

while Tesla (0.051005) shows the most pronounced standard deviation. The asymmetries are mostly negative except for Walmart (1.007663), Amazon (0.034238), Samsung (0.388962), while Walmart (14.34802) has the sharpest shorts. We can then evidence that the coefficients of asymmetry and kurtosis are statistically different from those of a normal distribution, and such indications were validated through the Jarque-Bera adherence test that rejects the null hypothesis with a significance of 1%.

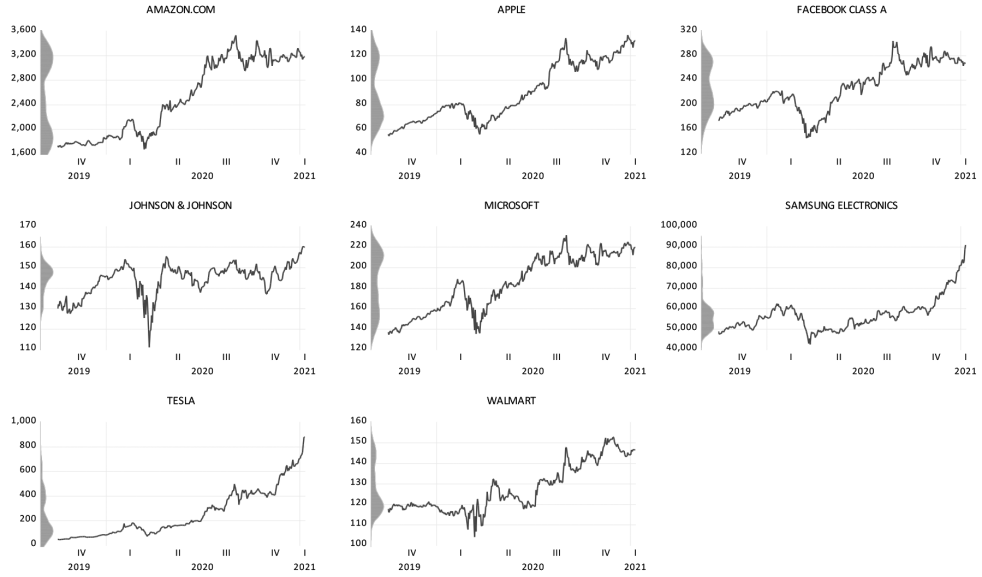

Figure 7. Evolution, in levels, of the quotations of the 8 companies, in the period from October 1, 2019 to January 11, 2021.

Source: Own elaboration.

Note: Thomson Reuters: October 1, 2019 to January 11, 2021, 335-point data.

Table 2. Descriptive statistics on profitability of the quotations of the 8 companies from October 1, 2019 to January 11, 2021.

	Amazon	Apple	Facebook	JOHNSON & JOHNSON
Mean	0.001810	0.002553	0.001254	0.000621
Std. Dev.	0.021566	0.026207	0.025917	0.017472
Skewness	0.034238	-0.352427	-0.490237	-0.010623
Kurtosis	5.094894	8.201442	8.406280	9.147459
Jarque-Bera	61.32274***	384.5774***	421.3908***	527.5092***
Observations	335	335	335	335

Source: Own elaboration.

Note: ***, **, * represent significance at 1%. 5% and 10%. respectively.

Table 3. Descriptive statistics on profitability of the 8 company's quotes from October 1, 2019 to January 11, 2021.

	Microsoft	Samsung	Tesla	Walmart
Mean	0.001407	0.001857	0.008625	0.000652
Std. Dev.	0.024492	0.019340	0.051005	0.017357
Skewness	-0.466187	0.388962	-0.475444	1.007663
Kurtosis	12.10776	5.682001	6.903570	14.34802
Jarque-Bera	1169.997***	108.8512***	225.3161***	1854.213***
Observations	335	335	335	335

Source: Own elaboration.

Note: ***, **, * represent significance at 1%. 5% and 10%. respectively.

Since we are in the presence of time successions, we should study the stationary nature of the series relating to the quotations of the 8 companies under analysis. For this, we used the test of unitary roots of Levin, Lin, and Chu (2002), which presents unitary roots in the null hypothesis. The results show the temporality of the time series, in profitability, that is, we are facing a white noise (mean = 0; constant variance) (see table 4).

Table 4. Levin, Lin, and Chu's Park Test (2002), applied to the quotations of the 8 companies, from October 1, 2019 to January 11, 2021.

Method				Statistic		Prob.**	
Levin, Lin & Chu t*				-71.6357		0.0000	
Series	2nd stage Coefficient	Variance Of Reg	HAC of Dep.	Lag	Max Lag	Band-Width	Note
D(AMAZON)	-1.10663	3102.4	95.062	0	16	71.0	333
D(APPLE)	-1.18789	5.1791	0.9103	0	16	12.0	333
D(FACEBOOK)	-1.13544	30.986	1.6117	0	16	36.0	333
D(JOHNSON & JOHNSON)	-1.04761	5.2781	0.5504	1	16	19.0	332
D(MICROSOFT)	-1.34105	15.770	4.4255	0	16	6.0	333
D(SAMSUNG)	-0.95807	1.E+06	48801.	0	16	63.0	333
D(TESLA)	-0.97370	217.64	26.361	0	16	16.0	333
D(WALMART)	-1.22285	4.1802	0.0792	0	16	124.0	333
	Coefficient	T-Stat	Reg SE	mu*	sig*		Note
Pooled	-1.14007	-61.017	1.007	-0.504	0.723		2996

Note: ** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Source: Own elaboration.

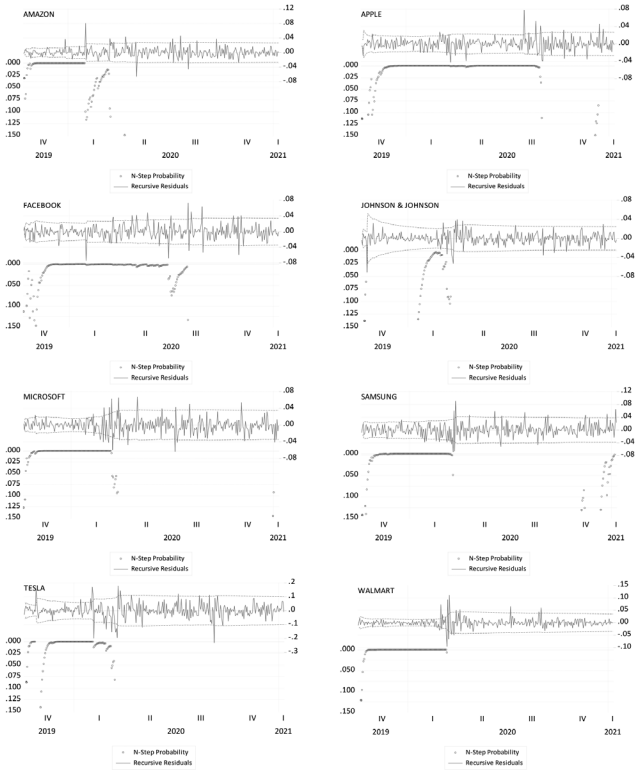

Figure 8. Stability tests carried out on waste applied to the quotations of the 8 companies from October 1, 2019 to January 11, 2021.

Source: Own elaboration.

Figure 8 shows the stability tests performed on the waste of the time series concerning companies Apple, Microsoft, Amazon, Tesla, Facebook, Samsung Electronics, Johnson & Johnson, Walmart, in the period from October 1, 2019 to January 11, 2021, to validate the presence of structural breakdowns. The determination of the structure break is relevant because it has a potentially similar effect to that of the unit roots. Through graphical analysis we can assess the existence of disturbances in variance. Additionally, when examining the graphs and the probability limits of 95%, we verified the existence of a violation of probability limits, therefore, the time series show unstable behavior.

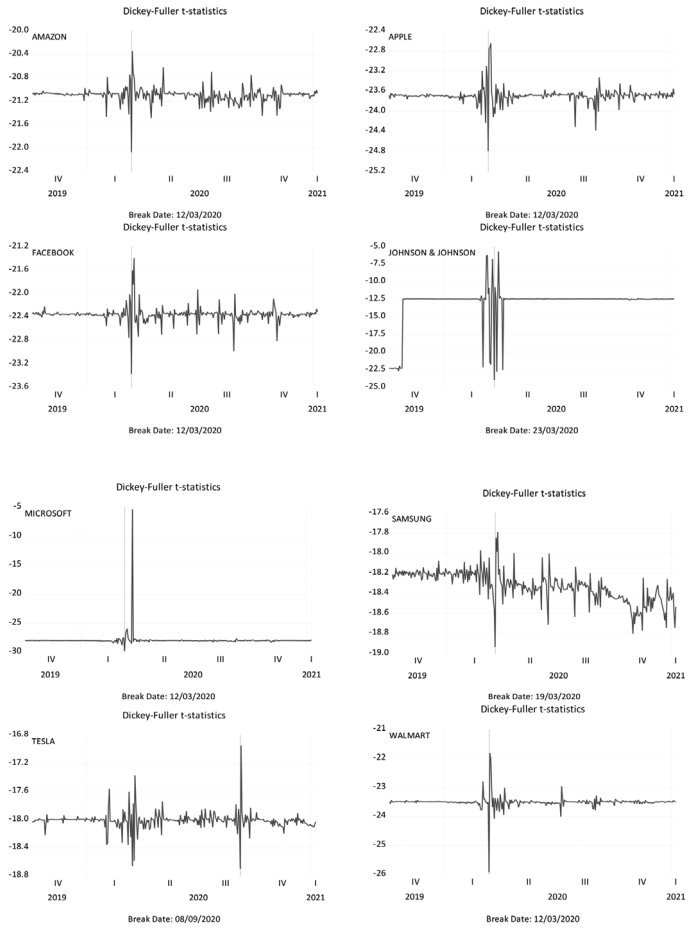

Figure 9. Park Test with structural breaks by Clemente et al. (1998) , return, applied to the quotations of the 8 companies, in the period from October 1, 2019 to January 11, 2021.
Source: Own elaboration.

Figure 9 shows the results of unitary root tests, with structural breaks, by Clemente et al. (1998); we can see that the breaks occur, mostly, in March 2020. The structure breaks of Apple's quotes (12.03.2020), Microsoft, Amazon (12.03.2020), Tesla (08.09.2020), Facebook (12.03.2020), Samsung Electronics (19.03.2020), Johnson & Johnson (23.03.2020), Walmart (12.03.2020). The breaks are in line with the evolution of the global pandemic of 2020, and the oil price war in 2020.

Table 5 shows the results of *the Exponents Detrended Fluctuation Analysis* (*DFA),* which shows that Apple (0.51), Microsoft (0.49), Amazon.com (0.53), Samsung Electronics (0.53), Johnson & Johnson (0.53) do not present long memories in their time series, i.e. investors cannot obtain abnormal profitability without incurring additional risk. Walmart (0.41) presents anti-persistence, while Tesla (0.60), Facebook (0.55) indicate some predictability, which suggests that prices do

not fully reflect the information available and that price changes are not i.i.d., i.e., investors adjusting their trading strategies to the necessary lags may have some above-average profitability, which partly validates the first question of the research.

Table 5. DFA exponent for return.
The values of the linear adjustments were always >0.99$\alpha DFAR^2$

Index	Exponent DFA (Covid-19)
Apple	0.51 ≈ 0.0214
Microsoft	0.49 ≈ 0.0079
Amazon.com	0.53 ≈ 0.0019
Samsung Electronics	0.5 ≈ 0.0073
Johnson & Johnson	0.53 ≈ 0.0081
Walmart	0.41 ≈ 0.0190
Tesla	0.60 ≈ 0.0015
Facebook	0.55 ≈ 0.0029

Source: Own elaboration.

Note: The hypotheses are: H_0α = 0.5 and: H_1α ≠ 0.5.

To answer the second research question, we estimated the *Detrended cross-correlation coefficient (pDCCA)* model, which indicates 17 mean correlation coefficients (≈ 0.333 → ≈ 0.666), 7 strong trendless cross-correlation coefficients (0.666→ ≈1,000), 4 weak correlation coefficients (≈ 0,000 → ≈ 0.333). In table 6, these results show that investors should be cautious about incorporating the shares of these companies into a single portfolio, which partly validates the second research question.

Table 6. Table summary of the coefficients, rhoDCCA referring to the quotations of the 8 companies under analysis, in the period from October 1, 2019 to January 11, 2021.

Index	rhoDCCA	Time scale (days)	Trend
APPLE / MICROSOFT	**0.80**	**n > 11 days**	**Strong**
APPLE / AMAZON	0.60	n > 14 days	Medium
APPLE / TESLA	0.42	n > 18 days	Medium
APPLE / FACEBOOK	**0.68**	**n > 9 days**	**Strong**
APPLE / SAMSUNG	0.36	n > 48 days	Medium
APPLE / JOHNSON & JOHNSON	0.47	n > 23 days	Medium
APPLE / WALMART	0.48	n > 6 days	Medium
MICROSOFT/ AMAZON	**0.72**	**n > 8 days**	**Strong**
MICROSOFT / TESLA	**0.67**	**n > 43 days**	**Strong**
MICROSOFT / FACEBOOK	**0.75**	**n > 5 days**	**Strong**
MICROSOFT / SAMSUNG	0.34	n > 45 days	Medium
MICROSOFT / JOHNSON & JOHNSON	**0.68**	**n > 58 days**	**Strong**
MICROSOFT/WALMART	0.57	n > 5 days	Medium
AMAZON / TESLA	**0.67**	**n > 56 days**	**Strong**
AMAZON / FACEBOOK	0.60	n > 11 days	Medium
AMAZON / SAMSUNG	0.10	n > 11 days	Weak
AMAZON / JOHNSON & JOHNSON	0.39	n > 35 days	Medium
AMAZON/WALMART	0.39	n > 6 days	Medium
TESLA / FACEBOOK	0.37	n > 11 days	Medium
TESLA / SAMSUNG	0.34	n > 35 days	Medium

TESLA / JOHNSON & JOHNSON	0.44	n > 38 days	Medium
TESLA / WALMART	0.11	n > 6 days	Weak
FACEBOOK / SAMSUNG	0.34	n > 52 days	Medium
FACEBOOK / JOHNSON & JOHNSON	0.36	n > 36 days	Medium
FACEBOOK/WALMART	0.17	n > 13 days	Weak
SAMSUNG /JOHNSON & JOHNSON	0.36	n > 29 days	Medium
SAMSUNG / WALMART	0.10	n > 36 days	Weak
JOHNSON & JOHNSON / WALMART	0.49	n > 9 days	Medium

Source: Own elaboration.

5. CONCLUSION

The overall conclusion to be withheld and sustained in the results obtained, through tests carried out with econophysics models show that the global pandemic of 2020 partially affected the prices index of Apple, Microsoft, Amazon.com, Tesla, Facebook, Samsung, Johnson & Johnson, Walmart, in the period from October 1, 2019 to January 11, 2021. The results of t*he exponents Detrended Fluctuation Analysis* (*DFA*) show that the actions of the companies under analysis show no predictability and present balance, except for Tesla (0.60), Facebook (0.55) which rejects, in part the first question of the research. To answer the second research question, we estimated the Detrended *cross-correlation coefficient* pDCCA model, which indicates 17 mean correlation coefficients (≈ 0.333 → ≈ 0.666), 7 strong cross-trend correlation coefficients (0.666 → ≈ 1,000), 4 weak correlation coefficients (≈ 0.000 → ≈ 0.333). These results show that investors should be careful to incorporate the shares of these companies into a single portfolio; the suggestion would be to group only the shares of companies that do not present predictability and have low *rhoDCCA.* The authors consider that this evidence will be important for institutional investors when they develop trading strategies based on maximizing profitability, but also mitigating risk when diversifying.

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RANDOM WALKS AND MARKET EFFICIENCY TESTS: EVIDENCE FOR US AND AFRICAN CAPITAL MARKETS

Rui Dias[1]
Hortense Santos[2]
Paulo Alexandre[3]
Paula Heliodoro[4]
Cristina Vasco[5]

DOI:

Abstract: *The 2020 Russia-Saudi Oil Price War was an economic war triggered in March 2020 by Saudi Arabia in response to Russia's refusal to reduce oil production to keep oil prices at a moderate level. This economic conflict resulted in a sharp drop in the price of oil in 2020, as well as crashes in international markets. In the light of these events, our aim was to test the efficient market hypothesis, in its weak form, in the stock markets of Botswana (BSE), Egypt (EGX 100), Kenya (NSE 20), Moroccan All Shares (MASI), Tunisia (Tunindex), and the MARKET of the USA (DOWJONES INDUSTRIALS), in the period of September 2, 2019 to January 11, 2021. The results therefore support the evidence that the random walk hypothesis is not supported by the financial markets analyzed in this period of global pandemic. The values of variance ratios are lower than the unit, which implies that the yields are autocorrelated in time and, there is reversal to the mean. In order to validate the results, we estimate the model αDFA that shows that the stock markets NSE 20 (0.75), TUNINDEX (0.69), MASI (0.63), EGX 100 (0.64), BSE (0.61), DOW JONES (0.58) show autocorrelation in their profitability, that is, these markets show signs of (in) efficiency, in its weak form, persistence in profitability, validating the results of the variance test by Rankings and Wright Signs. In conclusion we can show that the U.S. stock market has more market efficiency when compared to the African stock markets analyzed. The authors consider that the results achieved are of interest to investors looking for opportunities for portfolio diversification in these regional stock markets.*

Keywords: *Market efficiency; African capital markets, arbitration.*

1. INTRODUCTION

Since the mid-2000s, international financial markets have been subject to a number of significant financial crises, notably the subprime crisis in the US in 2008, and the sovereign debt crisis in Europe in 2010, which originated in developed economies. These events significantly infected developed economies, however, this significance was not dense in emerging economies. Understanding the synchronism between stock markets, as well as the study on the occurrence of movements in periods of turbulence is important for investors, investment fund managers, academics, in various aspects, particularly when it is to implement strategies for diversifying efficient portfolios (Alexandre, Dias, and Heliodoro, 2020; Alexandre, Heliodoro, and Dias, 2019; Dias, and Pereira, 2020; Dias and Carvalho, 2020; Dias, Alexandre, and Heliodoro, 2020; Dias, da Silva, and Dionysus, 2019; Dias, Heliodoro, and Alexandre, 2019, 2020; Dias, Heliodoro, Alexan-

[1] School of Business and Administration, Polytechnic Institute of Setúbal, Portugal and CEFAGE-UE, IIFA, University of Évora, Portugal
[2] School of Business and Administration, Polytechnic Institute of Setúbal, Portugal
[3] School of Business and Administration, Polytechnic Institute of Setúbal, Portugal
[4] School of Business and Administration, Polytechnic Institute of Setúbal, Portugal
[5] School of Business and Administration, Polytechnic Institute of Setúbal, Portugal

dre, Santos, and Farinha, 2021; Dias, Heliodoro, Alexandre, and Vasco, 2020a, 2020b; Dias, Heliodoro, Alexandre, et al., 2020a, 2020a; Dias, Heliodoro, Teixeira, and Godinho, 2020a, 2020b; Dias, Pardal, Teixeira, & Machová, 2020c; Heliodoro and Alexandre, 2019; Heliodoro, Dias, and Alexandre, 2020; Heliodoro, Dias, Alexandre, and Vasco, 2020; Heliodoro, Dias, Alexandre, et al., 2020; Sparrow, P., Dias, R., Šuleř, P., Teixeira, N., and Krulický, 2020; Santos and Dias, 2020).

The 2020 Russia-Saudi Oil Price War was an economic war triggered in March 2020 by Saudi Arabia in response to Russia's refusal to reduce oil production to keep oil prices at a moderate level. This economic conflict resulted in a sharp drop in the price of oil in the spring of 2020. On March 8, 2020, Saudi Arabia started a price war with Russia, facilitating a quarterly drop in the price of oil. In the first weeks of March, oil prices in the United States fell 34%, crude oil fell 26% and Brent oil fell 24% (Cardona-Arenas and Serna-Gómez, 2020; Dias, Heliodoro, Alexandre, et al., 2020b; L. Liu, Wang, and Lee, 2020).

On the African continent there are 29 stock markets with very significant differences, either in volume, liquidity, and access to information, and these restrictions have relevant implications in the efficient market hypothesis (EMH). In view of the events in 2020, namely the global pandemic and the oil war, it is important to analyze its efficiency, in its weak form, in African markets, as well as in the US stock markets to assess whether there are significant differences. The results show that the random walk hypothesis is not supported by the financial markets analyzed in this period of global pandemic. In order to validate results, we estimate the model *αDFA* that shows that the stock markets NSE 20 (0.75), TUNINDEX (0.69), MASI (0.63), EGX 100 (0.64), BSE (0.61), DOW JONES (0.58) show autocorrelation in their profitability, that is, these markets show signs of (in) efficiency, in their weak form. However, when comparing the results, we find that the U.S. stock market exhibits less persistence, that is, more efficient when compared to the African markets analyzed.

In terms of structure, this paper is organized into 5 sections. In addition to the current introduction, section 2 presents a Literature Review with regard to articles on the random walk hypothesis in the African financial markets, in section 3 the methodology is described, and section 4 contains the data and results. Section 5 presents the general conclusions of the work.

2. LITERATURE REVIEW

The first concept of market efficiency was presented by Gibson (1889), who considered that the stock prices had the complete information. Later the French mathematician Bachelier (1900), found that the behaviors of asset prices fluctuated randomly, that is, they are independent of previous fluctuations, thus formulating the hypothesis of random *walk* (Fama, 1965b, 1965a, 1970).

According to Fama (1965a) the efficient market is constituted by a group of rational agents that competes for the prediction of the behavior of asset prices. Assuming that all relevant information is already available to all market players, i.e. the arrival of new information is quickly reflected in the stock prices, thus preventing agents from being able to predict the fluctuation of prices and thus obtain abnormal profitability without incurring additional risk. To sum up, an efficient market is one in which its prices fully reflect all available information (Fama, 1970).

The Efficient Market Hypothesis (EMH) is one of the most important assumptions in financial economy, arguing that profitability rates have no memory, which implies that agents cannot ob-

tain abnormal profitability in financial markets through arbitrage-adjusted trading strategies. A market is designated as efficient, when all relevant information about the stock price is reflected in the market price. The lack of consensus among economists and financial analysts regarding market efficiency requires the study of the efficient market hypothesis (EMH). Another significant reason to study market efficiency is the role of stock markets to act as financial intermediaries between the saver and the borrower in the distribution of scarce resources via the price mechanism (Dias, da Silva, and Dionísio, 2019; Dias, Heliodoro, and Alexandre, 2020; Dias et al., 2021; Dias, Heliodoro, Teixeira, et al., 2020; Dias, Teixeira, Machova, et al., 2020; Jain, 2020; Karasiński, 2020)

The authors Obayagbona and Igbinosa (2015), Kelikume (2016), Abakah, Alagidede, Mensah, and Ohene-Asare (2018), Hawaldar, Rohith, and Pinto (2020) analyzed market efficiency, in its weak form, in the African stock indexes. Obayagbona and Igbinosa (2015) tested the Nigerian market in the context of market efficiency, the authors show that the price series do not show randomness, that is, they present long memories. Kelikume (2016) shows that Nigeria's stock market follows a random walk behavior, i.e. stock prices fully reflect all the information available on the market and investors are unable to achieve abnormal *yields at* the same level of risk. Abakah, Alagidede, Mensah, and Ohene-Asare (2018) analyzed the stock markets of South Africa, Nigeria, Egypt, Ghana, Mauritius and tested the hypothesis of market efficiency in its weak form. The authors suggest that the markets analyzed, for the most part, follow the random *walk hypothesis,* that is, they do not present autocorrelation in the price series, while the markets of Ghana and Mauritius show evidence of some (in) efficiency, in its weak form. Hawaldar, Rohith, and Pinto (2020) tested the persistence of the yields of 8 African stock markets, i.e., examined whether these markets are predictable. The authors show that the price series are independent and do not present memory, that is, investors are unable to obtain abnormal profitability, based on historical prices.

In short, this work aims to contribute to the provision of information to investors and regulators in African financial markets, where individual and institutional investors seek to efficiently diversify their portfolios, in a period of uncertainty and lack of confidence in international financial markets due to the global pandemic of 2020.

3. METHODOLOGY

3.1. Data

The stock markets analyzed are from Botswana (BSE), Egypt (EGX 100), Kenya (NSE 20), Moroccan All Shares (MASI), Tunisia (Tunindex), and the US market (DOWJONES INDUSTRIALS) from September 2, 2019 to January 11, 2021. Prices index are found in local currency to mitigate exchange rate distortions. The time scales are daily and were obtained from the *DataStream* database.

To analyze the behavior of financial markets, Tsay (2005) proposes the use of profitability series to the detriment of price series, because investors are primarily interested in knowing the profitability of an asset or an asset portfolio. In addition, the profitability series show statistical characteristics that simplify analytical treatment, namely the characteristic of stationarity, which is not usually present in price series. For the above reasons, the series of price indices were modified in growth rates or in series in the differences of neperian logarithms of current

and previous profitability, of logarithmic yields, instantaneous or continuously composed r_t , by the following expression:

$$r_t = \ln P_t - \ln P_{t-1} \tag{1}$$

where r_t is the rate of return, on the day t and P_t and P_{t-1} are the closing prices of the series, at the times t and t–1, respectively.

3.2. Methodology

The research will develop through several stages. Market graphs were made, at levels, and in profitability, to estimate the evolution of the markets that are studied. The characterization of the sample will be performed using descriptive statistics in order to verify whether the data follow a normal distribution. In form to assess whether the time series follow a white noise (mean = 0; constant variance), the tests of unit roots in Levin, Lin, and Chu panel (2002), Breitung (2000) will be used, which postulate the same null hypotheses. To answer the research question, we will use the non-parametric test developed by Wright (2000), because it is a more resilient test to time series that do not exhibit normality and quite consistent when they present correlation in series. In order to validate results, we will use *the Detrended Fluctuation Analysis (DFA).* DFA *is* an analysis method that examines temporal dependence on non-stationary data series. This technique, by assuming that time series are non-stationary, avoids spurious results when the analysis focuses on the relationships of data series in the long term (Bashir et al., 2019; Guedes et al., 2018).

The *Detrended Fluctuation Analysis (DFA)* presents the following interpretation:

Table 1. Detrended Fluctuation Analysis (DFA)

Exponent	Type of Signal
α_{DFA} <0.5	long-range anti-persistent
$\alpha_{DFA} \simeq 0.5$	uncorrelated, white noise
α_{DFA} > 0.5	long-range persistent

Source: Own elaboration

Wright's methodology (2000) consists of two types of tests, the position test (Rankings) for homoscedastic series and the signal test for heteroscedastic series.

The variance position test is supported in order of the series of yields. The position of profitability $r(r_t)$, shall be considered r_t between $r_1, r_2, \ldots, r_T$

$$r'_{1t} = \frac{\left(r(r_t) - \frac{T+1}{2}\right)}{\sqrt{\frac{\frac{(T-1)(T+1)}{2}}{12}}} \tag{2}$$

$$r'_{2t} = \Phi^{-1}\left(\frac{r(r_t)}{T+1}\right) \tag{3}$$

In what Φ^{-1} translates the cumulative inverse standardized normal distribution r'_{2t}, it is a standardized linear transformation of the position of profitability r'_{2t} and is a standardized reverse normal transformation.

$$R_1(q) = \left(\frac{\frac{1}{Tq}\sum_{t=q+1}^{T}(r'_{1t}+r'_{1t-1}+\cdots+r'_{1t-q})^2}{\frac{1}{T}\sum_{t=q+1}^{T}(r'_{1t})^2} \right) \times \left(\frac{2(2q-1)(q-1)}{3qT} \right)^{-1/2} \quad (4)$$

$$R_2(q) = \left(\frac{\frac{1}{Tq}\sum_{t=q+1}^{T}(r'_{2t}+r'_{2t-1}+\cdots+r'_{2t-q})^2}{\frac{1}{T}\sum_{t=q+1}^{T}(r'_{2t})^2} \right) \times \left(\frac{2(2q-1)(q-1)}{3qT} \right)^{-1/2} \quad (5)$$

The rejection of the random walk hypothesis of profitability is generated by a simulation process, in which the values of r'_{1t} and r'_{2t} statistics and are replaced by the simulated values r'^{*}_{1t} and r'^{*}_{2t}. Using bootstrap estimates, which result in the successive and random generation of data, in order to simulate the statistical properties of the true sample distribution, the exact distribution of $R_1(q)$ and $R_1(q)$ can be approximated to a certain level of confidence.

Wright's methodology (2000) proposes a second test, called a ratio of variances by signals, which considers the signal of profitability, to calculate the ratio of r_t signals, being the same heteroscedastic; so, we can use the following test statistics:

$$S_1(q) = \left(\frac{\frac{1}{Tq}\sum_{t=q+1}^{T}(S_t+S_{t-1}+\cdots+S_{t-q})^2}{\frac{1}{T}\sum_{t=q+1}^{T}(S_t)^2} \right) \times \left(\frac{2(2q-1)(q-1)}{3qT} \right)^{-1/2} \quad (6)$$

Where

$$S_t = 2v(r_t, 0) \quad (7)$$

$$v(x_t, p) = \begin{cases} 0{,}5 & se\ x_t > p \\ -0{,}5 & se\ x_t \leq p \end{cases} \quad (8)$$

The distribution of $S_1(q)$ can be approximated through $S^*_1(q)$ using bootstrap techniques, as happened in the variance ratio by rankings. $S^*_1(q)$ is obtained from the sequence $\{S_t^*\}_{t=1}^{T}$, as each of its elements being able to register the values 1 or -1, with the same probability.

4. RESULTS

Figure 1 shows the evolution of the Botswana (BSE), Egypt (EGX 100), Kenya (NSE 20), Moroccan All Shares (MASI), Tunisia (Tunindex) and the US Market (DOW JONES INDUSTRIALS) from 2 September 2019 to 11 January 2021. The prices index, in levels, show market downs in the first quarter of 2020, which coincides with the move of Covid-19 viruses from China to Europe, as well as the oil price war triggered in March 2020 by Saudi Arabia in response to Russia's refusal to reduce oil production to keep oil prices at a moderate level.

Figure 2 shows the evolution in profitability of the 6 stock markets from September 2019 to January 2021. The graphic representation allows us to visualize that the first wave of the pandemic (first trimester of 2020) caused sharp breaks in the stock markets under analysis

Table 2 shows the main descriptive statistics of the Botswana stock markets (BSE), Egypt (EGX 100), Kenya (NSE 20), Moroccan All Shares (MASI), Tunisia (Tunindex), and the US market (DOW JONES INDUSTRIALS) from September 2, 2019 to January 11, 2021. The stock markets analyzed show negative average yields, with the exception of the Dow Jones market (0.000460). The U.S. market (US) has the sharpest standard deviation (0.019900), the smallest deviation seen in the BSE stock index (0.001349); in terms of analysis, the Dow Jones market shows higher risk because it has a global scale dimension and has liquidity levels that cannot

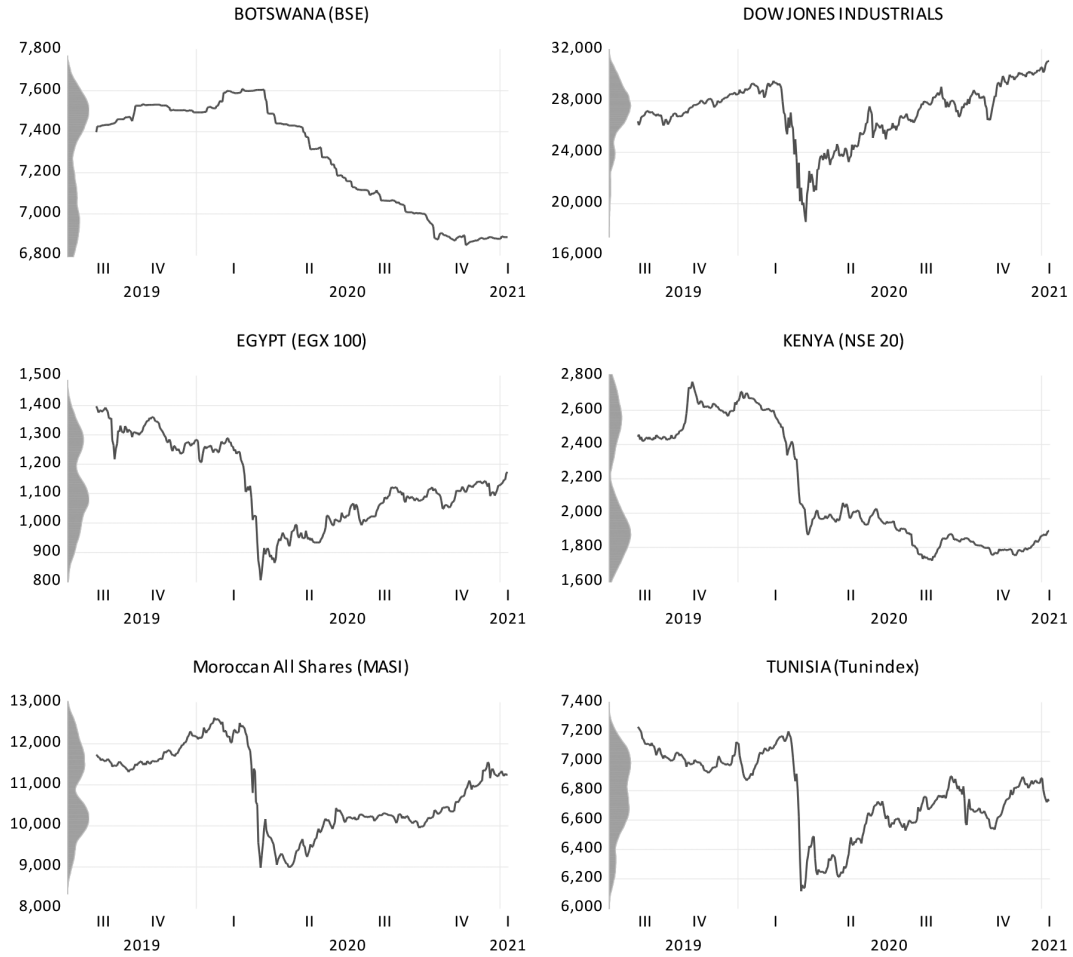


Figure 1. Evolution, in levels, of the 6 stock markets, in the period from September 2, 2019 to January, 11 2021.

Source: Own elaboration

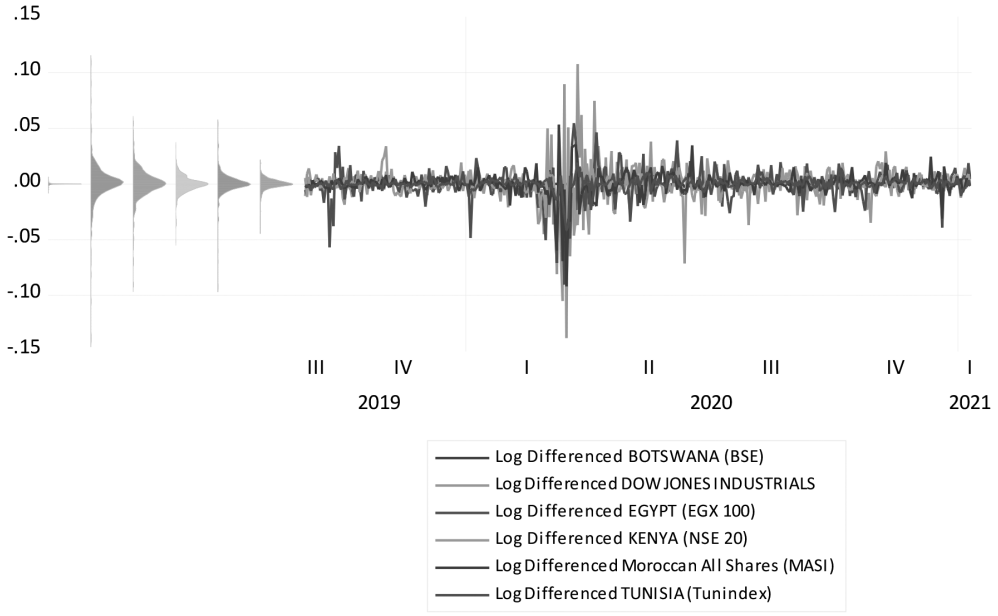


Figure 2. Evolution, return, of the 6 stock markets, in the period from September 2, 2019 to January 11, 2021.

Source: Own elaboration

be compared with the Botswana stock market. Additionally, we found that all markets have negative asymmetries, while in the kurtosis there are values above 3, which is contrary to the hypothesis that the data follow a normal distribution (asymmetry = 0, kurtosis = 3). In corroboration, the Jarque-Bera adherence test shows that the data series do not follow normal distributions, due to their null chance being rejected with a mean of 1%.

Table 2. Descriptive statistics return, 6 stock markets, in the period from September 2, 2019 to January 11, 2021.

	BSE	DOW JONES	EGYPT	KENYA	MOROCCAN	TUNISIA
Mean	-0.000201	0.000460	-0.000488	-0.000714	-0.000117	-0.000204
Std. Dev.	0.001349	0.019900	0.014647	0.008712	0.010990	0.005731
Skewness	-2.191377	-0.974641	-1.444163	-1.225348	-2.419688	-2.516450
Kurtosis	15.73302	16.24111	11.01526	9.438406	24.95555	18.33445
Jarque-Bera	2689.853***	2657.048***	1076.705***	703.9749***	7497.738***	3863.718***
Sum	-0.071385	0.163654	-0.173781	-0.254109	-0.041745	-0.072450
Sum Sq. Dev.	0.000646	0.140585	0.076159	0.026941	0.042873	0.011660
Observations	356	356	356	356	356	356

Notes: ***, **, * represent significance at 1%. 5% and 10%, respectively.

Source: Own elaboration

Table 3. Levin, Lin , and Chu parking test (2002), applied to the 6 stock markets, in the period from September 2, 2019 to January 11, 2021.

Method				Statistic		Prob.**	
Levin, Lin & Chu t*				-37.5913		0.0000	
Series	2nd stage Coefficient	Variance Of Reg	HAC of Dep.	Lag	Max Lag	Band-Width	Note
Botswana	-0.88629	2.E-06	3.E-08	0	16	109.0	355
DOW JONES	-0.84239	0.0003	4.E-05	8	16	15.0	347
EGYPT	-0.74971	0.0002	3.E-06	0	16	138.0	355
KENYA	-0.65624	7.E-05	2.E-06	0	16	62.0	355
MOROCCAN	-0.81971	0.0001	4.E-06	0	16	67.0	355
TUNISIA	-0.57514	3.E-05	3.E-06	0	16	18.0	355
	Coefficient	T-Stat	Reg SE	mu*	sig*		Note
Pooled	-0.73217	-32.393	1.006	-0.503	0.719		2122

Notes: ***, **, * represent significance at 1%. 5% and 10%, respectively.

Source: Own elaboration

Table 4. Hadri parking test (2000), applied to the 6 stock markets, in the period from September 2, 2019 to January 11, 2021.

Method			Statistic	Prob.**
Hadri Z-stat			0.10907	0.4566
Heteroscedastic Consistent Z-stat			1.48933	0.0682
Series	Lm	Variance Hac	Bandwidth	Note
Botswana	0.7445	2.72E-06	7.0	356
DOW JONES	0.1008	0.000317	7.0	356
EGYPT	0.2710	0.000295	3.0	356
KENYA	0.1553	0.000176	10.0	356
MOROCCAN	0.1805	0.000169	4.0	356
TUNISIA	0.0917	6.62E-05	8.0	356

Notes: ***, **, * represent significance at 1%. 5% and 10%, respectively.

Source: Own elaboration

As we are estimating time series, we should examine the stationary nature of the data series of the 6 stock markets under analysis. The Levin, Lin, and Chu (2002) test postulates that the null hypothesis has unitary roots, while the Hadri test (2000) shows the parking in the null hypothesis, that is, the tests have opposing hypothesis. The intersections of the unit root tests in panel show the stationary of the time series (return), that is, we are facing a white noise (mean = 0; constant variance) (see tables 3 and 4).

In figure 3 we can verify the results of the non-parametric version of the Wright variance test (2000), conducted on the Botswana stock markets (BSE), Egypt (EGX 100), Kenya (NSE 20), Moroccan All Shares (MASI), Tunisia (Tunindex), and the US market (DOW JONES INDUSTRIALS), which includes the Rankings and Signals Variance Ratios tests. In both cases, statistics were calculated for 2 to 16 days, with 1-day scales. Taking into account the results of the Variance test by Wright's Rankings and Signs (2000) the random walk hypothesis is rejected in all stock indexes. The results therefore support the conclusion that the random walk hypothesis is not supported by the financial markets analyzed in this period of global pandemic. The values of variance ratios are lower than the unit, which implies that the yields are autocorrelated in time and, there is reversal to the mean. In these conditions, markets tend to overreact to information, eventually correcting in the following days, whether it is good news or bad news. But when we compared the U.S. stock markets to African markets, we find that the U.S. stock index is less persistent, which shows that institutional investors will have a harder time achieving abnormal yields without incurring additional risk.

Table 5 shows the results of *the detrended fluctuation analysis (DFA)* exponents, carried out on the Botswana (BSE), Egypt (EGX 100), Kenya (NSE 20), Moroccan All Shares (MASI), Tunisia (Tunindex), and the US (DOW JONES INDUSTRIALS) stock markets. The results of αDFA the show sharp long memories, particularly in the stock markets NSE 20 (0.75), TUNINDEX (0.69), MASI (0.63), EGX 100 (0.64), BSE (0.61), DOW JONES (0.58), i.e. these markets show signs of (in) efficiency, in its weak form, showing persistence in profitability, validating the results of the variance test by Rankings and Wright Signs (2000), which show the rejection of the *random walk hypothesis*. These findings show that prices are not independent and that they have memory, i.e., investors using adjusted trading strategies will be able to achieve anoint yields without incurring additional risk. This evidence is contrary to the results of the authors Hawaldar, Rohith, and Pinto (2020) who examined the predictability of 8 African stock markets, showing that investors cannot obtain abnormal profitability, based on historical prices.

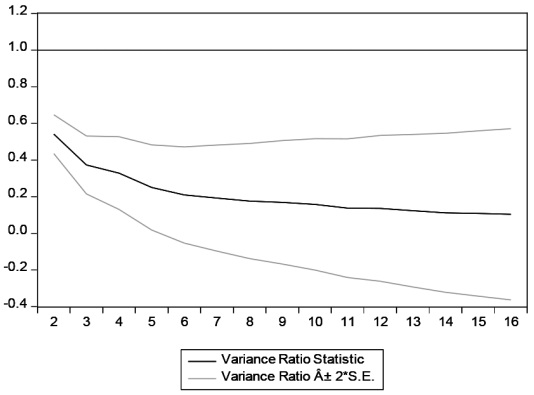
Table 5. DFA exponent for return. The values of the linear adjustments for always had > 0.99 αDFA^2

Index	**EXPOnent DFA**
BSE	0.61 ≅ 0.0033
EGX 100	0.64 ≅ 0.0037
NSE 20	0.75 ≅ 0.0008
MASI	0.63 ≅ 0.0011
TUNINDEX	0.69 ≅ 0.0084
DOW JONES	0.58 ≅ 0.0032

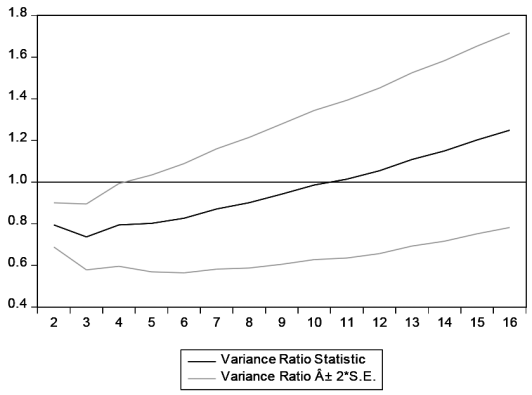
Note: The hypotheses are: H_0 $\alpha = 0.5$ and: H_1 $\alpha \neq 0.5$

Source: Own elaboration

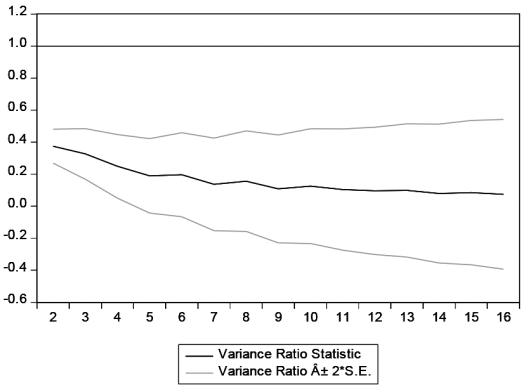
Rank Score Variance Ratio Test for BOTSWANA with Â± 2*S.E. Bands



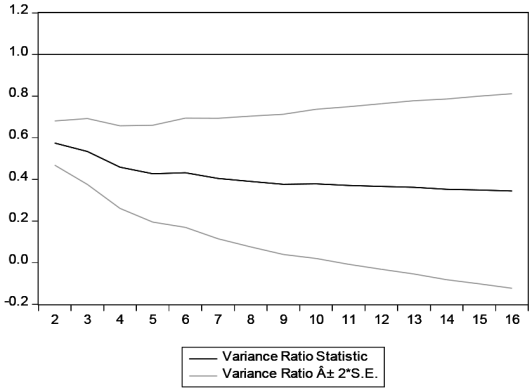
Sign Variance Ratio Test for BOTSWANA with Â± 2*S.E. Bands



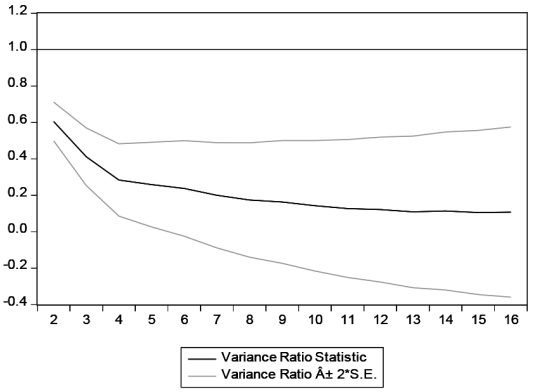
Rank Score Variance Ratio Test for DOW JONES with Â± 2*S.E. Bands



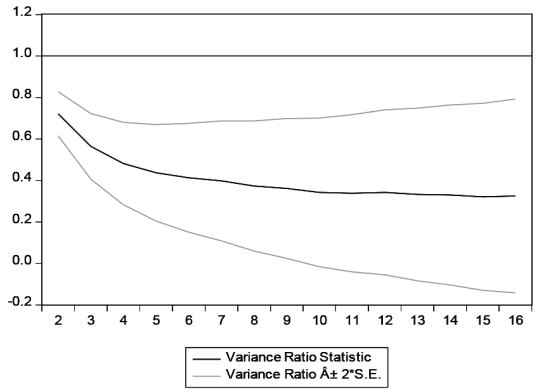
Sign Variance Ratio Test for DOW JONES with Â± 2*S.E. Bands



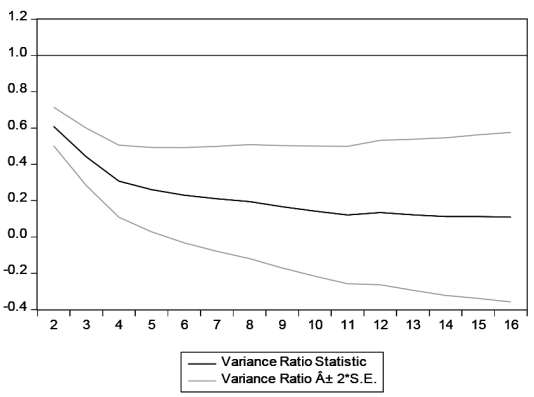
Rank Score Variance Ratio Test for EGYPT with Â± 2*S.E. Bands



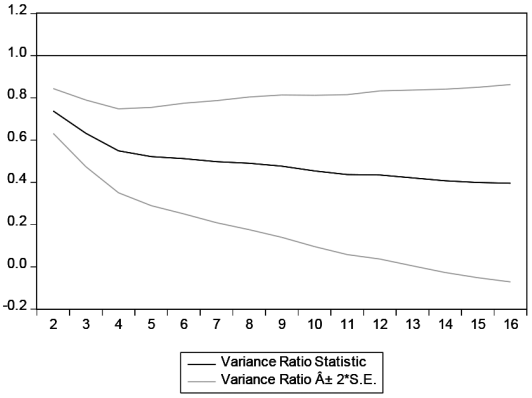
Sign Variance Ratio Test for EGYPT with Â± 2*S.E. Bands



Rank Score Variance Ratio Test for KENYA with Â± 2*S.E. Bands



Sign Variance Ratio Test for KENYA with Â± 2*S.E. Bands



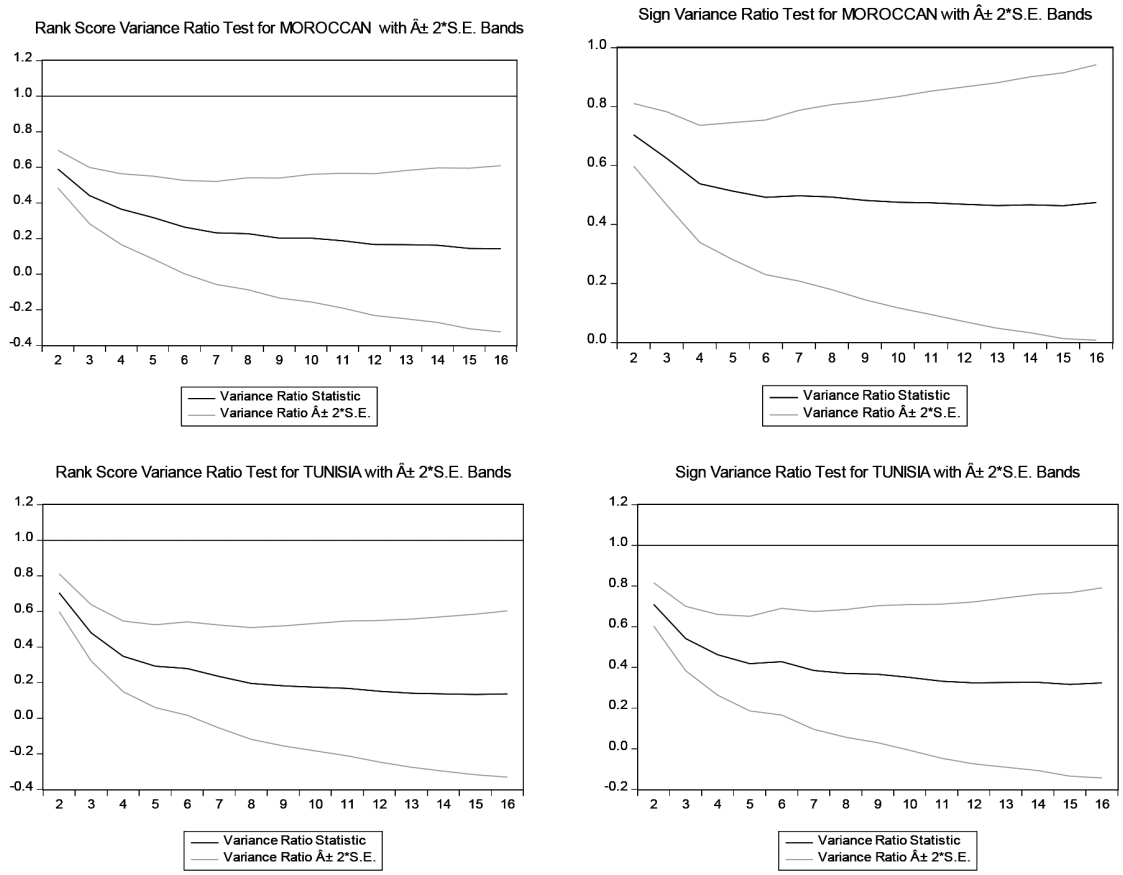


Figure 3. Wright's Ranking and Signal Variance Ratios Tests (2000) in yields, with 16-day lags, applied to the 6 stock markets, from September 2, 2019 to January 11, 2021.
Source: Own elaboration

5. CONCLUSION

This paper aims to test the efficient market hypothesis, in its weak form, in the stock markets of Botswana (BSE), Egypt (EGX 100), Kenya (NSE 20), Moroccan All Shares (MASI), Tunisia (Tunindex), and the US market (DOW JONES INDUSTRIALS) in the period from September 2, 2019 to January 11, 2021. For this purpose, we carried out two tests, an econometric and an econophysics one for this purpose. The first tests market efficiency, in its weak form, through a non-parametric test, the position test (Rankings) for homoscedastic series and the Signals test for heteroscedastic series. The second test analyzes temporal dependence on non-stationary data series using the *Detrended Fluctuation Analysis (DFA) methodology.*

In the first test, we estimated the Test of Variance Ratios of Rankings and Signs. In both cases, statistics were calculated for 2- 16-day lags. Considering the results of the variance test by Rankings and Signs, the *random walk hypothesis* is rejected in all stock indexes. The values of variance ratios are lower than the unit, which implies that the yields are autocorrelated in time and, there is reversal to the mean. In these conditions, markets tend to overreact to information, eventually correcting in the following days, whether it is good news or bad news.

The second test the *exponents Detrended Fluctuation Analysis* (*DFA*), show signs of (in) efficiency, in its weak form, showing persistence in profitability, that is, the existence of long memories, validating the results of the variance test by Rankings and Signs. These findings show

that prices do not fully reflect the information available and that price changes are not i.i.d., in all markets.

The general conclusion to be withheld and sustained in the results obtained, through the tests carried out with econometric and mathematical models demonstrate that the global pandemic sees a significant impact on the memory properties of the markets analyzed. The results indicate that markets have persistence and long memories in their profitability, which implies that investors will be able to obtain abnormal profitability without incurring additional risk. In conclusion we can show that the U.S. stock market has more market efficiency compared to the African stock markets analyzed. The authors consider that the results achieved are of interest to investors looking for opportunities for portfolio diversification in these regional stock markets.

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INTERNEST RATE ADJUSTMENT AND STOCK MARKET – THE CASE STUDY OF CHINA

Ning Zeng[1]
Xixi Li[2]

DOI:

Abstract: *This paper examines the impact of interest rate adjustment on the stock market in China. We collect the interest rate adjustment periods from April 21, 1991 to October 24, 2015 since the establishment of the stock market. Through an Error Correction model together with Granger causality, we investigate responses of the stock index to interest rate adjustment. Our findings suggest that there is existing a long-term reverse relationship between interest rate adjustment and stock index. The impact of interest rate adjustment on stock index returns could not be long-term disequilibria, which will be corrected in short-time. Also, the interest rate is the granger cause of the stock price index, while the stock price index is not the granger cause of interest rate.*

Keywords: *Interest Rates Adjustment; Shanghai Composite Index; Error correction model.*

1. INTRODUCTION

As one of the key components of financial markets, the stock market is closely watched by central banks (Blinder, 1988). Through the implementation of monetary policy such as interest rate adjustment, stock prices and returns could be affected swiftly and directly (Zeng & Xie, 2006; Hu & Ma, 2019). Consequently, macroeconomic variables may also be targeted and thus to stimulate the economy (Anwer, Azmi, & Mohd, 2019).

In the literature, empirical results demonstrate that there exists an inverse relationship between interest rates and stock returns (Spiro & Peter, 1990; Afful & Opoku, 2020). When interest rates increase, investors tend to transfer their capital from financial markets to banks with relatively higher returns and lower risks, which leads to a decline in stock price (Hu, Jiang, & Pan, 2020); whereas stock prices increase in respond to a decrease of interest rates. Humpe and McMillan (2020) conducted a pooled mean group estimator, and employed panel ARDL cointegration to explore nexuses between G7 stock prices and macroeconomic variables. Their findings suggested that stock prices are positively related to industrial production and consumer prices, and negatively associated with real 10-year interest rates, coinciding with the result of Willem and Thorbecke (2012). Afful and Opoku (2020) also found that foreign interest rates have negative effects on market returns in Sub-Saharan African (SSA).

However, such a relationship between interest rates and stock returns remains debatable and complex. Asravor and Fonu (2020) indicated that interest rates have a positive impact on stock market development in Ghana, using an ARDL cointegration approach. The positive relations between interest rates and the stock index were detected in Nigeria as well (Ejem, Ogbonna, & Ogbulu, 2020). Moreover, Rahman and Mustafa (1997) examined the series of interest rates and stock prices for

[1] School of Business, Macau University of Science and Technology, Avenida Wai Long, Taipa, Macau
[2] School of Business, Macau University of Science and Technology, Avenida Wai Long, Taipa, Macau; Zhuhai College of Science and Technology, Avenida Wai Long, Taipa, Macau

several countries, and they showed that there is a significant cointegration relationship between the two variables in the long run while no significant Granger causality. By contrast, Rigobon and Sack (2004) described a short-term relation between the US interest rates and stock returns.

The connection between interest rates and stock prices could help central banks to achieve monetary policy goals, as well as to reduce the generation of systemic and financial risks. In particular, the People's Bank of China (PBC) has imposed ceilings on deposit rates, which is a notable binding constraint on price discovery in the financial markets. Fang and An (2019) argued that monetary policy may have a significant mean spillover effect on the stock market and can effectively guide the market in the short run. Hu, Jiang and Pan (2020) suggested that the Chinese stock market reacts positively (negatively) to interest rate increases (cuts) by the central bank in short run. Specifically, Hu and Lai (2020) established a time-varying VAR system model of China's monetary policy and stock market for 20 years, and results pointed out the link between the two variables as "irrelevance, positive correlation and negative correlation".

In process of interest rate liberalization, how the stock market responds to changes in interest rates is an essential part of PBC's policy making, and hence to achieve the objective of the monetary policy – "maintain the stability of the value of the currency and thereby promote economic growth". This paper encapsulates an Error Correction model with Granger causality, filling in the gap in the literature, to investigate the response of the stock price index to the interest rate. Our findings suggest that there is a long-term reverse relationship between interest rate and stock index in China, and the disequilibria from the previous shock of interest rate will be corrected in a short period, which provides central banks with useful information for policy-making.

The rest of the work is organized as follows: Section 2 introduces the interest rate and stock index, the Error Correction Model procedure is outlined in Section 3, which is followed by the description of the data and discussion of the estimation results in Section 4, and offers some concluding remarks.

2. INTEREST RATE AND STOCK INDEX

As the price representation of the fund, the interest rate indicates the rate of return of the fund provider's transfer of funds, and the cost of the borrower's use of funds. Changes in interest rate, therefore, represent the demand situation of market capital supply, and ultimately would have a certain impact on financial markets as well as the aggregate economy.

Central banks set Bank Rate, which is known by many different terms depending on the country, to influence other interest rates, and thus to achieve monetary goals and stimulate economic growth. If bank rate changes, banks normally change their interest rates on saving and borrowing. If bank rate is to be cut, the profits from financial markets such as the stock market will show a favorable trend due to the overall economic prosperity; if the bank rate is to be increased, an overheated economy is supposed to be cooling down, which may lower financial profits. In a low interest rates scenario, financial markets tend to be more liquid, and borrowing or lending is relatively easy; whereas an increase in the interest rates, the cost of financing will rise, and then may reduce the investment in financial markets.

Although a change in the bank rate usually takes time, around 12 months, to have a widespread economic impact, central banks keep a vigilant watch on stock market with its immediate re-

sponse to a change. To observe stock markets, stock index is capable of a suitable proxy (Seo, Byun, & Kim, 2020). As a measure of a number of stock price statistics, stock index typically measures the performance of a basket of securities intended to replicate a certain area of the market and hence reflects the overall price level of the stock market and its changing trend. It could be a broad-based index that captures the entire market, such as the Standard & Poor's 500 Index or Dow Jones Industrial Average. When the stock index rises, it indicates that the average price level of the stock rises as well, which decreases as stock index falls. The stock index often serves as a benchmark for assessing the performance of portfolio returns and is also created to measure other economic data such as interest rates, inflation, or manufacturing output.

3. THE MODEL

To describe the impact of interest rate adjustment on China's stock market and equilibrium deviation adjustment mechanism, accommodate all relevant variables in the error correction model (ECM), which is written as

$$\Delta LNP_t = a_0 + b_0 \Delta LNR_t + \gamma(LNP_{t-1} - LNR_{t-1}) + e_t \tag{1}$$

where LNP is the logarithm of Shanghai Composite Index, LNR is the logarithm of China's one-year fixed deposit interest rate, γ ($LNP_{t-1} - LNR_{t-1}$) is an error correction term, e_t is a random error term. Error correction model is used to describe the autoregressive relationship between a variable and its lagging variable, which reflects the error adjustment process when the short-term shock occurs.

ECM is applicable to nonstationary series with known cointegration relations. Engle and Granger (1987) summarize and define the cointegration relationship: if two or more non-stationary time series are linearly combined to form a stationary time series, then these non-stationary time series have a cointegration relationship. If the variables x_t and y_t are co-integrated, the short-term disequilibrium relationship between them can always be expressed by an error correction model. For an ARDL (1,1) model, which is written as

$$y_t = a_0 + a_1 y_{t-1} + b_0 x_t + b_1 x_{t-1} + e_t \tag{2}$$

the first difference of equation (2) is outlined by the following

$$\Delta y_t = a_0 + b_0 \Delta x_t + \gamma(y_{t-1} - x_{t-1}) + e_t \tag{3}$$

where $\gamma = a_{1-1}$ and $1 - a_1 = b_0 + b_1$, if y_t and x_t are both I (1) process, so Δy_t and Δx_t in equation (3) are both I (0) process,the right side of equation (2) is also I (0) only if y_t and x_t are cointegrated.

Cointegration test can prevent the occurrence of spurious regression, among which EG (Engle and Granger) two-step test method is commonly used. It is based on the regression test of the predicted residuals from the regression model and estimating the cointegration relationship between variables by checking the stability of the residual sequence. If the residual sequence is stable through the unit root test, it can be considered that there is a cointegration relationship.

To sum up, the establishment of the error correction model requires the cointegration analysis of the variables first, so as to find the long-term equilibrium relationship between the variables,

and thus constitute the error correction term. Then the error correction term is regarded as an explanatory variable, and the short-term model established together with other explanatory variables reflecting short-term fluctuations is the error correction model.

4. EMPIRICAL ANALYSIS

Equation (1) is estimated by taking China's one-year fixed deposit interest rate (R) and Shanghai Composite Index (P) from Official Website of the People's Bank of China and the China Stock Market & Accounting Research Database. P and R are processed in logarithm to alleviate the heteroscedasticity that may exist in the model, which is written as LNP and LNR. The People's Bank of China has adjusted interest rates 36 times since the official release of the Shanghai Composite Index, so we use these 36 sets of data from April 21, 1991 to October 24, 2015 in this study.

Figure 1 plots the scatter diagram of the logarithm of China's one-year fixed deposit interest rate and Shanghai Composite Index from April 21, 1991 to October 24, 2015. It shows that the two variables generally show opposite trends, as the interest rate (R) increases, the composite index (P) decreases. Table 1 shows that the standard deviation of LNP is higher than LNR, normality test shows that LNR is normally distributed, and there is no heteroscedasticity between the variables by White test.

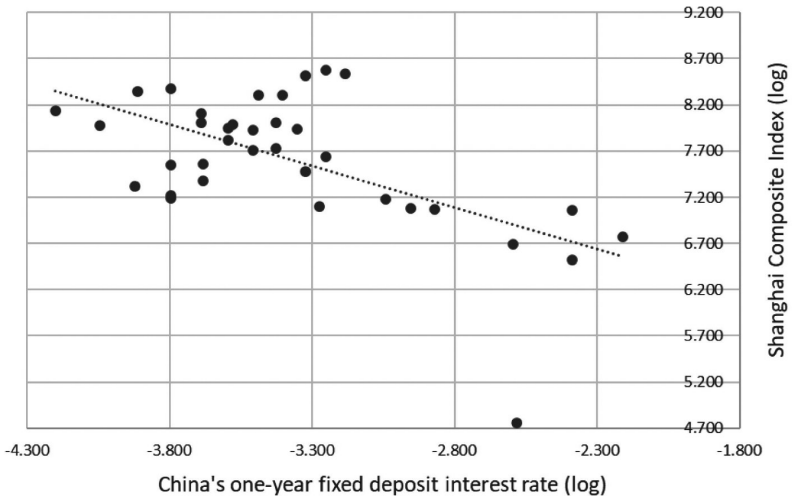

Figure 1. Data Scatter Diagram

Source: own processing

Table 1. Data Descriptive Statistics

	LNP	**LNR**
Obs.	36	36
Mean	7.606	-3.375
Std. Dev.	0.734	0.483
Normality	42.840	3.838
	[0]	[0.147]
Obs*R-squared	1.847	1.847
	[0.397]	[0.397]

Notes: Obs. denotes the number of observations. Std. Dev denotes the standard deviations. The numbers in brackets are p-values.

Source: own processing

To better capture the stability of the series, several unit root tests are applied. As reported in Table 2, the ADF test fails to reject the null hypothesis at 5% level for LNP and LNR and rejects the null hypothesis at 1% level for DLNP and DLNR. The PP test fails to reject the null hypothesis at 5% level for LNR, but rejects the null hypothesis at 1% level for LNP, DLNP and DLNR. The KPSS test rejects the null hypothesis at 5% level for LNP and LNR and fails to reject that the variables are stationary at 10% level for DLNP and DLNR. Therefore, all the tests imply that LNP and LNR are both non-stationary series, meanwhile each variable in this paper can be described as following an I (1) process and can be tested by cointegration except PP test.

Table 2. Unit Root Tests

	ADF	**PP**	**KPSS**
LNP	-1.497	-4.801*	0.166
DLNP	-10.457*	-9.417*	0.112
LNR	-3.275	-1.720	0.522
DLNR	-3.436*	-2.970*	0.096

Notes: *Significant at 1% level; **Significant at 5% level; ***Significant at 10% level.

As reported in Table 3, the variables pass the E-G cointegration test at 1% level, implying that there is a long-term stable equilibrium relationship between LNR and LNP, which is written as

$$LNP = \alpha_0 + \alpha_1 LNR + \varepsilon \tag{4}$$

where α_0 is a constant term α_i is a coefficient term, ε is a random error term. As reported in table 4, there exists a reverse relationship between the two variables, one unit of interest rate adjustment will cause a nearly 90% change of the stock index reversely.

Table 3. E-G Cointegration Test

	Value	**P-value**
Engle-Granger tau-statistic	3.610	0.008*
Engle-Granger z-statistic	-15.840	0.026*

Notes: *Significant at 1% level; **Significant at 5% level; ***Significant at 10% level.

Source: own processing

Table 4. Regression Test

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**P-value**
C	4.568*	0.716	6.381	0.000
LNR	-0.899*	0.210	-4.285	0.001

Notes: *Significant at 1% level; **Significant at 5% level; ***Significant at 10% level.
R-Squared=0.351 S.E. of regression=0.600 Schwarz criterion=1.959 F-statistic=18.363
Durbin-Watson stat=0.747

Source: own processing

Next, we apply the Granger causality test (Granger, Ghysels, Swanson & Watson, 2001) to investigate if the adjustment of China's one-year fixed deposit interest rate can influence the Shanghai Composite Index. As the test results displayed in Table 5, we reject the null hypothesis that LNR has a significant influence on LNP at 10% level. Therefore, changes in interest rates will have a certain impact on the Shanghai Composite Index.

Table 5. Granger Causality Test

H_0	F-Statistic	P-value
LNR does not Granger Cause LNP	3.960*	0.055
LNP does not Granger Cause LNR	1.209	0.280

Notes: *Significant at 1% level; **Significant at 5% level; ***Significant at 10% level.

Source: own processing

Then, in order to analyze the short-term fluctuation relationship between interest rate and Shanghai Stock Index, the short-term fluctuation between variables is expressed by the error correction model, which is written as equation (1). The estimation results are presented in table 6, which suggests that the effects of short-term fluctuations can be represented by differential terms. Short-term changes can be seen as two parts, one is the effect of the short-term interest rate represented by the front coefficient of D(LNR), and the other is the effect of $ECM(-1) = \gamma(LNP_{t-1} - LNR_{t-1})$ on the long-term equilibrium deviation. The coefficient of the error correction term reflects the adjustment strength to the deviation from the long-term equilibrium. The regression fits at $R^2 = 57.5\%$, which implies that the impact of interest rate adjustment on stock index could not be long-term disequilibria, which will be corrected in short-time. When the Shanghai Composite Index deviates from the equilibrium state by 1 unit, the error correction term decreases by 56.1%, thus reducing its fluctuation and gradually restoring the equilibrium state.

Table 6. Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	P-value
C	0.131**	0.055	2.377	0.02
D(LNR)	0.669***	0.337	1.985	0.056
ECM(-1)	-0.561*	0.089	-6.279	0.000

Notes: *Significant at 1% level; **Significant at 5% level; ***Significant at 10% level.
R-Squared=0.575 S.E. of regression=0.312 Schwarz criterion=0.723 F-statistic=21.656
Durbin-Watson stat=1.307

Source: own processing

Results show that one unit of interest rate adjustment will cause around 90% change of the stock index reversely, which is in line with the previous evidence. Although the interest rate is the granger cause of stock price index at the significance level of 10%, the stock price index is not the granger cause of interest rate. So the stock price index can be explained by the past interest rate to a certain extent. The interest rate of the current period will have an impact on the stock price index of the next period and have a certain predictive effect on the stock price index. Meanwhile, the short-term fluctuation relationship between interest rate and stock price index can be obtained according to the error correction estimates. Once the short-term fluctuations deviate from the long-term equilibrium, the system will pull the index back to the equilibrium state from the non-equilibrium state with the adjustment intensity of –56.1%.

5. CONCLUSION

This paper investigates the response of the stock price index to interest rate through cointegration test and Granger causality test. An Error Correction model is also conducted to study the equilibrium deviation adjustment mechanism.

The estimated results in this study show that there is a long-term cointegration relationship between interest rate and stock index where they change in the opposite direction, which is in line with previous studies. Meanwhile we have demonstrated some significant results among the interactions

between both variables: i) interest rate is the granger cause of stock price index, while stock price index is not the granger cause of interest rate; ii) the impact of the interest rate adjustment on the stock index returns could not be long-term disequilibria, and it will be corrected in a short period.

Our findings suggest that interest rate adjustment in China has a significant influence on stock index, which plays a key role in the movement of stock index. Thus, a central bank may set up interest rate, which could affect the price level of stock market; meanwhile such disequilibria caused by the interest rate adjustment cannot be a long term phenomenon, so the central bank may take other monetary actions to maintain financial stabilities. For further study, the bivariate framework could be extended to investigate a broader range of macroeconomic variables such as output growth, employment and thus to test market efficiency.

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IMPACT OF REGULATORY REQUIREMENTS ON ENTITIES NON-FINANCIAL REPORTING: THE CASE OF UKRAINE

Yana Oliinyk[1]
Maria Kucheriava[2]
Alla Zinchenko[3]

DOI:

Abstract: *In today's environment of uncertainty and rapid change in the business environment (VUCA), there is a need to find effective solutions to global problems. The solution to urgent global problems facing Ukraine and the world depends on the orientation of business entities on the path to sustainable development. Ukraine has recently joined the countries with legislation requiring companies to compile and publish a management report. Therefore, determining the impact of institutional factors in ensuring the level of transparency and accountability of business organizations in countries with economies in transition in the context of SDGs' attainment is now important. The core task of the study is to assess the dynamics of disclosure by certain enterprises of non-financial data, including the impact on the economy, environment and society, before and after the adoption of relevant regulations; to substantiate conclusions and suggest solutions to identified problems.*

Keywords: *Non-financial reporting, Directive 2013/34/EU, Directive 2014/95/EU, Management report, Extractive industry entities, ESG reporting area.*

1. INTRODUCTION

Dissemination of the corporate disclosure practice on risks of the negative impact of business activities, as well as the risks that create changes in the external environment for companies, contributes to the formation of a global information space. Its structure is formed based on worldwide-known international initiatives focused on the priority of disclosure of the economic, social, environmental and governance components of business activities. Various documents aimed at streamlining disclosure at both the international, national or sectoral levels produce a similar set of information through a recommended list of indicators, methodologies for their calculation and aggregation. Statements prepared in compliance with such recommendations reveal the company's values, model of management, compliance of its strategy with the achievement of sustainable development, economic, environmental and social consequences of companies' activities.

Within the current situation, there is a necessity for entities to improve the quantity, quality and comparability of the disclosure of relevant information in order to meet the needs of investors and other stakeholders.

The mentioned above confirms the key challenge to be addressed: to ensure the disclosure of quality data on the private sector entities' activities (this includes the usefulness and comparability of such information, its consistency with existing institutional frameworks).

1 SESE "The Academy of Financial Management", O. Honchara street, 46/48, 01034, Kyiv, Ukraine
2 SESE "The Academy of Financial Management", O. Honchara street, 46/48, 01034, Kyiv, Ukraine
3 National University of "Kyiv-Mohyla Academy", Building 4, Room 218, 2 Skovorody vul., Kyiv 04070, Ukraine

This work is aimed at finding tools for helping companies to disclose the principles of sustainable development and their efforts to counteract the crisis. This will contribute to social cohesion in addressing global challenges, raising awareness of how companies respond to the pandemic and ensuring sustainable development.

In terms of structure, this article is organized into 6 sections. Section 1 is the current introduction. Section 2 presents a Literature Review of studies devoted to the current state of non-financial reporting regulation and its impact on the number and quality of non-financial reports published by private sector entities. Section 3 describes the research design and methodology. Section 4 contains general research results and substantiation for developed by authors index of industry disclosure of non-financial data. Section 5 provides readers with a discussion on the novelty of obtained results and their comparison with current existing studies and practices. Section 6 contains the conclusions of the study.

2. LITERATURE REVIEW AND PROBLEM STATEMENT

The theory and practice of non-financial reporting concern an increasing number of companies joining the current trends of disclosure on sustainable development. Representatives of the scientific community take care of the development, implementation and improvement of private sector entities' non-financial reporting. Thus, researchers from different countries study the following issues: implementation of non-financial reporting (Adaui, 2020; Crowther, 2017; Vukić and others, 2019), scope and prospects of its implementation and the impact of non-financial disclosure on corporate social responsibility (Zheng, 2019; Slacik, 2019); scientific models of reporting taking into account the conceptual approaches to the development of accounting in the world and companies' non-financial reporting practice (Stolowy, 2018; Iefymenko and others, 2015). Also, researchers highlight the problems of the formation of strategic reporting by industrial enterprises (Asif, 2013; Kryshtopa, 2014) and the need for information to quantitatively assess investment risks (Boiral, 2018; Baumüller, 2018; Riepina and others, 2019). The assessment of types and quality of non-financial reports, progress and obstacles in their implementation, improvement of the content of reports are studied by authors (Hassan, 2020; Oliinyk, Kucheriava, 2019; Oliinyk and others, 2020; Iefymenko and others, 2017).

Discussions on the status and development of non-financial reporting allow us to form the view on the approaches to the formation of the theoretical and methodological background of non-financial reporting (Mion, 2019; Kumar, 2019). The international professional community is actively involved in addressing data related to climate change, environmental protection, natural resource management, labor protection, gender equality, etc.

An example of reporting approaches alignment is the EU's disclosure requirements for non-financial reporting by enterprises on their contribution to climate change prevention. As stated in the recent European Green Deal Communication, the European Commission expects companies and financial institutions to improve their non-financial information. The main users of such information are investors and civil society organizations that need a deeper understanding of the performance of financial and non-financial companies, as well as their social and environmental impact (European Commission, 2019).

Following online consultations on corporate reporting for 2018 and online targeted consultations on climate-related reporting, the European Commission launched a new public consul-

tation in May 2020. This reflects the general trend of various organizations and stakeholders calling for a new regulatory approach in the area of non-financial reporting.

The trend of non-financial reporting of private sector entities is to ensure the disclosure of quality information on climate issues. Thus, in 2019, the European Commission, Communication C(2019)4490, amended Guideline 2017/C215/01 in terms of climate disclosure (European Commission, 2019). The document was prepared in accordance with Article 2 of Directive 2014/95/EU in order to assist interested companies in disclosure of relevant, useful, consistent and comparable non-financial information. The notification from the European Commission contains optional instructions and does not create any new obligations.

Thus, at present time, there is no single approach among researchers and professional practice communities for the common model for disclosure of qualitative, comparable information on sustainable development and the risks posed by companies. These aspects need further research in order to develop a list of agreed indicators that will be disclosed in non-financial statements and universal methods of their calculation. This will ensure accountability and transparency of companies' reporting and allow to build the appropriate level of users' trust, to involve them in cooperation and to strengthen the responsibility in the area of sustainable development.

The main source of information for the formation of macro-indicators on achievement of sustainable development and overcoming the consequences caused by the pandemic are entities' data (various types of non-financial reports). The rules regulating the preparation of non-financial reporting are the institutional basis for non-financial reporting, while they form the basis for cooperation between entities that form policy in the field of sustainable development. This allows us to formulate the main hypothesis of the presented study. Hypothesis (H): the quality of companies' disclosure on the impact of socio-economic aspects of their activities in the countries with economies in transition depends on the application of mandatory and encouraging methods of legal regulation. The last includes the detailed regulation of the behavior of participants in legal relations and the development of conditions of obtaining the benefits by companies from compliance with the regulation.

Proof of the hypothesis consists of two general parts: the first - review of documents and initiatives issued by international professional organizations; the second - empirical analysis of the practice of private sector entities' non-financial reporting. Ukrainian extractive industries companies are a representative object for such research. After all, the extractive industry is budget-generating and extractive companies have a long experience in transparency practice through joining the Extractive Industries Transparency Initiative (EITI). Since 2013, Ukraine has been preparing a report. Therefore, extractive industries companies are not only the object of constant attention from society but are the leaders in the information provided about their activities' impact on the economy, environment and society.

3. RESEARCH DESIGN, METHODOLOGY AND DATA PROCESSING

In Ukraine, very strong challenges have been formed and manifested in the proactive search and implementation of standards designed to create the institutional basis for increasing the responsibility, transparency and accountability of enterprises through the implementation of international documents in the area of non-financial reporting. In pursuance of Ukraine's commitment to implement the provisions of Directive 2013/34/EU, in 2017 requirements for the disclosure of cer-

tain types of enterprises financial and non-financial information in the management report have been introduced into the national legislation (provisions of Directive 2013/34/EU implemented in the Law of Ukraine "On Accounting and Financial Reporting in Ukraine" dated 16.07.1999 № 996-XIV). Soon after that, in 2018, the Ministry of Finance of Ukraine has set requirements for its content through the approval of Guidelines for the preparation of the management report (Methodology). Thus, in Ukraine, it is necessary to prepare management reports for all large and medium-sized enterprises. Also, the requirements for its content and structure are defined. According to legislation, a management report is a document that contains both financial and non-financial information characterizing the state, prospects, general risks and uncertainties of the enterprises' activities. The management report has to be submitted together with the financial statements and consolidated financial statements in the manner and within the time limits established by law. If the enterprise submits consolidated financial statements, a consolidated management report is submitted. Micro and small enterprises are exempted from submitting a management report. Medium-sized enterprises have the right not to reflect non-financial information in the management report. At the same time, management reports are not subject to verification and no penalties are imposed for non-submission. There is no special platform for collecting and publishing such reports, management reports together with financial statements are sent to the State Statistics Service. However, management report data are not taken into account within the formation of the Voluntary National Review on SDGs attainment progress. The purpose of this publication is to establish the interrelation between progress in the achievement of the balance among stakeholders, businesses, the state interests and the spread of non-financial reporting in countries with economies in transition from the regulation (the case of Ukraine).

The search for tools to establish the interrelation of companies' disclosure of relevant high-quality information in the management report and the legislation was conducted in two stages.

At the first stage, the international documents in the area of non-financial reporting were analyzed (Section 2). At the next stage, it was studied how the introduction of national legal requirements in the area of non-financial reporting affected the content and number of companies publishing it. The analysis of dynamic was conducted (before the implementation of EU directive requirements into the legislation of Ukraine and after) in the following sequence.

1. *Selection of respondent companies.* The research of the state of non-financial reporting of extractive companies in Ukraine is representative. That is why we determined the next parameters for the pre-selection of companies: the company is established and located in Ukraine; the company has a practice of non-financial reporting; the company belongs to the extractive industry. For the analysis of non-financial reporting, we have selected extractive enterprises, included in the TOP - 100 largest taxpayers of Ukraine in 2018-2019 (according to the State Fiscal Service, the SFS). The extractive and energy companies are almost a third part (22 extractive companies and 10 energy companies) of the largest taxpayers in Ukraine. In addition, companies mostly in these industries have high risks of negative impact on the environment; that is why there is a steady interest in the activities of these companies from government agencies, investors, environmental organizations and the community. Also, according to the SFS, extractive industries are in third place in the top five industries by the payment of taxes to the country's budget in 2020.
2. *Data collection and accumulation of information* were done using the investigation of non-financial reporting of respondent companies, the conceptual framework of their reporting. We have also analyzed accumulated information according to selected criteria

following the EU directive requirements for the ESG reporting (environment, social and personnel policy, human rights and the fight against corruption and bribery).

3. *Summarizing the results of expert evaluation of non-financial reports* of the selected companies in the context of compliance with national legislation and the EU directive requirements for disclosure of information in management report and other non-financial statements (if any) using review of practice, detection of peculiarities and general trends in company reporting.

The sources of information are non-financial reports of extractive companies for 2018-2019 from their corporate websites.

In the capacity of the *method of data collection*, we have chosen a systematic targeted observation during the investigation of the state of non-financial reporting of extractive enterprises and expert evaluation of the results.

The empirical research was conducted by assessing the compliance of non-financial reports of extractive industry enterprises included in the Register of the largest taxpayers, the requirements of national legislation and the provisions of mentioned EU Directives.

The evaluation criteria on which the observation is based are shown in table 1.

Table 1. Criteria for evaluation of non-financial reports of respondent companies

Criteria	EU directive provisions
Criteria 1: practice of non-financial report preparation (yes/no)	Directive 2013/34/EU (article 19) Directive 2014/95/EU (article 1) Guidelines on non-financial reporting (methodology for reporting non-financial information) (2017/C215/01) (hereinafter – Guidelines 2017/C215/01) (p. 4.1)
Criteria 2: inclusion of the description of entity's existing business-model into non-financial report (management report) (yes/no)	Directive 2013/34/EU (article 19a, p. 1a) Directive 2014/95/EU (article 1) Guidelines 2017/C215/01 (p. 4.2)
Criteria 3: disclosure of ecological issues in non-financial report (yes/no)	Directive 2014/95/EU (article 1) Directive 2013/34/EU (article 19a) Guidelines 2017/C215/01 (p.4.2)
Criteria 4: disclosure of social issues and elements of personnel policy in non-financial report (yes/no)	
Criteria 5: disclosure of data on human rights, anti-corruption and bribery matters in non-financial report (yes/no)	

Source: Prepared by the authors

Research limitation. The fact that one analyzes the formal level of compliance of the enterprise's non-financial report (in particular the management report) with the EU Directives` requirements is the key limitation and caveat during the conduction of empirical research. At the same time, the authors do not assess the quality of data disclosed by the surveyed enterprises.

4. RESEARCH RESULTS

Extractive companies are at the forefront of Ukrainian enterprises concerning disclosure of sustainable development indicators in non-financial reporting. This trend has been observed since 2014 and has only expanded in recent years. The activity of extractive industry enterprises

in the field of reporting is a kind of response to the widespread and growing criticism of their numerous business processes by individuals who have a legitimate interest in the activities of extractive industry companies (hereinafter - stakeholders).

Historically, natural resources have been unevenly distributed among countries. Ukraine is rich in natural capital (mineral, climatic, land, forest, water resources, etc.). Among 120 types of minerals consumed by mankind, 117 can be found in Ukraine (Mineral resources of Ukraine, 2020). Ukraine took 28th place in the world ranking of extractive countries in the report of World Mining Data 2019, which was prepared by the international organizing committee of the World Mining Congress according to the results of 2017. Production volume is estimated at 88.6 million tons and $ 10.6 billion (International Organizing Committee for the World Mining Congress, 2019).

The extractive industry is of strategic importance for the economy of Ukraine. The volume of sold products of the extractive industry for 11 months of 2019 amounted to $ 14.2 billion (16% of sales of all industrial products), 25% of products of the extractive industry were exported, according to data of State Statistics Service of Ukraine.

In 2018, the fee for the use of subsoil amounted to 5% of state budget revenues, and 16 companies-subsoil users are in the TOP-100 taxpayers according to the State Fiscal Service. At the same time, 10.58% of the structure of Ukraine's GDP in 2018 belongs to the net income from sales of seven enterprises of the extractive industries, which have prepared non-financial reports (including management reports) in 2019 (Figure 1).

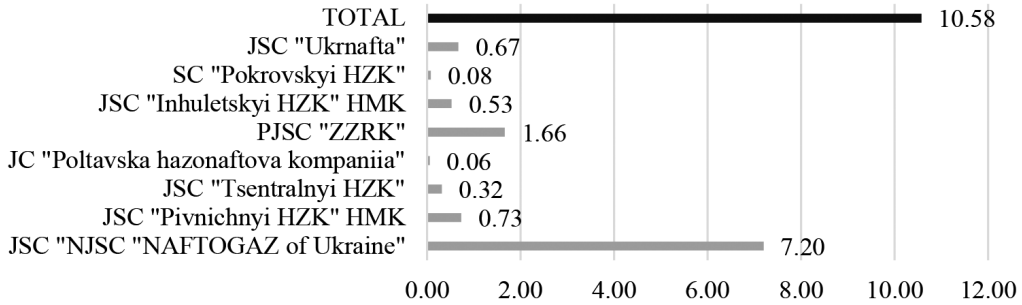

Figure 1. The share of net revenue of extractive industry enterprises (which prepared non-financial reports in 2019) in the GDP of Ukraine for 2018, **%.**

Source: Calculated by the authors according to the financial statements of the surveyed enterprises.

The demand for exhaustible natural resources of countries with a developed economy, which export mainly complex products, provokes an increase in demand for raw materials (iron ore, non-ferrous metal ores, oil, gas, roundwood). Ukraine is rich in it. This causes a steady increase in the share of natural resources in Ukraine's export and the fall of the domestic economy into the so-called "natural trap". Thus, for 11 months of 2019, the total export of minerals amounted to 51 million tons amounting to $ 4.2 billion.

This, at first glance, gives the domestic economy a competitive advantage and can provide sustainable economic growth, as it provides significant opportunities for the collection of natural rents. However, the excess profits from the export of natural resources lead to the formation of powerful business groups whose economic interests are aimed at obtaining rent. These are the main features of the "rent economy". The dominance and satisfaction of the needs of such

organizations is caused by the facts of non-transparency and fraud concerning the collection of rents and other payments to the government by enterprises engaged in the extractive industry.

At the same time, companies of this industry today have low level of investment, non-transparent extracting of minerals, protectionist policies of state support, and low level of interrelations with other sectors of the economy. The extractive industry diverts financial resources and human capital, which, otherwise, could ensure the growth and renewal of other industries. Thus, extracting and processing minerals are associated with 48% of the country's industrial potential and up to 20% of its labor resources.

Transparency of activity of enterprises of the extractive industry can be ensured through the disclosure of information on the state of the country's extractive sector according to indicators of ESG reporting areas (environment, social and personnel policy, human rights and the fight against corruption and bribery). Thus, in the context of growing attention to non-financial reporting, the introduction of the management report in the context of adaptation of national legislation to the EU requirements at the regulatory level has become a trigger for a rapid increase in the number of extractive companies that began to prepare non-financial reporting, including the management report.

According to the results of the conducted research, it was detected that 32 companies belong to the field of extractive industry and energy among the 100 largest taxpayers in Ukraine in 2018. Among them, only 8 companies of the extractive industry, which were the subject of the study, have prepared and published non-financial reports. 18 companies that belong to the field of extractive industry were among the 100 largest taxpayers in Ukraine in 2019, among them only 4 companies prepared non-financial reports (3 management reports).

The reduction in the number of management reports, according to the authors, is caused by several factors. First, the spread of the COVID-19 pandemic and the quarantine forced some companies to stop preparing non-financial reports. Second, only a small number of Ukrainian companies have the consistent practice of preparing non-financial reports, most of which are prepared in accordance with international standards. According to a study conducted by the Center for the Development of Corporate Social Responsibility, non-financial reporting in Ukraine among the 100 largest companies in Ukraine in 2014 was prepared by 14 companies, in 2015 - 17, in 2016 - 12, in 2017 – 16 (Zinchenko and others, 2018).

13 non-financial reports of various formats and 31 management reports were prepared in 2019. Another part of the companies formally prepared their reporting. In addition, the regulations of Ukraine do not contain provisions on the responsibility of the authorities for the collection and analysis of management reports. Third, there is the actual lack of public pressure on large companies, including extractive, to increase the level of transparency in their activities.

The initial retrospective analysis of the practice of non-financial reporting of extractive industry companies showed that only 8 companies among 22 companies had the practice of preparing non-financial reporting in 2019 and 4 companies in 2020 (Table 2). Among 8 surveyed companies only JSC "NJSC "NAFTOGAZ of Ukraine has a long practice of activities' non-financial aspects disclosure (Table 2).

Table 2. Dynamics of preparation and publication of non-financial reports by the investigated enterprises of the extractive industry of Ukraine

No	Company's name	Preparation of non-financial reports					
		2014	2015	2016	2017	2018	2019
1.	JSC "NJSC "NAFTOGAZ of Ukraine"	yes	yes	yes	yes	yes	yes
2.	JSC "Pivnichnyi HZK" HMK	no	no	no	no	yes	yes
3.	JSC "Tsentralnyi HZK"	no	no	no	no	yes	yes
4.	JC "Poltavska hazonaftova kompaniia"	no	no	no	no	yes	yes
5.	PJSC "ZZRK"	no	no	no	no	yes	no
6.	JSC "Inhuletskyi HZK" HMK	no	no	no	no	yes	no
7.	SC "Pokrovskyi HZK"	no	no	no	no	yes	no
8.	JSC "Ukrnafta"	no	no	no	no	yes	no
TOTAL (number of reports):		**1**	**1**	**1**	**1**	**7**	**4**

Source: Prepared by the authors according to the corporate sites of the surveyed enterprises.

Among the 8 companies, whose reporting was studied, 6 prepared a non-financial report for the first time in 2019 (for 2018) (see Table 2).

Analysis of the institutional framework for preparation non-financial reporting of the investigated group of enterprises showed that in 2018 in the capacity of the key framework we can name national regulations: The Law of Ukraine "On Accounting and Financial Reporting in Ukraine" of 16.07.1999 № 996-XIV, The Order of the Ministry of Finance of Ukraine of 07.12.2018 № 982 (table 3).

Table 3. Institutional framework for preparation of non-financial reporting by the investigated enterprises of the extractive industry of Ukraine

No	Company's name	Framework for non-financial reporting, applied by the company (name of the document, international initiative)					
		2014	2015	2016	2017	2018*	2019
1.	JSC "NJSC "NAFTOGAZ of Ukraine"	GRI	GRI	GRI	GRI	GRI, the Law No №996-XIV, the Order No 982**	GRI
2.	JSC "Pivnichnyi HZK" HMK	-	-	-	-	the Law No №996-XIV, the Order No 982**	the Law No №996-XIV, the Order No 982**
3.	JSC "Tsentralnyi HZK"	-	-	-	-	GRI, the Law No №996-XIV, the Order No 982**	the Law No №996-XIV, the Order No 982**
4.	JC "Poltavska hazonaftova kompaniia"	-	-	-	-	the Law No №996-XIV, the Order No 982**	the Law No №996-XIV, the Order No 982**
5.	PJSC "ZZRK"	-	-	-	-	the Law No №996-XIV, the Order No 982**	-
6.	JSC "Inhuletskyi HZK" HMK	-	-	-	-	the Law No №996-XIV, the Order No 982**	-
7.	SC "Pokrovskyi HZK"	-	-	-	-	the Law No №996-XIV, the Order No 982**	-
8.	JSC "Ukrnafta"	-	-	-	-	the Law No №996-XIV, the Order No 982**	-

Source: *Prepared by the authors according to the corporate sites of the surveyed enterprises.*

Notes: * After implementation of the provisions of the Directive 2014/95/EU in Ukraine;
** The Law of Ukraine "On Accounting and Financial Reporting in Ukraine" of 16.07.1999 No 996-XIV, The Order of the Ministry of Finance of Ukraine of 07.12.2018 № 982.

Analysis of preparation of non-financial statements by Ukrainian extractive enterprises showed that the number of non-financial reports (including management report) increased after the adoption of the Resolution of the Cabinet of Ministers of Ukraine on amendments to the Law №996-XIV and approval by the Ministry of Finance of Ukraine of Methodological recommendations for the preparation of the management report in 2019, and decreased in 2020 (Figure 2).

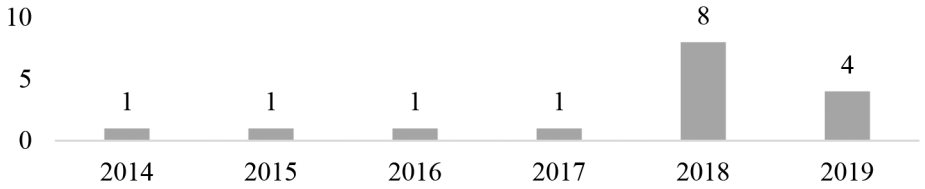

Figure 2. Number of non-financial reports published by the investigated group of enterprises, units

Source: Prepared by the authors according to the corporate sites of the surveyed enterprises.

It is too early to state about large-scale growth, but it can be concluded that the first hypothesis of our study has been confirmed and the level of preparation of non-financial reporting by companies depends on the institutional environment of such reporting. First of all, this is caused by the lack of an effective mechanism for collecting, processing and monitoring compliance with the law on non-financial reporting of enterprises. An example is the case of Ukraine as a country with an economy in transition. In the context of the implementation of EU directive requirements in Ukraine, non-financial reporting of enterprises has been approved at the legislative level. This determines the conceptual basis for the disclosure of information on the non-financial aspects of activities. An important next step towards the formation of the effective mechanism for non-financial reporting in Ukraine is to develop its regulatory and organizational framework through:

- identification of procedures for collection, processing and accumulation of enterprises' non-financial reporting data;
- formation of the effective model of interaction between the subjects of non-financial reporting in Ukraine (from the micro to the macro level, from the preparers to the policy-makers in the area of accounting and reporting);
- establishment of directions of use of non-financial reporting data as the important source for generalization of the information for the purpose of: formation of macroeconomic indicators of social and economic development of the country and regions within the realization and monitoring of SDGs achievement; assessment of the effectiveness of the use of national wealth and the contribution of enterprises to the development of the state social and economic environment;
- development of methodological basis and substantiation of organizational and methodological approaches to the establishment of enterprises' non-financial reporting quality control.

The lack of a clear deterministic mechanism for oversight over non-financial reporting and the quality of the data presented makes it impossible to aggregate report data at the sectoral and national levels. For example, some listed companies comply with the requirement to prepare a management report formally by including in the annual information at the request of the National Securities and Stock Market Commission. Thus, there is a substitution of concepts: the corporate governance report (which is part of the management report in accordance with the requirements of Directive 2014/95/EU) is called the "management report" in the annual information of issuers (for example, the annual report of JSC "NJSC "NAFTOGAZ of Ukraine" for 2019).

Non-financial information is disclosed by companies in various reports. Such reports differ in name, form, content and format of preparation. The most common reports: Sustainability Report, Corporate Social Responsibility Report, Integrated Report, Progress Report, Management Report, etc.

The analysis of the information presented in the reports on environmental, social and personnel aspects and the fight against corruption and bribery showed that the level and quality of information disclosure on these aspects is different.

Determining the level of compliance of surveyed enterprises' non-financial reports with the requirements of Directive 2014/95/EU is based on determining the index of industry disclosure of non-financial data I_{IDND}.

The main limitation is that the binary rating scale "1/0" is used for the assessment system. The basic reference value for the evaluation of each criterion is "1". Therefore, the overall average value, taking into account the estimates obtained for each enterprise of the surveyed group, will determine the level of compliance with the criteria for evaluation of non-financial statements defined in Table 1. Compliance with each of the five criteria is estimated at 1 point, non-compliance - 0 point.

The procedure for determining the indicator:

1) calculation for each group of criteria of the average value of the received estimations;
2) calculation of the non-financial data disclosure index by industry:

$$I_{IDND} = \sum_{i=1}^{n} a_i x_i \quad (1)$$

Where I_{IDND} – index of industry disclosure of non-financial data;
x_i – the average value of the i group of criteria;
a_i – weighting factor of the i group of criteria;
n – the number of groups of criteria (for the purposes of this study, the number of groups of criteria is 5, see table. 1).

In expanded form, the above formula (1) will look like:

$$I_{IDND} = 0,6x_1 + 0,1x_2 + 0,1x_3 + 0,1x_4 + 0,1x_5 \quad (2)$$

where I_{IDND} – index of industry disclosure of non-financial data;
x_1 – the average value of the criterion "Practice of non-financial report preparation";
x_2 – the average value of the criterion "Business model description";
x_3 – the average value of the criterion "Disclosure of ecological data";
x_4 – the average value of the criterion "Disclosure of social issues and elements of personnel policy";
x_5 – the average value of the criterion "Disclosure of data on human rights, anti-corruption and bribery matters".

The weights of the obtained average values for groups of criteria within the indicator in the work were calculated using Fishburne's rule, in which the largest value of the weighting factor was assigned to the value of estimates by the criterion "Non-financial report" - enterprises of the extractive industry and identification of factors influencing it.

Table 4 presents the results of the initial analysis of compliance of non-financial reports of surveyed enterprises with the requirements of Directive 2014/95/EU (based on non-financial reports prepared for 2018), which were formalized for the study in the form of criteria (see Table 1).

Table 4. Compliance of non-financial reporting (management reports) of the investigated enterprises of the extractive industry for 2018 with the EU Directive requirements in terms of disclosure of information according to ESG spheres

No	Company's name	Non-financial reports' evaluation criteria				
		Preparation of non-financial report, x_1	**Business model description,** x_2	**Disclosure of ecological data,** x_3	**Disclosure of social issues and elements of personnel policy,** x_4	**Disclosure of data on human rights, anti-corruption and bribery matters,** x_5
1.	JSC "NJSC "NAFTOGAZ of Ukraine"	1	1	1	1	1
2.	JSC "Pivnichnyi HZK" HMK	1	1	1	1	0
3.	JSC "Tsentralnyi HZK"	1	1	1	1	0
4.	JC "Poltavska hazonaftova kompaniia"	1	1	1	1	0
5.	PJSC "ZZRK"	1	1	1	1	0
6.	JSC "Inhuletskyi HZK" HMK	1	1	1	1	0
7.	SC "Pokrovskyi HZK"	1	1	1	1	0
8.	JSC "Ukrnafta"	1	1	1	1	0
Average values of x_1 for 22 enterprises of the group, including those that did not compile a management report for 2018		0,36	0,36	0,36	0,36	0,05
I_{IDND} in 2018		**0,33**				

Source: *Calculated by the authors according to the annual non-financial reports of the surveyed enterprises.*

In table 5 are presented the results of data compliance analysis of non-financial reports of surveyed enterprises with the requirements of Directive 2014/95/EU (based on data obtained from non-financial reports prepared for 2019).

Table 5. Compliance of non-financial reporting (management reports) of the investigated enterprises of the extractive industry for 2019 with the EU Directive requirements in terms of disclosure of information according to ESG spheres

No	Company's name	Non-financial reports' evaluation criteria				
		Preparation of non-financial report, x_1	**Business model description,** x_2	**Disclosure of ecological data,** x_3	**Disclosure of social issues and elements of personnel policy,** x_4	**Disclosure of data on human rights, anti-corruption and bribery matters,** x_5
1.	JSC "Pivnichnyi HZK" HMK	1	1	1	1	0
2.	JSC "Tsentralnyi HZK"	1	1	1	1	0
3.	JC "Poltavska hazonaftova kompaniia"	1	1	1	1	1
Average values of x_1 for 18 enterprises of the group, including those that did not compile a management report for 2019		0,17	0,17	0,17	0,17	0,06
I_{IDND} in 2019		**0,16**				

Source: *Calculated by the authors according to the annual non-financial reports of the surveyed enterprises.*

The surveyed enterprises disclose information on environmental, social and personnel aspects (see Tables 4, 5). However, most companies in the study group do not cover the fight against

corruption and bribery and its results, and therefore their non-financial reporting does not have a maximum assessment of compliance with the criteria based on the requirements of Directive 2014/95/EU and Directive 2013/34/EU (Figure 3).

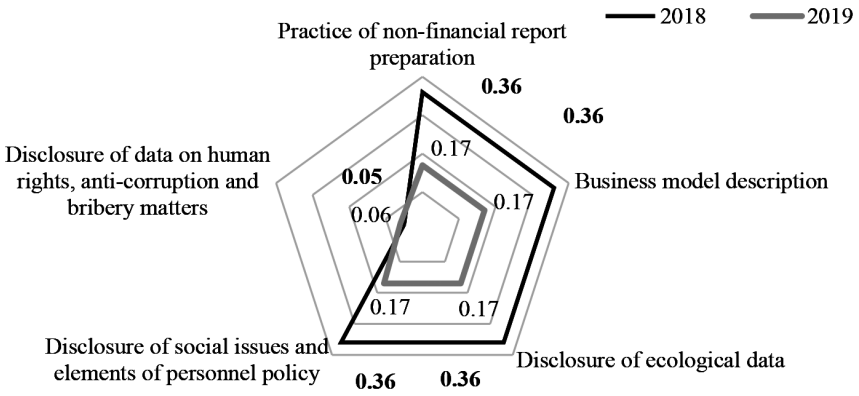

Figure 3. The results of the assessment of compliance with the requirements of Directive 2014/95/EU management reports of extractive industries' entities among the largest taxpayers for 2018-2019.

Source: Calculated by the authors according to the annual non-financial reports of the surveyed enterprises.

Another reason for the low-level values of the index of industry disclosure of non-financial data is the absence of published non-financial reports (management reports) of extractive companies among the largest taxpayers in 2018 and 2019.

5. DISCUSSION

The study was based on existing methodologies for assessment of enterprises' non-financial reporting practice: The Alliance for Corporate Transparency project analysis of companies' reporting, UNCTAD Reporting on the Sustainable Development Goals.

Directive 2014/95/EU does not specify in sufficient detail what information and key performance indicators should be disclosed. To address this issue, leading civil society organizations and experts have joined forces in a three-year Alliance for Corporate Transparency research project to analyze how European companies meet the requirements of Directive 2014/95/EU, and to develop proposals to improve policy requirements. In 2018, more than 100 companies engaged in energy and extractive industries, information and communication technologies and healthcare sectors were evaluated.

The UNCTAD research paper offers an original overview of indicators used by enterprises in the area of environmental, social and management reporting (ESG). The purpose of the study is to provide empirical data to identify a set of core indicators for companies as a baseline for ESG reporting, without excluding wider disclosure in the private sector. For this purpose, the document reviews the practices of the global 100 companies in the context of the Sustainable Development Goals. This empirical analysis was one of several contributions to UNCTAD's work on core indicators for reporting companies' contribution to the Sustainable Development Goals.

It should be noted that the algorithm of this study is based on existing best practices of empirical research conducted by international professional organizations. Nevertheless, the key difference

of this study is its focus on identifying the impact of legal regulation on the state of disclosure of financial and non-financial information by enterprises in the management report and their publication in countries with economies in transition (the case of Ukraine).

The main point for discussion and further research conducted by representatives of the scientific community, policy-makers and international organizations (key findings) is the necessity to substantiate a universal model and basic algorithm for the development of the effective mechanism for collecting, processing and quality control of non-financial reporting. The lack of requirements for verification of management reports and liability for non-submission, content and accuracy of data, as well as incentives in countries with transitional economies, are the prerequisites for reducing the level of preparation and low quality of non-financial reports.

In addition, one of the current tasks for research in the area of non-financial reporting is to regulate the disclosure of non-financial data and data reflecting the impact of the COVID-19 pandemic on performance. A separate area of activity of international organizations is to supplement the existing documents and regulations in the area of ESG disclosure with indicators (quantitative and qualitative) that reveal the impact of COVID-19 on the enterprises' activities, including the IPIECA Sustainability reporting guidance for the oil and gas industry; UN framework for the immediate socio-economic response to COVID-19; IFAC Summary of Covid-19 Financial Reporting Considerations, IIOSCO Statement on Importance of Disclosure about COVID-19 (Communication IOSCO/OR/02/2020 dated 29.05.2020) and others. However, at the regulatory level in Ukraine, these trends have not yet spread.

6. CONCLUSION

Non-financial reporting is an effective tool for ensuring accountability and informational openness of companies. In Ukraine, the EU directives have been implemented into national legislation and amendments have been made requiring certain types of enterprises to prepare a management report and a consolidated management report. However, the preparation of non-financial statements causes difficulties for business entities due to the problems of the inconsistency of regulatory and legal support, different levels of quality of source data depending on the sectoral affiliation, and so on. Therefore, at the current stage of the development of non-financial reporting in Ukraine, it is necessary to obtain objective information on current reporting practices of domestic companies, including the extractive industry, and to determine general trends, conclusions and proposals on this basis.

The assessment of the practice of non-financial reporting of extractive industries led to the following conclusions: the level of non-financial reporting by companies depends on the institutional environment, in particular, the number of non-financial reports (mostly management reports) increased after the introduction of legal requirements for such reporting; non-financial reporting mainly discloses information on environmental, social and personnel aspects, but the issues of combating corruption and bribery and the results of its implementation remain undisclosed in the reporting of most of the surveyed enterprises; the highest rate of compliance with EU directives on the disclosure of non-financial information belongs to companies that have a long practice of non-financial reporting. At the same time, it was found that the other side of government regulation (responsibility for non-submission of management reports) also has a significant impact on the level of disclosure of non-financial data of the enterprise, as evidenced by a decrease in non-financial reports. This fact is also a confirmation of the hypothesis formulated in the work.

The novelty of the study: the authors at the first time investigated and proved the direct impact of the effectiveness of government regulation and the state of disclosure of non-financial data by enterprises in countries with economies in transition (the case of Ukraine). Proof of this hypothesis led to the authors' development of the algorithm for assessment of the level of compliance of non-financial reports with regulatory requirements. It was suggested to use the index of industry disclosure of non-financial data for this purpose I_{IDND}.

The main direction for further development of non-financial reporting is to ensure the quality and comparability of disclosure of information on sustainable development through the development of an effective mechanism for regulation of the collection, processing and verification of relevant reports.

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THE FUTURE OF DIGITAL PLATFORM ECONOMY FROM A PERSPECTIVE OF GDP, TAX POLICIES, FDI AND REGULATORY FRAMEWORK IN EU COUNTRIES

Vito Bobek[1]
Shuporna Ghosh[2]
Tatjana Horvat[3]

DOI:

Abstract: *Digital data are core to all fast-emerging digital technologies, such as data analytics, artificial intelligence (AI), blockchain, the internet of things (IoT), cloud computing, and all internet-based services. The dominance of global digital platforms, their control of data, and their capacity to create and capture the ensuing value further accentuate concentration and consolidation rather than reduce inequalities between and within countries. This paper will analyze the digital platform economy in the European Union (EU) in the backdrop of the US and Asia Pacific digital platform economy and throw some light on critical factors for developing the conducive and globally competitive digital industry in the EU. This will be studied through some of the influences such as share of GDP, tax policies, FDI, and regulatory framework in the EU countries, contributing to creating a framework for a competitive global landscape of the EU.*

Keywords: *Tax policy, European Union, FDI, ICT, GDP, Digital platform economy.*

1. INTRODUCTION

How often have you come across the saying that *"data is the new oil"* (Hyrynsalmi, 2018)? Digital platforms are increasingly important in the world economy. The platform companies' combined value with a market capitalization of more than $100 million was estimated at more than $7 trillion in 2017 – 67 percent higher than in 2015. Some global digital platforms have achieved powerful market positions in certain areas. For example, Google has 90 percent of the market for internet searches. Facebook accounts for two-thirds of the global social media market and is the top social media platform in more than 90 percent of its economies. Amazon boasts an almost 40 percent share of the world's online retail activity, and its Amazon Web Services accounts for a similar share of the global cloud infrastructure services market. (UNCTAD, 2019)

In China, WeChat (owned by Tencent) has more than one billion active users and, together with Alipay (Alibaba), its payment solution has captured virtually the entire Chinese market for mobile payments. Meanwhile, Alibaba has been estimated to have close to 60 percent of the Chinese e-commerce market (UNCTAD, 2019).

In the paper, we assume the following:

- The revolution in information and communication technology (ICT) is rapidly moving the world from a resource-based economy to a knowledge-based economy. In the global knowledge economy, information and communication are the primary determinates

[1] DOBA Busienss School, Prešernova ulica 1, 2000 Maribor, Slovenia
[2] University of Applied Sciences FH Joanneum Graz, Austria, Eggenberger Allee 11, 8020 Graz, Austria
[3] University of Primorska, Faculty of Management, Cankarjeva 5, 6000 Koper, Slovenia

of competitiveness for firms and countries rather than traditional determinates (Hussain, 2000); Changing dynamics of Gross Domestic Product (GDP) – Information and Communication Technology (ICT) grabs larger pie in Foreign Development Investment (FDI);
- Taxes on digital platforms in EU countries are an essential factor of EU (un)competitiveness;
- Regulatory framework in the European Union (EU) countries is an essential factor of EU (un)competitiveness.

In this paper, we shall study the research gap:
- Testing Hypothesis to find the Impact of FDI (in ICT sector) affecting the countries' growth dynamics, i.e., the GDP of EU countries.
- Gaps in digital Regulatory framework of the European Union (EU)

Following contemporary literature, the effect of FDI from the ICT sector on each EU country's GDP dynamics is computed. These net effects constitute the effects of FDI on economic growth dynamics (i.e., GDP) on ICT variables' interaction. The research assesses how information and communication technology (ICT) modulates the effect of foreign direct investment (FDI) on economic growth.

2. THEORETICAL BACKGROUND

2.1. Digital Platforms Economy - Global Map

Let us have a glance into the global landscape of digital platforms. At present, the world is characterized by a yawning gap between the under-connected and hyper-digitalized countries. It is consistently being led by one developed and one emerging country: The United States and China. The two countries account for 75 percent of all patents related to blockchain technologies, 50 percent of global spending on IoT, and more than 75 percent of the world market for public cloud computing. Furthermore, perhaps most strikingly, they account for 90 percent of the world's 70 largest digital platforms' market capitalization value. Europe's share is 3 percent, and Africa and Latin America's together is only 2 percent. Seven "super platforms" – Microsoft, followed by Apple, Amazon, Google, Facebook, Tencent, and Alibaba – account for two-thirds of the total market value. Thus, in many digital technological developments, the rest of the world, especially Africa and Latin America, are trailing considerably far behind the United States and China (UNCTAD, 2019).

2.2. The European Union in the Digital platform Economy

According to the winner-takes-it-all, market-tipping effect, the first moving platforms are likely to end-up, attracting most users and dominating the market (Rysman, 2006). All the big and famous digital platforms have probably got the message by now: European policymakers do not like them very much. Several antitrust cases have been filed against Amazon, Apple, Facebook, Google, and others.

The European Commission and several EU-member states governments have advocated a special platform regulation to slow down the competitive effect of both larger and smaller platform firms. Indeed, the Commission proposed a new 'special tax' on services of digital platforms. Around Europe, Uber and Airbnb have been restricted by national or local governments. Fur-

thermore, there have been repeated calls for breaking up platforms and companies like Google and Facebook (Bauer, 2018).

The EU and American authorities differ in their doctrine of competition policy and their antitrust practices, notably regarding the exercise of market power and the behavior of dominant market players. The EU competition authorities have referred to a traditional static model of competition, whereas a more innovation-oriented, dynamic competition model prevails at the level of US antitrust agencies. The competition authorities in the EU consider that the exercise of market power is a source of inefficiency and that it should be removed because it harms effective competition (Lebourges, n.d.).

Due to different regulatory regimes, low competition levels and rigid market structures are a common feature of many industries in many Member States of the EU. As a consequence, national legal borders still exert much more negative effects on commerce within the EU than sub-federal policies do in the US (The European Parliament, 2017)

For the EU authorities, key policy questions include:
- how to assign ownership and control over data;
- how to build consumer trust and protect data privacy;
- how to regulate cross-border data flows.

The answer to these questions is the European Union's General Data Protection Regulation (GDPR), which took effect in May 2018, is currently the most comprehensive approach to data protection, with global implications (UNCTAD, 2019).

2.3. GDPR

EU lawmakers have taken broad action to protect data privacy and have restated in the new General Data Protection Regulation (GDPR) that companies are generally prohibited from processing any personal data unless there is a statutory exception.

Nevertheless, GDPR stops short of recognizing ownership or property rights for data subjects and refers to "ownership" and "property" only to recognize the conflicting rights that may outweigh privacy interests. Even the novel right to data portability is quite limited: it applies only to personal data provided (not created or acquired by an "owner"), by the data subject (not any "owner"), based on consent or contract (not legitimate interests, law or other bases), and does not confer any exclusion, usage or alienation rights. Besides, EU data protection laws confer exclusion rights against governments and businesses, but not against individuals acting for personal or household purposes (Determann 2018).

However, it leads to a question – Is GDPR enough for the growth of the digital platform economy of the EU. Does it answer all the relevant doubts? For example:
- How to assign ownership and control over data?
- How to build consumer trust and protect data privacy?
- How to regulate cross-border data flows?
- How to make a tax-friendly ecosystem for enhanced digital investment platforms?
- How to make the regulations and laws more investor-friendly to be able to compete with the digital superpowers?

2.4. Effect of ICT on FDI and GDP of the economy

Measuring the digital economy and related value creation and capture is fraught with difficulties. Although several initiatives are underway to improve the situation, they remain insufficient and struggle to cope with the rapid pace of evolution of the digital economy. Depending on the definition, estimates of several initiatives are underway to improve the situation. They remain insufficient and are struggling to cope with the rapid pace of evolution of the digital economy.

The value-added in the ICT sector, the share of the ICT sector as a percentage of the GDP is an essential growth indicator. In the absence of any in-depth measure of the EU's digital economy, we have considered ICT in this paper. Globally, ICT now is the crucial driver of growth, which is significant in FDI (Foreign Direct Investments), which contributes heavily to the GDP (Gross Domestic Product) of the economy (Table 1). The effect of ICT on FDI is either considered a location determinant for promoting investment or indirectly within the impact of ICT on other determinants that impact investments.

Table 1. Percentage of FDI in GDP of 28 EU nations

Country	2013	2014	2015	2016	2017
Belgium	102.2	114.5	123	115.6	111.1
Bulgaria	87.5	87.6	88.3	84.7	82
Czechia	61.7	64.2	61	63.1	65.1
Denmark	29	38.7	38.4	44.9	43.8
Germany	24.8	24.1	23.6	23.2	24.2
Estonia	84.6	86.1	84.3	86.4	84.4
Ireland	167.1	181.3	311.5	291.9	253.1
Greece	10.4	9.9	12.5	13.4	15.3
Spain	45	46.6	45.7	47	45.3
France	26.1	26.8	28.7	30	31.8
Croatia	50.5	55.1	53.4	56.1	57.4
Italy	16.5	17.9	18.9	19.5	20.3
Cyprus	851	841.3	1,041.6	1,058	989.8
Latvia	50.7	52.6	55.7	53.9	54
Lithuania	36.4	34.9	36.1	35.8	35.1
Luxembourg	4,638.7	5,353.3	6,554	6,783.3	6,004.5
Hungary	176.9	174	161	198.4	165.9
Malta	1,750.9	1,686.2	1,594.5	1,585.2	1,523.6
Netherlands	483	512.6	542.6	553.5	566.3
Austria	65.7	67.6	65.2	53.6	55.5
Poland	42.6	42.6	39.8	42.2	42.9
Portugal	53.3	57.2	60.3	59.3	61.5
Romania	41.8	40	40.2	41	40.4
Slovenia	24.6	27.1	29.9	32.1	31.8
Slovakia	56.7	53.8	53.4	55.6	54.9
Finland	31.7	36.9	35.8	35.4	32.8
Sweden	65.2	61	63.8	61.6	62.3
United Kingdom	52.6	58	53.9	58.3	57.5

Source: (Eurostat, n.d.)

ICT does not just increase firm productivity; it enables firms to be more competitive and innovative. Around two-thirds of US total factor productivity growth between 1995 and 2004 was due to ICT, and ICT has contributed roughly one-third of growth since then. Compared to the United States, Europe has had far smaller productivity gains from ICT. Although the contribution of ICT varies between European countries (Table 2) - some countries have gained roughly as much from ICT as the United States while many others, including France and the Mediterranean countries, have benefited significantly less -overall Europe trails significantly behind (Atkinson, 2014).

Table 2. Percentage of the ICT sector in the GDP of 28 EU nations

Country	2011	2012	2013	2014	2015	2016	2017	2018
Belgium	4.13	4.13	4.03	3.82	3.79	3.78	3.75	3.96
Bulgaria	4.64	4.57	4.72	4.89	5.05	5.38	5.72	6.10
Czechia	4.34	4.35	4.34	4.27	4.24	4.27	4.36	4.56
Denmark	4.62	4.61	4.60	4.60	4.59	4.58	4.57	4.56
Germany	4.04	4.00	4.08	4.17	4.23	4.13	4.19	4.40
Estonia	4.98	4.66	4.57	4.79	4.7	4.85	5.11	5.38
Ireland	17.10	17.20	14.40	11.50	11.50	12.10	13.20	14.40
Greece	2.11	2.08	1.99	1.96	2.18	2.17	1.95	2.49
Spain	3.40	3.37	3.31	3.20				3.28
France	4.06	4.01		3.83	3.89	4.00	4.33	4.31
Croatia	4.04	3.90	4.11	4.08	4.20	4.23	4.38	4.45
Italy	3.41	3.47	3.24	3.21	3.22	3.27	3.33	3.29
Cyprus								
Latvia	3.28	3.44	3.71	3.74	4.15	4.53	4.69	4.92
Lithuania	2.41	2.47	16.1			2.95	3.01	3.13
Luxembourg		8.30	2.38	21.30	15.20	10.30	7.00	6.90
Hungary	5.91	5.71	5.80	5.60	5.72	5.63	5.97	5.95
Malta	8.89	8.44	6.55	6.9	6.86	6.62	8.44	8.05
Netherlands			4.90					
Austria	3.25	3.15	3.23		3.37	3.46	3.49	3.58
Poland	3.27	3.14	3.03	3.07	3.14	3.21	3.33	3.59
Portugal								
Romania	3.10	3.19	3.14	3.31	3.36	3.56	3.53	3.74
Slovenia	3.47	3.55	3.56	3.59	3.60	3.59	3.67	3.59
Slovakia	4.45	4.68		4.16	4.35	4.01	4.30	4.12
Finland	4.33	3.62	4.32		4.54		5.43	4.85
Sweden	:	:	:	6.28	:	:	:	5.94
United Kingdom	:	:	:	5.67	5.81	5.87	5.97	6.15

Source: (Eurostat, n.d.)

3. REGRESSION ANALYSIS - FDI IN ICT VS. GDP

The research assesses how information and communication technology (ICT) modulates the effect of foreign direct investment (FDI) on economic growth, i.e., GDP dynamics in 28 countries in the European Union in the period 2011 - 2018.

Globally, ICT now is the crucial driver of growth, the impact of which is significant in FDI (Foreign Direct Investments), in return, which contributes heavily to the GDP of the economy.

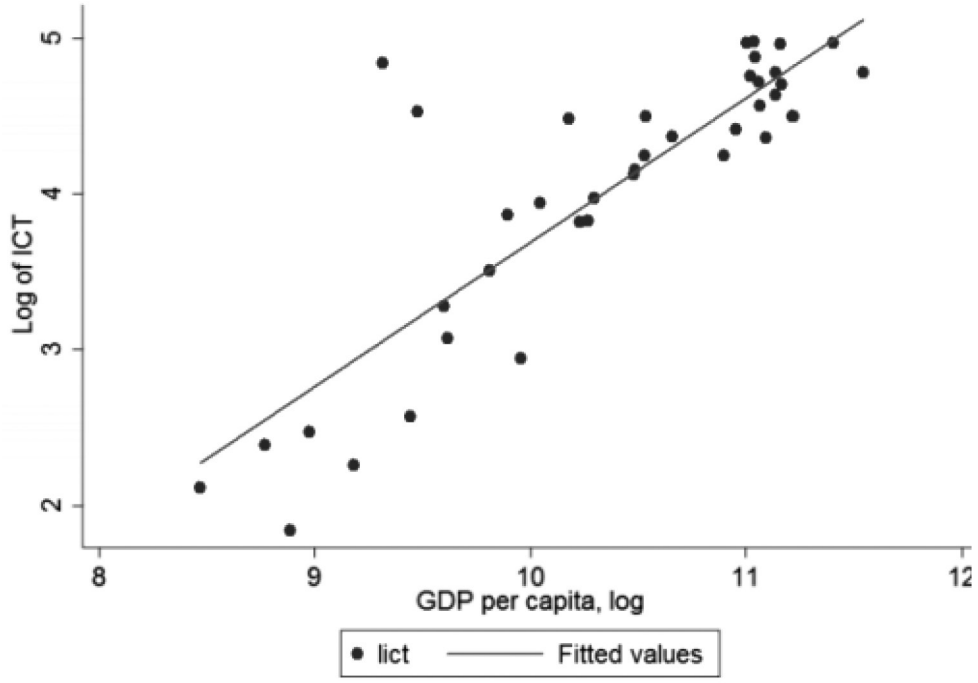

Figure 1. Regression analysis - FDI in ICT vs. GDP
Source: Calculation of the authors.

Our key findings are as follows:

- There is a causal relationship between ICT and FDI inflows of the countries in the EU;
- The empirical studies show the positive and significant impact of ICT on FDI. This has also been highlighted in the theoretical part of the study.
- There is a positive relationship between the GDP and the FDI of the countries in the EU.
- However, given ICT now globally is the key driver for growth, Europe has had far smaller productivity gains from ICT compared to the United States.
- Privacy regulations of digital platforms in the EU, stringent and heavy tax policy and continued fragmentation, making it difficult to achieve economies of scale.

4. WHY EU IS LAGGING

The primary proximate cause is simply the lack of investment in ICT capital: both as a percent of total investment and as a percent of GDP. ICT-using sectors, which indirectly also affect the digital platform economy and primarily the service sector, have been large drivers of growth in the United States have been relatively untouched by ICT in Europe (Atkinson, 2014).

In Europe, layers upon layers of laws and regulations in non-digital sectors significantly hamper digital businesses in their efforts to gain scale and economic clout within and beyond the EU.

The political decisions whose real-world implications effectively erode online platforms' beneficial network effects send strong warning signals to investors and innovators.

Given the significance of legal fragmentation in the EU, Europe does not have the same gravity of market size compared to the US and China, which renders platform-friendly policies even more important to encourage innovators – from inside and outside the EU – to set up shop in the EU (Bauer, 2018)

4.1. Challenges For Digital Platforms in EU

Regulation within product, labor, and land markets limits possible business models, raises the cost of ICT investment, and slows down market forces that can push firms to adopt more effective practices. For example, privacy regulations reduce the effectiveness of online advertising. The "right to be forgotten" legal provision can significantly raise the cost of doing business for a wide range of data providers, and restrictions on cloud provider locations and nationality can slow access and increase costs. Labor regulations also limit firms from using ICT to reengineer production processes.

Europe's ICT tax policy. EU consumption taxes on ICT products are high, which lowers consumer adoption and can slow business adoption of consumer-facing ICT. More regulatory constraints on modern platform businesses, e.g., special taxes on digital services or narrow and discriminatory interpretations of EU competition law, would further disincentive innovative companies to invest, grow and expand within and beyond the EU (Bauer, 2018). The continued fragmentation of European markets limits the potential size of demand for European goods and services, making it harder to achieve economies of scale from ICT investments. Besides, regulatory heterogeneity is a subsidy to big businesses. It generally reduces the willingness of smaller firms to engage in cross-border commerce. Both the scope and restrictiveness of sectoral regulations in the EU indicate there is enduring resistance of Member State governments to control many legislative and regulatory powers (Bauer, 2018). Regulation has provided a significant bottleneck to firm growth by favoring small firms at large ones' expense.

4.2. Steps Are Taken Towards Digital Tax in The European Union. Are They Sufficient?

Unfortunately, recent policy proposals and legislation have not been promising. The "right to be forgotten" and other privacy and data collection rules threaten to add high costs for internet companies and hold back both ICT adoption and digital innovation in Europe. Europe needs to find ways to address legitimate concerns around digital issues like privacy and security without harming ICT adoption.

Europe should focus primarily on ICT-using sectors because ICT-producing sectors alone are unlikely to provide significant productivity increases to the economy without adopting ICT in other sectors. Besides, actions to encourage the ICT-producing sector may sometimes hurt ICT-using sectors if protective tariffs or other actions to bias the market toward local ICT producers raise ICT prices for ICT-using industries.

By minimizing taxes on ICT investments, policymakers encourage the productivity effects of ICT use. These tax incentives are significant because while ICT investment provides immense benefits for the broader economy, the nature of these benefits makes them hard for any single firm to capture; therefore, firms tend to underinvest in ICT. Trade policy can play a role, mainly through an expanded Information Technology Agreement.

European firms would be better able to take advantage of ICT if they could achieve larger economies of scale, particularly in ICT-using industries. Recent EU reports have shown that the EU is far from a single market in many service industries due to national barriers to entry.

The European Parliamentary Research Service (European Parliament 2017, p. 12) highlights the "urgent need to bring EU single market rules up to date, in particular as regards online payments,

e-invoicing, the protection of intellectual property rights, data protection and privacy, as well as value-added tax (VAT). Measures in these areas would generate trust in e-commerce and provide adequate protection for EU consumers, who are still more inclined to shop online at domestic shops rather than with a seller in another country." The authors of this study indicate that the potential gain in Gross Domestic Product (GDP) from a complete Digital Single Market could amount to up to 500bn EUR per year, which corresponds to 3.6 percent of EU GDP (Bauer, 2018).

5. RECOMMENDATION AND FUTURE RESEARCH DIRECTIONS

In China and the US, traditional businesses and start-ups have immediate access to hundreds of millions of potential customers. Not so in the EU, where digital and non-digital industries' regulations still differ substantially across individual countries and often even within the EU Member States. It is the need of the hour to encourage the strategic cross-border collaboration of capabilities amidst EU countries. This will, in turn, enable and encourage platforms for data harvesting. In the past, the EU has indulged in Airbus cases in the EU to compete with Boeing from the US.

It is essential to transform government funds' structural utilization to enable the start-ups to work towards a shared vision, instead of competing with each other and working in silos. Converge to provide end-to-end processes and services from a customer perspective.

It would also be beneficial to call for collaborative R&D from universities to research and build common platforms and strategies where many faculties could contribute (Law, IT, Marketing, Business) instead of bringing individual capabilities. Establishing an EU centric digital cross data-collecting platform where other platforms and products such as e-commerce and payment platform can be based on. Ideally regulated by the EU government, to achieve economies of scale and overcome fragmentation.

Another crucial step would be making an investor and startup-friendly tax environment to help these platforms flourish and trickle their benefits to the related businesses and industries. The EU should also frame and introduce relevant regulations for FDIs acquiring the EU companies, which are primarily established through EU funds and experts from the EU.

6. CONCLUSION

Despite many – and growing – frictions in the world economy, it is notable that platforms like Amazon, Alibaba, or Facebook continue to create manifest change in market behavior and lead the world economy towards more integration. Even if most observers welcome that outcome, it has also provoked fears and reactions among those that have lost their previous market power and their ability to control how patterns of economic exchange should develop (Bauer, 2018).

Therefore, data is universal and is to be distributed and used freely on the grounds of public interest. It is essential to take measures to ensure that the data generated wealth is distributed legally. Given the high economic value of personal data, it is little surprise that currently not distributed equally. As data becomes commoditized, it is all the more critical to regulating the legal claim of the digital property than its transaction regulation (Fernández, 2019).

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COMPARISON OF SLOVAKIA REGIONS BASED ON SCORING METHOD

Ľubica Hurbánková[1]

DOI:

Abstract: *The aim of the paper is to analyse the regions of Slovakia using selected indicators related to housing. Indicators entering the analysis are: the proportion of households that consider paying of total housing cost to be very encumbering, the proportion of people below the poverty line (60% of median), the unemployment rate, the proportion of households who own a flat/house, average real estate prices, average nominal monthly wage of employee, regional gross domestic product per capita. We will use one of the multi-criteria comparison methods for the analysis, namely the scoring method. Based on this method, we rank the regions according to the value of the integral indicator from the best to the worst. From the results of the analysis, we found out that from the point of view of the analysed indicators the best were placed Trenčín, Nitra and Žilina regions, and the worst Košice and Prešov regions. The application of the statistical method was carried out through the program Microsoft Office Excel.*

Keywords: *Housing, Scoring method, Slovakia regions.*

1. INTRODUCTION

Statistical examination in most cases focuses on the analysis of only one monitored statistical feature and it´s only characteristic in the examined file. In many cases, however, this is not enough and it is necessary to examine the statistical file from several aspects, taking into account its several characteristics, represented by several statistical features (Hair, Black, Babin, Anderson, 2009). In such an analysis, it is necessary to use multi-criteria statistical methods, which include simple multi-criteria comparison methods, namely the order method, the scoring method, the standard variable method and the distance method from a fictitious object.

This paper aims to analyse the individual regions of Slovakia based on indicators related to housing. The issue of housing is actual, because housing at an adequate level is one of the basic human needs. Therefore, it was decided to resolve this issue.

One of the most important indicators in terms of housing is average real estate prices in individual regions stated in €/m^2. Table 1 and Figure 1 show the values of the above indicator in the years 2002 – 2018. We see (Table 1) that the highest real estate prices are in Bratislava and Košice regions, specifically, the highest value of this indicator was recorded in Bratislava region in 2008, during the economic crisis, namely 1 972 €/m^2. The lowest prices are in Nitra and Trenčín regions; the lowest value was found in Trenčín region in 2005, namely 345 €/m^2. In total, for Slovakia, average real estate prices ranged from 592 €/m^2 (in 2002) to 1 511 €/m^2 (in 2008). In 2018, this indicator reached the value of 1 431 €/m^2 for the whole of Slovakia.

[1] University of Economics in Bratislava, Dolnozemská cesta 1, 852 35 Bratislava, Slovak Republic

Table 1. Average real estate prices in €/m² in Slovakia and individual regions in years 2002-2018

Year	Slovak Republic	Region							
		Bratislava	Trnava	Trenčín	Nitra	Žilina	Banská Bystrica	Prešov	Košice
2002	592	779	370	457	361	404	356	359	462
2003	827	1 180	400	437	405	504	472	465	490
2004	954	1 285	659	630	573	439	505	505	779
2005	856	1 148	648	345	365	452	422	592	522
2006	1 000	1 376	712	473	387	507	512	612	581
2007	1 238	1 666	799	612	517	709	686	747	812
2008	1 511	1 972	1 006	830	744	945	851	1 051	1 137
2009	1 344	1 749	937	759	709	864	789	899	922
2010	1 291	1 726	850	685	620	790	791	826	941
2011	1 251	1 677	834	695	624	757	769	822	975
2012	1 237	1 661	824	657	612	760	764	803	971
2013	1 226	1 660	826	642	585	776	737	787	928
2014	1 216	1 648	823	629	580	782	740	765	920
2015	1 227	1 693	830	633	556	753	712	745	946
2016	1 279	1 790	863	653	587	812	714	784	932
2017	1 360	1 896	936	740	663	864	745	833	1 015
2018	1 431	1 973	1 060	786	748	936	777	875	1 071

Source: National Bank of Slovakia (2019)

From Figure 1, we found that average real estate prices recorded the highest values in Bratislava region during the entire period, the values of which are over the values for the entire Slovak Republic. As for the development trend, real estate prices rose from 2002 to 2008, reached their maximum values in 2008, then slowly decreased until 2014 and have risen again since then, almost reaching the values from the economic crisis.

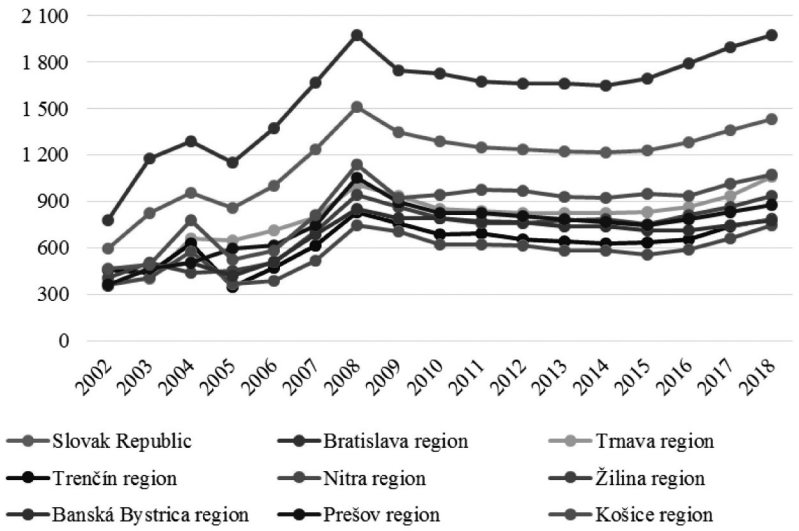

Figure 1. Real estate prices in €/m² in Slovakia and in individual regions in the years 2002-2018

Source: own processing in Excel

2. LITERATURE OVERVIEW

Several foreign authors dealt with the issue of housing.

Christensen et al. (1992) in their study examined objective housing indicators and their relationships with subjective housing quality evaluations for a representative national sample of independent elderly households. Hierarchical regression analyses revealed that two indicators of physical housing quality (structural adequacy and maintenance quality) provided significant and meaningful predictions of subjective housing evaluations. Discussed are study findings in terms of their implications for environmental assessment research, the development of housing quality indicators, and practical applications in social gerontology.

Bogdon and Can (1997) in their paper focused on the measurement of local housing affordability problems. There is number of different housing market indicators that help identify the magnitude and nature of housing affordability problems and their geographic distribution.

Saldaña-Márquez et al. (2019) presented a comparative analysis of the housing indicators used by the single-family housing rating systems, in which the residential urban environment influences buildings' certification scores, emphasizing the relationships of six systems developed by middle-income countries (MICs) and the two most-recognized rating systems. The aim was to provide new housing indicators that are capable of bringing the concept of sustainability into the cities of MICs. The results revealed that the percentage of influence that single-family housing can achieve in the metric established by each system is relatively low. However, considering all of the identified indicators, this influence could increase to 53.16% of the total score in multi-criteria evaluations.

The following authors dealt with the issue of housing in Slovakia.

Šoltés (2007) in his paper analysed the impact, which the selected factors have on households' accommodation costs each month. For his analysis used report called Income and Living Findings EU SILC 2005. By using methods of regression and correlation analyse he found out which factors influence accommodation costs. He considered their influence.

Cár (2009) concluded that the significant rise in estate prices was largely due to the favourable development of the Slovak economy, which was the basis for the positive expectations of the population and the growing willingness to procure housing with relatively well available credit resources. The growing demand for housing and not adequate supply resulted in relatively dynamic growth in estate prices in recent years. The turning point came in the second half of 2008, when and estate prices fell between quarters. Among the factors that significantly affect the development of residential property prices, Cár includes the population aged 25 to 44, gross domestic product, the volume of housing loans provided, the volume of construction output associated with the construction of residential buildings.

Vidová (2014) in her paper analysed investments in housing in the context of household behavior in the housing market.

Žuffová and Pilch (2015) in their paper focused on young clients, whom the state supports in housing issues.

3. THE SCORING METHOD

We use for analysis Slovakia regions based on one of the multi-criteria comparison methods – the scoring method.

Multi-criteria comparison methods aim to replace several selected indicators, with which we want to compare selected objects (in our case the regions of Slovakia), with one quantitatively expressed integral indicator. Selected indicators are usually heterogeneous (expressed in different units of measure), which means that we can´t aggregate them by direct addition and therefore we must transform them into homogeneous indicators, from which an integral indicator is formed.

We can divide indicators into (Pažitná, Labudová, 2007):

- stimulants - in which there is positive growth of values,
- destimulants - in which there is positive decrease of values,
- nominants - their increasing values have a positive effect on the observed indicator, but only up to a certain value.

The most commonly used methods of creating an integral indicator are (Vojtková, Stankovičová, 2020):

- the order method,
- the scoring method,
- the standard variable method,
- the distance method from a fictitious object.

The independence of individual indicators is important for the mentioned methods of multi-criteria comparison. Therefore, before applying the methods themselves, we must quantify the correlation matrix, which will help us identify variables for which there is no statistically significant dependence. In determining whether the correlation coefficient is statistically significant, we will consider the following hypotheses (Pacáková et al., 2009):

H_0: $\rho_{xy} = 0$ (correlation coefficient is not statistically significant)

H_1: $\rho_{xy} \neq 0$ (correlation coefficient is statistically significant)

So that we can´t reject hypothesis H_0, which talks about independence, respectively statistically insignificant dependence, it must be true that all values of the correlation coefficient have a *P*-value higher than the significance level α – *P*-value > 0.05.

The scoring method

In the scoring method, we replace the values of the individual indicators X_j with the appropriate number of points. For each indicator X_j we find an object (region) in which the indicator reaches the maximum value ($x_{max.j}$), if it is a stimulating variable or the minimum value ($x_{min.j}$), or a destimulating variable. We will assign 100 points to the given object for the given indicator. Other objects get from 0 to 100 points, depending on how many % represents the value of the indicator x_{ij} from the maximum value ($x_{max.j}$), resp. minimum value ($x_{min.j}$). We assign the number of points to the object according to the relation (Glaser-Opitzová and Myslíková, 2001):

if X_j is a stimulating indicator: $z_{ij} = \frac{x_{ij}}{x_{max.j}}\ 100$ (1)

where: z_{ij} is the number of points for the j-th indicator in the i-th object,
x_{ij} is the value of the j-th indicator belonging to the i-th object,
$x_{max.j}$ is the maximum value of the j-th indicator,

if X_j is a destimulating indicator: $z_{ij} = \frac{x_{min.j}}{x_{ij}}\ 100$ (2)

where: $x_{min.j}$ is the minimum value of the j-th indicator.

We determine the resulting integral indicator as the average number of points:

$$d_i = \frac{1}{k}\sum_{j=1}^{k} z_{ij} \quad (3)$$

The order of individual objects is determined as follows: the first in the order will be the object with the highest value of d_i, the last will be the object whose value of the integral indicator d_i is the lowest (Jílek, 1997).

4. APPLICATION OF THE SCORING METHOD

In this part of the paper, we will analyse the regions of the Slovak Republic based on selected indicators related to housing in the year 2017:

- **The proportion of households that consider paying of total housing costs to be very encumbering (X_1)** – the indicator is expressed in percentage of the total number of households.
- **The proportion of people below the poverty line (60% of the median)** (X_2) – the indicator expresses the at-risk-of-poverty rate. This is the proportion of people with equivalent disposable income below 60 % of the national median equivalent income (Statistical Office of Slovak Republic, 2018).
- **The unemployment rate according to LFS[2] (X_3)** – calculated as the proportion of the number of unemployed persons according to LFS (persons aged 15 to 74 who do not have a job in the observed week, who are actively looking for a job in the last four weeks - or have already found a job and start work within 3 months - and who are able to start work within two weeks at the latest, these persons may or may not be registered in Employment, social affairs and family offices as jobseekers) and the number of economically active population according to the LFS (excluding persons on parental leave) (Statistical Office of Slovak Republic, 2019). The indicator is given in percentage.
- **The proportion of households that own a flat/house (X_4)** – the owner must be a member of the household and have an acquisition deed regardless of whether the house is fully paid or not (Statistical Office of Slovak Republic, 2018). The indicator is given in percentage.
- **Average real estate prices (X_5)** – this indicator tells us about the amount of real estate prices in individual regions of the Slovak Republic in €/m^2.

[2] LFS is a labour force sample survey. It is a monitoring of the workforce based on a direct survey in selected households. The basis for the survey is a stratified selection of flats, which evenly covers the entire territory of Slovak Republic. The sample includes 10 250 flats on a quarterly basis, which represents 0.6% of the total number of permanently inhabited flats in Slovak Republic. The subject of the survey are all persons aged 15 and over living in households of selected flats. Each selected household remains in the sample for five following quarters.

- **Average nominal monthly wage of employee (X_6)** – includes benefits that belong to the basic (tariff) wage determined according to wage regulations, including the basic components of contractual salaries and wages for overtime, wage compensation for the time when employees did not work, monthly and long-term bonuses and bonuses paid depending on performance and fulfilment of evaluation criteria, overtime rates, cash allowances to night workers, premium pay for work on Saturdays and Sundays, holidays, harmful environment, noise, risky and hard work, natural wages expressed in cash and other wages in the form of wage benefits, whose amount and periodicity are determined in advance regardless of the situation of the company (Statistical Office of Slovak Republic, 2019). The indicator is expressed in € /employee.
- **Regional gross domestic product per capita (X_7)** – is the proportion of two indicators – regional gross domestic product and the average number of permanent residents in the region (Statistical Office of Slovak Republic, 2019). This indicator is given in €/inhabitant.

Before proceeding with the analysis, we must verify based on the correlation matrix whether the indicators are independent – the correlation coefficients are not statistically significant. From the correlation matrix (Table 2) it is clear that some correlation coefficients have *P*-values less than 0.05, so they are statistically significant. In this case, we must remove from the analysis the indicators that show the highest dependence. After the gradual removal of indicators, we obtained a correlation matrix that contains only those indicators between which there is no statistically significant dependence. This correlation matrix is in Table 3.

Table 2. Correlation matrix of all variables

	X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_1	1.0000	-0.2244 0.5931	-0.1576 0.7093	-0.3095 0.4557	0.4429 0.2718	0.3595 0.3818	0.3288 0.4265
X_2	-0.2244 0.5931	1.0000	0.8784 0.0041	-0.0677 0.8734	-0.5915 0.122	-0.8037 0.0162	-0.7803 0.0223
X_3	-0.1576 0.7093	0.8784 0.0041	1.0000	-0.4069 0.3171	-0.3417 0.4075	-0.6028 0.1137	-0.5615 0.1476
X_4	-0.3095 0.4557	-0.0677 0.8734	-0.4069 0.3171	1.0000	-0.0033 0.9937	0.0555 0.8962	0.0872 0.8373
X_5	0.4429 0.2718	-0.5915 0.1225	-0.3417 0.4075	-0.0033 0.9937	1.0000	0.9432 0.0004	0.9468 0.0004
X_6	0.3595 0.3818	-0.8037 0.0162	-0.6028 0.1137	0.0555 0.8962	0.9432 0.0004	1.0000	0.9812 0.0000
X_7	0.3288 0.4265	-0.7803 0.0223	-0.5615 0.1476	0.0872 0.8373	0.9468 0.0004	0.9812 0.0000	1.0000

Source: own processing in statistical program STATGRAPHICS Plus

After adjustments, we have only four indicators left, between which there is no statistically significant dependence. We will continue to work with these indicators. We need to determine the direction of the trend of individual indicators – to determine whether it is desirable for their values to increase or decrease:

X_1 The proportion of households that consider paying of total housing costs to be very encumbering – destimulant

X_3 The unemployment rate according to LFS – destimulant

X_4 The Proportion of households that own a flat/house – stimulant
X_5 Average real estate prices – destimulant

Table 4 shows the values of the individual indicators, with the lowest value highlighted for each destimulating indicator and the highest for the stimulating indicator.

Table 3. Correlation matrix of independent variables

	X_1	X_3	X_4	X_5
X_1	1.0000	-0.1576 0.7093	-0.3095 0.4557	0.4429 0.2718
X_3	-0.1576 0.7093	1.0000	-0.4069 0.3171	-0.3417 0.4075
X_4	-0.3095 0.4557	-0.4069 0.3171	1.0000	-0.0033 0.9937
X_5	0.4429 0.2718	-0.3417 0.4075	-0.0033 0.9937	1.0000

Source: own processing in statistical program STATGRAPHICS Plus

Table 4. Values of analysed indicators in the regions of Slovak Republic in 2017

Region	X_1 **(v %)**	X_3 **(v %)**	X_4 **(v %)**	X_5 (v €/m²)
Bratislava (BA)	26,7	4,2	90,2	1 896
Trnava (TT)	27,8	5,9	87,9	936
Trenčín (TN)	25,5	**4,1**	89,5	740
Nitra (NR)	23,7	6,3	92,0	**663**
Žilina (ZA)	23,1	6,7	**92,9**	864
Banská Bystrica (BB)	**22,1**	12,3	86,7	745
Prešov (PO)	26,1	12,9	90,4	833
Košice (KE)	27,6	11,1	87,1	1 015
Character	-	-	+	-
Average	25,3250	7,9375	89,5875	961,5000
Standard deviation	1,9942	3,3675	2,0979	368,7577

Source: EU SILC 2017 (2018), Statistical yearbook of Slovakia regions 2018 (2019), National Bank of Slovakia (2019)

The scoring method

The base of this method is to determine the point evaluation of each indicator for all compared regions. We assign the maximum number of points (100) to the region that achieves the best value of the indicator. To the other regions we assign the number of points, which indicates the percentage of the indicator from the best value of this indicator according to equations (1) and (2). For each region, we determine the average number of points that the region achieved. We will put descending order of all points that the regions have achieved. The region with the highest number of points was placed first, and the region with the lowest number was placed last.

From Table 5 and Figure 2, we can see that when using the scoring method, Trenčín region comes first, followed by Nitra region and, similarly to the order method, Žilina region. The order in the last place is the same as in the previous method, the last is the Košice region, before it Prešov.

Table 5. Comparison of Slovakia regions using the scoring method

Region	X_1	X_3	X_4	X_5	d_i	Order
Bratislava	82,77	97,62	97,09	34,97	78,11	6
Trnava	79,50	69,49	94,62	70,83	78,61	5
Trenčín	86,67	100,00	96,34	89,59	93,15	1
Nitra	93,25	65,08	99,03	100,00	89,34	2
Žilina	95,67	61,19	100,00	76,74	83,40	3
Banská Bystrica	100,00	33,33	93,33	88,99	78,91	4
Prešov	84,67	31,78	97,31	79,59	73,34	7
Košice	80,07	36,94	93,76	65,32	69,02	8

Source: own calculation in Excel

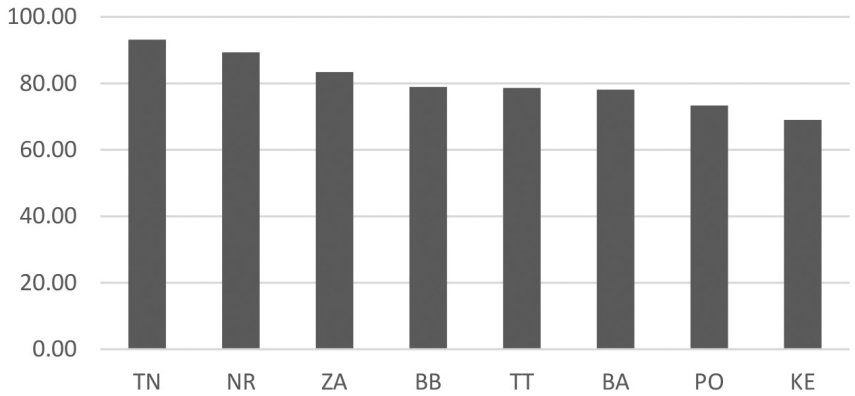

Figure 2. Ranking of Slovakia regions based on integral indicator using the scoring method

Source: own processing in Excel

5. CONCLUSION

The results obtained using the scoring method could be summarized as follows:

- In the first three places are the west Slovakian regions (Trenčín, Nitra and Žilina region). The reason is that they reach the best values in all analysed intensity indicators. It follows that in terms of housing there are the best conditions in comparison with other regions of the Slovak Republic. Trenčín region has the lowest unemployment rate – the inhabitants of this region have a permanent source of income and here are the second lowest real estate prices. In Nitra region there is a lower demand for flats, so real estate prices are also the lowest here. One of the reasons is that there are not enough job opportunities, so the inhabitants of this region are forced to go to work in other regions. The large automotive company KIA has its headquarters in Žilina Region, providing employment opportunities for almost 4,000 employees (the figure is for year 2017 based on data from the KIA Annual Report).
- In the last places are east Slovakian regions (Košice and Prešov region). Košice region has the second highest average real estate prices and in this region is the second lowest proportion of households, which are the owners of house / flat, and there is the third highest unemployment rate. In both regions there is a high share of households that consider the payment of total housing costs very encumbering.

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COVID-19 CRISIS MANAGEMENT SYSTEM'S RESPONSE IN SOUTHEAST EUROPEAN ECONOMIES: A CAS FRAMEWORK

Katerina Fotova Čiković[1]

DOI:

Abstract: *The global COVID-19 pandemic has transformed the world in 2020 and it has been recognized as the biggest stress test in the history of the European Union. The pandemic is inflicting high and rising human costs worldwide, and the necessary protection measures are severely impacting economic activity. As a result of the pandemic, the global economy had been projected to contract sharply by –3 percent in 2020, which is much worse than during the 2008–09 Global financial crisis. In these difficult and challenging times, countries and societies need to adapt to the new situation while minimizing the negative social and economic implications.*

This paper discusses how different governments in the South East Europe region (Albania, Bosnia and Herzegovina, Croatia, Kosovo, Montenegro, North Macedonia and Serbia) have managed and dealt with the COVID-19 pandemic. A review of the current literature on COVID-19 is conducted. This paper should enable a better understanding of how different governments have faced the pandemic and how and to which extent they facilitated a proactive and timely approach towards crisis management.

The objective of this study is to theorize a CAS (Complex Adaptive System) framework to evaluate the prevention, preparedness, response and crisis management and strategies used during the pandemic and assess the steps taken so far by the selected Southeast European transitional countries for tackling the COVID-19 crisis up to September 2020.

Keywords: *COVID-19 pandemic, SEE countries, CAS (Complex Adaptive System) framework, Crisis management.*

1. INTRODUCTION

The Covid-19 pandemic has strongly affected the lives and economies of countries all over the world, generating numerous challenges for private, public and business entities. Massive quarantines have been implemented globally that stopped most of the interactions between people, which is popularly referred to as social distancing (Pejić Bach, 2021). The virus initially spread rapidly across the world, affecting the mortality rates to go up, and the world has witnessed countries desperately struggling to test their citizens for the virus once it became known that many infectious carriers of it show no noticeable symptoms (Bird et al., 2020).

The income per capita in the vast majority of emerging markets and developing economies had been expected to shrink in 2020. The global recession could be deeper if financial stress triggers increasing debt defaults. The pandemic calls attention to the urgent need for policy action to cushion its consequences, protect vulnerable populations, and improve countries' capacity to cope with similar future events (WB, 2020).

Global flows of foreign direct investment (FDI) will be under severe pressure as a result of the COVID-19 pandemic. These vital resources are expected to fall sharply from 2019 levels, dropping well below the level reached during the global financial crisis and undoing the al-

[1] University North, Trg dr. Žarka Dolinara 1, 48000 Koprivnica, Croatia

ready lacklustre growth in international investment over the past decade. Flows to developing countries will be hit especially hard, as export-oriented and commodity-linked investments are among the most seriously affected (World Investment Report, 2020).

The consequences of any new virus are always unexpected and become more and more multisectoral as time compounds them, at all levels, from an individual to the macro level. At an individual level, a person's income, access to food and health care are all impacted. At the macro level, financial structures (of both public and private institutions) and political stability (or instability and tensions) are impacted (Fakhruddin et al., 2020).

Even though the COVID-19 pandemic has had a lower degree of destructiveness than the pandemics of the twentieth century, the reaction of the globalized society to the new pandemic – though quite similar in content to medieval quarantines formed by the threat of plague or black death – by the extent of institutional closure that gripped almost the entire developed world, has been a historical precedent. Aside from the epidemiological consequences, the general social and economic consequences of the pandemic are immeasurable. In a time with rapid social changes, it is possible to guess what impact not only the pandemic but also the reaction to the pandemic will have in many areas: primarily economies, where a new financial crisis is predicted for the coming autumn (Čokolić et al., 2020).

The COVID-19 pandemic has thus far shown a strike on three fronts through shocks on the demand, supply and expectations side. Furthermore, its effects will be asymmetric concerning the structure of the economy, industry and enterprises, but also with respect to the political economy – the relationship between the state and the market and the implemented model of a mixed market economy (Mačkić, 2020).

The economic crisis of 2008 has shown a lack of solidarity and a coordinated common policy within the EU, and this has been once more confirmed by the immigrant crisis seven years later. The corona crisis is rocking the European project again and shows that in times of crisis "every bird flies with their own kind, eagles with eagles, crows with crows". The actors in resolving the crisis are not supranational EU organizations, but national countries (Dijanović, 2020).

Its effect on the Southeast European (SEE) countries has been non-negligible. As the number of coronavirus cases continued to grow rapidly in SEE, governments have been gradually announcing states of emergency, lockdowns and partial shutdowns to contain the spread of the virus. Coronavirus measures resulted in suspended flights, partial border closures, domestic travel restrictions and school shutdowns across the region. Government authorities banned large gatherings and imposed travel restrictions. Serbia and North Macedonia have cancelled and rescheduled their respective general elections scheduled for April 2020 (OECD, 2020c).

Systematic analysis of how countries have dealt with this pandemic, individually and collectively, is of vital significance (Rodhes, 2020). Complexity theory explores the individual, organizational and systemic behaviours of a social phenomenon. Using complexity theory, complex and emerging health issues such as pandemics or epidemics can be clarified (Biswas et al., 2020). Four major dimensions were extracted from the crisis and complexity theories to encompass preparedness, response and crisis management, and strategy of the governments of the selected SEE transitional countries for COVID-19, as well as the social and economical implications and, based on these four dimensions and adapted from the study of Biswas et al. (2020), the CAS (complex adaptive system) framework for this study, has been assembled and formulated.

2. LITERATURE REVIEW

Research on the implications of the COVID-19 pandemic is still very poor since the implications and consequences as well as the recovery from it are yet to come. However, there are some quite interesting aspects of the pandemic that have been researched and analysed. Namely, Srbljinović et al. (2020) have assessed the Croatian crisis management system's response to the COVID-19 pandemic through the lens of a systemic resilience model; Puca et al. (2020) have given a short epidemiological overview of the current situation on COVID-19 pandemic in Southeast European (SEE) countries. Thu et al. (2020) have investigated the effect of the social distancing measures on the spread of COVID-19 in 10 highly infected countries. The effectiveness of the social distancing measures on the spread of COVID-19 was diverse between the 10 analysed countries due to the difference in the levels of promulgated social distancing measures, as well as the difference in the COVID-19 spread situation at the time of promulgation between the countries.

Cvetković et al. (2020) have conducted a study on the preparedness and preventive behaviours for a pandemic disaster caused by COVID-19 in Serbia. Their findings show that there are major differences in the public's perception of risks posed by communicable disease threats such as presented by COVID-19, and their recommendation is to develop targeted strategies to enhance community and national preparedness by promoting behavioural change and improving risk management decision-making. Biswas et al. (2020) have implemented a similar CAS framework for evaluating the health system of Bangladesh. Their findings suggested that Bangladesh severely lacked the preparedness to tackle the spread of COVID-19 with both short- and long-term implications for health, the economy, and good governance. Absence of planning and coordination, disproportionate resource allocations, challenged infrastructure, adherence to bureaucratic delay, lack of synchronized risk communication, failing leadership of concerned authorities, and incoherent decision-making have led to large uncertainties in the coming days.

Tan (2004) has recognized 6 key concepts and approaches for crisis intervention: 1. dealing with feelings and drama associated with crisis; 2. assessing danger and threats within a short time; 3. need for strategic planning and reorganisation of the crisis situation; 4. mobilising of resources to meet the challenge; 5. establishing communication channels and education; and 6. restoring a new level of equilibrium. Furthermore, in the Tan (2004) study, it is highlighted that, like most contagious diseases, the social and community response to both treatment and prevention is critical to containing the spread.

Literature about the prevention, response and crisis management and strategy of different governments is scarce. Furthermore, there is a lack of studies that have compared the policies and strategies used by the governments of several transitional countries. This paper and this research are an attempt to fill in this gap.

3. METHODOLOGY AND DATA

Complex adaptive systems (CAS) are systems composed of many individual parts or agents in which patterns can emerge as a result of agents deploying "simple rules" from the "bottom-up" without external control – CAS are "self-organizing" systems. The behaviour of a complex adaptive system can be inherently uncertain and non-linear as elements of the system, the internal and external agents have multiple perturbations, changes, and interdependencies (Martin, 2018).

A Complex Adaptive System (CAS) is what the name suggests: a system consisting of large numbers of interacting adaptive compartments. These systems are dynamical (changes over time) and non-linear, in the sense that the behaviour of a complex system cannot be obtained by simply summing up its parts (individuals) (Santos et al., 2006).

The complex adaptive system is an emerging theoretical approach in crisis management, which is increasingly used by practitioners and scholars in situations involving ambiguity, uncertainty, and lack of control. The CAS provides a conceptual framework for allowing many diverse actors to interact locally in discontinuous, asymmetrical situations where unpredictable, shifting variables can quickly adapt to entire environments (Bolton & Stolcis, 2008).

According to Bircher & Hahn (2016), a complex adaptive system is an entity with a more or less permeable boundary between it and its nearby environment, which can take up material and energy from the environment (input), release end products (output, e.g. entropy) and do work. There are many different parts of the system- the so-called agents, that are illustrated as circles in the general model of a CAS (Figure 1).

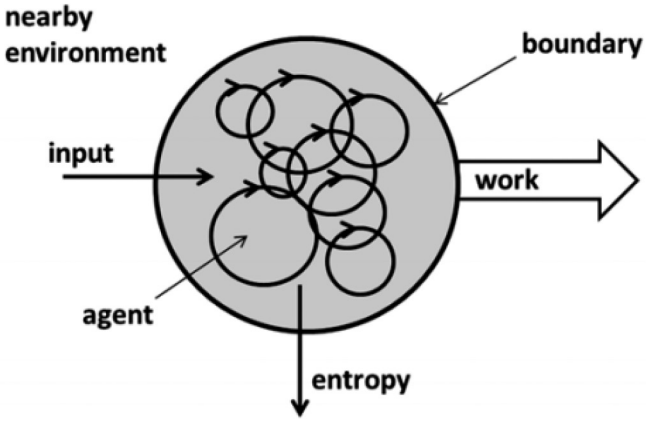

Figure 1. General model of a complex adaptive system (CAS)
Source: Bircher & Hahn, 2016

Complex Adaptive Systems (CAS) have proven to be a powerful framework for exploring thresholds and resilience and other related phenomena. As the name implies, a CAS is a system of agents that interact among themselves and/or their environment, such that even relatively simple agents with simple rules of behaviour can produce complex, emergent behaviour (Carmichael & Hadzikadic, 2019).

Four major dimensions were extracted from the crisis and complexity theories to encompass preparedness, response and crisis management, and strategy of the governments of the selected SEE transitional countries for COVID-19, and, based on these four dimensions and adapted from the study of Biswas et al. (2020), the CAS (complex adaptive system) framework for this study was assembled and formulated. These four dimensions are prevention (preventive measures), response to the crisis, emergence and crisis management and strategy. The framework and model are shown in Figure 2. Data were sourced from reports published by the authorities of the selected analysed countries, the World Health Organization (WHO), World Bank (WB), International Monetary Fund (IMF), as well as media articles up to September 30, 2020, for the situation analysis.

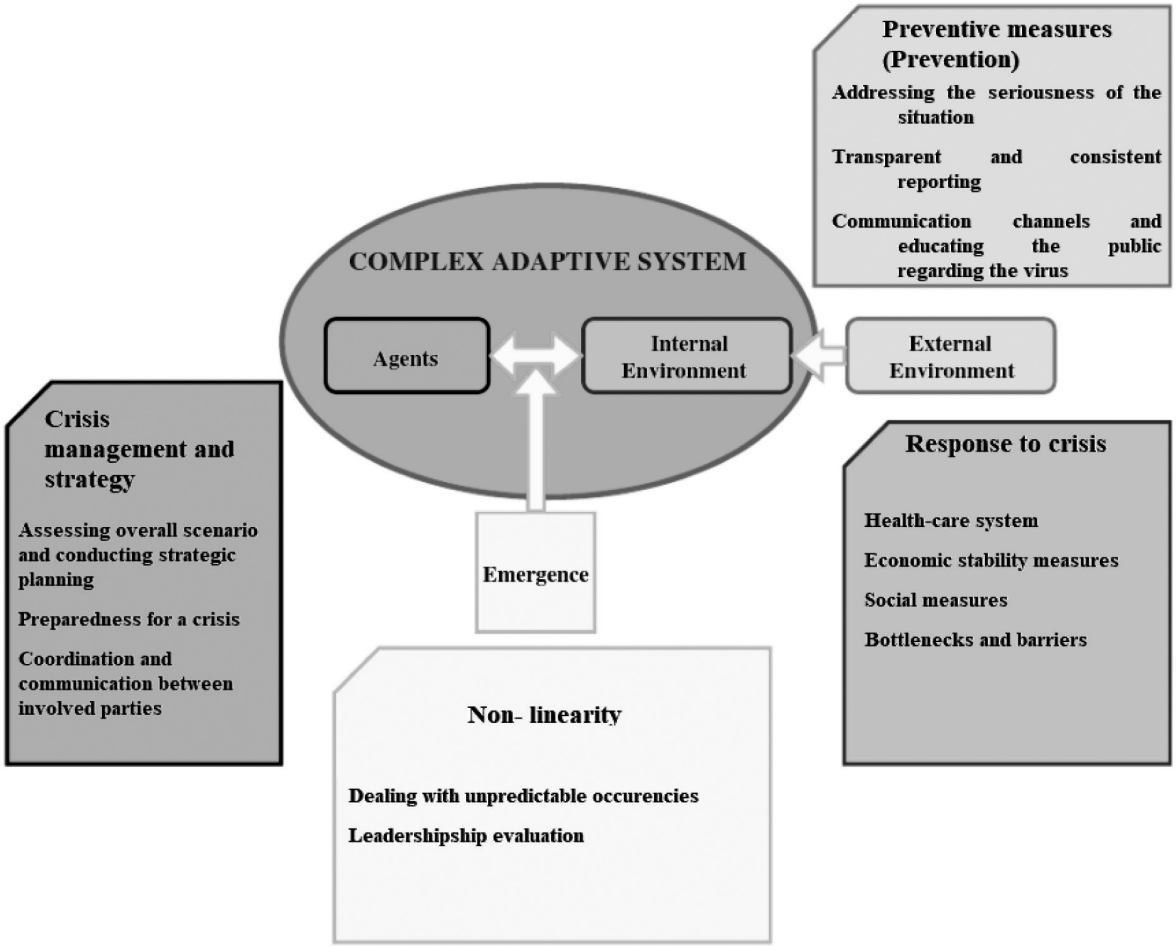

Figure 2. The complex adaptive system (CAS) framework
Source: Author, adapted from Biswas, Huq, Afiaz & Khan (2020)

4. PREVENTIVE MEASURES (PREVENTION)

4.1. Addressing the Seriousness of the Situation

When the usual ways of dealing with a situation or a problem fail, an increased tension occurs. Furthermore, to contain the problem immediate actions need to be taken to detect infection and prevent its spread. As COVID-19 (identically as SARS) primarily spread through close person-to-person contact, quarantining those infected with the virus, suspected cases, as well as those who have come into contact with SARS patients, have been enforced in many countries in order to prevent further transmission. Other safety measures included the closure of schools, closing down of a wholesale vegetable market, postponement of public events as well as issuing of travel advisory (Tan, 2004).

In this period, the response of all governments, organisations and individuals at all levels, national or international, has been put to the test.

4.2. Transparent and Consistent Reporting

Around the world, governments have been leveraging public communication to counteract disinformation and support policy. The efficacy of these actions depends on grounding them in

open government principles, chiefly transparency, to build trust in public institutions (OECD, 2020a). It is crucial to provide an accurate analysis of the COVID-19 crisis with timely, consistent and reliable information. A key priority is fostering and maintaining compliance with mitigation measures through targeted, proportionate enforcement and transparent communication (OECD, 2020b). Most governments have held daily briefings to keep citizens updated and informed.

Clarity of rules, use of discretion, and appreciation of intent: rules on "lockdown", physical distancing etc. have not always been clear or easy to interpret. Of course, to the extent possible, unambiguous rules are preferable, to avoid abuse and maximise compliance, but there is no possibility of designing "optimal" rules, and sometimes leaving a margin of flexibility in interpretation and enforcement is necessary to avoid "regulatory unreasonableness" and excessive rigidity. Notwithstanding, the issue of information/communication and their effectiveness (or lack thereof) is essential to the overall success of COVID-19 response, and has significant regulatory aspects and implications. Indeed, the population (including the business community) trusts that the measures imposed are effective as well as authorities are competent, trustworthy and legitimate, which is essential for effectiveness – and for *continued* effectiveness (OECD, 2020b).

4.3. Establishing Communication Channels and Educating the Public Regarding the Virus

Since the vaccination against COVID-19 has been unavailable until early spring 2021, establishing communication channels and education of the public regarding the virus and public health guidance and instructions (including lockdown and social distancing) have been considered vital. This policy is often targeted at the most vulnerable community members or is aimed at informing the wider public audience about the risks to the most vulnerable. Indeed, much of the efforts in the prevention and response of a biological disaster such as the COVID-19 pandemic focus on the spreading of information at national or regional levels (Fakhruddin et al., 2020).

WHO (2020) suggests that in the time of the pandemic, countries should put in place appropriate "listening devices" (e.g. surveys, online polls) that allow health authorities to gauge population response and behaviour in an ongoing and real-time manner. These can be used to explore perceptions, acceptance of restrictions, mental and physical health, behaviours, information needs and misperceptions. This intelligence would enable authorities to anticipate how the public might react, to pilot test measures with certain segments of the population, and to adjust and mitigate early and fast.

5. RESPONSE TO PANDEMIC

5.1. Healthcare system

The interlinking of agents and their dynamic interactions across the healthcare system mirrors the characteristics of complex adaptive systems (CAS). Even though they have consisted of separate parts, they can only be fully recognized by appreciating the relationship and interconnectedness between the different parts (Paina & Peters, 2011; Agyepong et al., 2012).

Responding to a pandemic, caused by a novel virus whose behaviour and effects are initially poorly known, is an extremely challenging task. It involves taking disease-control decisions,

adopting guidelines for testing and treatment, and managing resources – all with insufficient information and extreme pressure given the potential and actual impact on human lives (OECD, 2020b). In this sense, the healthcare system is of vital importance. According to Biswas et al. (2020), a resilient healthcare system is expected to absorb the shock and adapt to dynamic needs while maintaining the existing level of healthcare accessibility. However, the health system has faced difficulties, both in terms of the psychological consequences that the pandemic will undoubtedly cause and in terms of the unavailability of basic health services (Čokolić et al., 2020).

5.2. Economic Stability Measures

Regarding the economic implications of the COVID-19 pandemic, it will take time for them to come into full view. But some of the costs are already becoming apparent, beginning with the devastation the crisis will wreak on the global workforce. With climate change also threatening to hurt the world's most vulnerable workers, the need for a holistic crisis response that emphasises both justice and sustainability could not be greater (Abou-Jaoudé & Robbins, 2020).

The COVID-19 pandemic has caused a huge economic and human cost since its outbreak in early 2020. But the economic consequences of the pandemic are still not well understood. The social distancing measures and especially the lockdowns that were introduced to contain the pandemic have had a systemic impact on the global economy. With the closure of stores, restaurants, and nonessential businesses came unprecedently high unemployment rates and sharp declines in personal incomes. In many countries, there were questions about whether the "cure was worse than the disease," claiming that the economic downturn was more severe than the human cost these interventions were trying to prevent (WB, 2020).

Table 1. Economic support packages

	Expenditure measures				Revenue measures			Other	
	Increased health spending	Support to firms/ SMEs/ sectors	Support to vulnerable population (low-income households; children/families; informal workers)	Employment/ job support	Tax cuts to households	Tax cuts to firms/ SMEs	Tax payment deferrals, credits, or refunds	Liquidity/ credit measures	Oil wealth fund
Albania	x	x	x	x			x	x	
Bosnia and Herzegovina	x	x	x		x	x	x	x	
Croatia	x	x		x		x	x	x	
Kosovo	x	x	x	x			x	x	
Montenegro		x	x	x			x	x	
North Macedonia	x	x	x	x				x	
Serbia	x	x	x	x			x	x	

Source: World Bank ECA economic update (2020)

Most of the region's central banks in this period have responded to deteriorating growth prospects through expansionary monetary policy, including unconventional policies such as asset purchases. Central banks in Croatia and Serbia have intervened in foreign exchange markets to stabilize their currencies and mitigate volatility. Despite measures to protect jobs, unemployment claims and the number of registered unemployed workers have increased sharply in Serbia and Croatia. Economic packages have included support to vulnerable households, as well as to firms, particularly those in critical sectors or industries. Many countries have boosted health care spending (Croatia); provided tax payment deferrals, credits, or refunds (Albania, Croatia); subsidized utility costs (Montenegro) or postponed utility tariff increase; offered vouchers or

support for the tourism sector (Croatia, and North Macedonia); and expanded social protection coverage. Employment protection measures, including short-term work schemes or wage subsidies, have also been an important component of support packages (Albania, Central Europe, North Macedonia), with experience suggesting that such measures were effective at providing income support and limiting job losses, as well as avoiding costly search and matching processes as the economy recovered – Table 1 (WB, 2020; OECD, 2020c).

Central banks in the Western Balkans have also cut policy interest rates this year to record lows to deal with the economic fallout of the COVID-19 pandemic (Albania, North Macedonia, and Serbia) (WB, 2020).

5.3. Social Measures

The Covid-19 pandemic has had a profound impact on lives and livelihoods around the world. Many countries have taken unprecedented measures to extend social safety nets, especially for vulnerable groups such as low-income households, children and young people, women, low-skilled workers, part-time or temporary workers, and the self-employed (OECD, 2020c).

According to CDC, Social Distancing is important to slow the spread. It recommends considering social distancing options to travel safely when running errands or commuting to and from work; limiting contact when running errands (if possible, using drive-through); choosing safe social activities (using video chats and social media) and keeping the distance at events and gatherings. Leveraging the social and economic implications of the COVID-19 pandemic is an essential pillar of the transition strategy. The transition phase can only be properly managed if the public is effectively engaged and ready to support the measures being implemented. Social and economic support measures are critical to ensure societal resilience during this difficult phase so that no one is left behind (WHO, 2020).

The social distancing measures, which are called "lockdown" have been considered and promulgated in order to limit human interaction at close distances in certain regions as well as in a national scale (Thu et al., 2020). Adverse social, psychological and economic consequences of a complete or near-complete lockdown demand the development of more moderate contact-reduction policies (Block et al., 2020). Furthermore, social distancing has been presented as the safest and most important measure in stopping the spread of the COVID-19. However, establishing and keeping contact with people, developing trust and relationship building are important in crisis management, whether it is with the individual or the community. The role of social workers nowadays is not only to help COVID-19 patients but also to help their families and the communities to cope with the emotional distress and to ease the regaining of a normal life thereafter. As the stakes for the crisis are high, high profile management and response are needed as shown by political and religious leaders coming out to allay fears, identifying with the afflicted and comforting those who are grieving (Tan, 2004).

5.4. Bottlenecks and Barriers

While the response to the pandemic is primarily an epidemiological and healthcare concern, it involves regulatory issues at nearly every stage, and specifically many regulatory delivery instruments – permits and approvals, inspections and enforcement, etc. (OECD, 2020b). Consistent and reliable communication and reporting to the public is a vital bottleneck for response

and preparedness in a pandemic. This kind of communication includes understanding public perceptions and promptly addressing misinformation (Biswas et al., 2020). Other than that, OECD (2020b) recognizes two main issues: *costs*: in countries with a single-payer health care system or other publicly funded health-care coverage, governments may have been or still be reluctant or unable to cover the increased costs of tests provided by laboratories outside of the public provider network, and/or to approve testing for patients that do not fit strict guidelines for selection; and *supply*: testing, as long as a broader variety of testing methods is not available and/or validated, can be hampered by an insufficient supply of key reagents.

6. EMERGENCE (NON- LINEARITY)

6.1. Dealing with Unpredictable Occurrences

„Pandemics force humans to think outside of the box, or in the case of COVID-19, outside the typical emergency management cycle. In other words, while four phases to reduce the impact of a natural hazard (preparedness, response, recovery, and mitigation) are principally linear, the response and recovery phases for a pandemic are essentially non-linear. Unlike earthquakes, cyclones or other natural hazards, which are usually one-off events occurring within a limited period, COVID-19 or any other pandemic, tend to return in several waves over a prolonged period – until the effective vaccine or herd immunity is in place" (Fakhruddin et al., 2020).

Advanced economies with strong governance capacity, well-equipped health care systems, and the privilege of issuing reserve currencies are relatively better placed to weather this crisis. But several emerging market and developing economies without similar assets and confronting simultaneous health, economic, and financial crises will need help from advanced economy bilateral creditors and international financial institutions (IMF, 2020).

6.2. Leadership Evaluation

Evaluating leadership as a skill of leaders of different governments has been highlighted in this pandemic. A proactive and innovative approach is expected of today's leaders. Strategic leaders play a vital role in organizing to the "edge of chaos" and aid in learning and adaptation by affecting the tags that produce the structure of interactions among various agents. Through dialogue and storytelling, strategic leaders shape the evolution of agent interactions and construct the shared meanings that provide the rationale for included agents (Boal & Schultz, 2007). This view is consistent with the novel approach in complexity science from Lichtenstein et al. (2006), the notion that leadership is an emergent event, an outcome of relational interactions among agents. Leadership (as opposed to leaders) can be recognized as a complex dynamic process that emerges in the interactive "spaces between" people and ideas. In this sense, leadership is a dynamic that triumphs the capabilities of individuals alone and is the result of interaction, tension, and exchange rules governing changes in perceptions and understanding.

According to Srbljinović et al. (2020), leadership should first and foremost be credible, in terms of leading by example, which provides more credibility than solely pointing out other people's faults and mistakes. When the same leaders, who were justifying strict lockdown, a month or so later become reluctant to introduce any measures, it represents an inconsistent and confusing message for the public. Such policy changes need to be clearly and patiently explained to citizens.

7. CRISIS MANAGEMENT AND STRATEGY

7.1. Assessing Overall Scenario and Conducting Strategic Planning

A quick and comprehensive assessment of the crisis, person (or system) and the situation, is necessary in order for the constructive intervention to begin. Crisis intervention and management is essentially a problem-solving process with the change agent assuming greater control of the process. The strategy of crisis management is to simplify or redefine the problem or situation, therefore making it more manageable and approachable. The next step is to prioritise the problems and explore all the possible alternatives. A workable action plan is then formulated and implemented. For the effective management of the COVID-19 crisis, strategic high-level planning, decision making and implementation are vital (Tan, 2004).

7.2. Preparedness for a Crisis

Horizon scanning and preparedness to adapt to the new situation that has hit the world in early 2020 has been of crucial importance. The health system must remain prepared for a potential upsurge of cases during the transition which requires creating "elasticity" in the use of acute and intensive care facilities. Other than that, it is important to retain preparedness and readiness for the COVID-19 response via addressing bottlenecks to further scale up the capacity to identify, isolate, test, treat all patients and trace and quarantine contacts; creating public health and laboratory surge capacity by joining forces with primary health care, invest in mobile services and digital technologies to aid the process; involving communities to enable people to be the frontline workers to protect their health and wellbeing; creating a step-wise elastic and flexible plan for acute and intensive care use, as well as establishing and maintaining a mobile pool of resources at national level (e.g. ventilators, PPE, staff, etc.) and a protocol for its (re)deployment on to area(s) of a new potential outbreak (WHO, 2020).

7.3. Coordination and Communication Between Involved Parties

Coordination and accountability are vital elements in forming an effective response to events such as COVID-19. Therefore, such mechanisms need to channel the implementation of evidence-based decision-making at the central level for its contextualization to the needs at the local level. Coordination also requires the incorporation of feedback from communities addressing their concerns that may be causing emotional distress and the development of effective relationships at the local level (Biswas et al., 2020).

8. RESULTS AND DISCUSSION

What is crucial for this study is that it evaluates the prevention, preparedness, response and crisis management and strategies used by the selected South-eastern European transitional countries (Albania, Bosnia and Herzegovina, Croatia, Kosovo, Montenegro, North Macedonia and Serbia).

The results of the CAS framework show that the analysed countries have performed quite solidly during the COVID-19 pandemic. Namely, most of them have properly addressed the seriousness of the situation (there are some concerns regarding the Republic of North Macedonia and Serbia about timely and effective decisions and lack of clear procedures and frequent change

of instructions, respectively). There are some opinions that Kosovo was the only country in the region that failed to apply swift, extraordinary measures to limit the spread of the pandemic (Kuzmanovic & Savic, 2020). Opposed to Kosovo, due to its proximity and close links to Italy, Albania adopted some of the toughest lockdown measures in Europe. They have adopted restrictive measures regarding public health as well as social measures on March 09, 2020. All of these transitional SEE countries have implemented timely healthcare, economic and social measures. Economic measures have been introduced as fiscal and monetary measures, whereas most often social measures were the prohibition of movement and curfew, closure of borders, suspension of flights, closure of education institutions, closure of coffee-bars and restaurants as well as the recommendation of working from home for the public and private sector.

Regarding the bottlenecks and barriers these countries have faced, the organizational issues in Bosnia and Herzegovina should be mentioned (cantonal and entity level) and the discoordination at these levels as a bottleneck and barrier to better respond to the pandemic; Albania, on the other hand, has faced two back-to-back shocks after the devastating earthquake in November 2019; the early easing of restrictive measures has been seen as counter-productive in Croatia; the weak delivery system of the healthcare system and the weakness of the total health system in Kosovo has been recognized as a bottleneck together with the restructuring of the Ministry of Health and its key management in the heat of the pandemic; there were problems with certain municipalities in North Macedonia, who appeared to be constant COVID-19 hot-spots; and the brain drain and insufficient resources, respirators and capacity in the Republic of Serbia. Montenegro has shown exquisite performance and no bottlenecks have been recognized thus far. The reason behind this performance can be explained with the Montenegrin Action Plan for improvement of the monitoring & response system for infectious diseases (2017-2022) together with the National Plan for Preparedness and Response to COVID-19. Montenegro has published a Strategy for Disaster Risk Reduction (2018-2023) before the COVID-19 pandemic and they have shown a thorough situational analysis and risk assessment of infectious diseases, epidemics and pandemics.

Table 2. Effective vs. Ineffective government responses

Effective responses	**Ineffective responses**
Transparent governance, collaborative structures	Top-down governance, bureaucratic structures
Efficient and effective information dissemination	Lack of knowledge on how to disseminate information correctly
Modern information technologies and well-developed communication channels	Poor technology and fragmented communication channels
Dissemination of information to targeted population in a transparent manner, resulting in trust and engagement by the public	Inadequate/inconsistent information or misinformation, resulting in mistrust by the public
Strong community vigilance through public education and incentives	Weak community vigilance and lack of public education measures
Strong collaboration of major parties including city councils, citizens, and community volunteers	Lack of collaboration between major parties with the lack of risk management integration into major sectors (e.g., health, infrastructure, tourism, environment)
Evidence-based decision making, with the effective use of big data	Lack of data interoperability and meta data standardisation
Stringent hospital infection control measures, hygiene practices and use of personal protective equipment designating separate zones within the hospital or certain hospitals for infected patients only	Inadequate personal protective equipment and hygiene practices, no separation between the infected and non-infected patients
Continuing support during the lockdown	Lack of support to community in lockdown

Source: Fakhruddin et al. (2020)

Table 3. Title of the table

CAS Framework- RESULTS		Albania	Bosnia and Herzegovina	Croatia	Kosovo
1. Preventive measures	**1. Addressing the seriousness of the situation**	Extensive rigorous public health restrictive measures to control its spread (March 09, 2020)	Exceed institutional autonomy and make coherent state documents to equalize all measures.	Timely & in accordance with other EU countries.	Kosovo does not currently have any Law on Emergencies. A modus-operandi within the National Strategy for COVID-19
	2. Transparent and consistent reporting	**Yes**	**Yes**	**Yes**	**Yes**
	3.Communication channels and educating the public regarding the virus	Information on response measures and outbreak severity on a daily basis	Special communication channel of the health sector and specialized web pages	TV commercials, mobile app, and daily Civil Protection Authority conferences	A specialized COVID web page with very little information
2. Response to pandemic	**1. Health-care system**	Monthly remuneration for medical personnel, public health specialists dealing with COVID-19	Federal Civil Protection Authority	Civil Protection Authority + Interventional procurement of essential health supplies	EUR 6 million additional budget allocation for the Health Ministry; vital personnel receive extra 300 EUR monthly
	2. Economic stability measures	Two support packages for affected by the COVID-19 pandemic (2.8 percent of GDP)	Programme of Economic Stabilisation 2020-2021	Measures of a combined worth of over EUR 3.9 billion	Economic Recovery Programme, EUR 365 million, total of EUR 570 million for economic recovery
	3. Social measures	Prohibition of movement and curfew, closure of borders, suspension of flights, closure of education institutions	Prohibition of movement and curfew	The government subsidizes the salaries of workers who cannot come to work due to the epidemic with a sum of (EUR 524 per worker.	Social assistance allowance will be doubled for the period March– May 2020, amounting to EUR 7.65 million
	4. Bottlenecks and barriers	Albania is faced with two back-to-back shocks, after a devastating earthquake in 2019	Organizational issues (cantonal and entity level)	Relatively early easing of measures- due to tourism	At the height of the pandemic, Kosovo fired the health minister and key management people of that sector (Kuzmanovic & Savic, 2020).
3. Emergence (Non-linearity)	**1. Dealing with unpredictable occurrences**	Satisfactory	Satisfactory	Satisfactory	Satisfactory
	2. Leadership evaluation	Satisfactory	Satisfactory	Satisfactory	Satisfactory

4. Crisis management and strategy	**1. Assessing overall scenario and conducting strategic planning**	Albania adopted some of the toughest lockdown measures in Europe.	Risk has been recognized and timely measures had been taken	Existence of Crisis Headquarters of the Ministry of Health was essential.	The public health response to the pandemic is led by the health system in Kosovo, with limited capacity to the rising demands due to COVID-19
	2. Preparedness for a crisis	Satisfactory	Satisfactory	Satisfactory	Satisfactory
	3. Coordination and communication between involved parties	Satisfactory. Central Government focused on the overall management of the crisis, municipalities were at the frontline.	Certain peculiarities in organization of the security system-cantonal and entity level (Smajić, 2020).	Satisfactory	Satisfactory, considering the weak delivery systems and the weakness of the health system.

CAS Framework- RESULTS		**Montenegro**	**North Macedonia**	**Serbia**
1. Preventive measures	**1. Addressing the seriousness of the situation**	Situational analysis and risk assessment of infectious diseases, epidemics and pandemics	Contagion from first hotspots increased concern about timely & effective decisions (Georgieva & Mitrevska, 2020).	Lack of clear procedures and frequent change of instructions.
	2. Transparent and consistent reporting	**Yes**	**Yes**	**Yes**
	3.Communication channels and educating the public regarding the virus	National Coordination Body for Infectious Diseases (NCB) acted proactively, with regular daily press-conferences (Injac, 2020).	National Health 2020 Strategy Platform	A lot of mistakes in crisis communication (Kešetović, 2020). Specialized web page and a telephone
2. Response to pandemic	**1. Health-care system**	National Plan for Preparedness and Response to COVID-19	Main Coordination Crisis Headquarters (MCCH)	Two ad hoc crisis teams
	2. Economic stability measures	Various fiscal and monetary measures	EUR 1 billion: 31 measures, "solid COVID-19 fund" to collect donations from the civil society. The government implemented a fiscal package (0.2% of GDP)	Various measures + Innovation Fund
	3. Social measures	Curfew, distance learning and online courses	Prohibition of movement and curfew	Prohibition of movement and curfew
	4. Bottlenecks and barriers	None. Exquisite performance.	Certain municipalities-crisis situation & constant hotspots	Brain drain, insufficient resources, respirators & capacity

3. Emergence (Non-linearity)	**1. Dealing with unpredictable occurrences**	Satisfactory. Action Plan for improvement of the monitoring & response system for inf. diseases (2017-2022)	Satisfactory. Early easing of restrictive measures was counterproductive (Georgieva & Mitrevska, 2020).	Satisfactory
	2. Leadership evaluation	Satisfactory	Satisfactory	Satisfactory
4. Crisis management and strategy	**1. Assessing overall scenario and conducting strategic planning**	Strategy for Disaster Risk Reduction (2018-2023); Law on Protection of Population of Inf. Diseases	Operational plan and Manual for Risk Management in Pandemic Influenza	The risks and dangers were recognized in Disaster Risk Assessment (2019)
	2. Preparedness for a crisis	Satisfactory	Satisfactory	Satisfactory. Cvetković et al. (2020) study results in rather negative perception of the public.
	3. Coordination and communication between involved parties	Satisfactory	Satisfactory	Satisfactory

Source: Author, based on official data (OECD, WB and national institutions)

On the positive side, all of the analysed transitional SEE countries have shown a preparedness to deal with a pandemic and have implemented timely economic and social measures in order to fight COVID-19. Serbia seems to be the only exception in this matter. Namely, Cvetković et al. (2020) have conducted a study on the preparedness and preventive behaviours for a pandemic disaster caused by COVID-19 in Serbia, with ratings of X = 2.76 for local government preparedness and state preparedness (X = 3.12), which is relatively low. They have all implemented transparent and consistent reporting and have properly reacted and dealt with unpredictable occurrences. The governments of the analysed countries have set up communication channels in form of specialized web pages and even mobile applications in order to stay connected and to inform the public regarding the situation with COVID-19. The leadership shown in a crisis like this has been satisfactory in all of the selected countries. The detailed results of the CAS framework are shown on the next two pages. According to Fakhruddin et al. (2020), different governments will be broadly categorised as *effective* or *ineffective*. By *effective* measures, they include collaborative structures, transparent communication, well-developed information technologies and communication systems combined with rigorous public health measures; in contrast, *ineffective* responses were considered those that rely on bureaucratic structures, weak information and communication technologies and inadequate public health measures (Table 2).

9. CONCLUSION

The COVID-19 pandemic has sunk the world economy into the deepest recession in the last 80 years. In the emerging and developing countries of Europe and Central Asia, GDP has been expected to contract 4.4 percent in 2020. Growth is projected to recover in 2021, but the pace of recovery is highly uncertain and depends on the duration of the pandemic, the availability and distribution of a vaccine, and the degree of improvement in trade and investment. The recovery

could be weaker than expected if the pandemic worsens, necessitating prolonged restrictive measures and/or escalating geopolitical tensions (WB, 2020). The two great crises of the XXI. century – the Great recession 2008/09 and the corona crisis of 2020 have introduced us to a new century in which markets and technological advances will continue to drive growth, but fluctuations around the long-term trend will increase (Agyepong et al., 2012).

In the SEE economies, the coronavirus pandemic has led to a remarkable slowdown, which heavily relies on trade with and investments from the EU, particularly Germany and Italy. Unemployment in the SEE economies is expected to rise again and labour market conditions may deteriorate further, as a significant share of the workforce lives abroad (between 20-25% of the population). Poverty rates may increase if remittances are suspended, as remittances constitute 10% of GDP in the Western Balkans. Within the domestic markets, the sectors of SMEs, manufacturing and tourism will be most affected by the pandemic (OECD, 2020c).

This paper is among the first to elaborate on how the COVID-19 pandemic has influenced CEE countries and which measures had been taken from the side of SEE governments in order to tackle the COVID-19 pandemic. It thereby provides a unique and timely commentary about how coronavirus has altered different societies and economies.

The topic in this article is rather important and contemporary. However, there are some limitations of this study. First and foremost, the topic itself is crucial to the economies and countries analysed and due to the unavailability of scientific research and methodologies utilized to assess the impact of the pandemic on these countries, it may seem that the author has made some arbitrary assumptions regarding the responses of governments. The author however has used the available data, press releases and scientific reports in order to give the public a broader perspective and a comparison of what each analysed government had undertaken in 2020. Still, if governments have conducted all that could have been done in the available time with the available resources, it is quite difficult to make comparison to other countries that started from a different position and did not have the same amount of information and the same resources. Different countries have adopted different containment and testing strategies for SARS-CoV-2 and those differences in testing make it difficult to compare the effect of different containment strategies as well (Middelburg & Rosendaal, 2020). Regarding Covid-19, the world has witnessed that much mutually contradictory information has been input and a basis for official decision making and that only posteriori one can definitely decide what were the optimal (and correspondingly, what were bad) decisions. Furthermore, it still cannot be scientifically proven which ones of the decisions have been optimal and which have not. What we know is, if the Covid-19 pandemic has learned humanity a lesson up until now, that we were not prepared for it (Bird et al., 2020).

Second, another limitation of this study is to elaborate on the social and economical effects and implications of the COVID-19 pandemic. Bearing in mind that the COVID-19 pandemic is still ongoing, further statistical analysis should continue. However, the effects and implications could be quantified as soon as the pandemic ends. The CAS framework model used in this paper conveys the underlying complexity of crisis management systems. Future work should extend this study in terms of modelling approaches, the sample of analysed countries, and the time covered. It can also be extended to lower, sub-national, as well as higher, supra- national levels, such as the EU.

This framework has helped run and conduct a comparative analysis of the prevention, preparedness and response to the pandemic in selected South-eastern European countries and assess the

steps taken so far for tackling the COVID-19 crisis up to September 2020. The results have shown that all the analysed countries have introduced fiscal (economic), social and healthcare measures. There is a need for greater communication and coordination between different agents (institutions), as well as cooperation between entities in Bosnia and Herzegovina, but other than that, it can be concluded that these transitional countries have recognized the high risk and introduced timely measures in accordance with the actual situation. In times of crisis like this pandemic, it is crucial to act upon the information at hand, show leadership, give a solid response to it, embrace its non-linearity and plan strategically and build a coherent system of crisis management.

Systems thinking concepts and frameworks, such as the complex adaptive systems framework used in this analysis, are very valuable methods for analysing policies and are quite relevant to researchers, scholars, policy analysts and policy makers (Agyepong et al., 2012). Additionally, there are some key recommendations for improving the crisis management techniques that could be drawn from this study. According to OECD (2020b), what would be useful is to do an in-depth analysis and see what has been done well and what less well at all levels – from the political to professional to individuals. An in-depth analysis of previous crisis is crucial, in order to turn identified lessons into practice, changing the way governments and institutions organize and act, all in order to be more successful next time in less time, by investing less financially and with less stress. More importantly, it is vital to adopt improvements at all levels and make them a procedure, faster, more efficiently and more transparently. Smajić (2020) recommends establishing a security risk registry in line with international standards and regulations that would perform a gradation of the security situation (security risk measurement matrix) in each country based on the performed security risk measurement, analysis and classification. Furthermore, he recommends formation of specialized sub-staffs/teams in health, economic and legal sectors in order to overcome the COVID-19 crisis as well as a state-level procedure and minimum national standards and procedures at all levels in case of emergence of the new crisis.

In the future, pandemics like COVID-19 should be addressed differently and an integrated approach is required. Notwithstanding, the concept of a pandemic should move into an interdisciplinary science, with an integrated approach of medical science and public health with medical research and development, social sciences, diplomacy, biomedical science, big data, information technology, artificial intelligence, statistics, meteorology, biotechnology, ecology and so on – combined to provide an integrated cycle of prevention, preparation, response and recovery (Thu et al., 2020). Finally, a protocol should be put in place for a smoother and sustainable transition between the lockdown period and normality. A predefined procedure on steps from lockdown to cautioned opening should be documented and followed. For a long-term transition process to achieve normalcy, awareness of health literacy, close monitoring, data-driven decision making, and coordinated efforts from all relevant stakeholders are of greatest importance (WIR, 2020).

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IMPACT OF INTRODUCING THE MIDDLE ALTERNATIVE: META-ANALYTIC APPROACH

Radka Kubalová[1]

DOI:

Abstract: *This paper explores the impact of adding a compromise alternative into the choice set taking into account the previous findings in the literature. The paper takes a meta-analytical approach when examining the results of previously published peer-reviewed studies which included specific product categories in their study design. The literature selection process generated 69 choice set comparisons across 8 scientific studies including over 14 000 individual observations which allow examining the compromise effect in a broader view.*

Keywords: *Compromise, Consumer, Context Effect, Decision-making.*

1. INTRODUCTION

How consumers make their decisions and what influences their preferences and choices are of main interest for marketing researchers as well as practitioners. In highly competitive markets, it is more than ever important for companies to know what influences consumers' preferences and leads them to buy a specific product. Although for a long time, the decision making process was contained and hidden in the so called 'black box' and it is still not easy to observe and explain how consumers decide, according to Panwar et al. (2019, p. 39) it is at least possible to follow the tendencies and shed light on some processes today. This is being done with the help of psychology, decision making field and modern technologies which allowed development of such fields as neuromarketing.

The previous studies in the field of decision making and consumer behavior represents empirical evidence that consumers do not always choose the product with the maximum utility but their preferences are influenced by the context of the choice set, namely the position and presence of additional alternatives (Thomadsen et al., 2018). The findings in the area of context effects suggest consumers often exhibit an extremeness aversion and are more likely to choose the alternative when it is presented to them as a middle option rather than an extreme option, giving the phenomenon the name compromise effect (Simonson, 1989).

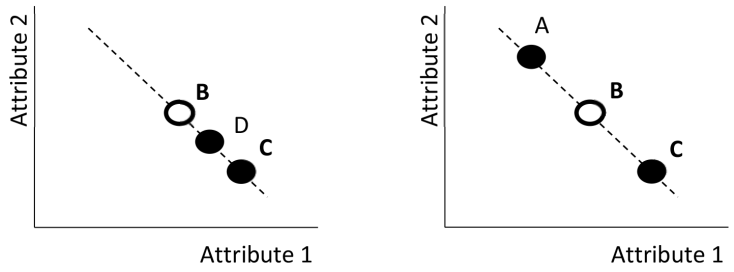

Figure 1. Position of the alternative as extreme (left) and compromise (right)

Source: Simonson & Tversky (1992); own processing

[1] Silesian University in Opava, School of Business Administration in Karvina, Univerzitní náměstí 1934/3, 733 40 Karviná, Czechia

Figure 1 exhibits the relative positions of the alternatives in a choice set to account for the compromise effect where the alternative B is reported to be more popular and have a larger share when it is introduced as the compromise (situation on the right) instead of when it is presented as the extreme option even if its attributes do not change in both conditions.

If a consumer is choosing between two extreme product alternatives of which each is superior in a different attribute, then the consumer has to make a trade-off between the attributes and sacrifice one of the attributes to gain more of the other attribute (e.g. give up higher quality to buy a cheaper product). However, according to Sheng, Parker and Nakamoto (2005), the presence of a third compromise alternative in the choice set simplifies this difficult trade-off decision making as the compromise appears to be the safest choice.

Since the compromise effect was firstly observed by Simonson (1989), it was then explored in relation to different experimental conditions and different samples. Moreover, the studies mostly focus on testing the statistical significance but rarely report the effect sizes. It can be assumed the individual studies also differ in the reported impact of introducing the alternative as a middle option on the consumers' product choice. Thus, this paper aims to explore the impact of adding a compromise alternative into the choice set taking into account the previous findings. Using the meta-analytical approach, the standardized effect size of introducing a middle alternative is computed and compared across the studies and the importance of the compromise effect impact is discussed. The findings are used to draw implications for the businesses that can use contextual effects, including compromise effect when designing the product lines or promotional offers.

2. RESEARCH METHODS AND DATA SELECTION

To meet the aim of the paper, the secondary data about consumers' decision making were collected from the literature to be used to conclude the effect of introducing the compromise alternative. In the following sections, the process of the article selection and analysis is described. The number of articles in each of the phases is shown in Figure 2.

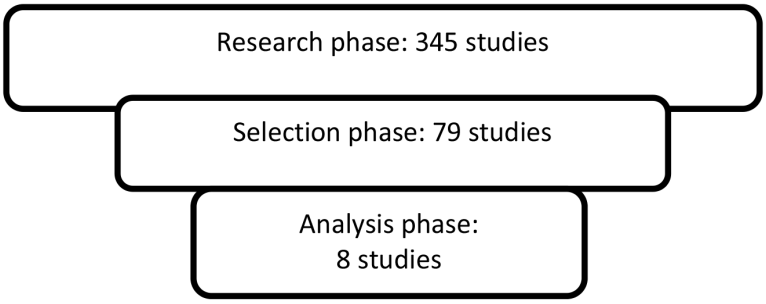

Figure 2. Number of studies for each phase
Source: own processing

The online databases ScienceDirect, EBSCO and Google Scholar represented the main sources of the bibliographic research. The studies were searched using the key term 'compromise effect' in title, abstract or keywords with the focus on the social sciences, especially decision making field, economics or marketing. The studies included 'compromise effect' but their topical meaning was different than the one in the interest of current research that was omitted from further reading with 79 studies making it to the selection phase.

During the selection phase, several duplicates were removed (8) and the remaining studies were examined closely to meet the criteria of the analysis. For the analysis, only the studies which involved own empirical research were included, omitting literature reviews, theoretical studies, dissertation, master and bachelor theses. Most importantly, only the studies which involved controlled experiments with two experimental conditions (comparing the choice shares of the middle alternative in 2 item and 3 item sets, respectively) were included, therefore excluding such studies or observations that compared the choice shares of middle alternative in 3 item sets but under two different experimental conditions. Lastly, the studies that presented in the results only the choice shares without the complete information about the sample sizes of the experimental and control condition were excluded as well.

This resulted in 8 final studies that were analyzed without aggregating the data per study. The data aggregation per study was avoided as there can exist differences in the decision making based on the product type, attributes type and their values and the aggregation would diminish these differences. Hence, the units of analysis are the choice scenarios of the studies reported in the relevant articles — an approach common for meta-analyses as stated by Chernev Böckenholt and Goodman (2015, p. 340).

As each of the studies included more than one choice scenarios (e.g. for different products) then a study may have one, a portion of, or all of its choice sets included in the analysis depending on meeting the following criteria: presence of attribute ratings, choice shares of 2 item vs. 3 item set, and number of observations for each option in each treatment condition.

Therefore, the results per choice scenarios were examined which led to obtaining a total of 69 distinct scenarios with more than 14 000 individual observations which are more than would be feasible and obtainable in a single study experiment. The final studies involved and the corresponding choice scenarios ID, minimum and maximum sample sizes in the study and product categories are shown in Table 1.

Table 1. Characteristics of the studies

Study	Choice scenario ID	Sample sizes	Product categories
Gui, Kim and Kim (2020)	1-10	94-106	Hotel
Kim, Spence and Marshall (2018)	11-18	72-84	Computer, Chocolate
Kim (2017)	19-28	67-105	Vacation Spots, Chocolate
Wu, Huang and Wang (2015)	29-30	227- 234	Massage Chair
Müller, Kroll and Vogt (2012)	31-38	63-233	Toothpaste, Shampoo
Kivetz, Netzer and Srinivasan (2004)	39-54	226-420	Portable PC, Speakers
Dhar, Nowlis and Sherman (2000)	55-60	250	Binoculars, Computer, Tires
Simonson and Tversky (1992)	61-69	121-250	Camera, Calculator, Portable Grill

Source: own processing

From these studies, the data about consumers' choices were then extracted and processed. The extracted information were the numbers of respondents choosing the alternative when it was presented as the middle/compromise alternative, the numbers of respondents choosing the very

same alternative when it was not presented as middle/compromise alternative in the choice set and also, the sample sizes for both conditions.

To quantify the standardized effects and the common (global) effect of compromise alternative on the choices for the included choice scenarios, odds ratio (OR) was used due to the dichotomous nature of the variables (alternative either being or not being chosen). In this context, OR higher than 1 is associated with a higher odds of alternative being chosen when it is presented as a compromise, whereas OR lower than 1 is associated with a higher odds of alternative being chosen when it is NOT presented as a compromise. The OR was calculated by dividing the odds of the first group by the odds in the second group using the following formula:

$$OR_i = \frac{a_i d_i}{b_i c_i} \tag{1}$$

To combine results of the individual scenarios inverse-variance method was used to pool log odds ratio for binary data. The individual effect sizes are weighted according to the reciprocal of their variance (Deeks & Higgins, 2010).

3. RESULTS

As the goal of the analysis is to quantify the common effect for all the observations included, firstly the heterogeneity of the cases was tested and measured ($p < 0.00001$; $I^2 = 93\%$) which indicates considerable heterogeneity between the scenarios. Therefore, the variability in the effect estimates is due to heterogeneity (methodical diversity) rather than sampling error (chance). The presence of heterogeneity led to use of the random effects model instead of the fixed effect model.

The results for all 69 choice scenarios are captured in Figure 3. The first column corresponds with the choice scenario ID. The events represent the number of observations of participants choosing the alternative in compromise and non-compromise condition and the total size of the observation in the condition. Next, there are the weights and ORs of the individual choice scenarios with 95% confidence interval. The right side of the figure then shows the forest plot which visualizes the individual effect sizes for every choice scenario as well as the overall, common effect size represented by the black diamond by the bottom of the forest plot.

It can be noticed that in the majority of the cases the introduction of the alternative as the compromise led to the raise of its relative share (OR > 1). While some of the individual cases do not provide evidence of the compromise effect leading to raise in the alternative share, the results show the common (global) OR is 1.53 (1.17; 2.00) which means that overall, there is an association between the preference of the alternative and its positioning as a compromise. Specifically, the odds of an alternative being chosen when it is presented as the compromise alternative is 1.53 times of the cases of it being chosen when it is not presented as the compromise. Therefore, the analyzed cases present evidence that the alternative brings higher odds of it being chosen by the consumers when it is introduced as the compromise option. However, the effect can be considered very small or practically insignificant, as Ferguson (2009) claims that OR of 2 is the "recommended minimum effect size representing a "practically" significant effect for social science data."

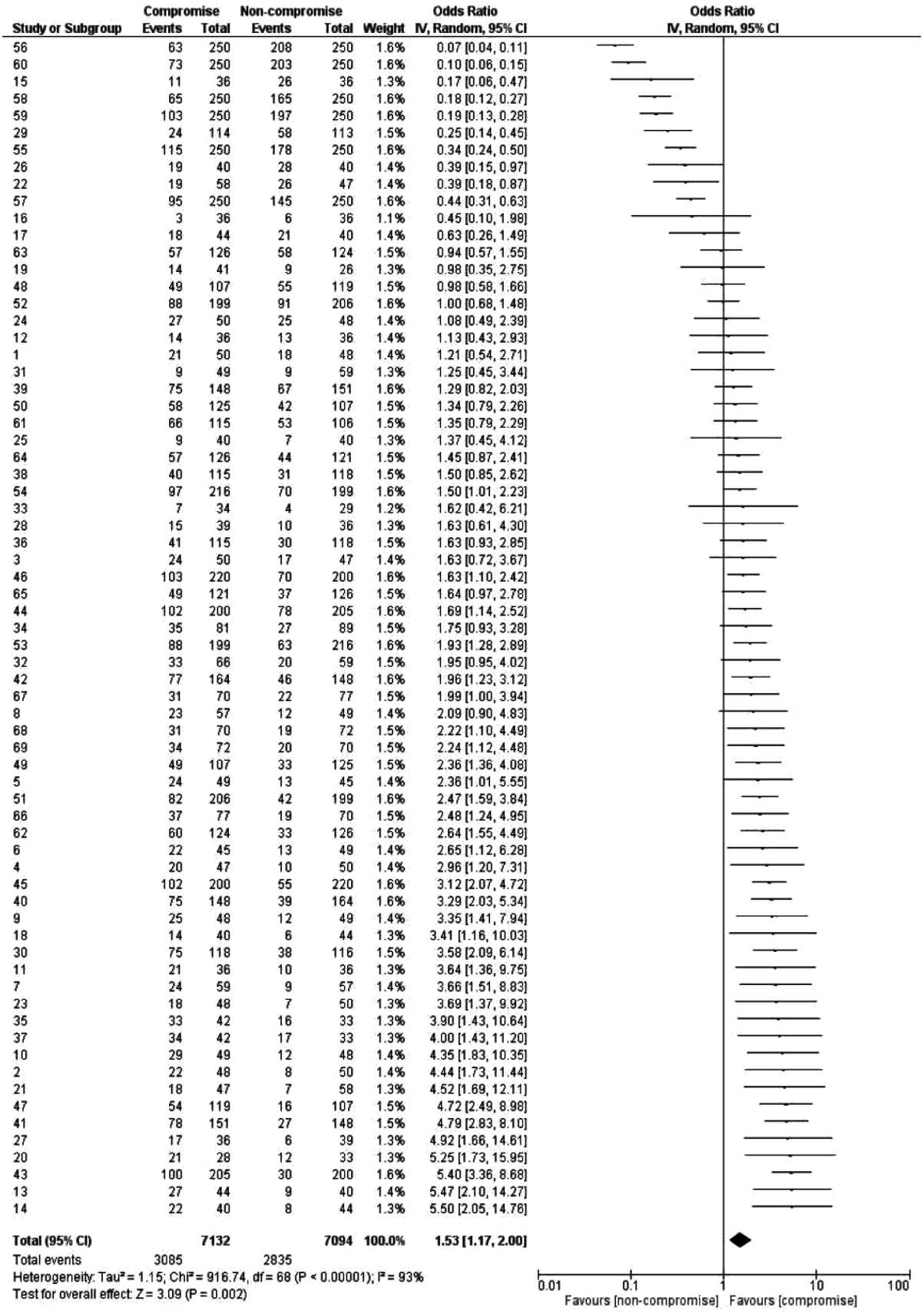

Figure 3. Comparison of choice shares under compromise and non-compromise condition

Source: own processing

4. FUTURE RESEARCH DIRECTIONS

As the current study does not examine the moderators and factors leading to the different effect sizes between the scenarios, future research could focus on estimating the impact of the independent variables on the effect sizes, such as the various experimental design features.

5. CONCLUSION

The results of individual studies that focus on the compromise effect often differ in the experimental conditions as well as in the size of the samples used, as well as the reported results. Moreover, most of the studies tests statistical significance between the choice shares under compromise and non-compromise conditions without computing the standardized effect sizes. To compare and measure the differences in the results between the studies and choice scenarios, meta-analytical approach was taken to estimate standardized effect sizes using odds ratio and the common effect size as this approach allows to draw conclusions based on the larger number of the observations which would be near impossible to obtain in a single study experiment.

The results imply there exists an overall association between the shares of the alternative and whether it is introduced as the compromise option in the choice set. It can be therefore concluded that presenting the alternative as a compromise raises the shares of the said alternative. However, when it comes to the interpretation of the effect size, the discovered effect size is very small and its practical significance is according to some authors questionable. To conclude practical implications, it is important to consider the costs of introducing the compromise alternative in the choice set as the businesses that design their product or promotional offers for relatively low costs should keep in mind that designing the offers in a way that includes the compromise alternative might indeed raise the preference for that product alternative.

ACKNOWLEDGMENT

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MANAGEMENT EDUCATION IN THE DISRUPTIVE TIMES OF COVID-19 PANDEMIC: THE CASE OF PARTICIPATIVE APPROACH IN DISTANCE LEARNING

Eliška Čičmancová[1]
Marián Šotek[2]

DOI:

Abstract: *This paper is focused on various possibilities of effective management education at universities during the world pandemic of Covid-19. In more detail, there is examined one specific case of distance learning at the Faculty of Management Science and Informatics, University of Žilina, Slovakia. This paper highlights the importance of active interaction between educators and students, and building relationships among students by teamwork. The substantial outcome of this research paper is endorsing the importance of participative attitude at the seminars of Management. One of the key factors in students' motivation is the attitude of teachers, who, in this process, act as colleagues. Thus, the lecturers form a direct part of the educational process, rather than just the controlling part. In this research, the students' satisfaction with the way of teaching this subject was measured. It was proven that the participative attitude of teachers is linked to increased motivation of students. Some of them would even welcome this type of leading and learning in other lectures, too. This approach was confirmed as effective mostly during distance learning since students might feel more stressed and overwhelmed and their motivation tends to decrease. It is crucial to include such elements into the education process which strengthen the students' motivation. Teaching based on practical examples from a business environment in which the students work with real data and information may be the right way.*

Keywords: *Management, Education, Distance learning, Management education, Student motivation.*

1. INTRODUCTION

The pandemic of Covid-19 in the year 2020 brought a lot of challenges for society. Education at the universities needed to be moved to the online environment. This meant a lot of changes in the education processes such as implementing technologies, using new systems, methods and even bringing a new approach to the students. In this paper, education possibilities and approaches are discussed, mostly the participative approach and its usage in higher education. For the students not to lose motivation, it is needed to implement interesting approaches and establish a vivid environment at the university courses. Since social contact has been severely limited, communication has gained its importance also in education. The discussions may be the right tool to be used in university lectures and seminars. In the analytic part of this paper, a case study from the Faculty of Management Science and Informatics, University of Žilina, is being discussed. The authors choose one particular case of teaching – the subject Management 1 where the basics of management are taught, mainly for freshmen. At the end of this course, the students had a chance to express their opinion on the chosen approach of the teachers in the questionnaire. The results of this questionnaire are discussed in the last part of the paper.

[1] University of Žilina, Univerzitna 8215/1, Zilina 010 26, Slovakia
[2] University of Žilina, Univerzitna 8215/1, Zilina 010 26, Slovakia

2. LITERATURE REVIEW

2.1. Higher Education and Its Changes

Nowadays, education is facing several changes. For a more sustainable future, even education should be sustainable. Burbules with co-authors (2020) gave a set of changes needed for sustainable education in the future. Those are *changes in aims and objectives, changes in educational ecologies, changes in conceptions of teaching and learning, changes that specifically affect teachers* and *changes in governance.* For the needs of this paper, the most important are changes in conceptions of teaching and learning.

According to Burbules (2020), it is important to slowly shift from 'curriculum-based' to 'problem-based' learning. Thus, the students need to feel motivated and driven by practical questions and purpose. This is also an attribute of a participative approach when the students are encouraged to discuss real problems. Students are accessing the information they need right on time when they use it as well. On the other hand, effective teaching is the responsibility of the teachers and educational institution itself. The teachers are no longer only sources of authority as persons who tell the students what they need to know, but also facilitators of learning, giving the students the right directions in their path of self-learning.

Employers nowadays search for students and university graduates that are creative and able to adapt to a constantly changing professional environment (Atabekova, 2015). As the author states, the students welcomed later at the labour market need to know how to use information and communication technologies well, need to have strongly developed critical thinking, problem-solving, and high creativity skills. Thus, teaching for the practice is essential. This may be achieved by non-formal educating, where the students are involved in systematized, structured, and organized activities based on the real world.

Education differs also by the used strategy. According to Tudor (2013), there are three basic education strategies:

- *Formal education,* typical for a set structure, given curriculum, classical formal relationship teacher-student,
- *Non-formal education,* as the opposite for the formal education, using games, improvisations, discussions, and practical problems through which the students are learning,
- *Informal education,* where learning is not intentional, and the students often do not even know they are being taught.

The purpose of non-formal and informal education is to prepare students for real-life and business problems. However, the universities need to maintain a certain level of quality even when using non-formal methods for teaching the students (Vilcea, 2014). Every educational act influences the behaviour of students, therefore the teachers' approach may reflect on the students' action and motivation. Graduates act as the main output of the educational process and they should be able to work in a real context and real environment.

Kovacova and Vackova (2015) stated that *e-learning* is an efficient way to get in touch with students and give them valuable information in a shorter time and at greater distances. During distance learning, e-learning systems are used as a primary tool for communication between teachers and students. Self-studying is encouraged since e-learning systems contain all needed

information, data, documents, and even recordings of lectures or seminars. Such systems gain even higher interest and importance during distance learning, just like during the Covid-19 pandemic when the university scholars are taught online.

2.2. Participative Approach in Education

As Romanova and Lyshenko (2012) stated, when it comes to pedagogical communication there are three basic types: *monologue, dialogue, and discussion.* A monologue is very popular in lectures, though only fifty per cent of the information can be perceived by the students. In a dialogue, the interaction is stronger, and the students are more likely to perceive and memorize given information. The discussion may be the most effective style for the seminars since the students are strongly involved and can directly contribute to the learning process. Besides the types of communication, there are six main communication styles based on their classification, as seen in Table 1.

Table 1. Teacher communication styles

Communication style	Characteristics
Autocratic	Total control and supervision of a teacher, a set of strict rules and regulations, no possibility of students' dialogue with a teacher.
Authoritarian	Rules and regulations, students can share their opinions and points of view, a teacher holds the decisions.
Democratic	An active dialogue between the teacher and the students, the teacher understands and persuades the students.
Ignoring	The persona of the teacher is autonomous with a rather formal approach to teaching, the teacher is not directly involved in the process and the students' environment.
Permissive	The teacher is only slightly involved in the process, the students take their own decisions.
Illogical	The teacher does not follow one style but a combination, this can lead to disorganisation and even conflicts in the group.

Source: Romanova and Lyshenko (2012)

A participative approach is based on the democratic style of communication. A vivid dialogue is very important in this teaching approach as an element of creating a friendly environment for the students. In the educational system, a participative approach is a practice-oriented tactic where the students take part on an equal basis. The participative approach has the following attributes (Romanova, Lyshenko, 2012):

- One's opinion in doing tasks and assignments is welcomed and appreciated,
- The agreement between the teacher and students, counselling and advising,
- The communication between the teacher and the students is based on parity, tolerance, and voluntary participation.

It is necessary to include this communication approach in the teaching process systematically. If used occasionally, the participation may be perceived as a game and something not as usual. The teacher's role is not to act autocratically but to lead the communication democratically, thus delegating the decision making to the students. Also, the teacher acts as a moderator of the discussion, being (Romanova, Lyshenko, 2012):

- Hard-working, self-motivated, and self-confident,
- Able to concentrate, memorize, and deal with a large amount of information in a short time,
- Friendly, sociable, and an effective listener with good listening skills.

The participative approach leads to higher motivation of the students. It can also be combined with other strategies in order to achieve the best results in the level of motivation. These strategies can also strengthen responsibility and creativity among students. The strategies are (Blašková, 2014):

- Natural influence of the teacher's charisma – to have a friendly approach, to challenge in discussions, to appreciate the thoughts of students, to give positive feedback,
- Inspirational leadership of students – to engage students in creative processes, to enhance clear visions of students, to have trust in students' abilities and creativity,
- Demonstrating the individualised consideration towards students – to get to know students well soon, to make students feel engaged in faculty's life,
- Training and stimulating the students' intellect - to solve real life problems with the students, to inspire students to have their own opinions and solutions, to enhance innovativeness in students.

2.3. Management Education

According to Brook and Pedler (2020), teaching management should be not only about practice but also for practice. Practical-oriented learning may also be named *action learning.* This is an opposite approach to the classical didactic traditions of the university.

Learning based on experience is strongly connected to the real-world problems that are solved by the students. In such a way of learning, critical thinking is enhanced, and the students are challenged to find solutions and bring their ideas into the problem. For the teachers, it is important to well manage various activities during the lesson and act as a facilitator for the working groups and teams. Project-based learning is different from the traditional way of teaching also by the number of various steps leading to the final evaluation. Students not only take exams but also need to be active, take part in workshops, do researches and assessments given by the teacher. This way, cognitive skills are evaluated with emotional and social skills as well. (Efstratia, 2014)

According to Soviar, Varmus and Kubina (2015), the *students' cooperation* at the university courses seems to be a very effective tool. These authors also stated that working on a real problem is crucial for the students to understand the problematics well. Discussions in the seminars are also strongly advised by these authors.

Another approach to management teaching is by using *design thinking* (Figueiredo, 2020). The popularity of this teaching method has risen over the last two decades. Although design thinking is significant mostly for areas like architecture, urban planning, or various forms of arts, it can be used in management, as well. According to Figueiredo (2020), the practice of design can be understood as finding concrete ways to solve complex abstract problems. In management, design thinking means approaching management problems in the way that designers approach the design problems. It may be mostly used when dealing with innovations, products, and strategic planning. Using this kind of critical design thinking may fill the gap between theory and practice in management.

3. CASE STUDY BACKGROUND

An example of teaching the subject Management 1 at the Faculty of Management and Informatics UNIZA was chosen as a case study for the solved problem. Management 1 is an obligatory subject for the students of the first year in the Management studying program. For other

programs at the faculty (for example Informatics) this subject is optional. This subject may be an ideal example for using a *participative approach* in teaching because management is not absolutely an exact science and therefore it is necessary to hear all opinions on the problem. This way of teaching enables (mostly first-year) students to actively participate in the teaching process, to present their opinions and thus to overcome the difference between the method of teaching at secondary schools and universities.

The teachers of this subject chose a set structure for the theoretical lectures as well as for the practical seminars. The lectures consisted of two basic parts - repeating the previous lecture and taking over the new curriculum, while even during the lectures, students were involved in the event and any opinion on the topic was welcome. Active participation was evaluated with the bonus points. The practical seminars consisted of multiple parts:

- Repeating the latest lecture,
- Presentations of the team homework and discussions,
- Taking over the new curriculum,
- Practical examples,
- Student activities with icebreakers and energizers,
- Assignment of team homework for the next seminar,
- Discussion, questions, and answers.

The students worked on a semester work in their teams during the whole semester. The results they came up with were presented in the middle and the end of the semester. This work and partial assignments were focused on analysing a real business organisation and in the works, the students needed to show their own opinions on situations in those organisations. The students had to use critical thinking when designing the best proposals on how they would solve the management and development of the chosen company and what benefit they would expect from their solutions. At the seminars, students received feedback from students and detailed feedback on each assignment was received from the teacher by e-mail. Thanks to this double feedback, students gained several perspectives on the issues in their work and thus had the opportunity to adjust their processing to the final evaluated semester work.

The subject Management 1 is designed to give the students the bases in management and administration. The semester is divided into 13 weeks among which the following topics are distributed (listed according to the weeks of the semester):

- Basic information about the teachers, the subject itself, icebreakers, and energizers,
- Vision, purpose, and philosophy of an organisation,
- Three-stage product analysis, mind map, and process map,
- SWOT analysis and controlling,
- Analysis of organisation's internal environment (production resources, financial resources, human resources, information resources, marketing communication),
- Teamwork mid-semester presentations,
- STEEP analysis,
- Analysis of competitors, Porter's model of five forces,
- SMART methodology for setting goals,
- The long-term direction of the company,
- Final repetition of the curriculum,
- Final teamwork presentations,
- Consultations and feedback collection.

However, a proactive approach to teaching was not only required of students but also taught by the teachers themselves. To help students who were at the university for only a few days to adapt to the rules of work at university, teachers prepared several workshops and aids that showed students how to process academic assignments. Such activities include, for example:

- Online workshop on formatting in MS Word,
- A little guidebook on how to list citations and references according to the faculty rules,
- A little guidebook on how to use figures, graphs, and tables in the assignments,
- Various occasional tools for finding and verifying information in available sources.

All the activities and documents were prepared by the teachers in their spare time and were dedicated to showing the students the right and correct approach to write academic assignments since Management 1 was the first subject for the students to meet such assignments and teamwork. The purpose of these activities was that the students did not feel 'lost' anymore in the new environment and they are more motivated in working and continuing in their university studies.

One of the main goals for the students during the seminars was to actively join in the discussions, give feedback to their classmates, present their ideas and thoughts, and later discuss them. The teachers were acting more like facilitators or moderators in the discussions, giving some additional questions or answering the questions. The students were rewarded with points for the activity (as a part of the subject evaluation).

The purpose of this method of teaching and communication within the subject was to encourage students to discuss and exchange views to learn how to present their views and at the same time accept, tolerate, and possibly incorporate feedback from others. Each of the opinions was welcomed and appreciated, as the teachers tried to achieve the highest possible level of motivation of students to participate in discussions and active approach by students.

4. RESULTS

In the last week of the semester, students were given the task of filling out an anonymous questionnaire, which provided teachers with feedback on several important areas of teaching. Examined areas include students' view of teachers, their satisfaction with the level of explanation of the curriculum, evaluation of the current concept of exercises, examination of students' motivation for active participation in practical exercises, use of support activities and free discussion. The questionnaire was filled by 101 students that attended this subject. The approach to all students was very similar since the practical seminars of the subject Management 1 were led by both authors of this paper. Thus, the result of the final survey could not be affected by any other teacher.

One of the important was the question where students evaluated the current concept of the seminars. 89.1% of students stated that this concept suits them fully and nothing needs to be changed. The other 10.1% were partially satisfied and would change some little things as less homework or less theoretical curriculum repetition.

The next two questions dealt with the motivation of students - motivation for collecting points for activity and motivation for active participation in discussions. The vast majority of students stated that they had no problem getting involved and were highly motivated because it was possible to collect points for the activity. Other responses included options such as students being ashamed to express themselves in front of others, disliking public speaking, or not being

comfortable with the way they communicated (video call due to distance learning during the Covid-19 pandemic).

Another area of the questionnaire was focused on the use and evaluation of auxiliary activities (workshops and other aids) by students. 79.2% of students stated that they often used these aids and were very helpful to them in other subjects as well. They considered them very helpful, some students even said that they would appreciate the equally helpful approach in other subjects. Although 15.9% of students looked at these aids, they decided not to use them in their work. Other students did not work with these helpful materials.

In one of the questions, the students had to evaluate several important factors about the teachers, such as teacher's expertise, teacher's approach (responsibility, punctuality, equal approach), communication with the teacher, teacher's willingness (consultations, help), level of feedback from the teacher, teacher's attitude and overall impression. The students could evaluate the teachers on a scale from 1 to 5 where 1 was minimum and 5 was maximum. The resulting values are shown in Figure 1.

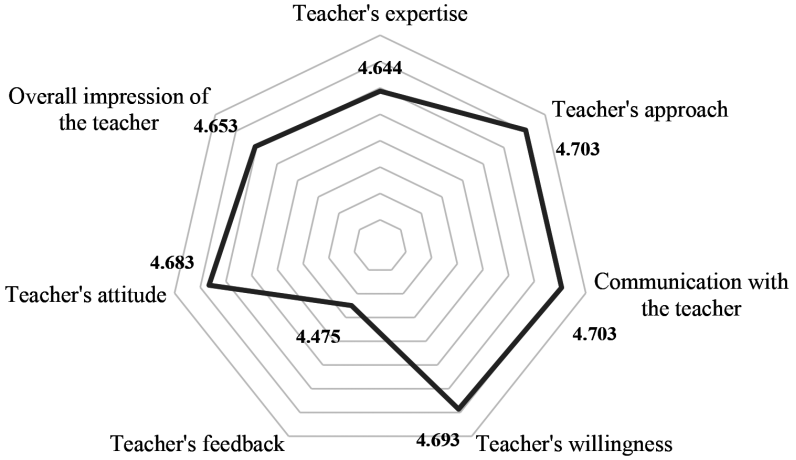

Figure 1. Students' evaluation of the teachers' approach

Source: Authors research

At the end of the questionnaire, the students had a chance to say anything. A lot of them used this opportunity and stated their opinions, most of which consisted of positive words. The most common answers included:

- Praises on the teachers' willingness in the seminars and outside them (consultations),
- Positive view on friendly-professional (non-formal) teachers' approach,
- Appreciation of the open communication in the practical seminars,
- Appreciation of the equal approach of the teachers to the students,
- Appreciation of the willingness and effort of the teachers to help when in need,
- Positive view on the practical examples and problems,
- Positive view on the nice and friendly atmosphere in the seminars.

There were only a few negative thoughts as well:

- The work on the semester assignments was more time-consuming than expected for some students,
- Some students did not like the concept of teamwork,
- Some foreign students did not understand the purpose of the assignments well. (The course was taught in the Slovak language)

Overall, the outcome from the questionnaire proved that students find a participative approach in the teaching of the subject Management 1 very beneficial and satisfying. The students compared the way of teaching to other subjects taught at the faculty and they stated they would appreciate more of this approach in their studies. They also pointed to the risen motivation thanks to the friendly participative approach from the teachers.

5. DISCUSSION

The stated case study shows a real problem that the participative approach to teaching is one of the very effective ways how to achieve a higher level of students' motivation for the studies and the discussions at the practical seminars. Yet, it is important to say that it is not possible to use this way of teaching with every subject. The authors of this paper see the greatest potential of a participative way of teaching in more humanistic subjects and in subjects where it is possible to use discussion as a teaching tool. In many technical subjects, such a way of teaching can be considerably limited, as it is often necessary to work with exact facts and there is not so much room for discussion.

When choosing the method of teaching the subject, it is necessary to think about the limitations of the chosen method of teaching for the teacher. Participative teaching is very effective and to a large extent more attractive for the students themselves, but it is much more demanding for the teacher than the classic teaching methods - time, knowledge, but also argument oriented. Preparing for practical seminars conducted in this way will take a lot of time, as the teacher must be prepared for various alternatives to develop a discussion and should always be able to respond to questions and discussion contributions from the students.

However, regarding the development of education, it is possible to assume that the participative approach and other modern methods of teaching will be used more and more in colleges and universities, as well as in secondary and primary schools. The reasons may be, for example, the development of imagination, discussion skills, thinking 'outside of the box', critical thinking of students at the youngest possible age.

6. CONCLUSION

The theoretical part of this paper showed that education nowadays needs to adapt to difficult situations and new ways of approaching students need to be established. The analysis of literature pointed that one of the effective methods is using the participative approach. Various authors agreed that the traditional teaching approach may no longer be effective and motivational for the students and that the teacher should act not only as an authoritative person but also as a facilitator with friendly communication. Non-formal and informal education strategies are also rising in popularity and the students can learn even more than just by formal education.

The teaching of management has its specifics. According to some authors, cooperation between students is the key to success since students learn how to work in a team and therefore they are better prepared for the real business environment. This technique alongside real business problem solving may be the right way to prepare students well for their later jobs.

The case study in this paper discussed the way of teaching the subject Management 1 at the Faculty of Management and Informatics, University of Žilina, during the winter semester of the academic year 2020/2021, when education worldwide had to adapt to new anti-pandemic measures due to

Covid-19. For this reason, the teaching of subjects took place in electronic form (via MS Teams). Overall, distance learning did not suit several students (compared to the classic full-time form of teaching) and for this reason, it was necessary to approach a form of teaching that would keep students motivated, which, as the output of the questionnaire proves, was successful. Students found the approach of the teachers very friendly and helpful. They felt more comfortable at the seminars and wanted to join or even initiate the discussions. Overall, the students felt more motivated and by their words, they would welcome a similar approach in a different subject, as well.

The participative approach turned out to be an effective way how to link the right communication with the actual process of teaching the students at the university. The authors think this approach may be used in those types of courses and subjects where discussions and own opinions of the students can play a significant role. Plus, the critical thinking of the students is provoked which can have even more advantages in their later studies.

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DIFFERENCE BETWEEN SHARE, AVERAGE GROWTH AND NUMBER OF TOOLS USED IN ONLINE SALES OF INDIVIDUAL AND GROUP HOTELS

Tina Vukasović[1]
Vlaho Mihač[2]

DOI:

Abstract: *The purpose of the following research was to explore the possible difference between individual and group hotels, to determine which is and is there any difference in the share of online sales, average growth and tools used for online sales of hotel accommodation in the Republic of Croatia. To reach the desired results, the authors have used the quantitative research method and research of secondary data from the PHOBS CRS system, which is the most used CRS in the Republic of Croatia. The main discoveries of the research are the share of online sales in total hotel sales, the average growth of online sales, the number of tools used in hotel sales and the impact of COVID-19 on online sales in 2020. Employees in hotel sales can use these findings to gain insight into mentioned topics and to compare their results with the results in the paper.*

Keywords: *Hospitality, Tourism, PHOBS CRS, COVID-19, Croatia.*

1. INTRODUCTION

Tourism has been recognized as a strategic sector for economic growth in many countries and as one of the most important industries in the world. It is the largest generator of well-being and employment in the world and an engine for economic development, both in developed and developing countries (Blažević, 2007, World Travel & Tourism Council, 2014, World Tourism Organization, 2019.). According to the European Commission, it is the third-largest socio-economic activity in the EU (after the trade and distribution, and construction sectors), and has an overall positive impact on economic growth and employment. Traditionally, Europe plays a significant role in the overall international tourism flow, with a share of 51% (World Tourism Organization, 2019.) in 2018. In the last five years, this sector has registered growth, a trend that is projected to continue over the next decade. Online travel sales worldwide have increased by double-digit every year and the online booking market reached the scale of $189.62 billion in 2017 (eMarketer, 2017). The growth trend would have continued if there was not an outbreak of the COVID-19 in 2020. According to the World Tourism Organization, international tourist arrivals dropped by 72% (Europe 68%) from January to October 2020. (United Nation World Tourism Organization, 2020)

Croatia's tourism industry is characterized by mass tourism and 'sun and sea' as the main tourism product. Recently, many attempts to move away from such products have been made, resulting in the development of various selective forms of tourism such as cultural, health, sports tourism, and others. Furthermore, considering the economic variables in the observed countries, the results indicate that tourism in Croatia is a more significant backbone of economic development, due to its greater contribution to GDP and employment. On the one hand, this can

[1] DOBA Business School Maribor, Slovenia
[2] PHOBS, Croatia

be an advantage, but on the other hand, changeable tourism cannot be the main and sole driver of economic development, nor would it be desirable in Croatia. The development of tourism in Europe, and hence in Croatia, contributes to a stronger consolidation of the European Union, guaranteeing a link between regions and countries with their systems, languages, traditions, and cultures (Krstinić Nižić, Šverko Grdić & Hustić, 2016, p. 79).

The hotel industry in Croatia thrives largely due to the growth in tourism and travel. Due to the increase in tourism with rising foreign and domestic tourists, the hotel sector is bound to grow. With a consistently growing middle class and increasing disposable income, the tourism sector is witnessing healthy growth and accounts for 19,6 per cent of the country's GDP (Ministry of Tourism of the Republic of Croatia, 2019.).

According to Ambrož and Gomezelj Omerzel (2017), like other industry sectors, the tourism industry has also encountered a variety of changes recently. New technologies and new tourist habits are the main reasons for the constant development. The revolution of the E-Commerce industry boosts the immense growth and potential business opportunities of the online tourism market. 95% of consumers search online before making a travel purchase. Best deals are an important motivation for customers to go online. Since the online agencies provide flexibility and accessibility, it is easy for tourists to search and buy travel products and services within a small fraction of time. Train and air tickets, car rentals or accommodation can be researched, evaluated, and reserved through the online sites 24/7 (Akhila and Manikandan, 2018, p. 9).

1.1. Tools Used in Hotel Sales and Marketing Departments

According to the previous research conducted on 30th January 2019, systems used by employees of the hotel sales and marketing department in their day-to-day business are the following:

Table 1. Systems used in online sales

System	Percentage of tools used
Hotel Information System / Property Management System (HIS /PMS)	74%
Central Reservations System (CRS)	74%
Content Management System (CMS)	32%
Payment gateway	18%
Online reputation management tool	6%
Revenue Management System (RMS)	6%
Call center management system	2%
Customer Relationship Management (CRM)	2%
Rate shopping tools	2%

Source: Vukasović and Mihač, 2021.

1.2. Purpose and Goals of the Research

The purpose of the following research was to explore the possible difference between individual and group hotels, in order to determine which is and is there any difference in the share of online sales, average growth and tools used for online sales of hotel accommodation in the Republic of Croatia.

The authors were also interested in the impact of COVID-19 on online sales in 2020. For that reason, the following research questions were set:

1. What is the share of online sales in total hotel sales?
2. What is the average growth of online sales in total hotel sales?
3. How many tools are used on average in hotel sales?
4. General impact of COVID-19 on online sales in 2020.

To reach the desired results, the authors have used the quantitative research method and research of secondary data from PHOBS CRS (Central Reservation System).

The name PHOBS in Croatian stands for 'Prvi Hrvatski Online Booking Sustav', or translated to English 'First Croatian Online Booking System'. Today, three hotel groups - the Luksic Group, the Valamar Riviera, and Maistra - manage more than half of the total hotel, resort and camp accommodations in Croatia (Istarski.hr, 2018). Besides the above mentioned hotel groups, some of the other multi-property groups in Croatia that use PHOBS CRS are Liburnia Rivijera Hotel, Arena Hospitality Group, Bluesun Hotels and Resort, Suncani Hvar Hotels, Jadran Hotels and Campsites, Aminess Hotels and Campsites, and many more. The PHOBS system is a Croatian product well known outside of Croatia. As a virtual sales office for hotels, resorts, camps, and villas, it offers revenue-generating solutions for hospitality: property management interfaces, booking engine, yield manager, channel manager, revenue management interface, business intelligence & analytics, B2B manager, etc. (PHOBS, 2018).

2. METHODOLOGY AND RESEARCH SAMPLE

This research was based on the quantitative research method and research of secondary data from the PHOBS CRS system. As the basis for the quantitative survey, the authors have used the list of categorized facilities available on the Ministry of Tourism's website published on 31.08.2018 to which the authors have emailed an online survey on date 25.02.2019. According to the mentioned database, at the given moment, there were 737 hotels in the Republic of Croatia to which the authors have sent anonymous surveys.

Table 2. Number of hotels in the Republic of Croatia on date 31.08.2018.

Object type	Facilities in total
2*	61
3*	305
4*	294
5*	37
Hotel baština (Heritage)	20
Scattered hotel	1
Dispersed hotel	15
Hotels of a special standard	4
The total number of hotels:	737

Source: Ministry of Tourism (2018).

In the research of secondary data from PHOBS CRS system, the authors have analyzed the data from 249 different companies.

3. RESULTS AND DISCUSSION

3.1. Share of Online Sales in Total Hotel Sales

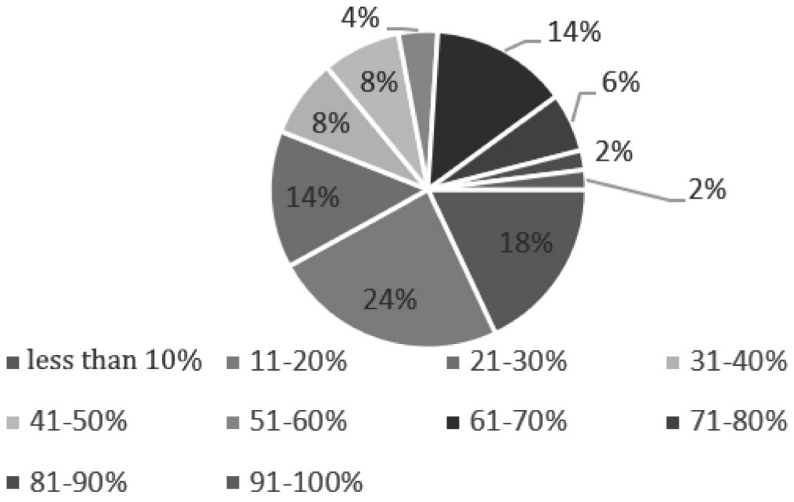

Figure 1. The share of online sales at individual facilities in 2018

Source: Author's research (2019)

Figure 1 shows the share of online sales at individual facilities. The overall average share of online sales for individual facilities in 2018 was 36.46%. Most facilities have a share of 11% to 20%. According to the chart, different shares on online sales can be seen, so for example, 5 respondents have an online sales share of over 70%. Such a high percentage is possible, for example, for establishments with a small number of accommodation units that do not accept group bookings and as such are not interesting to the classic allotment, so online sales remain the primary way of filling their capacities. In addition, it is important to know the average occupancy of such facilities, as well as the number of days in which such facilities are open, meaning they receive guests.

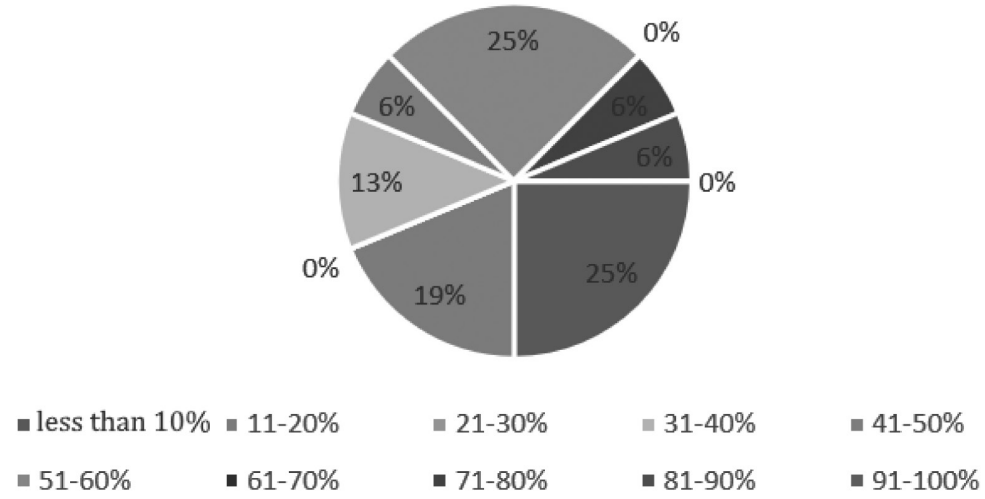

Figure 2. The share of online sales at group facilities in 2018

Source: Author's research (2019)

Figure 2 shows the share of online sales at group facilities in 2018. In such facilities, the total average share of online sales is 37.13%, and most of the facilities (25%) are in groups where the

share is less than 10% or 51% -60%. Companies with multiple properties, most often for ease of sales management, have a certain amount of capacity in allotment leases and cooperate much more with groups and agencies on request. The bankruptcy of the world's oldest tourist company and the second-largest tour operator in the world, Thomas Cook in 2019, will certainly affect the distribution of shares in the future. The growth of online and the increase in individual sales has certainly been one of the elements that influenced the aforementioned.

3.2. The average growth of online sales

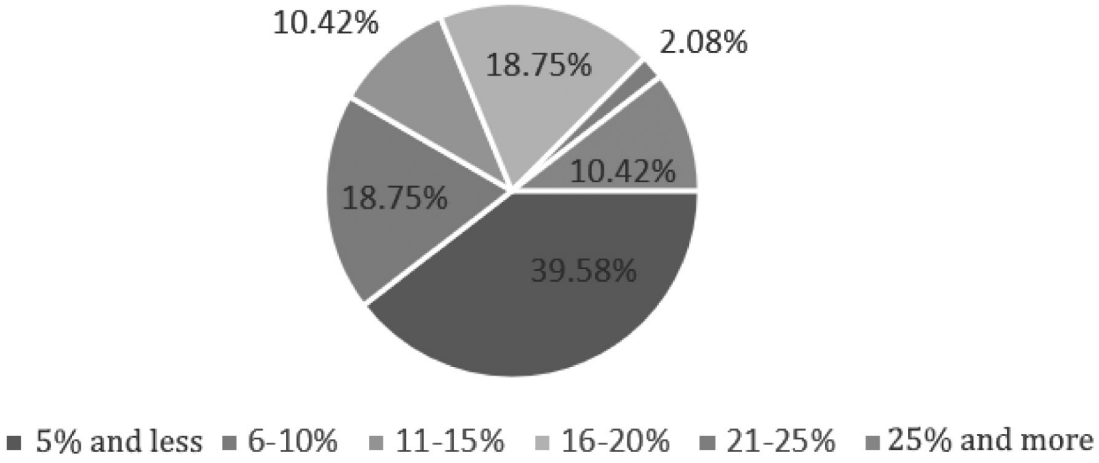

Figure 3. Average growth of online sales in the period from 2015 to 2018 - individual facilities
Source: Author's research (2019)

Figure 3 shows the average growth of online sales from 2015 to 2018 for individual facilities. The overall average growth in online sales for individual facilities over the last three years is 12.87%. Most facilities have growth of 5% and less, that is 19 of them or 40%. The increase in online sales has certainly been influenced by advances in technology, Internet accessibility, an increase in secure purchases, and the efforts of OTA companies and the hoteliers themselves who have gone in that direction. General knowledge, prices of websites, social networks, and comment sites can be considered to be responsible for this trend.

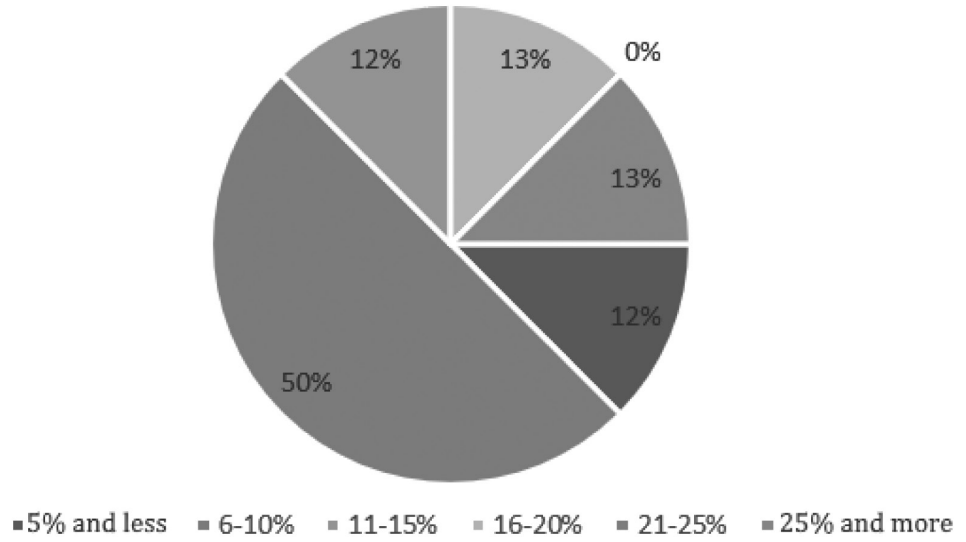

Figure 4. Average growth of online sales in the period from 2015 to 2018 – groups
Source: Author's research (2019)

Figure 4 illustrates the total average growth of online sales in facilities within the group from 2015 to 2018. In such facilities, a total average increase is 14.44%, and the majority of respondents, to be more precise, 8 of them (50%), have an average growth between 6% and 10%. Almost all groups in the territory of the Republic of Croatia (which may be generalized to other territories) aim to increase their share of online, i.e. direct sales for several reasons. Some of these represent better average prices and diversification of sales channels, i.e. less dependence on one channel/partner, which makes them more resilient to unplanned events. Some of the symptoms responsible for growth are certainly the same as those listed under Growth for Individual Facilities, and it can be expected that online share is going to grow over the years.

The overall average share of online sales for individual facilities is 36.46%, while for group facilities, it amounts to 37.13%. The overall average increase of online sales for individual facilities in from 2015 to 2018 is 12.87%, while the overall average increase of online sales for group facilities is a little higher and is 14.44%. (Vukasović and Mihač, 2021.)

3.3. Tool used in hotel sales

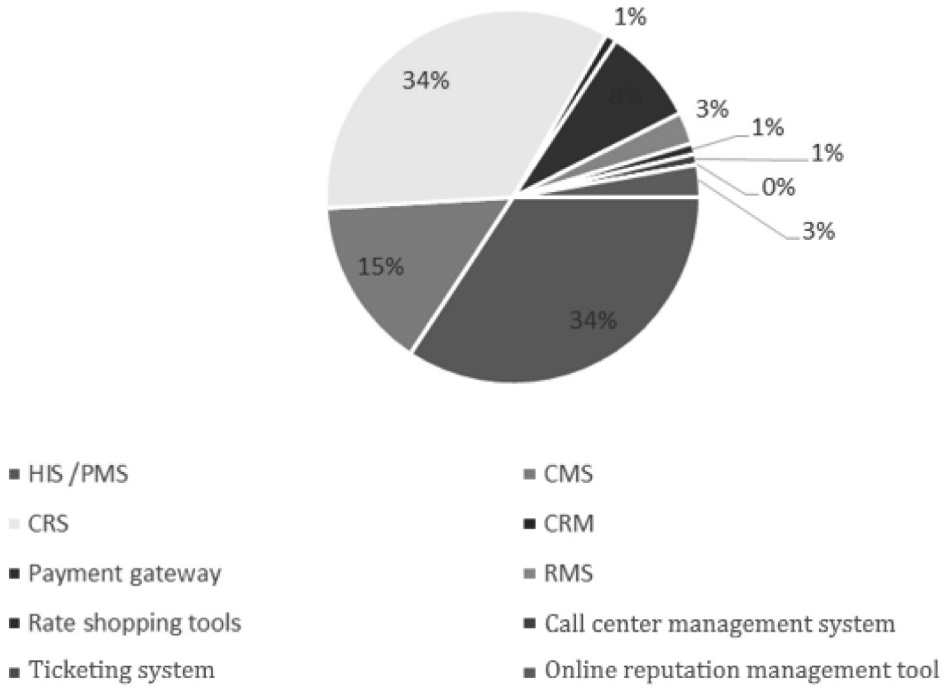

Figure 5. Tools used – single facilities
Source: Author's research (2019).

Figure 5 shows the percentage of tools used in individual facilities in 2018. The overall average of tools used in such facilities is 22.6%. The most used tools in individual facilities are reception and a central reservation system used by 74% of respondents, followed by a content management system used by 32% of respondents, and a payment processor used by 18% of respondents. Price and reputation management systems are used by 6% of respondents; the customer management system, a rate shopping tool, and a call center management system are used by 2% of respondents, and a ticketing system for customer communication is not used by any of respondents.

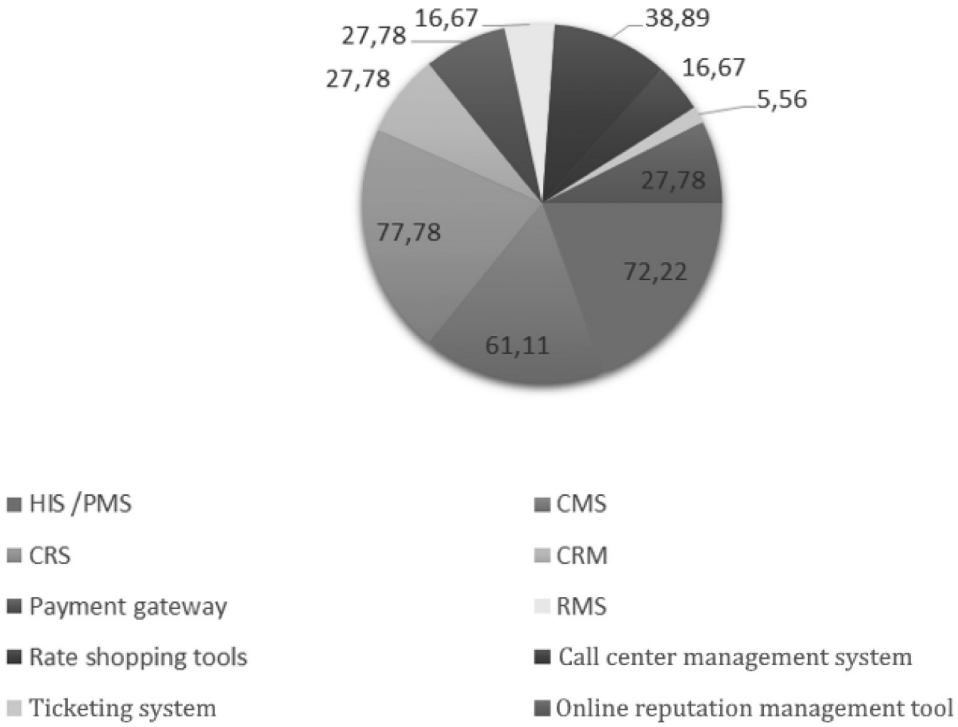

Figure 6. Tools used in 2018 – Groups
Source: Author's research (2019).

Figure 6 shows the percentage of tools used in group facilities in 2018. In such facilities, the most commonly used tools are (1) central reservation system used by 77.78% of respondents and (2) reception system used by 72.22% of respondents. Furthermore, (3) web content management system is used by 61.11% of respondents. A (4) rate shopping tool is used by 38.89% of respondents while a (5) customer management system, (6) payment processor and (7) online reputation management tools are used by 27.78% of respondents. An (8) price management and a (9) call center system are used by 16.67% of respondents, and one user, i.e. 5.56% of respondents, uses a (10) ticketing system to communicate with customers.

If answers of respondents who manage group facilities are compared with answers of those who manage individual ones, it can be seen that an equal percentage of them use reception and central reservation systems. The biggest difference may be seen in the usage of website content management systems, price management tools and guest communication and online reputation management tools. For smaller facilities, which represent the majority of 66% according to the results of the survey, it is very common that they have a ´family´ atmosphere and that there is a large percentage of guests who return for this reason. Suppose that in such facilities hotel staff may be more dedicated to guests, which leads us to the question whether they need tools such as CRM, call center management system, ticketing communication system and various online reputation management tools.

General impact of COVID-19 on online sales in 2020 in Croatia

In pre-pandemic time, according to the earlier research of secondary data on 241 hotels in the Republic of Croatia, the growth of online sales from 2017 to 2019 was 24.43% on average.

According to the financial data from 249 different companies inside PHOBS CRS, the difference between income in 2020 and 2019 is -53.74%. In 2019, there were 19.6 million tourist

arrivals and 91.2 million tourist nights recorded in commercial accommodation establishments. Compared to 2018, there was an increase in tourist arrivals of 4.8% and an increase in tourist nights of 1.8%. (Croatian bureau of statistics, 2020)

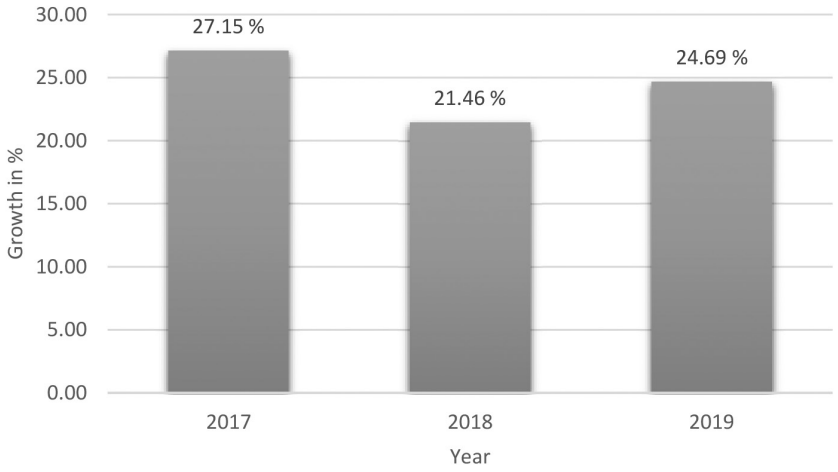

Figure 7. Growth of online sales from 2017 to 2019
Source: Vukasović and Mihač, 2020.

The following figure shows international tourist arrivals by region from January to October 2020.

Figure 8. International tourist arrivals by region January-October 2020
Source: UNWTO, 2021.

Most foreign tourist arrivals and nights in 2019 in the Republic of Croatia were realized by foreign tourists (88.69%), of which the most were from Germany (16.6%), followed by the nights realized by tourists from Slovenia (8.9%), Austria (8.4%), Poland (7.0%), Italy (6.1%), Czech Republic (5.9%) and The United Kingdom (5.1%). (Croatian bureau of statistics, 2020) If the difference between the income from PHOBS and the drop of international arrivals from UNWTO are compared, it can be concluded that some other segments of hotel sales (like for example groups, MICE and allotment) had even bigger drop than the online sales, which is most likely because of the gathering limitations given by the government to slow the spread of the disease. According to the survey conducted by UNWTO in 2021, 86% of respondents expect that international tourism would return to pre-pandemic 2019 levels in Europe.

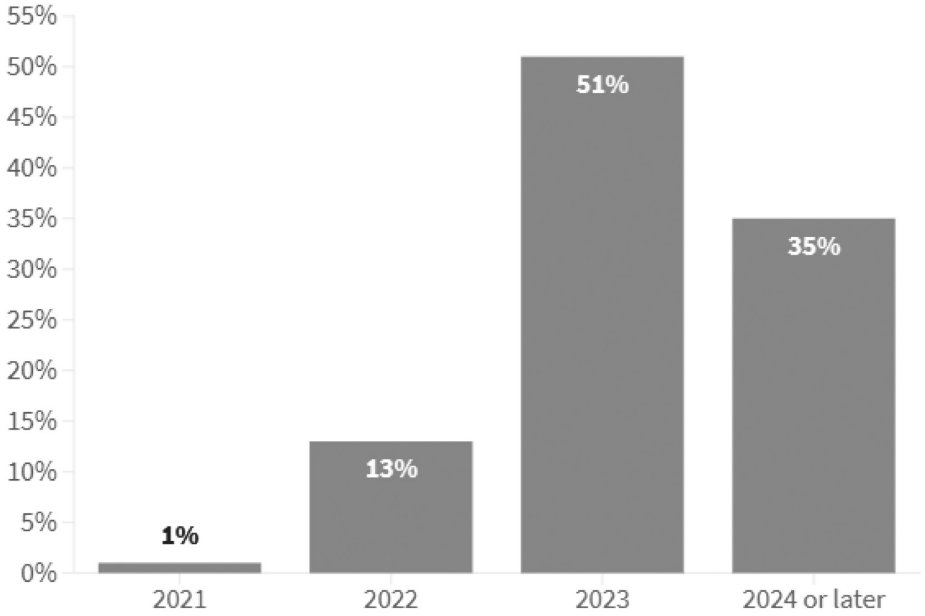

Figure 9. Expect of international tourism returning to pre-pandemic 2019 levels in Europe
Source: UNWTO, 2021.

4. FUTURE RESEARCH DIRECTIONS

It would be interesting to know how the whole situation with COVID has influenced the number of tools used per property and the percentage of direct reservations in comparison to group and allotment sales. There is also a possibility that, because of the need for automation and distance, there will be more tools on the market with features like online check in and the like.

5. CONCLUSION

The results indicate that online sales have been increasing recently, as well as the share of direct bookings of observed companies till 2020, which has then drastically dropped because of the ongoing pandemic.

In the quantitative research, the authors have decided to research separately group and individual hotels because the authors have noticed that in general group hotels have more employees working in sales and marketing departments, they use more tools and have larger budgets for online marketing, while in individual hotels (depending on its size/number of units) usually, one or two employees have multiple roles. For example, the sales manager takes care of online marketing and revenue management, front desk manager takes care of revenue manager, etc. It is the same with the tools used/needed given the size of the property.

If the results from respondents who manage group facilities are compared with those who manage individual ones, it can be concluded that an equal percentage of them use reception and central reservation systems. The biggest difference may be seen in the usage of website content management systems, price management tools and guest communication, and online reputation management tools. Although the number of tools used does not have a significant impact on the share of online sales in total sales, according to the results from PHOBS CRS, it can be concluded that companies that use more tools have a more significant share of direct bookings made through the website than bookings made through the OTA channels. It is also a fact that larger

companies have more resources for advertising and sales management. Therefore, smaller facilities need to think about the cost-effectiveness of introducing new technologies.

Predictions on the market for 2021 are that the main season (July and August for "costal" properties in Croatia) will mostly depend on the percentage of the vaccinated population in countries like Germany, Slovenia, Austria, etc. which had the most tourist arrivals in the past. Like the year 2020, the year 2021 will also be unpredictable and most of the reservations and decisions by guests will be made at the last minute.

Another interesting question is how this will all affect season workers and will there be plenty of them once the numbers turn back to normal.

The authors believe that research results can help anyone who wants to know more about the above-mentioned topic, whether they are just starting with the research or looking for additional ways and tools to improve their business. With all the available systems and automation, it is crucial to have a capable and motivated workforce. Systems are still a tool in the hands of man, which depend on his ability and creativity. Employees in hotel sales can use these findings to gain insight into mentioned topics and to compare their results with the results in the paper. They can also get more information about the impact on business results, depending on the number of tools used in day-to-day business.

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THE ROLE OF ENTREPRENEURS IN TOURISM DESTINATION MANAGEMENT SYSTEM: A CONCEPTUAL MODEL

Petr Štumpf[1]
Jitka Mattyašovská[2]
Adriana Šťastná[3]

DOI:

Abstract: *A tourism destination is defined as an open, complex and adaptive system in which numerous relations in the economic, social and environmental spheres are generated. This paper aims to define a conceptual model of tourism destination management as a complex system and to identify the role of entrepreneurs as key stakeholder in a tourism destination. The main methodological approaches were systems thinking and system dynamics. A Causal Loops Diagram (CLD) enabled to cover the complexity of the tourism system and to identify relations among a number of stakeholders and elements in a tourism destination. The authors identified crucial elements of the entrepreneur sub-system involved in a high number of causal loops to establish the importance of entrepreneurs in the destination management system. Profits of individual entrepreneurs and the occupancy of hospitality and tourism services represent the model's most frequent variables from the entrepreneurs' perspective.*

Keywords: *Destination management, System dynamics, Systems thinking, Causal loop diagram.*

1. INTRODUCTION

The use of the systemic approach in tourism originates from the fact that tourism destinations are considered complex systems (Baggio & Sainaghi, 2011; Kaspar, 1976; Laesser & Beritelli, 2013; Mai & Smith, 2018; Štumpf & Vojtko, 2016). According to the Sankt-Gallen consensus of destination management, destinations can be understood not only as geographic entities, clusters or networks of suppliers but also as productive social systems with specific business aims and non-business related goals (Laesser & Beritelli, 2013).

The systems theory is used as one of the essential approaches towards the study and management of the travel and tourism industry (Kaspar, 1976), especially in a specific environment of tourism destinations. Based on this theory, a tourism destination is defined as an open, complex and adaptive system, in which numerous relations in the economic, social and environmental spheres are generated. A tourism destination is considered as a dynamic complex system since it is composed of many different components that interact in a non-linear way (Baggio & Sainaghi, 2011; Mai & Smith, 2018). The tourism destination as a complex system is needed to be appropriately modelled to achieve efficient destination management (Bieger, 2008; Farrell & Twining-Ward, 2004; Lew & McKercher, 2006; Rodriguez-Diaz & Espino-Rodriguez, 2007).

[1] Faculty of Management, Prague University of Economics and Business, Jarošovská 1117/II, 377 01 Jindřichův Hradec, Czech Republic
[2] Faculty of Management, Prague University of Economics and Business, Jarošovská 1117/II, 377 01 Jindřichův Hradec, Czech Republic
[3] Faculty of Management, Prague University of Economics and Business, Jarošovská 1117/II, 377 01 Jindřichův Hradec, Czech Republic

The system also contains many stakeholders with completely different management objectives and interests (Mai & Smith, 2018; Štumpf & Vojtko, 2016), and it is influenced by various internal factors (such as policy, government regulation, socio-economic conditions) as well as external factors (such as the economic situation, safety and security, technological or environmental changes). It means that managing a tourism destination is uncertain, and destination managers have to make decisions in a complex environment (Mai & Smith, 2018).

In comparison to other methods that are often used for the evaluation of the economic impact of tourism on destinations, the system dynamics has one advantage – it can be operated at the same time with "soft" factors from the social and environmental spheres, non-linear relations, delays and causal loops (reinforcing or balancing) in one complex model (Sterman, 2000). Thus, we can observe stakeholders and general tourism development in destinations in a broader context with an emphasis on sustainability. The first system dynamics models were used for simulations in businesses (Forrester, 1961). However, system dynamics modelling enables to evaluate economic impacts as well as socio-cultural and environmental impacts and their mutual interactions (Jackson, 2003).

Several research studies have been published in the field of travel and tourism using system dynamics as the main theoretical approach. Schianetz et al. (2007) based on Senge's (1990) theory of Learning Organization present the concept of Learning Tourism Destination using the system dynamics as a tool for implementing and reinforcing collective learning processes. The results show that system dynamics methodology can support communication among crucial stakeholders in tourism destinations and stimulate organisational learning.

System dynamics in travel and tourism research is used by other researchers as well (Borštnar et al., 2011; Jere Jakulin, 2016, 2017; Lazanski & Kljajic, 2006; Mai & Smith, 2018; Patterson et al., 2004; Ropret et al., 2014; Sedarati et al., 2019; Štumpf & Vojtko, 2016; Tegegne et al., 2018; Vojtko & Volfová, 2015).

The tourism destination system involves a great number of stakeholders. One of the most significant stakeholders are the tourism enterprises that are regarded as the "backbone" of the tourism destination system. A destination in which tourism enterprises operate has a significant impact on the competitiveness of these enterprises and their performance. However, the opposite relation also applies. It means that the competitiveness of the destination is noticeably dependent on the competitiveness of the enterprises in the destination, in terms of each individual company and all companies in aggregate (Ritchie, 2003).

The ability to compete in the tourism market is, from the perspective of individual entrepreneurs, the subject of their interest; on the other hand, the competitiveness of the whole industry and aggregated results of the private sector in the destination are important for the public administration. Thus, the competitiveness of the whole destination should be in the spotlight of the destination management represented by destination management organisation (DMO).

The main ambition of this paper is to define a conceptual model of tourism destination management as a complex system and to identify the role of entrepreneurs as key stakeholder in a tourism destination. Therefore, we formulate the following research questions:

1) *What is the role of entrepreneurs in the complex destination management system?*
2) *What are the essential causalities of the entrepreneur sub-system?*

2. METHODS

The main methodological approaches were systems thinking and system dynamics. We built the model according to the previous studies based on system dynamics modelling, and according to the system dynamics methodology (Jackson, 2003). The first step consists of the identification of a research problem and variables which have a crucial influence on the defined problem. The variables create the boundaries of the system.

In the second step, a complex Causal Loops Diagram (CLD) of the destination management system was built. The CLD reveals interactions among the defined variables. Relations between the model, the object and the subject of the modelling were defined by Jere Lazanski & Kljajic (2006). Based on this approach, the object of our model was defined as the destination management system of a tourism destination. The subject of the model is then represented by the researchers (authors) as the observers/descriptors of the model.

As the third step, we built a specific entrepreneur sub-model in a simplified CLD based on the complex destination management system. Thus, we identified essential causal loops that influence entrepreneurs in complex destination management. In order to describe relations between the elements of the model, the CLD includes various feedback loops influencing the business activities of entrepreneurs within the destination management system. The loops can be both balancing and reinforcing, and the interconnections (arrows) are marked with positive (+) or negative polarity (-). The delay is marked by an interruption of the arrow (⫩).

Using Vensim Professional software, we were able to identify crucial elements of the system involved in a high number of causal loops to determine the importance of entrepreneurs in the destination management system. We used the function *LOOPS* for counting the number of causal loops in which the particular elements of the system are included.

In the following step, the CLD is usually converted in the mathematical simulation model and validated in comparison with real-world behaviour. We did not implement this step in the study since we aimed to build a conceptual model of the destination management system and to identify the role of entrepreneurs in this system. The dynamics of the system based on the data from various destinations is the way for future research. Therefore, our approach is in line with some system dynamics related disciplines, such as systems thinking (Senge, 1990).

3. RESULTS

In our model, the borders of the management destination system are defined by the fundamental activity of the most significant stakeholders (entrepreneurs within the tourism sector, public administration, visitors, residents). The stakeholders operating in the tourism destination have various interests that are frequently contradictory. DMO as a company of destination management stands in the centre of the whole system, and its role lies in the coordination of the interests with the aim to find an agreement which would achieve the satisfaction of the given stakeholder groups as well as the appraisal of economic, socio-culture, and environmental dependencies which are linked to a particular behaviour of stakeholders.

A conceptual model in the form of a CLD includes 57 variables, out of which 47 are endogenous and 10 exogenous (Figure 1).

3.1. The role of entrepreneurs in tourism destination management system

Entrepreneurs within tourism are represented by accommodation and catering providers, transportation companies, incoming travel agencies and tour operators, wellness facilities and spas, sports&leisure and cultural services providers, animators, tourist guides, and a number of other private business entities whose activities are directly or indirectly influenced by the visitors' occupancy in a destination. The main goal of private business entities is to gain a profit. Tourism is a sector that is "drawn by the offer", business entities operate in a highly competitive environment where, in general, supply exceeds demand. The system is even more complicated because not only business entities in a given destination compete but also the individual destinations in the domestic, international, and global market which are not, for the needs of this model, within the defined borders but they enter the system from the exterior as an *exogenous variable.*

Entrepreneurs mainly pursue their individual interests (individual profits), which primarily determines their satisfaction. If they are not satisfied with their individual economic result, they will search for a cause other than their own business abilities. It will result in a lack of confidence in the DMO's ability. But also, vice versa, if entrepreneurs are satisfied with their individual profits, the DMO's persuasive ability to sufficiently defend the interests of the business sector will be higher. The aggregate performance of all entrepreneurs in the destination will not be decisive for the satisfaction of individual entities since the results of each business unit may differ significantly from the overall results.

Individual profits (and profitability) of business entities influence the decisions made by new entities to enter the market. Such decisions may be significantly influenced by public consumption in the tourism sector within the destination; firstly, by building public infrastructure that will increase accessibility and attractiveness of the destination, and secondly, by direct support of business entities in tourism in the form of grants and subsidies. The entry of new enterprises increases the competition in the sector, which should positively impact the quality of services provided, the level of which will be increased by investments (in various forms). However, improving the quality of services means not only an increase in costs for business entities (modernisation of infrastructure, technological development, qualified human resources, etc.) but also an increase in visitor satisfaction, which may result in higher average spending, and thus, higher yield per visitor.

The entry of new entities into the market will cause not only an increase in competition (which also means better quality) but also an increase in the capacity of tourism facilities, which with the same or a slowly growing number of visitors (or overnight stays) will reduce the occupancy of these facilities resulting in lower sales. Moreover, the price level will decrease, which will positively affect the satisfaction of visitors (the destination will become cheaper for them). However, on the other hand, the yield per visitor will be lower, which will again have a negative impact on entrepreneurs' sales.

Business entities generate job opportunities, and thus, they help to reduce unemployment. Together with public budgets and the attractiveness of the destination's primary offer (cultural and natural potential), their performance determines the attractiveness of the environment (in terms of geography and sector) for future investments.

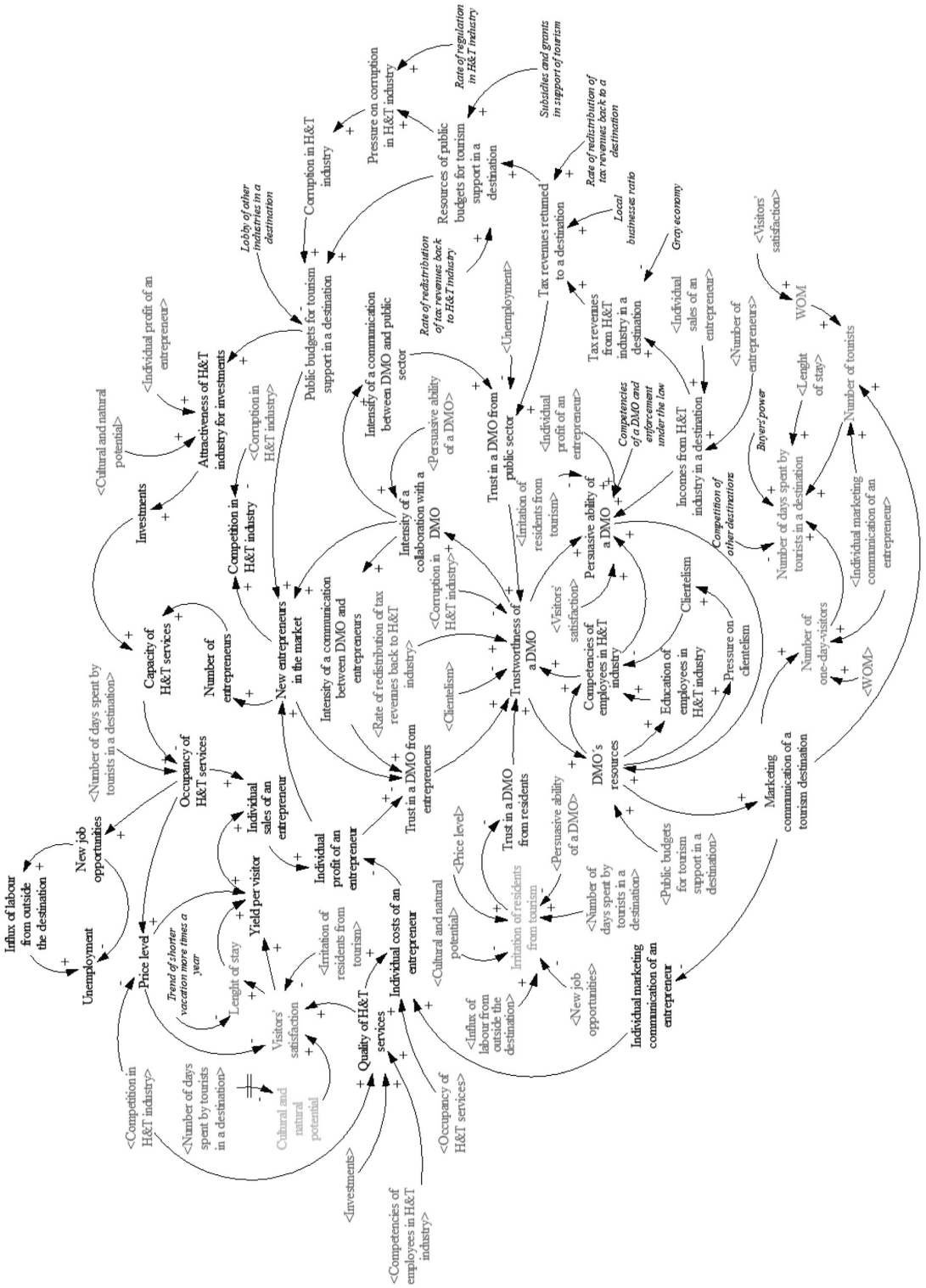

Figure 1. Tourism Destination System – Causal Loops Diagram

3.2. Causal loops affecting enterprises dynamics in the destination management system

Basic feedback loops that determine the dynamics of the model were identified from the perspective of entrepreneurs. The feedback loops may be either reinforcing (marked with R = reinforcing), or balancing (marked with B = balancing). Figure 2 depicts selected feedback loops that are integral to the above-mentioned causal loop diagram.

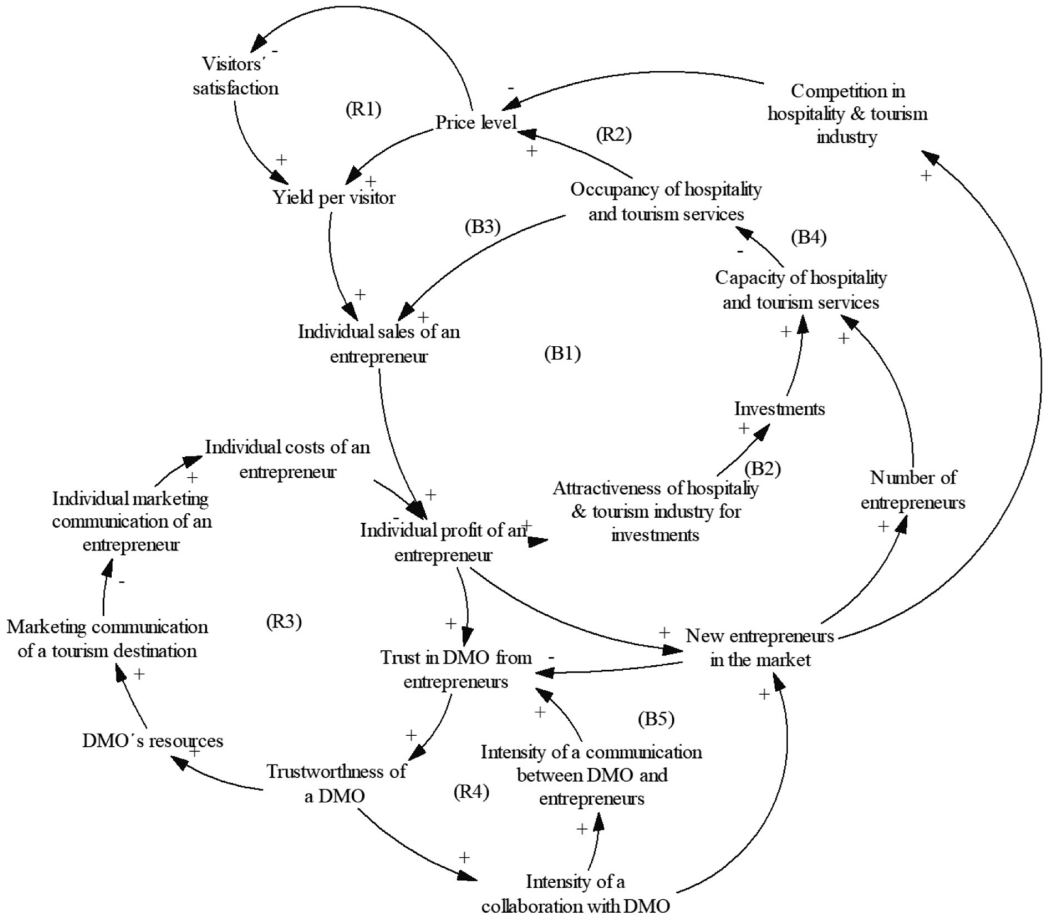

Figure 2. *Causal loops affecting enterprises dynamics in the destination management system*

B1 Balancing feedback loop determines the growth of the tourism sector from the perspective of quantity (capacity of the tourism services) based on investments. However, a higher capacity of tourism services, with the same number of visitors, will result in lower occupancy of tourism services.

B2 Balancing feedback loop determines the growth of the tourism sector from the perspective of quantity (capacity of the tourism services) based on the entry of new entrepreneurs into the market. A higher capacity of tourism services caused by a higher number of tourism services providers, with the same number of visitors, will result in lower occupancy of tourism services.

B3 Balancing loop includes, compared to the previous two relations (B1 and B2), the influence of the price level, which affects the yield per visitor, and thus, the individual sales and profits of entrepreneurs.

B4 Balancing feedback loop, where the increasing individual profit of an entrepreneur attracts new entrepreneurs to the sector; compared to the previous relations, this loop expresses competition that will grow with the entry of new business entities into the market. As a result, higher competition will put downward pressure on prices.

B5 Balancing feedback loop, in which, compared to all previous relations, the influence of DMO is already projected. If a DMO operates in a destination, higher individual profits of entrepreneurs will increase the trust in the DMO, and its trustworthiness in general. The DMO will cooperate more intensively, and its activities may attract new business entities into the sector. However, the entry of new business entities will pose a threat to the position of the existing enterprises in the destination, which might cause a decrease of trust in the DMO's activities from the part of such enterprises.

R1 Reinforcing feedback loop which includes the impact of visitors' satisfaction on the model's dynamics. Higher visitors' satisfaction causes higher yield per visitor, higher individual sales and entrepreneurs' profits, followed by higher capacities (from a number of new entities or the investment of the existing entities). Higher capacity will cause, with the constant number of visitors, lower occupancy of services and a decrease in prices. Lower prices will have a positive impact on visitor's satisfaction.

R2 Reinforcing feedback loop which includes the competition, in contrast to the previous relations, will grow with the entry of new business entities into the market. Greater competition will put downward pressure on prices, which will result in higher visitor's satisfaction.

R3 Reinforcing feedback loop in which DMO's activity is reflected. If a DMO operates in a destination, higher individual profits of entrepreneurs will increase the trust in the DMO, and its trustworthiness in general. A credible DMO is able to generate higher resources for its activity. Moreover, it will reinforce the marketing communication of the whole destination, which can lead to the savings of individual costs of business entities for marketing communication, and thus, the increase of their profits.

R4 Reinforcing feedback loop in which a higher intensity of communication between the DMO and entrepreneurs will increase the DMO's credibility as perceived by business entities. It will increase DMO's trustworthiness in general. If the DMO is trustworthy, entrepreneurs will be more willing to cooperate, and the intensity of cooperation will be higher.

The overview of all variables included in the CLD of the whole destination management system (Figure 1), including the number of feedback loops that contain the individual variables, is depicted in Table 1. The variables connected with the activities of business entities are in bold.

Table 1. Variables and Loops of the Tourism Destination System

Variable (endogenous / *exogenous*)	**Number of Causal Loops**
Attractiveness of H&T industry for investments	**22 468**
Price level	**7 626**
Tax revenues returned to a destination	20 616
Tax revenues from HT industry in a destination	17 533
Length of stay	1 093
Subsidies and grants in support of tourism	0
Trust in a DMO from residents	13 004
Trust in a DMO from entrepreneurs	16 302
Trust in a DMO from public sector	16 291
Trustworthiness of a DMO	32 766
Individual marketing communication of an entrepreneur	**336**
Individual costs of an entrepreneur	**21 277**
Individual sales of an entrepreneur	**12 092**
Individual profit of an entrepreneur	**32 766**
Intensity of a communication between DMO and entrepreneurs	3 677
Intensity of a communication between DMO and public sector	3 632
Intensity of a collaboration with a DMO	32 766
Investments	**30 276**
Irritation of residents from tourism	26 416
Capacity of H&T services	**30 439**
Clientelism	2 187
Competencies of a DMO and enforcement under the law	0
Competencies of employees in H&T	5 265
Competition of other destinations	0

Competition in H&T industry	**2 529**
Corruption in H&T industry	4 917
Buyers' power	0
Cultural and natural potential	b
Quality of H&T services	**14 171**
Lobby of other industries in a destination	0
Marketing communication of a tourism destination	307
Rate of redistribution of tax revenues back to a destination	0
Rate of redistribution of tax revenues back to H&T industry	0
Rate of regulation in H&T industry	0
Unemployment	**9 874**
New job opportunities	**4 232**
Number of one-day-visitors	2 833
Number of entrepreneurs	**4 734**
Number of days spent by tourists in a destination	6 967
Number of tourists	2 833
Local businesses ratio	0
Persuasive ability of a DMO	32 766
Incomes from H&T industry in a destination	22 591
Influx of labour from outside the destination	**4 208**
Visitors´ satisfaction	2 393
Grey economy	0
Pressure on clientelism	3 555
Pressure on corruption in H&T industry	4 502
Trend of shorter vacation more times a year	0
Public budgets for tourism support in a destination	5 473
New entrepreneurs in the market	**6 519**
Occupancy of HT services	**32 766**
Yield per visitor	**9 636**
Education of employees in H&T industry	1 1032
WOM	1 086
DMO´s resources	16 146
Resources of public budgets for tourism support in a destination	19 944

Source: Own calculation using Vensim Professional

From the enterprises' perspective, several variables in the model are included in a high number of causal loops. Using Vensim Professional software, we identified *Individual Profit of an Entrepreneur* and *Occupancy of Hospitality and Tourism Services* as the most frequent in the model (included in 32,766 causal loops). It indicates that the dynamics of the presented destination management system is closely connected with the main aims of enterprises.

To imagine the causality of the system, the causes tree of the *Individual Profit of an Entrepreneur* shows which variables affect the individual profits of entrepreneurs in the system (Figure 3). Moreover, the uses tree shows, which elements of the system are influenced by this variable (Figure 4).

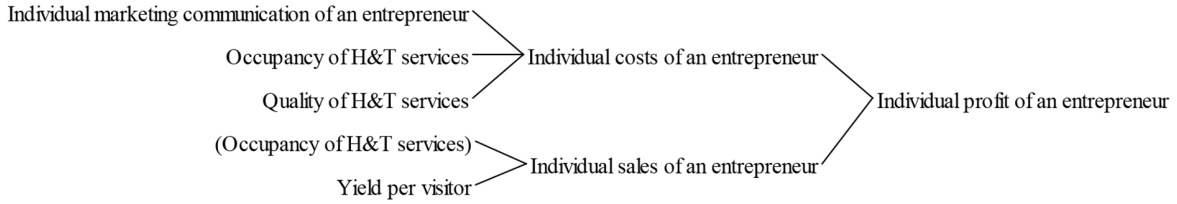

Figure 3. *Individual Profit of an Entrepreneur – Causes Tree*

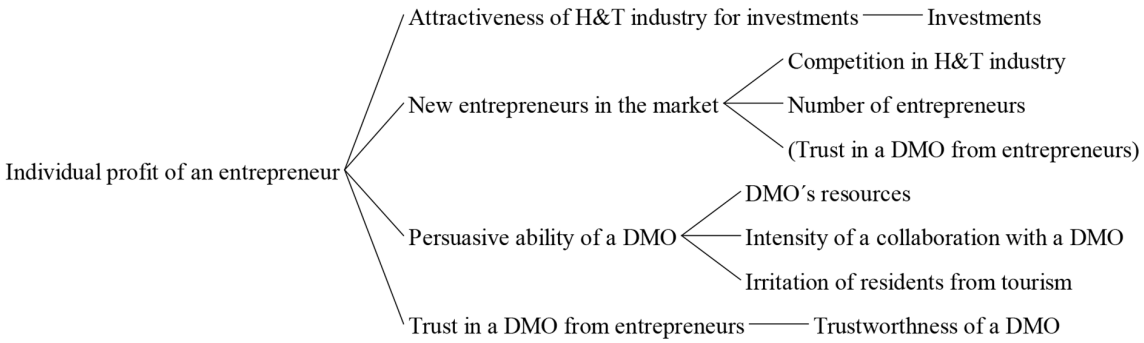

Figure 4. *Individual Profit of an Entrepreneur – Uses Tree*

Finally, other variables related to the enterprises' activities are included in a high number of causal loops (more than 10,000), such as Capacity of H&T services (30,439), Investments (30,276), Attractiveness of H&T industry for investments (22,468), Individual Costs of an entrepreneur (21,277), Quality of H&T services (14,171), or Individual Sales of an entrepreneur (12,092). Therefore, we can conclude that enterprises play a crucial role in destination management and create the core of the system.

4. FUTURE RESEARCH DIRECTIONS

A tourism destination is considered a dynamic complex system. Managing tourism destinations is uncertain, and destination managers have to make decisions in a complex environment, including a number of stakeholders with different management objectives and interests (Mai & Smith, 2018). System dynamics in travel and tourism research was used by a number of researchers (Borštnar et al., 2011; Jere Jakulin, 2016, 2017; Jere Lazanski and Kljajic, 2006; Mai and Smith, 2018; Patterson et al., 2004; Ropret et al., 2014; Sedarati et al., 2018; Štumpf and Vojtko, 2016; Tan, 2017; Tegegne et al., 2018; Vojtko and Volfová, 2015). Our study identifies the complexity of the destination management system and highlights the role of enterprises, supported by a number of causal loops in the system.

The proposed system dynamic model is considered a unique tool for DMOs to understand and deal with the soft systems and tourism development policies that determine the dynamics of the destination management system. Based on Jere Lazanski and Kljajic (2006), the proposed conceptual model was established by the authors as the observers/descriptors of the model. We can consider this fact as a limitation of the study since the model can suffer from the subjectivity of the authors to a certain extent. However, a conversion of the model into the Stock and Flows Diagram, which enables the calibration and simulation, will precise the model and represent the revenue for the future. Using simulations, destination management can focus business activities in destinations with a systematic explanation. The model will enable to simulate different combinations of policies, test their effectiveness, and find appropriate solutions.

The system dynamic models will be used for simulations of the travel and tourism industry in the post-COVID-19 era. The complex and system approaches will be much appreciated to understand the changing travel and tourism world and its dynamics.

5. CONCLUSION

The systems approach and complex system dynamics modelling deserve more attention in future research, regarding social, environmental, and economic sustainability in tourism destinations. These methods represent the scientific tools that can provide balanced, optimal results to find a consensus among various stakeholders' aims in tourism destinations. The proposed model can explain the tourism destination management system in connection with the post-COVID-19 travel behaviour. This tourism crisis has shown an enormous and sudden drop in international travels and reduced business activities in the hospitality and tourism sector.

The dynamics of tourism and simulations of post-COVID-19 scenarios represent a big challenge for the future. The current situation outlines the necessity of a complex and systemic approach in managing tourism destinations. Therefore, we consider our conceptual model a useful tool for decision-making support and sustainable destination development in the post-COVID-19 era.

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AESTHETIC GUEST EXPERIENCE IN RESTAURANT: A STATE-OF-THE-ART REVIEW

Suzana Marković[1]
Jelena Dorčić[2]
Dora Rašan[3]
Bruna Bucić[4]
Marko Blažić[5]

DOI:

Abstract: *The concept of customer experience has received considerable attention in various disciplines, particularly in tourism and hospitality research. However, the aesthetic guest experience has hardly been investigated in previous studies. Aesthetics involves what makes an object beautiful and what people feel when they encounter a beautiful object. Dining experience encompasses almost all senses together, which makes it difficult to measure this concept properly. Considering the important role of aesthetics in the dining experience, this study provides a review and synthesis of the literature to establish a foundation for the conceptual framework for measuring the aesthetic guest experience in restaurants. The main objectives of this study are to categorise and summarise the research on aesthetic guest experience, present a new conceptualization and conceptual model of the aesthetic guest experience in restaurants, and highlight the emerging trends and gaps in the literature. The findings of this study contribute to aesthetic theory and offer practical implications for restaurant managers regarding all aesthetic components that should be considered when designing a memorable aesthetic restaurant experience.*

Keywords: *Experience economy, Aesthetic experience, Restaurant, Content analysis, Descriptive analysis.*

1. INTRODUCTION

In the last decade, there have been structural changes in the elements of demand (Pine & Gilmore, 2011), which occur due to the development of technological achievements, where society is no longer satisfied with the classic offer of products and services, but strives to create memorable experiences. Therefore, it can be said that there has been a transition from a service economy to an experience economy.

Experience, however, is a complex, multidimensional concept. It has roots in many fields and disciplines (Beard & Russ, 2017), but this article will focus on experience in tourism and hospitality, as one of the social disciplines that have expansive growth in the market. In the hospitality industry, many academics have studied the impact of the dining experience on revenue, concluding that applying a sensory experience strategy can significantly increase catering revenue (Rozendaal & Schifferstein, 2010). Voss (2004) pointed out that experiences create strong emotional connections that serve as a powerful tool for branding and product differentiation in the marketplace.

[1] University of Rijeka, Faculty of Tourism and Hospitality Management; Primorska 42, Opatija, Croatia
[2] University of Rijeka, Faculty of Tourism and Hospitality Management; Primorska 42, Opatija, Croatia
[3] University of Rijeka, Faculty of Tourism and Hospitality Management; Primorska 42, Opatija, Croatia
[4] University of Rijeka, Faculty of Tourism and Hospitality Management; Primorska 42, Opatija, Croatia
[5] University of Rijeka, Faculty of Tourism and Hospitality Management; Primorska 42, Opatija, Croatia

Due to the importance of achieving a positive experience for the guests, the so-called 4E model was created (Pine & Gilmore, 2011), which includes four basic dimensions: (1) entertainment, (2) education, (3) aesthetic and (4) escape. In the last few years, there has been increasing competition in the restaurant industry to achieve an aesthetic experience for guests. Consequently, there was a need to determine its components. The term "aesthetics" has been used since Baumgarten in the 18th century when the community started to discuss the human feeling for the essence of beauty (Horng & Hsu, 2020). Since then, researchers have become aware that aesthetic experience does not involve only aesthetic qualities but also aesthetic perceptions (Folkmann, 2010; Horng & Hsu, 2020). The ability to satisfy human needs for novelty and curiosity represents the hedonic quality-stimulation dimension which can be described as creative; original and innovative refers to expressive aesthetics (Lavie & Tractinsky, 2004).

It is important to emphasize the relationship of the terms "aesthetics" and "restaurant experience". The need to explore the aesthetic restaurant experience as the main concept has emerged in recent years. There are only a few studies that focused specifically on aesthetic experience in restaurant context (Bekar, 2017; Horng & Hsu, 2020, 2021). Aesthetic experience in restaurant provides the guest with 'perceive-feel-sense' an artwork, which in turn implies the activation of sensorimotor, emotional and cognitive mechanisms and consequently determines the level of guest satisfaction (Di Dio & Vittorio, 2009).

In order to better understand the state of knowledge in the contemporary scientific literature, this paper critically examines and summarises the existing literature on aesthetic guest experience using a conceptual approach. This approach is extremely valuable in mapping the current state of knowledge on the topic by analysing previous research in terms of conceptualisations, theoretical models and research methods. As a result of this process, a new conceptual model of the aesthetic guest experience in restaurants is presented, emerging trends are discussed, and gaps in the literature are identified.

2. AIM OF THE REVIEW

The main aim of this review is to analyse the relevant scientific literature in order to identify and evaluate studies measuring aesthetic guest experience in restaurant.

The specific aims of this research are:

(1) to define the concept of aesthetic guest experience in restaurant,
(2) to explore models and methods for measuring aesthetic restaurant experience,
(3) to analyse previous research on the aesthetic restaurant experience according to pre-established criteria such as author and year, country, domain, method and dimensions,
(4) to establish a foundation for the conceptual framework for measuring the aesthetic guest experience in restaurants.

3. METHODOLOGY

Relevant scientific literature was searched by keywords such as "*aesthetic restaurant experience*", "*restaurant experience quality*" and "*restaurant experience*" in the following online databases: Google Scholar, Elsevier and Emerald insight.

After searching by these keywords, the papers with the previously mentioned online databases were downloaded. In the following process, elimination criteria were used to select the publication to be included in the review. Following exclusion criteria were applied:

1) Papers written in English language,
2) Papers published only in the period from 2008 to 2021,
3) Research applied in the context of the restaurant and focused on measuring the aesthetics in the restaurant (either as one of the dimensions of some higher constructs or as the main concept).

Following the elimination process, a total of 26 scientific articles were included in the final sample. Furthermore, the scientific research method used to analyse collected data was content analysis (Knutson et al., 2010; Volos, 2009; Wijaya et al., 2013; Woodside & Dubelaar, 2002). Content analysis is conducted as qualitative research (Tkalac Verčić et al., 2010) the aim of which was to investigate the topic of aesthetic restaurant experience in order to create a conceptual framework for future measurement. The content analysis method is used to identify and capture specific content, the attributes of which are additionally analysed and included in the conceptual framework (Žugaj et al., 2006). 26 scientific studies were analysed according to predefined criteria such as author and year, country, domain, method and dimensions of the research.

4. RESULTS

This section presents the progression of 26 identified scientific articles on the topic of aesthetic guest experience in restaurants. The first part of the section presents definitions of the concept of the aesthetic restaurant experience, while the second part of the section presents a content analysis of previous research on the aesthetic restaurant experience.

4.1. The Concept of Aesthetic Restaurant Experience

Service experience is defined as the customer's direct experience of the service process, the organisation, the facilities, other customers and how the customer is treated by the service firm's representatives (Johnston & Clark, 2005). It is a mental journey that leaves the customer with memories of having performed something special, having learned something or just having fun (Sundbo & Hagedorn-Rasmussen, 2008).

Customer delight is a customer's experience of a product or service that provides an unanticipated level of value or satisfaction (Crotts & Magnini, 2011). Zeithaml (1988) in this context emphasizes the importance of the perceived value that he characterized as "overall evaluation of the benefits and costs from a customer's brand experience; consumer's overall assessment of the utility of a product based on perceptions of what is received and what is given".

From a gastronomic industry perspective, the food service provides those experiences and feelings that individuals believe they should have on vacation (Johns & Kivela, 2008), while the experience of consuming food is defined in the literature as "pivotal behaviour that can fulfil sensory, cultural, social and epistemic motivations" (Correia et al., 2020).

After the service is provided, the restaurant guests evaluate the whole set of elements and one of them is aesthetics. In a small number of studies, the authors discussed the aesthetic compo-

nent, mainly within areas such as: the restaurant environment (Canny, 2014; Han & Ryu, 2009; Hanks & Line, 2018; Horng & Hsu, 2020; Hwang & Ok, 2013; Ryu et al., 2012; Ryu & Shawn Jang, 2008; Wu & Liang, 2009), aesthetic labour (Tsaur et al., 2015; Warhurst et al., 2000) and food aesthetics (Loporcaro et al., 2017).

Aesthetic experience is a process to perceive-feel-sense an object, represent active sensation, emotion, cognition and integrate the aesthetic pleasure appraisal (Di Dio & Vittorio, 2009). Likewise, the aesthetic experience can be conceived as "sensitive selection or appreciation of formal, expressive or symbolic qualities of the product or environment, providing non-instrumental benefits that result in pleasure or satisfaction" (Fiore, 2010). As such, it allows the beholder to 'to perceive-feel-sense' an artwork, which in turn implies the activation of sensorimotor, emotional and cognitive mechanisms (Di Dio & Vittorio, 2009).

The artistic dishes must be aesthetically composed, thereat the food aesthetic represents an interaction between taste and sight that creates a certain influence on the customer's choices about food (Loporcaro et al., 2017). The process of serving food is not possible without the restaurant staff. Therefore, their aesthetic labour is also important for the guest, and can be considered as "an environment stimulus presented by the first staff" (Warhurst et al., 2000). Furthermore, another essential element in creating an aesthetic experience is the physical environment, which includes architectural design, interior design and decor that contribute to the attractiveness of the dining environment (Wakefield & Blodgett, 1994).

Regardless of the current traditional perspective of aesthetics from only the visual aspect, it is necessary to include all five senses in the examination of the perception of guests. For a more detailed understanding of this topic, the following section presents an overview of the models used to measure the aesthetic restaurant experience, either as one of the dimensions of some higher constructs or as the main concept.

4.2. Measuring the Aesthetic Restaurant Experience

In order to achieve a competitive advantage, service companies strive to achieve the greatest possible restaurant experience for guests. Consequently, the need arose for the measuring of the restaurant experience. Due to the lack of literature, in the review of previous research, special emphasis was placed on aesthetic experience.

Table 1 summarizes the main findings of 26 collected scientific articles. As shown in Table 1, data of extracted articles were chronologically analysed following by author and year, country, conference/journal, method, constructs and/or dimensions.

Of the total number of studies shown in the table, twenty-three of them were categorised as original scientific articles (88.46%), and the remaining publications were presented at congresses and conferences (11.56%).

The majority of journal articles were published in the International Journal of Hospitality Management (30.43%), Journal of Hospitality Marketing and Management (13.04%) and Journal of Hospitality and Tourism Management (8.70%). According to the type of research, most of the studies used a quantitative research approach (69.23%) followed by qualitative (19.23%) and mixed approach (11.54%).

Table 1. Aesthetic restaurant experience – previous research

AUTHOR (YEAR)	COUNTRY	JOURNAL / CONFERENCE	Method	CONSTRUCTS AND/OR DIMENSIONS
Ryu & Shawn Jang (2008)	USA	Journal of Foodservice Business Research	Quantitative	Six dimensions of DINERSCAPE model: (1) Facility Aesthetics, (2) Ambience, (3) Lighting, (4) Table Settings, (5) Layout, (6) Service Staff
Liu & Jang (2009a)	USA	International Journal of Hospitality Management	Quantitative	Three constructs: (1) Restaurant attributes, (2) Consumer satisfaction, (3) Behavioural intentions Four dimensions are included within the construct restaurant attributes: (1) Food-related attribute, (2) Service-related attribute, (3) Atmospherics-related attributes, (4) Other attributes
Liu & Jang (2009b)	USA	International Journal of Hospitality Management	Quantitative	Five constructs: (1) Dining atmospheric, (2) Positive emotions, (3) Negative emotions, (4) Perceived value, (3) Behavioural intentions Four dimensions are included within the construct dining atmospheric: (1) Interior design, (2) Ambience, (3) Spatial layout, (4) Human elements
Wu & Liang (2009)	Taiwan	International Journal of Hospitality Management	Quantitative	Three constructs: (1) Service encounter elements, (2) Experiential values, (3) Consumer satisfaction Three dimensions are included within the construct service encounter elements: (1) Restaurant environment factors, (2) Interaction with service employee, (3) Interaction with other consumer Three dimensions are included within the construct experiential values: (1) Fair price, (2) Time efficiency, (3) Excellent service, (4) Aesthetics, (5) Escapism
Jang & Namkung (2009)	USA	Journal of Business Research	Quantitative	Six constructs: (1) Product quality, (2) Atmospherics, (3) Service quality, (4) Emotion (positive), (5) Emotion (negative), (6) Behavioural Intentions

AUTHOR (YEAR)	COUNTRY	JOURNAL / CONFERENCE	Method	CONSTRUCTS AND/OR DIMENSIONS
Marković et al. (2010)	Croatia	Tourism and Hospitality Management	Quantitative	Seven factors of DINERSERV model: (1) Cleanliness and appearance of facilities and staff, (2) Assurance, (3) Individual attention, (4) Satisfaction and loyalty, (5) Basic demands, (6) Responsiveness, (7) Reliability Two factors of customers' restaurant service perception: (1) Restaurant ambience, (2) Overall dining experience
Walls et al. (2011)	USA	Journal of Hospitality Marketing and Management	Qualitative	Two constructs: (1) Physical Environment, and (2) Human Interaction Four dimensions are included within the construct physical environment: (1) Ambience, (2) Multisensory, (3) Space/functional, (4) Sign/Symbol/Artefact
Marković et al. (2011)	Croatia	1st International Scientific Conference Tourism in South East Europe 2011.	Quantitative	Seven factors of DINERSERV model: (1) Cleanliness and appearance of facilities and staff, (2) Assurance, (3) Individual attention, (4) Satisfaction and loyalty, (5) Basic demands, (6) Responsiveness, (7) Reliability Five factors of city restaurant customers' expectations: (1) Assurance and empathy, (2) Cleanliness and reliability, (3) Appearance of facilities and staff, (4) Satisfaction and loyalty, (5) Staff quality Eight factors of city restaurant customers' perceptions: (1) Satisfaction and loyalty, (2) Appearance of staff and restaurant interior, (3) Individual attention, (4) Confidence, (5) Appearance of dining area and rest rooms, (6) Reliable service, (7) Prompt service, (8) Staff quality and attractive exteriors

AUTHOR (YEAR)	COUNTRY	JOURNAL / CONFERENCE	Method	CONSTRUCTS AND/OR DIMENSIONS
Ryu & Han (2011)	Korea	International Journal of Hospitality Management	Quantitative	Four constructs: (1) Physical environment, (2) Disconfirmation, (3) Customer satisfaction, (4) Customer Loyalty Six dimensions are included within the construct physical environment: (1) Facility Aesthetics, (2) Ambience, (3) Lighting, (4) Table Settings, (5) Layout, (6) Service Staff
Wardono et al. (2012)	Japan	Procedia - Social and Behavioural Sciences	Qualitative	Four constructs: (1) Physical service environment, (2) Customers' perceived sociability, (3) Emotion, (4) Behavioural intention Three dimensions are included within the construct physical service environment: (1) Colours, (2) Lighting, (3) Décor
Horng et al. (2013)	Taiwan	Tourism Management	Qualitative	Four dimensions of Innovative Physical Dining Environment: (1) Eco-friendless, (2) Creativity, (3) Aesthetic, (4) Performance
Marković et al. (2013)	Croatia	Recent Advances in Business Management & Marketing	Quantitative	Seven factors of DINERSERV model: (1) Tangibles, (2) Assurance, (3) Responsiveness, (4) Reliability, (5) Empathy, (6) Price, (7) Satisfaction
Canny (2014)	Indonesia	International Journal of Innovation, Management and Technology	Quantitative	Three constructs: (1) Dining experience attributes, (2) Consumer satisfaction, (3) Behavioural intention Three dimensions are included within construct dining experience attributes: (1) Food quality, (2) Service quality, (3) Physical environment
Tsaur et al. (2015)	Taiwan	International Journal of Hospitality Management	Mixed	Six constructs: (1) Aesthetic labour, (2) Food quality, (3) Service quality, (4) Atmospheric, (5) Positive emotion, (6) Behavioural intention Three dimensions are included within construct aesthetic labour: (1) Aesthetic trait, (2) Aesthetic requirement, (3) Service encounter

AUTHOR (YEAR)	COUNTRY	JOURNAL / CONFERENCE	Method	CONSTRUCTS AND/OR DIMENSIONS
Marković et al. (2015)	Croatia	Proceedings of 24th CROMAR Congress : Marketing Theory and Practice - Building Bridges and Fostering Collaboration	Quantitative	Four constructs: (1) Perceived quality, (2) Positive emotions, (3) Negative emotions, (4) Behavioural intention Three dimensions are included within the construct perceived quality: (1) Food quality, (2) Service quality, (3) Atmospherics
Bekar (2017)	Turkey	The Journal of Academic Social Science Studies	Quantitative	Three constructs: (1) Aesthetic value components, (2) Customer aesthetic experiences, (3) Behavioural Intentions Three dimensions are included within the construct aesthetic value components: (5) Interior visual appeal, (6) Exterior visual appeal, (7) Sensory appeal
Ouyang et al. (2017)	USA	Journal of Hospitality Marketing and Management	Quantitative	Three constructs: (1) Food aromas, (2) Emotion, (3) Impression of food and restaurant
Her & Seo (2018)	USA	International Journal of Hospitality Management	Quantitative	Four constructs: (1) Social identity, (2) Anticipated loneliness, (3) Anticipated negative evaluation from others, (4) Intention to eat alone in the restaurant
Hanks & Line (2018)	USA	International Journal of Hospitality Management	Quantitative	Four constructs: (1) Social Servicescape, (2) Attitude to Restaurant, (3) Experience Satisfaction, (4) Cognitive Loyalty Two dimensions and six sub-dimensions are included within the construct social Servicescape: (1) Employee Servicescape (Perceived Similarity, Physical Appearance, Suitable Behaviour), (2) Customer Servicescape (Perceived Similarity, Physical Appearance, Suitable Behaviour) Three dimensions are included within the construct Cognitive Loyalty: (1) Return Intention, (2) WOM Intention, (3) EWOM Intention
Paakki et al. (2019)	Finland	International Journal of Gastronomy and Food Science	Mixed	Three dimensions: (1) Aesthetics in food, (2) Colours in food, (3) Green colour in the eating surroundings
Horng & Hsu (2020)	Taiwan	Journal of Hospitality and Tourism Management	Qualitative	Four dimensions: (1) Physical environment, (2) Product and service, (3) Employee's aesthetic traits, (4) Other customer's aesthetic traits

AUTHOR (YEAR)	COUNTRY	JOURNAL / CONFERENCE	Method	CONSTRUCTS AND/OR DIMENSIONS
Wen et al. (2020)	USA	Journal of Hospitality and Tourism Management	Mixed	Five constructs: (1) Music Enjoyment, (2) Music Congruency, (3) Perceived Authenticity. (4) Satisfaction, (5) Behavioural Intention
Oh & Kim (2020)	China	Tourism Management Perspectives	Qualitative	Ten dimensions: (1) Price, (2) Reputation, (3) Occasions, (4) Location, (5) View, (6) Desserts, (7) Drinks, (8) Food, (9) Service, (10) Ambiance
Apaolaza et al. (2020)	Chile	International Journal of Contemporary Hospitality Management	Quantitative	Four constructs: (1) Aesthetic value, (2) Escapism, (3) Service excellence, (4) Customer satisfaction, (5) Customer loyalty
Carins et al. (2020)	Australia	Food Quality and Preference	Quantitative	Three constructs: (1) Facility Aesthetics, (2) Perceived Food Variety, (3) Satisfaction
Horng & Hsu (2021)	Taiwan	Journal of Hospitality Marketing and Management	Quantitative	Four constructs: (1) Aesthetic guest experience (dining environment) (2) Pleasantness, (3) Memorable experience, (4) Behavioural intentions Four dimensions are included within the construct aesthetic guest experience: (1) Physical environment, (2) Product and service, (3) Employee's aesthetic traits, (4) Other customer's aesthetic traits

Source: Author's research

Geographic analysis showed that most of the research was conducted in the United States (34.62%), Taiwan (19.23%) and Croatia (15.38%). All researches conducted in Croatia, which are listed in the table, were published by Professor Suzana Marković and her associates.

In most publications, the aesthetic experience was measured as one of the four components which produce a positive experience for the guests in the so-called 4E model, while only in a few studies it was measured as the main concept (Bekar, 2017; Horng & Hsu, 2020, 2021; Loporcaro et al., 2017; Paakki et al., 2019; Tsaur et al., 2015). However, of the aforementioned publications, only in the research by Bekar (2017) and Horng & Hsu (2020, 2021) the main focus was on measuring the overall aesthetic restaurant experience. Bekar (2017) uses three components of the restaurant aesthetic value in determining the overall aesthetic experience of restaurant guests and their behavioural intentions. These aesthetic values are: (1) Interior visual appeal, (2) Exterior visual appeal and (3) Sensory appeal.

On the other hand, Horng and Hsu (2020) use a larger number of dimensions in measuring the aesthetic restaurant experience, more precisely four of them, and these are: (1) Physical environment, (2) Product and service, (3) Employee's aesthetic traits and (4) Other customer's aesthetic traits.

The same authors in 2021 tested the conceptual model developed in 2020, but this time applying the so-called S-O-R model in measuring. The main goal of this research was to determine the relationships among aesthetic stimulation, pleasantness, behavioural intentions, and memorable experiences in the restaurant. It is important to point out that within the construct of the aesthetic restaurant experience, identical dimensions were used as in their previous study in order to test the developed model.

Besides previously mentioned models for measuring overall aesthetic experience, in literature is identified the model focused on measuring the aesthetic labour. Aesthetic labour is defined as employees exhibiting the capacities and attributes for embodying an organization (Warhurst et al., 2000). This model was developed by Tsaur et al. (2015) and in measuring they use the following dimensions: (1) Aesthetic trait, (2) Aesthetic requirement and (3) Service encounter.

Measurement of food aesthetic was the main goal in the study by Paakki et al. (2019). In the research, the authors determined three important dimensions in measuring the aesthetic food experience: (1) Aesthetics in food, (2) Colours in food and (3) Green colour in the eating surroundings.

Overall, based on the literature review the following conceptual framework for measuring the aesthetic restaurant experience of guests is proposed (see Figure 1).

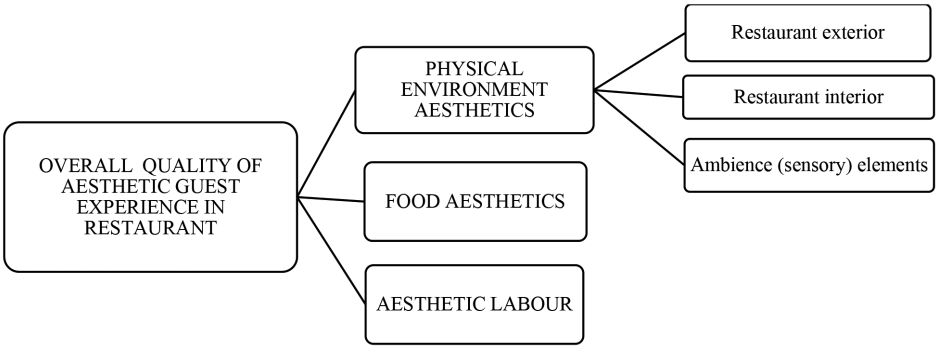

Figure 1. Conceptual framework for measuring the aesthetic restaurant experience
Source: Author's research

It is possible to see from figure 1 that this research has identified three main dimensions, which are: (1) physical environment, (2) food aesthetics and (3) aesthetic labour.

The following sub-dimensions are included within the physical environment dimension*:* ***restaurant exterior*** (Bekar, 2017; Horng & Hsu, 2020, 2021; Marković et al., 2011), ***restaurant interior*** (Bekar, 2017; Canny, 2014; Carins et al., 2020; Horng & Hsu, 2020, 2021; Liu & Jang, 2009b; Ryu & Han, 2011; Ryu & Shawn Jang, 2008; Wardono et al., 2012), ***ambience (sensory) elements*** (Bekar, 2017; Canny, 2014; Horng & Hsu, 2020, 2021; Jang & Namkung, 2009; Liu & Jang, 2009b; Marković et al., 2010, 2015; Oh & Kim, 2020; Ryu & Han, 2011; Ryu & Shawn Jang, 2008; Tsaur et al., 2015; Walls et al., 2011; Wardono et al., 2012; Wen et al., 2020).

In addition to the physical environment in this study, the **food aesthetics** dimension was identified (Canny, 2014; Horng & Hsu, 2020; Jang & Namkung, 2009; Liu & Jang, 2009a; Marković

et al., 2015; Oh & Kim, 2020; Ouyang et al., 2017; Paakki et al., 2019; Tsaur et al., 2015). The food aesthetics implies the visual appeal of dish, delicious and authentic food.

The last dimension - **aesthetic labour** refers to the aesthetic appearance of employees and their behaviour (Apaolaza et al., 2020; Canny, 2014; Hanks & Line, 2018; Horng et al., 2013; Horng & Hsu, 2020, 2021; Jang & Namkung, 2009; Liu & Jang, 2009a, 2009b; Marković et al., 2011, 2013, 2015, 2010; Oh & Kim, 2020; Ryu & Han, 2011; Ryu & Shawn Jang, 2008; Tsaur et al., 2015; Walls et al., 2011; Wardono et al., 2012; Wu & Liang, 2009).

5. CONCLUSION

Due to increasing competition in the restaurant industry, this review paper recognized the importance of examining and measuring the aesthetic restaurant experience. Although this review has provided insights into the current state of the aesthetic restaurant experience, it has certain limitations. Specifically, this literature review considered only articles published in English between 2008 and 2021. Future research should, therefore, cover a wider period, include other relevant scientific databases and use other keywords to further capture the concept of the aesthetic restaurant experience. It will be interesting to apply a bibliographic analysis to gain an even more detailed insight into previous research.

The review of the existing literature shows that the aesthetic restaurant experience is a complex concept as it involves multiple factors in its measurement. Based on the review of the selected 26 scientific articles, this study identifies the knowledge gaps and suggests future research directions. Much of the existing research on customer experience is descriptive rather than explanatory. Future research can investigate the differences in diners' and restaurateurs' perceptions of the aesthetic restaurant experience. This will provide a framework for better delivery of the overall restaurant experience. The methodological analysis of scientific articles revealed that the majority of studies used a quantitative approach. Therefore, future research can use a qualitative approach (such as sentiment analysis of online reviews) to explain the aesthetic restaurant experience in the context of social media. Another area of research is to investigate the causal relationship between different variables and the aesthetic restaurant experience using an experimental design. The conceptual framework presented in this study could be used to investigate the overall quality of aesthetic guest experience in restaurant. Indeed, the preliminary framework is not comprehensive, so further research is needed to confirm the reliability and validity of the model.

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