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# **Economic and Social Development**

101<sup>st</sup> International Scientific Conference on Economic and Social Development –  
"Roadmap to NetZero Economies and Businesses"

## **Book of Proceedings**

Editors:

**Jelena Janjusevic, Josko Lozic, Vlatka Ruzic**

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# NON-FINANCIAL REPORTING AND FINANCIAL PERFORMANCE OF COMPANIES LISTED ON THE ZAGREB STOCK EXCHANGE

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## **ABSTRACT**

*Sustainable business has become the main business challenge for companies due to its influence on business strategy. The biggest challenge for all companies is how to boost sustainable development and business profitability. Without good results, companies cannot survive, nor develop a sustainable business. At the end of 2022, the European Commission adopted Directive (EU) 2022/2464 which increased the number of reporting entities and reporting transparency. This paper covers a sample of the financial statements of 31 companies listed on the Zagreb Stock Exchange for the 2012–2021 period (310 firm-year observations) and it examined whether there was a correlation between business performance Tobin's Q, ROA, ROE, and the obligation to publish non-financial reports, voluntary or obligatory. A statistically significant negative correlation was found between ROA after obligatory publications and non-financial reports. It was found a positive statistically significant correlation between ROE before obligatory publishing of reports and non-financial reports. In the study, there was not found a statistically significant difference in Tobin's Q, ROA or ROE depending on which period of publication is calculated, voluntary or obligatory. An increasing number of Croatian companies deal with ESG issues and voluntarily publish their non-financial reports. All stakeholders should pay more attention to work in ESG areas and value those who do.*

**Keywords:** *ESG, Non-Financial Reports, ROA, ROE, Tobin's Q*

## **1. INTRODUCTION**

In modern business conditions, corporations consider non-financial reporting to be an instrument for integrating the concept of sustainable development into their business strategy. In this manner, by combining long-term business profitability and social responsibility, and environmental protection, they direct their business toward sustainability. In McKinsey's survey (2017), 70% of the respondents had formally established business sustainability management. Sustainable development as an approach to a broader ecological paradigm aims to reconcile three pillars: ecological, social, and economic. For purposes of transparency in reporting to all stakeholders on the role of sustainable development in their operations, corporations also use the Sustainable package, which includes Directives, the EU Taxonomy and standards. The Directive 2022/2464 (2022) helps investors, consumers, and other stakeholders to assess the social, environmental, and governance impact of the operations of individual companies. Companies considered buyers the most important stakeholder group even before the introduction of the legal obligation to publish non-financial reports (Osmanagić Bedenik et al., 2016). Investors want to have a complete picture of the operations of companies they invest in, and besides financial information, it is important to determine the market position of the companies and investment feasibility. According to McKinsey's survey (2017), the strongest motivating factors for companies to adopt a sustainable mindset in 2017 were alignment with the company's goals, missions, reputation and creating new opportunities for growth. Similar conclusions on reporting motives such as reputation, strategic advantages, and innovation have been reached by Osmanagić Bedenik et al. (2016). At the beginning of the legal introduction of the publication of non-financial information, many authors investigated the quality of the published reports.

The Matuszak and Różanska (2017) examination of the quality of corporate social responsibility (CSR) of reporting companies listed on the Warsaw Stock Exchange (WSE) suggested that the new reporting obligation should increase the scope and quality of non-financial disclosure. Sustainable business reports were, in most cases, not aligned with the new requirements in the Directive 2014/95/EU. Companies only reported on human rights and the fight against corruption. Given that sustainable development is nowadays imperative, company management should also allocate funds in the financial plans for addressing global ESG problems. The KPMG survey (2022) has shown that companies prefer narrative descriptions to highlight potential risk impacts rather than quantification of such risks. Quantification of impacts is carried out in only 2% of the companies in N100 and G250. The “doing good” can have a direct impact on company's ability to “do well” (Spiliakos, 2018). The aim of this paper is to investigate on the entities subject to non-financial reporting listed on the Zagreb Stock Exchange whether the introduction of the non-financial reporting obligation led to an increase in market share prices as an increase in financial performance. The paper consists of five parts including Introduction and Conclusion. The literature review is provided in the second part. The third part covers methods and research. The fourth part presents research results and discussion.

## **2. THEORETICAL FRAMEWORK**

In this part is explained legal framework, literature review and working hypotheses.

### **2.1. Legal Framework**

The Sustainable package includes Directives, the EU Taxonomy (2020), as well as standards for producing sustainability reports. At the end of 2022, the European Commission adopted the Corporate Sustainability Reporting Directive – CSRD (EU) 2022/2464. The Directive EU 2022/2464 reviews the obligations introduced by the Non-Financial Reporting Directive (NFRD), Directive 2014/95/EU. The aim of this amendment is to establish common reporting rules that will increase the transparency and regularity of disclosure of information on the environmental and social impacts of activities and on potential risks by introducing more reporting entities. The EU Taxonomy (2020/852), laid down in the Taxonomy Regulation, provides investors with information on which economic activities are considered sustainable to enhance their investments. Activities prescribed by the EU Taxonomy contribute to the development of six environmental objectives: climate change mitigation; climate change adaptation; the sustainable use and protection of water and marine resources; the transition to a circular economy; pollution prevention and control, and the protection and restoration of biodiversity and ecosystems. Directive 2014/95/EU or the Non-Financial Reporting Directive (NFRD), which entered into force in 2017, denoted the first legal introduction of the publication of non-financial reports for all public companies with more than 500 employees for all EU Member States. Directive 2014/95/EU has adopted rules for the publication of non-financial information for large companies. However, large companies were already familiar with non-financial reporting, given that many had voluntarily published non-financial report years before the Directive was adopted. The adoption of a new Directive 2022/2464 increased the number of reporting entities, as well as the liability of companies. Corporate reporting entities should publish detailed information on sustainability issues, allowing comparability and verification of ESG data, and facilitating the transition to a sustainable economy. All reporting entities will report according to the European Sustainability Reporting Standards (ESRS) published by the EFRAG (2022) (European Financial Reporting Advisory Group) which should be adopted by the EU Commission by the end of June 2023. Sustainability reports will no longer be standalone documents but integrated reports covering the management report, the financial report, and the sustainability report. The reports will need to be verified externally by statutory auditors or



other verification service providers. The new regulations extend the scope of reporting entities, and the application of Directive 2022/2464 will be carried out in four stages:

- Reporting in 2025 on the financial year 2024 for companies already subject to non-financial reporting
- Reporting in 2026 on the financial year 2025 for large companies (over 250 employees and/or turnover of 40 million euros and/or 20 million euros in total assets) that are not subject to reporting yet
- Reporting in 2027 for the financial year 2026 for SMEs listed in the stock exchange (other than micro enterprises) and other financial corporations
- Reporting in 2029 for the financial year 2028 for third country enterprises with net turnover above 150 million in the EU if they have at least one EU subsidiary or branch exceeding certain thresholds.

Under the required double materiality principle, reporting entities will have to report on how their business model affects their sustainability and how external sustainability factors (such as climate change or human rights issues) affect their activities. This will allow investors and other stakeholders to make informed decisions on sustainability issues. Prior to the publication of the European Sustainability Reporting Standards (ESRS) (which will be adopted by the EU Commission in June 2023), developed by the EFRAG, when preparing a non-financial report, reporting entities could rely on generally recognised reporting frameworks: national, EU, or international reporting frameworks. Reporting entities specify the selected framework in the report. The International Reporting Framework typically includes:

- GRI (Global Reporting Initiative) Guidelines
- ISO 26000 (International Organisation for Standardisation 26000) Framework
- Global Compact Guidelines (UNGC)
- OECD Guidelines are intended for multinational companies.
- IIRC (International Integrated Reporting Council) Guidelines
- Eco-Management and Audit Scheme (EMAS)
- United Nations (UN) Global Agreement; Guiding principles on entrepreneurship and human rights for the implementation of the UN framework program “Protection, Respect, and Assistance”
- ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy of the International Labour Organisation.

Sustainability reporting has been intensively developing since the mid-1990s. The best known is the Global Reporting Initiative – GRI, founded in 1997, which was the first to develop a comprehensive sustainability reporting framework. The GRI remains the most used reporting standard (KPMG, 2022) globally with increased application in N100 (68%) and G250 (78%) companies. The benefits of full reporting (Glavočević and Radman Peša, 2013, p. 16) for company stakeholders are the following: stakeholders’ trust in management knowledge of the entire business; an indicator that the business is efficient and that business strategy is in line with long-term and sustainable value creation; increased transparency that results in stronger trust and reputation among stakeholders; increased transparency that may result in reduced capital costs: achieving a competitive position on the market by a better understanding of business risks and challenges.

### *2.1.1. Legal framework in Croatia*

The first reports on sustainable business operations in Croatia (Osmanagić Bedenik et al., 2016) were published in the period 1995–2000, but the majority were published in the period 2006–

2010 (41.18%). In the Republic of Croatia, as in other Member States, Directive 2013/34/EU and Directive 2014/95/EU have been incorporated into the Accounting Act (2022). The new Directive 2022/2464 will be incorporated into the Accounting Act in accordance with the statutory deadline. In addition to these directives, non-financial reports are also prepared in accordance with the Taxonomy Regulation (2020) and the related delegated regulations and acts as well as current guidelines of the Croatian Financial Services Supervisory Agency for the preparation and publication of ESG relevant issuer information. Entities subject to disclosure of a non-financial report most commonly publish information on business development, business results, entrepreneur's position, and the impact of their activities regarding at least environmental, social, and personnel matters, respect for human rights, the fight against corruption and bribery issues in their management report, and do not publish them as an independent report. The entities subject to publication of non-financial reports most commonly implement the Global Reporting Initiative (GRI) standards, the OECD (Organisation for Economic Cooperation and Development) Guidelines for Multinational Enterprises, and the ISO 26000 standard of the International Organization for Standardisation (ISO).

## **2.2. Literature review and working hypotheses**

According to Firedman (1970), there is only one social responsibility for corporate executives: to earn as much as possible for their shareholders. Social responsibility is permissible when it serves the interests of the corporation. Managers are nowadays trying to attract new investors through sustainable growth by encouraging ESG investments, as well as by publishing these information. Investors need information to make quick and sound investment decisions. Given that companies provide only part of the required information, investors and analysts directly focus on different forms of disclosure (e.g., websites, environmental reports, annual reports) when they examine CSR (Clarkson et al., 2013; Tilling & Tilt, 2010). According to Bebbington et al. (2008), the volume of disclosure of social and environmental information has increased over the years. However, Kim et al. (2012) analyse whether CSR disclosure can be considered a responsible, transparent, and reliable way of reporting to shareholders. According to the results, socially responsible companies are less likely to manipulate financial information and be subject to investigations. However, it cannot be concluded that any voluntary disclosure of ESG information serves transparent reporting without devoting attention to the motives of the disclosure (Bouten et al., 2012). In contrast to voluntary disclosure, financial reporting of publicly listed companies is mandatory. Previous sustainable management studies can mainly be classified into studies relating to the financial result or company value and studies concerning earnings management (Lee, 2011). In order to attract investors, it would also be necessary to use mathematical models to show how a company can achieve profit sustainability while simultaneously reaching the desired level of sustainable business. In order to monitor profitability, companies should have experts who monitor the balance of sustainable business and profits. Research on financial results shows that sustainable management has a positive impact on financial results and company value in different ways. Osmanagić Bedenik et al. (2010) found that management (89%) plays the most important role in sustainable business development, followed by marketing and sales (70.8%), while owners, customers, suppliers, and employees have the greatest influence. The same conclusion was reached by Lev et al. (2010), who confirmed that socially responsible businesses had better sales and financial performance because consumers prefer the products and services of such companies. A high level of implementation of international standards, as well as cooperation with different stakeholders, leads to a higher level of application of the materiality principle (Henriques et al., 2022).

Waddock and Graves (1997) confirmed that a company's social contribution activities are positively linked to financial performance and have positive effects on improving long-term financial performance. Investors often overestimate short-term earnings and underestimate long-term earnings (Del Río et al., 2023) and a sustainability report may contribute to long-term improvement of results. Like Dalal and Thaker (2019) and Bhaskaran et al. (2020), they also found that companies with good ESG performance improve both accounting and market performance. El Ghouli and Karoui (2017) conclude that the impact of the ESG and company value are positively linked, especially in countries with weaker market supporting organisations. The ability of green innovations to significantly improve the ESG performance of GEM-listed companies as well as financial performance was established by Zheng et al. (2022) on a sample of Chinese enterprises. In their research, Kim and Yoo (2022) reached the conclusion that the opacity of a company is negatively linked to the company's CSR performance. However, the positive impact of CSR on long-term profitability decreases as opacity increases. Studies found a positive correlation between the impact of sustainable business reports and stock market prices (Carnevale and Mazzuca, 2014). Therefore, the report also increases corporate value (Choi, 2021), i.e., CSR was positively correlated with company value (Mutihah, 2022). Research in the EU Member States on how market capitalization, price-to-book value, the Sharpe ratio, and ESG results of high capitalisation companies are linked to 2010–2020 results were carried out by Gavrilakis and Floros (2023). It was established for Greek and French companies that company size has a negative impact on the stock market return. Investors in European countries (except Italy) do not jeopardise their returns by investing in companies with high ESG performance, because smaller companies with a higher price-to-book value and a higher Sharpe ratio are more likely to generate higher returns. In all EU countries (except Portugal), the studied coefficients are positive and significant, and price-to-book value (P/BV) and the Sharpe ratio increase the returns. Numerous studies (Alshurafat et al., 2023; Velte, 2017; Dalal and Thaker, 2019; Tsoutsoura, 2004; Carnevale and Mazzuca, 2014; Friske et al., 2023) explored the impact of sustainability reports on financial indicators, among which the most represented indicators are ROA, ROE, and Tobin's Q. In the return on equity (ROE) study, Parikh et al. (2023) established the positive impact of the governance (G) factor and the negative impact of the environmental (E) factor. Since the impact of the social (S) factor was not significant, it was concluded that companies should devote more attention to E and S factors in their business strategy and practice. A negative correlation between ESG and financial performance was established by Sahut and Pasquini-Descomps (2015) in the U.S., the UK, and Switzerland, as well as Borokova and Wu (2020) in the U.S. and Asian companies. In Australian and South Korean firms Borokova and Wu (2020) did not identify a significant relationship between ESG scores and returns. Individual significance tests in the study conducted by Saygili et al. (2022) show on a sample of Turkish companies listed on the stock exchange that Shareholder information right (SIR), Board of directors' structure (BDS) and Company size (LNSIZE) have significant negative effects on Return of Assets (ROA), while Stakeholder participation in management (SPM), Net profit margin (NPM), and Asset turnover (ATO) have significant positive effects. The results for the subsample of large companies suggest that Board of director remuneration (BDR) and Dividend Yield (DY) are significant, and that Environmental disclosure score (EDS) has a significant negative impact on Tobin's Q. The positive relationship between average Corporate Governance results reported by XKURY companies and Tobin's Q value was confirmed, while accounting-based CFP was not significantly related (Kara et al., 2015). The impact of size and performance on shareholder wealth has been empirically proven in both developed and developing countries (Kousenidis et al., 2000). Besides, Drempetic et al. (2020) and Ramić (2019) showed the impact of market capitalisation of companies and return on investment (ROI) on ESG results.

The following hypotheses of this paper were also developed from above mentioned studies:

- H1: Obligatory publications of non-financial reports since 2017 has statistically significantly correlation of the financial ratios of companies as compared to the voluntary publication period.
- H2: There is a statistically significant difference in Tobin's Q depending on which period of publication is calculated, voluntary or obligatory.
- H3: There is a statistically significant difference in ROA depending on which period of publication is calculated, voluntary or obligatory.
- H4: There is a statistically significant difference in ROE depending on which period of publication is calculated, voluntary or obligatory.

Disclosure of information on sustainable business activities helps investors to make timely and efficient decisions. Jung (2014) found that sustainable business represents a win-win situation for both the company and all other stakeholders. Companies should become aware of their sustainable development management policy to improve the wealth of their shareholders (Parikh et al., 2023; Mutiha, 2022).

### 3. METHODS AND RESEARCH

This paper aims to investigate the impact of non-financial statements on the financial performance of business operations by comparing the results of operations and market values before the obligatory publication of non-financial reports in the 2012–2016 period with the results after the obligatory publication in the 2017–2021 period. The study was conducted on the performance of companies listed on the Zagreb Stock Exchange which have a legal obligation to publish non-financial indicators because they have over 500 employees. 76 non-financial companies are listed on the Zagreb Stock Exchange, and the sampled companies were listed on the stock exchange in the 2012–2021 period. Only 31 non-financial companies' reports of companies met these criteria and were included in the study. Market values per share were analysed for 31 companies, as well as data from financial statements in the 2012–2021 period (310 firm-year observations). In Croatia only 74 companies met the requirements for obligatory publication of non-financial reports in 2017 and 2018 (Omazić et al., 2020). Market values, asset values, equity values as well as net results were established for all companies. Tobin's Q, ROA, and ROE were then calculated for all sampled companies as the most frequently used measures for determining the impact of non-financial reports on financial performance for the 2012–2021 period. The indicators are divided into two groups. In the first group, each of the indicators with an indicator name numbered 1 refers to the performance before the introduction of the obligatory publication in the 2012–2016 period, and the second group, in which each indicator name is numbered 2, consists of indicators after the introduction of the obligatory publication of non-financial reports from 2017 to 2021. By dividing the sample into two groups, each group has 155 firm-year observations. The financial indicators are presented before and after the introduction of the legal obligation. ROA and ROE are traditional measure of profitability. Tobin's Q formula is an economic ratio used to compare a company market value to its book value. The formula used for calculation is the following:

$$\text{ROA} = \text{net profit}/\text{total assets} \quad (1)$$

$$\text{ROE} = \text{net profit}/ \text{equity} \quad (2)$$

$$\text{Tobin's Q} = \text{Total Market Value}/\text{Total Asset} \quad (3)$$

For the statistical analysis, this paper uses Descriptive Analysis, a Nonparametric test like the Spearman’s Correlation and Wilcoxon signed-rank test. The non-parametric test is used because data samples are not normally distributed, and the assumption of normality is violated. The statistical study used the software IBM SPSS. Figure 1 shows the activities of the sampled companies: production, hotels, wholesaling and retailing, transport, management, construction, agriculture, telecommunications, and research and development. Most companies, 40% of them, engage in different production activities, while 23% are hotel companies.

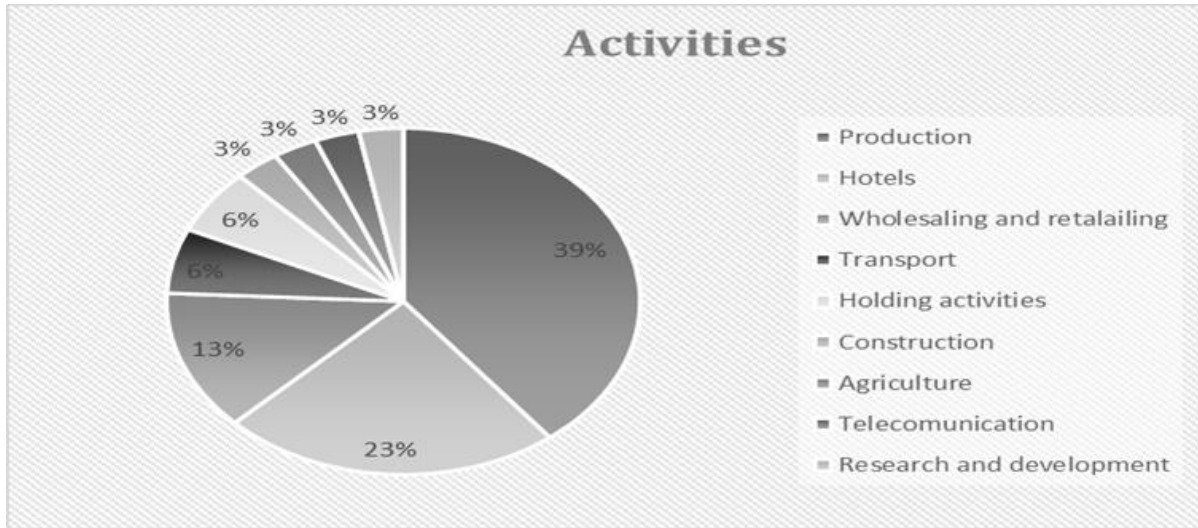


Figure 1: Activities of the Sampled Companies  
 (Source: Author)

The predominant companies in the sample are domestically owned, with 77.42%, only 3.23% are foreign businesses, and 19.35% are mixed-owned companies, both domestic and foreign owned.

#### Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75 <sup>th</sup>
TQ 1	155	25.48	54.023	.001	229.07	.029	.130	14.42
ROA 1	155	-.11	6.330	-65.22	12.91	.0002	.003	.012
ROE 1	155	.53	2.251	-2.15	19.14	.0004	.007	.154
TQ 2	155	18.31	58.561	.0001	439.24	.032	.092	.209
ROA 2	155	.37	1.986	-14.79	7.57	-.0011	.003	.008
ROE 2	155	.37	1.862	-.25	12.93	.0004	.007	.019

Table 1: Descriptive Statistic Basic Ratios of Listed Companies in the Sample  
 (Source: Author)

Table 1 shows descriptive statistics of the studied variables. Tobin's Q 1 ranged from 0.001 to EUR 229.07 in the 2012–2016 period. The maximum value of Tobin's Q 2 in the 2017–2021 period was EUR 439.24. The maximum value for ROA 1 was EUR 12.91 from 2012 to 2016 and ROA 2 amounted to EUR 7.57 for 2017–2021. The maximum value for ROE 1 was EUR 19.14 from 2012 to 2016 and for ROE 2 it amounted to EUR 12.93 for 2017–2021.

#### 4. RESULTS AND DISCUSSION

Table 2 shows the correlations between publishing of non-financial reports (NFR), ownership structure, Tobin's Q, ROA, and ROE.

			Correlations				
			NFR	OWNERS	TQ	ROA	ROE
Spearman's rho	NFR	Correlation Coefficient	1.000	0.000	-.106	-.057	-.046
		Sig. (2-tailed)		1.000	.063	.319	.419
		N	310	310	310	310	310
	OWNERS	Correlation Coefficient	0.000	1.000	.272**	.186**	.142*
		Sig. (2-tailed)	1.000		.000	.001	.012
		N	310	310	310	310	310
	TQ	Correlation Coefficient	-.106	.272**	1.000	.471**	.135*
		Sig. (2-tailed)	.063	.000		.000	.018
		N	310	310	310	310	310
	ROA	Correlation Coefficient	-.057	.186**	.471**	1.000	.633**
		Sig. (2-tailed)	.319	.001	.000		.000
		N	310	310	310	310	310
	ROE	Correlation Coefficient	-.046	.142*	.135*	.633**	1.000
		Sig. (2-tailed)	.419	.012	.018	.000	
		N	310	310	310	310	310

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

\**. Correlation is significant at the 0.05 level (2-tailed).*

*Table 2: Correlations for basic ratios  
 (Source: Author)*

The 310 firm-year observations study found that there was a positive statistically significant correlation between TQ, ROA, and ROE. Negative correlation, but not statistically significant, was found between voluntary or obligatory publications of non-financial reports and all ratios, TQ, ROA and ROE. Table 3 shows the relationship between Tobin's Q1 (TQ1), ROA 1, and ROE 1 relating to the 2012–2016 period, i.e. voluntary publications, and Tobin's Q 2 (TQ2), ROA 2, and ROE 2 relating to the 2017–2021 period, i.e., the period of the obligatory publication of non-financial reports.

*Table following on the next page*

			Correlations							
			NFR	OWNER S	TQ 1	TQ2	ROA 1	ROA 2	ROE 1	ROE 2
Spearman's rho	NFR	Correlation Coefficient	1.00	0.000	-.085	-.093	.053	-.199*	.276*	-.088
		Sig. (2-tailed)		1.000	.293	.248	.515	.013	.001	.274
		N	155	155	155	155	155	155	155	155
OWNERS		Correlation Coefficient	0.00	1.000	.318**	.198*	.266**	.104	.203*	.078
		Sig. (2-tailed)	1.00		.000	.014	.001	.199	.011	.332
		N	155	155	155	155	155	155	155	155
TQ 1		Correlation Coefficient	-.085	.318**	1.000	.663**	.406**	.326*	.059	.080
		Sig. (2-tailed)	.293	.000		.000	.000	.000	.462	.323
		N	155	155	155	155	155	155	155	155
TQ2		Correlation Coefficient	-.093	.198*	.663**	1.000	.383**	.537*	.164*	.191*
		Sig. (2-tailed)	.248	.014	.000		.000	.000	.041	.017
		N	155	155	155	155	155	155	155	155
ROA 1		Correlation Coefficient	.053	.266**	.406**	.383**	1.000	.426*	.623*	.183*
		Sig. (2-tailed)	.515	.001	.000	.000		.000	.000	.023
		N	155	155	155	155	155	155	155	155
ROA2		Correlation Coefficient	-.199*	.104	.326**	.537**	.426**	1.000	.211*	.623*
		Sig. (2-tailed)	.013	.199	.000	.000	.000		.008	.000
		N	155	155	155	155	155	155	155	155
ROE1		Correlation Coefficient	.276*	.203*	.059	.164*	.623**	.211*	1.000	.184*
		Sig. (2-tailed)	.001	.011	.462	.041	.000	.008		.022
		N	155	155	155	155	155	155	155	155
ROE2		Correlation Coefficient	-.088	.078	.080	.191*	.183*	.623*	.184*	1.000
		Sig. (2-tailed)	.274	.332	.323	.017	.023	.000	.022	
		N	155	155	155	155	155	155	155	155

\*. Correlation is significant at the 0.05 level (2-tailed).  
 \*\*. Correlation is significant at the 0.01 level (2-tailed).

Table 3: Correlations of the basic ratios  
 (Source: Author)

The correlation (table 3) between voluntary or obligatory publication of non-financial reports and calculated ratios are statistically significant only in ROA 2 and ROE 1. It was found a positive statistically significant correlation  $p=0,01$  between ROE1 and NFR. A negative statistically significant correlation  $p=0,05$  was found between ROA 2 and publication of NFR.

The negative correlation was established between voluntary or obligatory publication of non-financial reports are Tobin's Q, in period 1 and 2, as same as ROE 2, but was not statistically significant. It was found a positive correlation, but not statistically significant between voluntary or obligatory publication of non-financial reports and ROA 1. Since the voluntary or obligatory publication of non-financial statements has a statistically negative significant effect only on ROA after the introduction of obligatory publication of non-financial statements, it can be concluded that the first hypothesis: Obligatory publications of non-financial reports since 2017 has statistically significantly correlation of the financial ratios of companies as compared to the voluntary publication period, was not accepted. The result of the Wilcoxon signed-rank tests for TQ, ROA and ROE depending in which period of publication is calculated, voluntary or obligatory. were shown in Table 4.

Test Statistics <sup>a</sup>			
	TQ2 - TQ 1	ROA2 - ROA 1	ROE2 - ROE1
Z	-1.292 <sup>b</sup>	-.931 <sup>b</sup>	-1.395 <sup>b</sup>
Asymp. Sig. (2-tailed)	.196	.352	.163
a. Wilcoxon Signed Ranks Test			
b. Based on positive ranks.			

*Table 4: Wilcoxon Signed Rank Tests  
 (Source: Author)*

Median Tobin's Q for the voluntary publication (TQ 1) was 0.130 (0.029 to 14.42), for the obligatory publications (TQ 2) it was 0.092 (0.032 to 0.092). It was not a statistically significant difference in TQ in TQ 1 vs. TQ 2 ( $Z = -1.292$ ,  $p = 0.196$ ). Because  $p > 0.05$  we will reject the second hypothesis: There is a statistically significant difference in Tobin's Q depending on which period of publication is calculated, voluntary or obligatory. Median ROA for the voluntary publication (ROA 1) was 0.003 (0.0002 to 0.012), for the obligatory publications (ROA 2) it was 0.003 (-0.0011 to 0.008). It was not a statistically significant difference in ROA in ROA 1 vs. ROA 2 ( $Z = -.931$ ,  $p = 0.352$ ). Because  $p > 0.05$  we will reject the third hypothesis: There is a statistically significant difference in ROA depending on which period of publication is calculated, voluntary or obligatory. Median ROE for the voluntary publication (ROE 1) was 0.007 (0.0004 to 0.154), for the obligatory publications (ROE 2) it was 0.007 (0.0004 to 0.019). It was not a statistically significant difference in ROE in ROE 1 vs. ROE 2 ( $Z = -1.395$ ,  $p = 0.163$ ). Because  $p > 0.05$  we will reject the fourth hypothesis: There is a statistically significant difference in ROE depending on which period of publication is calculated, voluntary or obligatory. There is a culture of development of socially responsible business operations in Croatia, but a better database of non-financial data is required. Over the years, employers have been receiving awards in individual ESG categories, for the best non-financial report in relation to company size. The assessment of companies is based on questionnaires prepared independently by institutions. Since 2015, the Institute for Corporate Social Responsibility has been assisting entrepreneurs to develop, educate and report on ESG areas. The most frequently used standards in voluntary reporting are GRI standards – 48.1%, and the UN Global Compact – 11.1% (Osmanagić Bedenik et al., 2016). Reporting should not be an end in itself or a legal obligation, but rather a manner of two-way communication between companies and interested stakeholders. In their survey, Omazić et al. (2020) found that the majority of published reports covered statutory contents such as key non-financial indicators (87%), companies' business policies described in relation to society and the environment (92%), and the results of these policies (67%).



By contrast, most companies did not recognise in their reports the obligation to set targets (74%); and most failed to identify the fundamental risks of climate and social impacts (72%). The research results established statistically significant correlation ROA with non-financial reports as same as research (Matar et al., 2023, Alshurafat et al. 2023, Tsoutsoura, 2004 and Velte 2017). But, in this research it was negatively statistically significant correlation ROA with non-financial reports, which contradicts the positive correlation found in research of Alshurafat et al. (2023), Tsoutsoura (2004) and Velte (2017). Alshurafat et al. (2023) found on a sample of companies listed on the Amman Stock Exchange from 2010 to 2016, that CSRD publishing was positively and statistically correlated with the value of companies measured by Tobin's Q. Moreover, it is positively and statistically related to ROE and ROA. Tsoutsoura (2004) found a positive impact of ESG on profitability measures such as the return on assets (ROA) as same as Velte (2017). In their study (Matar et al., 2023) on 164 listed companies in Amman stock Exchange the period of 2016- 2019, they found a statistically significant and strong correlation between CSRS and financial ratio ROA and ROE. Velte (2017) concluded that other ratios does not have an impact on company value (as measured by Tobin's Q), what was a similar in this research. The obtained results support the study (Friska et al., 2023), which found that CSRD is negatively correlated to Tobin's Q, but in this study, it was not statistically significant.

## 5. CONCLUSION

Nowadays, the focus shifts to environmental, social, and governance issues of all stake-holders relevant to any company business. Therefore, all companies, whether they participate in the capital market or not, should they want to remain on the market in the long term and meet the needs of their stakeholders, should pay more attention to ESG issues, and publish their sustainability reports regardless of their obligation. The subject of analysis in this paper was the relationship between financial indicators TQ, ROA, and ROE of companies subject to non-financial reporting over two periods, before and after the introduction of the obligatory publications. The research results indicate that there is no statistically significant difference between business performance, market values, and the publication of non-financial reports, voluntary or obligatory. The EU Taxonomy, Directive 2022/2964 as well as European sustainability standards will facilitate transparent and full sustainability reporting. Legislation can also become a Guide for sustainability to companies that are not obliged to publish the prescribed reports. The analysis makes a key contribution to the empirical CSR research which includes both accounting-based and market-based financial performance measures for the companies on the Zagreb Stock Exchange. The capital market in Croatia is not large, nor is the number of reporting entities subject to non-financial reporting. Therefore, a limitation of this paper is the small sample and data diversity in reporting entities subject to non-financial reporting. The main disadvantage of this study is the lack of databases with ESG results per reporting entities, as well as those reporting voluntarily. In this first step, the study identified the state of publicly available data of non-financial reporting entities on the Zagreb Stock Exchange. Further research should create a basis for calculating ESG data. This study can be used for comparison in further studies of reporting entities subject to non-financial reporting when the circle of reporting entities expands under Directive 2022/2464. In addition to financial indicators, non-financial factors have become crucial for companies' long-term sustainability and success.

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# LEADING THROUGH CONFLICT; HOW MANAGERS CAN USE CONFLICT EFFECTIVELY

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## **ABSTRACT**

*When there is more than one person in a room, there is opportunity for conflict. However, many workers and managers either view conflict as a negative aspect of the workplace or avoid it all together, hoping it will work itself out. When handled effectively and intentionally, managers have an opportunity to use conflict as a way to strengthen teams by embracing differences of opinion and learning skillful handling of conversations with employees. It is vital that supervisees feel heard and respected and have an opportunity to not only air grievances but to use the perceived conflict as a tool towards better understanding, cohesiveness, and forward movement and productivity. Viewing conflict through the lens of diversity, equity, and inclusion, and bearing in mind a long history of colonialism, oppression, and both explicit and implicit bias and prejudices, we analyze how conflict can be effectively utilized in the workplace. Understanding cultural context, emotional safety, and perceived levels of respect are important in order to better understand employees' willingness or reticence to engage in exercises involving conflict resolution. By exploring conflict avoidance, confrontation, task vs. relational conflict, interpersonal and transactional trust and other related themes, managers will have an increased understanding of the dynamics of inter-personal strife and knowledge about de-personalizing conflict. Additionally, this paper explores skills to help managers better lead their teams through difficult times, including the use of reflective listening, documentation, outside moderation, team building, and other strategies. Conflict can be seen as something destructive and needing to be avoided, or it can be used as an effective pathway towards increased understanding and solicitation of ideas with the goal of problem-solving.*

**Keywords:** *Conflict Management, Conflict Resolution, Effective Management*

## **1. INTRODUCTION**

There's an expression that a person doesn't quit their job, they quit their boss. This adage stems from what is often referred to as toxic leadership, which can include bullying and/or abusive behavior, a lack of concern for employees, and/or someone who is motivated by their own self-interest (Smith & Fredricks-Lowman, 2019). This behavior could be the trait of the individual or an indication of a culture that allows- or even promotes- bullying behavior in its leadership (Smith & Fredricks-Lowman, 2019). On the other hand, researchers have demonstrated positive project outcomes when supervisors have a 'humble leadership' style, meaning they are open to the ideas and feedback of others, appreciate the strengths of colleagues and subordinates, and have an accurate view of themselves (Ali et al., 2021). Additionally, effective leadership requires a number of important skills including developing and motivating employees, facilitating the goals and changes within an organization, and managing conflict effectively within teams (Verawati & Hartono, 2020). It is the effectual use of conflict that shall be explored herein.

## **2. TASK VS. RELATIONAL CONFLICT**

The relationship between the Wright Brothers, the inventors of the first flying aircraft, was fraught with disagreements. Their arguing, which the brothers referred to as 'scrapping', centered around ideas and design - not about the personal traits of each other (Kraft, 2005).

This paradigm, which would later be referred to as task conflict vs. relational conflict, was possible due to the underlying trust and respect the brothers had for each other. Many people hear the word ‘conflict’ and assume it has negative connotations, whether that be in a personal relationship or a workplace setting. Some studies indicate, however, that a certain degree of task conflict, when handled appropriately, can be a healthy thing. The ability to participate in task conflict, which centers around content and goals, can lead to the work group exploring concepts in greater depth (Jehn, 1995; Schulte et al., 2020). It has been noted, however, that in order to address task conflict effectively, relational conflict cannot be present (de Wit et al., 2013). Relational conflict is when members of a team or working group focus on personal aspects of each other (such as personality traits) and has been linked to decreased satisfaction, issues with trust, and lessened productivity in the workplace (Qiao et al., 2023). In other words, if participants are feeling resentful or allowing their feelings about the relationship into the discussion, they are less likely to consider alternative possibilities; remain wedded to the outcome they wanted originally and are less likely to receive input from others (de Wit et al., 2013). An important element of conflict resolution is to mitigate any potential negative consequences of workplace conflict intervention, such as disgruntled employees being unfriendly to colleagues, damaging workplace property, wasting work-related resources, or even resorting to sabotage (Ogungbamila, 2006). Additionally, employees may resort to more passive aggressive tactics such as hiding knowledge that may be helpful to coworkers and the larger team (Qiao et al., 2023). One way to avoid these possible negative outcomes is for employees to feel a part of the process, rather than being forced into it (Ogungbamila, 2006). The extra time it takes to establish feelings of trust and belonging are worth it, as some of the benefits of allowing healthy conflict to occur include higher levels of strategic planning and improved decision making, according to Jehn and Bendersky (2003). It is imperative, therefore, that supervisors model and lead task conflict effectively. A supervisor understands that conflict, if handled appropriately, can be an effective way for teams to problem solve and come together. That same supervisor realizes that there are subtextual cultural nuances at play, as well as potential underlying power dynamics that make addressing sensitive issues challenging. How, then, does the supervisor lead the team through effective conflict management? There are several strategies that may be helpful. Discussing task vs. personal conflict, naming it, and practicing it, is one method. For example, a team member may state, “John, I disagree. I want to point out that this is a task conflict- this is not a personal indictment of you in any way. I take issue with your point about..... because...”. By specifically naming what is happening, the team can address differences or disagreements directly. (The team lead and members should take care that this not be abused- for example, no one should say ‘this is a task conflict’ and then proceed to verbally abuse the person with whom they disagree.) By naming the task conflict, it reminds the group not to take the feedback personally, but to examine the issue at arm’s length. Some groups prefer to have someone assigned as moderator of the conflict. If a supervisor chooses to engage a moderator, they should keep in mind that there are both advantages and disadvantages when using someone either internally or externally. Hiring an external moderator can be a useful strategy, as that person often has skills specific for the task and does not have a stake in the outcome or emotional connection to the issues or the players in the room, while someone internal may be more trusted by the group but may have a stake in the outcome (Kuriakose et al., 2019). If the supervisor decides to keep moderation in-house, having some groundwork for how to ‘rumble’ may be helpful.

### **2.1. Having a ‘Rumble’**

Dr. Brené Brown, researcher, professor, and author, outlines several steps to address workplace conflict effectively, sometimes referring to the process as having a ‘rumble’. It begins with one party sharing that they would like to discuss a particular issue with their colleague (briefly

explaining what the issue is), and then asking what a good time would be later that day to discuss it. This allows the receiving party to have time to process and reflect on the issue before engaging in conversation about it, rather than feeling blindsided. Dr. Brown recommends providing feedback ‘at time’, or as close to the behavior as possible, and emphasizes the importance of being clear about the behavior and the expectations, stating “clear is kind, unclear is unkind” (Brown, 2021). She further states that a person is ready to give feedback when they are ready to sit next to (not across from) the other person; this symbolizes putting the problem in front, not between, the parties, or ‘sliding it’ closer to the other person (Brown, 2021). Dr. Brown (2022) recommends using language that keeps the dialogue open, nonjudgmental, and moving forward. For example, participants may choose to begin the conversation with one or more of the following:

- I’m curious about...
- Help me to understand....
- Tell me more...
- That’s not been my experience.
- I’m wondering...
- Walk me through that...
- What’s your passion around this?
- Tell me why this doesn’t fit/work for you.

Any good therapist will tell you that behavior change does not happen immediately. People need to practice new behaviors and require repetition in order for the change to be lasting (Gardner et al., 2021). It is therefore incumbent upon the supervisor to emphasize the value of direct, clear conflict resolution to the team, ideally having the first of these conversations *before* a conflict arises (it is much easier for people to learn and practice a new skill when they are not emotionally charged). The supervisor should model the behavior they want to see and make time to have the team review and practice conflict management skills as needed. It may be effective to begin with low stakes discussions to begin with, to get confidence and buy-in from participants. Active listening is an effective conflict resolution competency that sounds deceptively simple but requires practice and skill.

### **3. THE POWER OF LISTENING**

Effective listening is an essential element in conflict management, team leadership, and interpersonal relationships in the workplace. Skillful listening has been associated with improved outcomes such as effective teamwork, and organizational morale, while poor listening has been connected to “counterproductive conflict and organizational mishaps” (Barbour, 2016). While the exercise of listening sounds like an easy skill, there is more to it than simply not talking while the other person speaks. Researchers have found the study of effective listening more difficult to measure than expected but seem to agree that it entails receiving and attending to the verbal and nonverbal messages being delivered (Barbour, 2016; Bodie, 2016). Listening, acknowledging, and reflecting are effective strategies for the speaker to feel heard. This is an important step towards better understanding, and a powerful tool in conflict resolution. It is common during times of stressful communication, including during a conflict, for the receiver of the information to take a defensive emotional posture and spend their time preparing their response. By its very nature, this interferes with the process of active listening. If instead the receiver can suspend judgment and truly listen to what is being said, it allows for a more productive discussion. Following are two examples. In each, Martha is sharing with her colleague, George, her feelings in response to his behavior. In the first example, George is defensive and not able to suspend judgment and truly take in what is being said.

*Martha:* “George, I find it very frustrating when you cut me off during meetings. When that happens, I feel as if my ideas are not valuable, and I shut down.”

*George:* “You interrupt me, too! We all do- if you don’t jump in there, no one gets their ideas heard. No offense, but I think you’re just being sensitive.”

Because George was allowing defensiveness and judgment into the process, he was unable to truly hear the message Martha was attempting to share. In this version of the same scenario, note the difference when George responds after actively listening.

*Martha:* “George, I find it very frustrating when you cut me off during meetings. When that happens, I feel as if my ideas are not valuable, and I shut down.”

*George:* “I’m hearing that when I interrupt you during meetings it upsets you, and that you experience the interruption as me not finding your contributions valuable. That is not my intent. I tend to get excited and jump the gun when I have an idea- I will work on that. I appreciate you bringing this to my attention. Is there anything else?”

In this example, George is able to reflect what he hears Martha sharing. While it may not have been his intent to invalidate her contributions by interrupting her, that was Martha’s experience. By acknowledging that and taking responsibility, George has created a framework of respect and honesty that will allow for more dialogue between them. Finally, by asking ‘is there anything else’, George is creating an opportunity to explore other issues that may have been hiding beneath the surface of their communications. It should be noted that George does not need to now share with Martha *his* grievances (unless she asks). He can, however, use the momentum created in this dialogue to approach Martha another time and ask her if she is willing to continue the conversation they started. It takes strength to be able to reflect back the emotion being expressed, own the consequence, or the effect it had, and to commit to making a change. Some or all of these elements may be important when having a conflict-resolving dialogue of this nature. In these scenarios, George may also have asked for some time to reflect on the conversation so he could gather his thoughts. He may have asked (appropriately) for examples of a recent time when he exhibited the behavior in question, so he understands the context of the conversation. He may also choose to thank Martha for bringing her concerns to him in such an open manner. One or both parties may decide to document the conversation for their records, especially if there is an ongoing source of tension or conflict between the parties.

#### **4. DOCUMENTATION**

Documentation is an important tool for supervisors (Reid et al., 2021), including for issues surrounding conflict management. This is especially true if an employee demonstrates a pattern of disruptive behavior. Supervisors should take notes to reflect the conversation that took place, especially if feedback is not being heeded, and verbal or written warnings may ensue. For example, instead of documenting, ‘I spoke with John Jones a number of times about his anger issues’, a supervisor presents a much stronger case when the documentation captures the following: ‘I spoke with John Jones in his office on December 14<sup>th</sup>, and again on a Teams call on January 27<sup>th</sup>. In each instance I stated that his tone and the volume of his voice were causing team members to state they feel uncomfortable, possibly even threatened. John responded by saying he would be “more mindful” of his tone and interactions, and we came up with a plan of support and resources, including the Employee Assistance Program, several LinkedIn communication trainings, and scheduled several follow up meetings for continued feedback.’



The first example demonstrates sloppy documentation that really doesn't define the problem, the scope of the disruption, or any proposed solution or remedy. In contrast, the second example lays out the problem, the dates in which it was addressed, and the plan, including next steps. Documentation may be kept privately, such as in encrypted/password protected documents on a computer file, in order to keep a record of the outburst or behaviors, as well as the ensuing discussion and plan. This is an effective way to demonstrate patterns of behavior, especially if they rise to the level of disciplinary action. Documentation may become a part of the employee's file if necessary. Supervisors are better able to demonstrate their efforts of conflict management and staff development by recording the dates of team trainings and practice sessions. It should be taken into consideration that people from varying backgrounds experience and engage in conflict differently, as we explore below.

## **5. THROUGH A CULTURAL LENS**

Having difficult conversations and resolving conflicts are difficult enough. Adding power differences, as well as racial/ethnic, gender, and other types of diversity creates new dimensions and complexity to the discussion. For example, in some Asian cultures it is considered inappropriate to correct a superior, and there is strong emphasis on saving face (Dirrler, 2022), making a discussion around conflict resolution difficult, if not culturally contraindicated. Additionally, with a long history of institutional and systemic racial and gender oppression in the United States, it can be challenging to find and create an environment that welcomes frank, open discussion. For example, some researchers have demonstrated that in work cultures the perception of marginalization on the part of employees plays a significant role in the efficacy of conflict management as well as the overall efficiency of the organization (Inegbedion et al., 2020). Colleagues have shared with this writer that if they don't feel seen or valued, they don't feel motivated to have a voice in managing organization conflict. To ensure that all voices are heard begins with ensuring that all voices are- and feel- valued. Initiating team building, as well as group training, can help increase organizational efficiency in a diverse workforce (Inegbedion et al., 2020), and sharing experiences as a team can increase the trust necessary to delve into effective conflict resolution when needed. Additionally, understanding historic underrepresentation, oppression, and abuse is an important first step as supervisors work to mitigate conflict in the workplace.

## **6. CONCLUSION**

Supervisors and managers have many responsibilities- maintaining budgets and ensuring smooth work operations, as well as communicating to and from levels above and below. They create and share vision, model a solid work ethic, and ensure moral and production from supervisees. Add to that list addressing, in an ongoing manner, the issue of conflict resolution. With an eye towards people's diverse backgrounds, supervisors can introduce and maintain conversations and a consistent practice of addressing conflict in the workplace. Leaders can encourage their team members to use specific language such as, "We are having a task conflict- I disagree with what you are saying, and this is not about you, personally", or through the verbiage of a 'rumble', using expressions such as, "Help me to understand...", or "I'm curious about...". As one university President says, "Leaders bring the weather", meaning they create the climate, or help to set the tone, of the workplace. People learn quickly if their workplace avoids conflict or looks the other way regarding bullying behavior. They sometimes act out passive aggressively because they feel they have no voice, or if conflict is not handled respectfully and skillfully. If it is true that people don't leave a job, but leave a boss, then leaders have tremendous power and a responsibility to get it right.

Introducing and modeling the concepts of active listening, and respectful conflict resolution can elevate morale and productivity in the workplace. Effective leadership, therefore, includes effective conflict management.

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## **BITCOIN AND POTENTIAL MARKET CORNERING**

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### **ABSTRACT**

*In line with the large media coverage of cryptocurrencies, the impact they have on the financial market, it is important to understand the basics of the functioning of this relatively new virtual financial instrument and understand its importance in today's market. Thanks to the noticeable increases in the price of Bitcoin and other leading cryptocurrencies, many traders and investors have made profits, which further encourages the attractiveness of investment. However, with the undoubted presence of the bull market for many years, there is also high volatility and sudden and hitherto unrecorded price corrections, which opens space for calculations about the coming of the bear market and the profitability of short selling. The authors explore the possibility of forming a corner market for Bitcoin trading, as well as the risk of long and short positions. The authors conclude that due to its global spread, the formation of a corner cannot be expected in the near future, but call for caution when entering positions due to the possibility of significant and unpredictable fluctuations.*

**Keywords:** *Cryptocurrencies, Market corner, Short selling, Investing, Financial market*

### **1. INTRODUCTION**

Globalization and digitalization and the development of technology have enabled the emergence of new means of trading in the market. The emergence of cryptocurrencies was a logical result of the digitalization of business and trading. This new digital medium of exchange has changed the way money is perceived and its value in the world. Researching how financial markets work requires extensive knowledge of assets, participants and trading methods. Short selling means a way of investing, ie a trading strategy based on speculation on the decline of securities and trading assets. Due to the risk of loss of invested funds, this type of investment should be used only by experienced traders who have the appropriate knowledge of advanced trading on stock exchanges. Short selling of stocks is common, which in markets that are volatile and influenced by many factors can create individuals or groups manipulating prices or creating a shortage of commodities and securities in the market, and this shortage can cause an investor unable to buy stocks that are borrowed. In the event that a large number of investors appear who cannot repay the loan, a sharp rise in the price of securities and a situation of short-sale contraction will follow. Examples from the history of financial markets prove that many brokers and traders have successfully manipulated the market for longer or shorter periods of time to secure profits, while distorting market prices and causing instability. The formation of a corner is considered an illegal activity as it manifests itself in gaining an unfair advantage and manipulating the market and attempts to avoid and control it by introducing various protocols and methods of protection.

Bitcoin was the first cryptocurrency created in 2008, and since its inception, when it was worth \$ 0, it is now worth tens of thousands of USD. The limited number of Bitcoin units, the lack of central authority, security, transparency, the perception of anonymity and the ease of transactions are just some of the reasons for the growing popularity and number of Bitcoin investors. Observing the movement of the price of Bitcoin throughout its history shows great jumps and differences in the price that Bitcoin realizes in the market. Based on the established high volatility and drastic fluctuations in Bitcoin prices, it can be determined that this type of investment seems very risky and unpredictable, and investing significant financial resources can cause large losses for the investor. Some aspects of Bitcoin suggest the possibility of forming a corner, so based on certain data, such as falling prices, increasing the number of short positions in Bitcoin and reducing long positions, it suggests that Bitcoin traders are increasingly turning to short selling of this currency. Due to the specifics of Bitcoin, it is not possible to determine with certainty whether the formation of a corner will occur, but possibly to investigate whether there is a possibility of further falling prices. The paper is divided into five interrelated parts. After analyzing the characteristics of financial markets and short sales, the movement of the price of Bitcoin was studied and the possibility of forming a market corner was explored. The most important findings of the paper are systematized in the conclusion.

## **2. RELEVANT CHARACTERISTICS OF SHORT SALE NAD MARKET CORNER**

Four dimensions of the securities market can be defined: capital markets, money markets, primary and secondary markets (Novak, 1990). The stock exchange is a permanent and organized market in which replaceable, i.e. standardized goods are traded according to the standard designation, services, securities and money (Andrijanić, 2001). There are various trading techniques and methods on the stock exchanges, including short selling. Bear market means a market in which the prices of securities or commodities fall by at least 20% of their most recent price in a few months, which encourages their sale, and these situations occur due to the influence of investors and traders, economic conditions, interest rates and many other factors (Amadeo, 2022b). Its average duration is 363 days, and some of the most notable examples are the bear market during the Great Depression, the bear market in 1970, 1973, 2000 and 2008, while in the last ten years the bear market occurred in 2020 and 2022. After the end of the bear market, the bull market begins. The bull market means a market in which prices continue to rise, and investors earn regardless of the price at which they buy the investment because prices generally continue to rise, and the latest example of the bull market is also the longest and lasted from 2009 to 2020. A long position in securities means owning a security, and an investor maintains a long position in securities in anticipation that their value will grow in the future. A short position indicates the sale of a security that is not owned by the trader, who sells with the belief that the value will fall in the future (SEC). Profit is made by buying at a lower price in the market, but if the price of a security rises, the trader will not be able to buy at a lower, but at a higher price and will be at a loss. Short selling as a way of investing or trading strategy that speculates on the decline in the value of stocks or other securities is intended primarily for experienced traders and investors as these speculations carry great risk and are considered an advanced method of trading on stock exchanges (Hayes, 2022; Buterin et al, 2018). O'Neill (2009) defines short selling as selling a stock instead of buying it, even though the seller doesn't actually own it but borrows it from a broker, hoping the price will fall instead of rising. So if the stock price falls as expected, the seller can cover his short position by buying the stock in the market at a lower price and take the difference as his profit. The U.S. Securities and Exchange Commission (SEC) states that a short seller closes positions by returning a borrowed security to the owner (stock lender) by buying securities on the open market, and brokerage houses usually borrow shares to clients involved in short sales.

Simply put, short selling is an investment technique of earning on falling stock prices by borrowing shares and selling them. Amadeo (2021a) states that short selling is often used by hedge funds to make money during a bear market or stock market crash. These funds prefer short selling because they can get money in advance, from the sale of a share they borrowed from a broker, and their only expense is the fee for the short sale transaction itself. The short seller must set a margin (cash or guarantee) with the broker to cover losses if the share price rises during the short sale, and this margin represents the amount of the seller's own money deposited with the broker. In the event of a sharp rise in the share price and a loss for the investor (seller), the broker requests coverage of the requested margin, i.e. a call for additional payment (margin call). Hedge funds, as described by the European Central Bank (2005) are unregulated or poorly regulated funds that are free to use different investment strategies to achieve positive returns. This term has historical significance, since at the beginning of the second half of the last century the first institutions of this kind were involved in buying and selling shares to eliminate (hedge) the risk of market fluctuations. The legislative framework for short selling that is in force in the Republic of Croatia is based on the legislation of the European Union, so short selling is regulated by Regulation (EU) no. 236/2012 of the European Parliament and of the Council of 14 March 2012 on short selling and certain aspects of credit derivatives based on default, the Law on the Implementation of the Regulation (Narodne novine 54/13), the Decision on the method of notification and the place of public publication of information in accordance with the Regulation and Decision of the European Securities and Capital Markets Authority of 16 March 2000. The European Securities and Markets Authority (ESMA) states that regarding uncovered short selling, the Regulation stipulates that EU Member States must establish their own rules on penalties and administrative measures in accordance with the provisions of the Regulation. However, most Member States have not established specific provisions, but have prescribed generic links to its provisions that have led to different ways of sanctioning uncovered short selling and are not considered precise enough to discourage uncovered short selling. ESMA (2022) states that the majority of respondents from the Member States supported the establishment of a centralized collection and information system for short positions. According to the Regulation, investors must meet certain requirements related to the short sale of shares and government debt instruments (HANFA):

- It is permissible to contract a short sale of a share if such sale is covered by a share loan, a loan agreement or an agreement with a third party which means that uncovered short sales of shares are prohibited.
- The same rules apply to the short sale of government debt instruments as to the short sale of shares.
- Credit derivatives transactions may be entered into on the basis of default on sovereign debt only if it has a long position in that issuer's sovereign debt or a portfolio of assets or financial liabilities of that value.

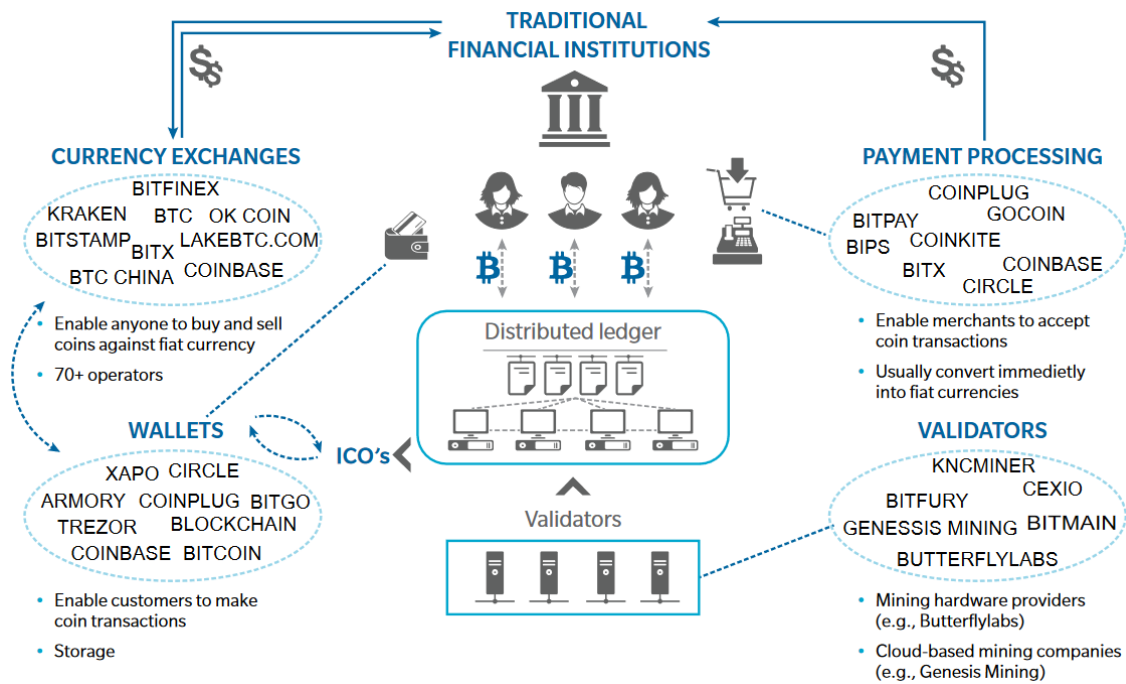
Short selling contractions and market corners have tried to be regulated and banned by rules throughout history, so the New York Stock Exchange enacted rules in 1920 that discouraged market cornering and short selling contractions. The Securities Exchange Act of 1934 enacted further comprehensive rules to eliminate stock price manipulation. Although stock price manipulations such as short sale contractions and corner markets have been banned in the US since 1934, many European countries have only recently begun to introduce and implement measures to prevent such manipulations (Allen et al, 2018). Uncovered short selling is banned in Croatia to prevent market disruptions caused by potentially failed attempts to settle, and public disclosure of net short positions is needed to provide the market with information on the percentage of issuance of a short sale.

The threshold set for public announcement is a percentage equal to 0.5% of the issued share capital of a certain company and every 0.1% above that (HANFA). It is necessary to secure the possession of the share on the day when the trader is to deliver it, and the trader who does not have the share he is selling at the time of sale must insure the above. The history of financial markets is filled with examples of various brokers and traders who tried to manipulate the market and stocks in some way to make a profit, distort the share price of other companies or cause instability in the financial market (Tengulov, 2021; Buterin et al, 2014). Corner market is a situation that is created mostly intentionally, in which all shares in the market are owned by an individual or group who therefore have the power to dictate the share price or form an extreme form of short sale contraction when one party has almost all control over shares in circulation.

### **3. EMERGENCE AND DEVELOPMENT OF CRYPTOCURRENCY ON THE MARKET**

The beginnings of cryptocurrency date back to the 1990s when American cryptographer David Chaum in the Netherlands created what was considered the first form of digital money, DigiCash as an extension of the encrypted Rsa algorithm, which was popular at the time (Quest, 2018). The popularity of this new technology caused Microsoft to try to buy DigiCash for \$ 180 million to install it on every computer in the world that used the Windows operating system, but Chaum turned down Microsoft's offer, which soon led to the collapse of his company. The development of technology and opportunities pointed out by DigiCash has prompted other companies to start thinking and developing alternative payment methods and alternative online currencies and systems. One of the companies that proved to be the winner in this technology race was PayPal. The reason for PayPal's success was to provide customers with what they really wanted, which was to transfer money from sellers and customers using a peer-to-peer system to exchange money. Another system developed at the time was the e-Gold system, which used gold as its primary currency, and users received e-Gold currency or "gold loans" for physical gold deposits, however, this system was due to the large amount fraudulent investments soon failed. Based on these systems and driven by the economic crisis of 2008, which affected a large number of global financial institutions, the development of today's cryptocurrencies followed. From the development of Bitcoin to the many other cryptocurrencies that marked the beginning of the 21st century, technology has made it possible to change financial systems like never before in history. In addition to the most famous cryptocurrency, Bitcoin, many other currencies are exchanged today, such as Ethereum (Ether), Ripple, Litecoin, Golem, Monero, Stratis, BitShares and many others. Buterin et al (2015) state the biggest shortcomings of paper money: the possibility of counterfeiting, impracticality of transporting large quantities, high costs of distribution and production, limited number of nominations and the existence of more than one currency. The absence of a central institution that issues or manages can be considered a major feature of cryptocurrencies.

*Scheme following on the next page*



*Scheme 1: Overview of the "eco-system" of cryptocurrencies  
 (Source: Meyer and Boezio, 2018)*

Users decide whether to obtain cryptocurrencies for the purpose of their hoarding or to purchase other goods and services from a particular merchant, exchange between two users, send remittances or for investment or speculative purposes. Today, more than 6,000 cryptocurrencies are exchanged internationally in the digital financial system, and one in ten investors invests in cryptocurrencies, making cryptocurrencies impossible to be ignored by central banks, and this parallel monetary system has completely forced central banks to create own options for digital currencies (Mediawire, 2022). The Bahamian sand dollar is listed as the first central digital banking currency.

#### 4. BITCOIN PRICE TRENDS AND INDICATOR OF POSSIBLE MARKET CORNER

The original price of bitcoin was \$ 0, and the peak price was reached on November 10, 2021, when its price was \$ 68,789. Below is a brief overview of the prices that bitcoin achieved from 2010 to 2022. The first big jump in the price of bitcoin occurred in the summer of 2010, when the price rose from a fraction of a cent to \$ 0.09. Back then, few people, with a narrow niche of technical experts and financial enthusiasts, knew enough about bitcoin to buy this cryptocurrency (DeMatteo, 2022). Bitcoin price movements over the years:

- 2011 - Bitcoin broke the \$ 1 mark in April 2011, then rose nearly 3,000% over the next three months to \$ 29 in July 2011, before falling back to \$ 2.
- 2012 - the year passed without jumps and bitcoin-related events in general, and ended the year at a price of 13-14 USD.
- 2013 - The year started at a price of about 13 USD, which rose to the level of 30 USD in the first quarter of the year, to break the price of 100 USD by April 1. Online forums and Reddit have become a place to spread information for curious money enthusiasts and technical professionals who have wondered if this new asset, unrelated to any physical good, can have real value. By November 2013, the price had broken the \$ 1,000 level, followed by a drastic drop in price in December when the price was \$ 530.
- 2014 - 2016 - the price has stagnated, and interest among individuals, especially in various forums, has grown.



- 2017 - After years of price fluctuations between \$ 100 and \$ 900, bitcoin finally broke the \$ 1,000 level in January 2017, which doubled to \$ 2,000 in mid-May and then rose exponentially to \$ 19,000 in December of that year.
- 2018 - thanks to the media and their reporting on bitcoin, as well as the sharp rise in the price of bitcoin, the crypto industry has experienced a rise. Thousands of different new cryptocurrencies have been created while governments, mathematicians, economists, technicians and financial experts have debated the regulation of cryptocurrencies. During 2018, bitcoin maintained its price, reaching its highest price that year in January, when it was about \$ 17,527, and the biggest drop in price occurred in December of that year, when the price was \$ 3,226.
- 2019 - at the end of this year, the price of bitcoin was \$ 7,200.
- 2020 - With the COVID-19 pandemic closing economies and stirring fears over inflationary pressures on the US dollar, the price of bitcoin has begun its accelerated path upwards. In December 2020, the price of bitcoin increased by 300% compared to January of the same year and ended the year at a price of 29,374 USD, the highest it had been at until then.
- 2021 - Bitcoin doubled its price in 2021, when it reached its highest level and a price of \$ 64,000 in the first half of the year, followed by a decline to below \$ 30,000 and a record high of 68,000. USD in November 2021.

Chart 1 shows the movement of the price of bitcoin in the period from 2010 to May 2022, which shows the variability of the price and the large jumps that the price of bitcoin has had over the years.

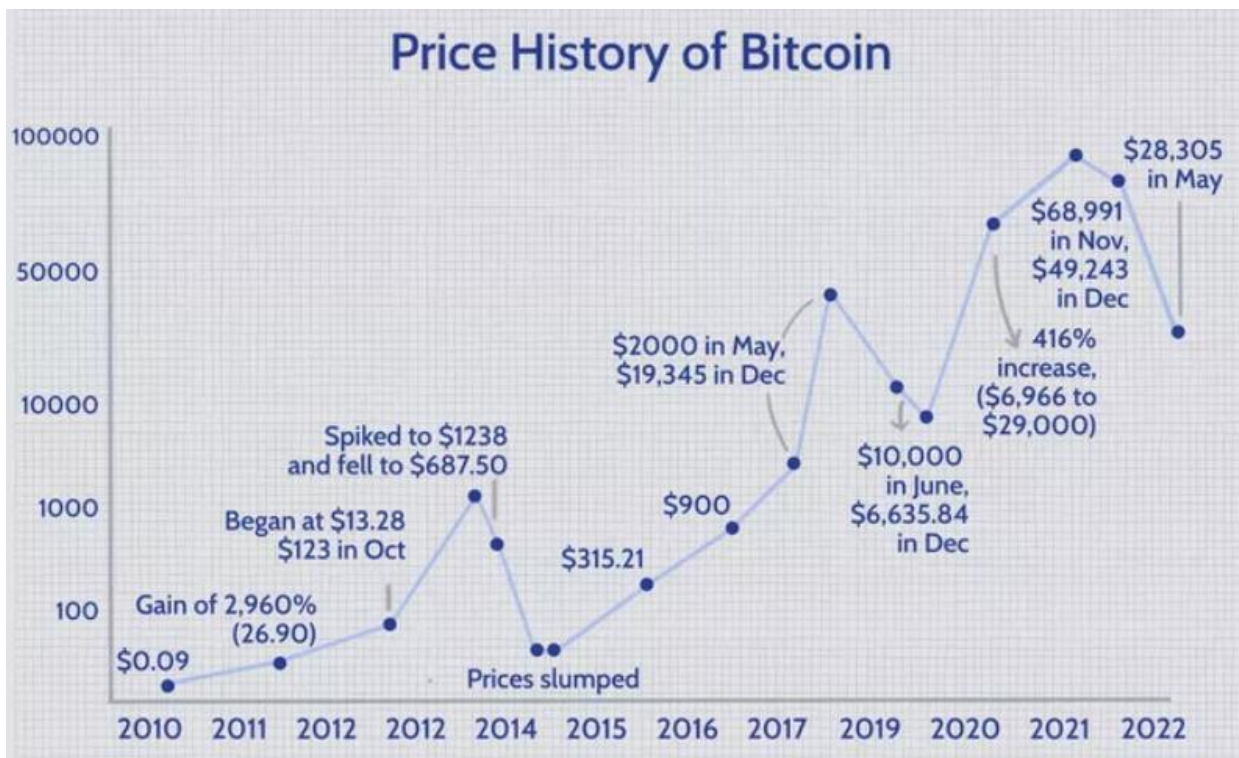
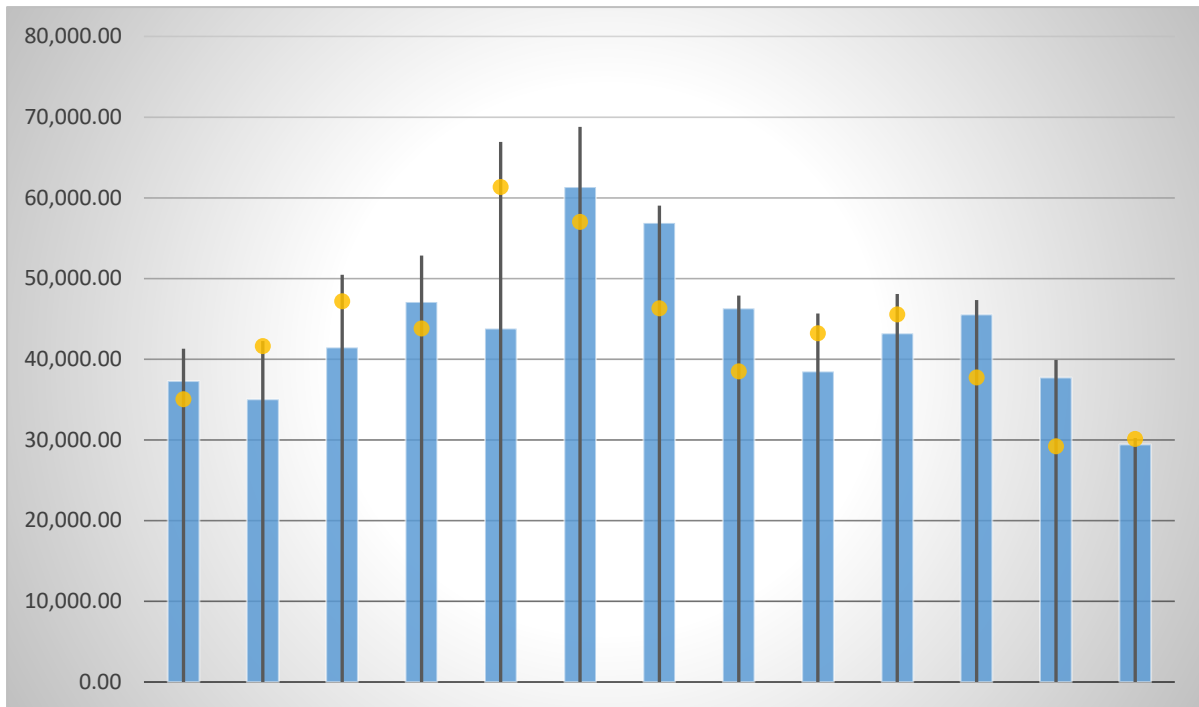


Chart 1: Price of bitcoin from 2010 to 2022  
(Source: Edwards, 2022)

When looking at the price of Bitcoin in the period from June 2021 to May 2022 (Chart 2), a drastic jump is visible in October, November and December 2021, when the historically high price level was reached.



*Chart 2: Overview of Bitcoin prices in the period from June 2021 to May 2022  
(Source: Yahoo.finance; authors calculations; Available at:  
<https://finance.yahoo.com/quote/BTC-USD?p=BTC-USD> (23/05/2022))*

The cause of this jump in price can be found in the then market conditions, which were strongly influenced by the consequences of the COVID-19 pandemic, which caused the closure of many companies and entire economies and the consequent outflow of large amounts of funds from the stock market. Financial resources in these extraordinary circumstances have been heavily invested in gold and cryptocurrencies as a way to hedge against potential inflation. Bitcoin has been identified with gold but in digital form and investors have decided to invest at least part of their financial resources in Bitcoin. Turning to new technologies and digitalization of business has brought the concept of cryptocurrency closer to many investors who did not pay much attention to this type of investment until then. Bitcoin has become something more than a digital currency for technical enthusiasts, becoming a globally known currency in which many people, who had no interest in cryptocurrencies until then, decided to invest at least a small amount of their funds. Bitcoin Short Sale Options (Edmondson, 2022):

- Direct short sale of Bitcoin - the simplest way to short sell Bitcoin. Bitcoin is sold in the market at a price that suits the investor, who hopes the price will fall as low as possible so that he can then buy Bitcoin at a lower price.
- Margin trading of Bitcoin - use a margin trading platform where the investor borrows money from a broker and trades hoping that the "bet" will pay off.
- Bitcoin trading on the futures market - buying Bitcoin through a contract on a future date at a certain fixed price. The investor predicts (hopes) that the price of Bitcoin will rise, so that when the contract expires, the investor can buy Bitcoin at a price lower than the market price.

Table 1 shows 15 cryptocurrencies according to their market capitalization, price and number of units in circulation as of May 14, 2022. It shows that Bitcoin has the highest price of all cryptocurrencies, while the number of units in circulation is 19,039,600 out of a total of 21 million Bitcoins that can be mined. The limited amount of Bitcoin units left on the market also affects the attractiveness of this cryptocurrency.

No.	Cryptocurrency name	Code	Market capitalization in USD	Price	Number of units in circulation
1.	Bitcoin	BTC	552,906,600,872	\$29,062.53	19.039.600
2.	Ethereum	ETH	240,197,371,761	\$1,988.55	120.773.083
3.	Tether	USDT	76,564,844,752	\$0.9982	76.708.151.375*
4.	USD Coin	USDC	50,906,057,280	\$1.00	50.903.981.947*
5.	BNB	BNB	45,428,024,634	\$278.47	163.276.975*
6.	XRP	XRP	19,834,679,299	\$0.4102	48.343.101.197*
7.	Binance USD	BUSD	17,546,240,903	\$1.00	17.507.983.539*
8.	Cardano	ADA	17,061,028,505	\$0.5058	33.739.028.516
9.	Solana	SOL	16,275,952,429	\$48.17	337.322.130*
10.	Dogecoin	DOGE	11,670,455,303	\$0.08794	132.670.764.300
11.	Polkadot	DOT	9,963,315,269	\$10.09	987.579.315*
12.	Wrapped Bitcoin	WBTC	8,267,221,985	\$28,973.21	285.104*
13.	Avalanche	AVAX	8,258,905,310	\$30.73	268.942.396*
14.	TRON	TRX	7,207,317,813	\$0.07332	98.178.686.185*
15.	Shiba Inu	SHIB	6,417,680,079	\$0.00001168	549.063.278.876.302*

\* mining is not possible

Table 1: Overview of 20 cryptocurrencies by their market capitalization, price and number of cryptocurrencies in circulation on May 14, 2022  
 (Source: <https://coinmarketcap.com/> (14/05/2022))

Long and short positions in cryptocurrencies, including Bitcoin, can be roughly observed as long and short positions in stocks (Buterin, 2021; Šarlija et al, 2020). Based on the above, short selling of Bitcoin is possible in a similar way as short selling of shares is carried out. An example is the sale of borrowed Bitcoins on November 1, 2021 at a price of 61,356.06 USD (chart 3) with a repayment period of two months, or on January 1, 2022.

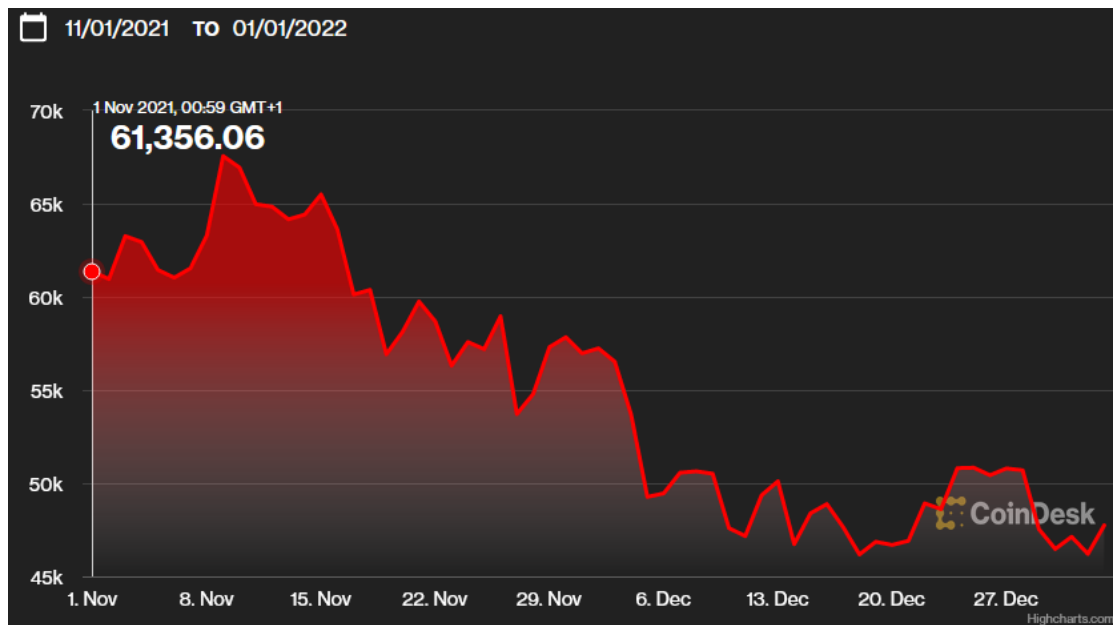
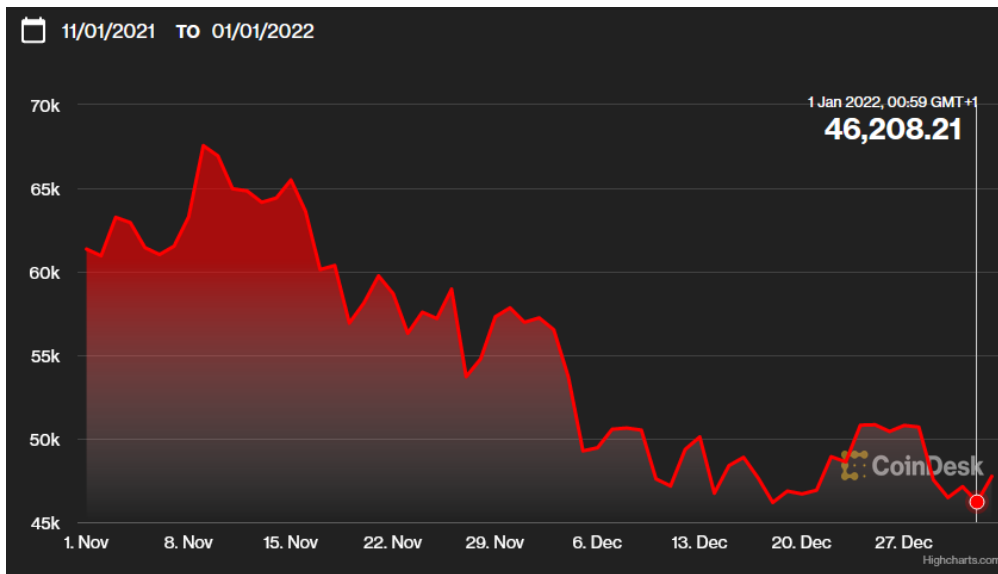


Chart 3: Bitcoin price display on November 1, 2021  
 (Source: <https://www.coindesk.com/price/bitcoin/> (15/04/2022))

On January 1, 2022, an investor buys Bitcoin for \$ 46,208.21 (Chart 4) to close his short position.



*Chart 4: Bitcoin price display on January 1, 2022  
 (Source: <https://www.coindesk.com/price/bitcoin/> (15/04/2022))*

In the above example, the investor correctly decided to get involved and close the short sale and earned \$ 15,147.85 in the process (Table 2). The calculation of examples of short sales does not include fees and commissions that the investor would pay to the broker and the page on which he performed the transactions.

	Transaction date	Price
Sale	01/11/2021	61.356,06 \$
Repurchase	01/01/2022	46.208,21 \$
	Profit	15.147,85 \$

*Table 2: An example of Bitcoin short selling  
 (Source: <https://www.coindesk.com/price/bitcoin/> (15/04/2022), authors calculations)*

The short sale of Bitcoin, which in this example paid off to the investor, could also have caused large losses in another period. High volatility and fluctuations in Bitcoin prices make this type of investment very risky and unpredictable. Investing significant amounts in assets, whether cryptocurrencies or other assets, potentially carries significant losses, so all investors should invest funds that are willing to lose and be educated and able to invest and participate in the financial market (Kozulić Balaban, 2022). The probability of forming a corner market in Bitcoin is difficult to predict, however, certain aspects of this cryptocurrency suggest this possibility, while others deny it (Zubalj et al, 2021). Based on data on falling prices during the first few months of this year, it can be inferred that Bitcoin has entered the bear market. Jones (2022) also refers to the decline in Bitcoin prices in the first quarter of 2022 (a 38% decline in prices in May 2022 compared to January) which may indicate that the formation of a corner market in Bitcoin is possible soon. The high sales volume of Bitcoin at the end of April 2022, according to the digital brokerage firm GlobalBlock, has cancelled the bull market for Bitcoin, and short positions on the cryptocurrency exchange Binance suggest the possible formation of a contraction. Some of the signs that may also point to the real possibility of forming a corner market in Bitcoin are the continuous decline in the participation of small retailers during the first quarter (a decline in retailers on Capital.com of 16% in February and the next 10% in March).

The situation of the decline in the number of long positions in cryptocurrencies is even more indicative, which is the lowest in the first quarter of 2022 since the middle of 2020 and amounts to 71%. The propensity for bearish behaviour of Bitcoin traders, who have so far been mostly bullish, indicates that traders are increasingly turning to short selling of cryptocurrencies, which is surprising since the Bitcoin market has always been more oriented to long positions and holding cryptocurrencies. The cryptocurrency market is characterized by emotionality, so the experimental index of fear and greed of Bitcoin has been developed, which can show traders the prevailing feeling in the market and direct them towards buying or selling cryptocurrencies. The index is measured by indicators from 0 to 100, in which 0 indicates extreme fear, while 100 indicates extreme greed and is measured on the basis of: volatility (unusual increase in volatility is a sign of fear in the market), market volume (high buying volume in positive market indicator of greedy market - bull market), social networks (presence of Bitcoin topic on social networks - unusually high representation of this topic means higher greed), dominance (indicator similar to the share in cryptocurrency market capitalization, increasing Bitcoin market dominance is a sign of market fear, and decline in greed) and trends based on Google Trends data for various searches for Bitcoin-related terms, so for example, searching for Bitcoin price manipulation may indicate market fear (Buterin et al, 2020). In case the index shows an extreme level of fear, it may be an indicator that investors are too worried and indicate an opportunity to buy cryptocurrencies, and an index that shows investors are too greedy indicates the need to correct market prices.

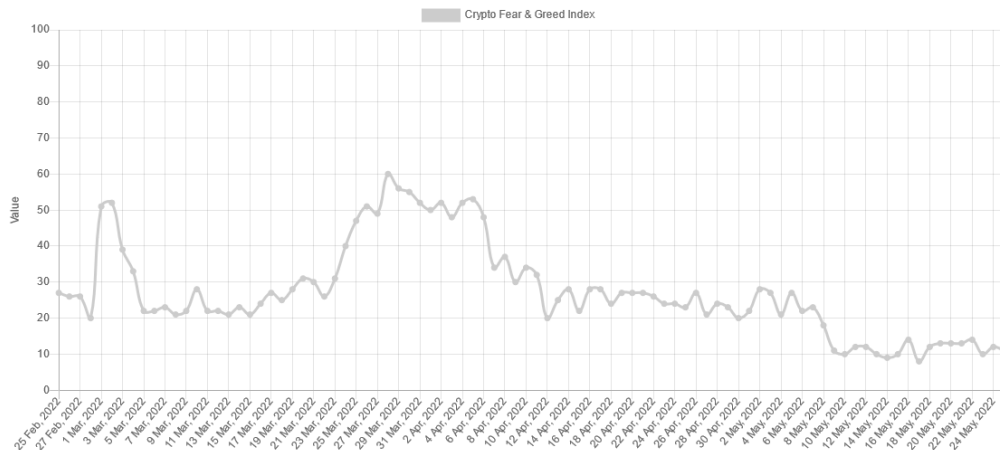


Figure 1: Fear and Greed Index on May 25, 2022

(Source: Crypto Fear & Greed Index, <https://alternative.me/crypto/fear-and-greed-index/> (25/05/2022))

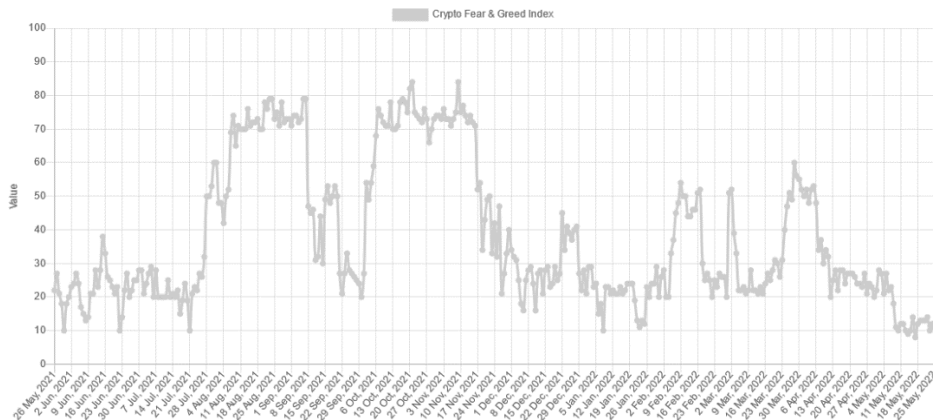
Figure 1 indicates a market with an index of extreme fear on May 25, 2022, which may be another indicator of the possibility of forming a corner market in Bitcoin trading, and such an index is present throughout the month of May 2022 (Chart 5).

Chart following on the next page



*Chart 5: Display of the level of the index of fear and greed in the period from April 25 to May 25, 2022*  
 (Source: Crypto Fear & Greed Index, <https://alternative.me/crypto/fear-and-greed-index/> (25/05/2022))

The presentation of the fear and greed index for the period of one year (from 25 May 2021 to 25 May 2022) shows that during the observed period the market was characterized by a high index of greed during August and September 2021 and again from mid-October. by the end of November 2021 and since then, with smaller periods of increasing greed, the fear index has been mostly high (Chart 6).



*Chart 6: Display the level of the fear and greed index in the period from May 25, 2021 to May 25, 2022*  
 (Source: Crypto Fear & Greed Index, <https://alternative.me/crypto/fear-and-greed-index/> (25/05/2022))

Some of the indicators show that despite all the other signs, the situation is more likely that the price of Bitcoin will continue to fall without forming a market corner (Edwards, 2022). As with other currencies, products and services, the price of Bitcoin and other cryptocurrencies depends on perceived value and supply and demand, so if people believe that Bitcoin is worth a certain amount, they will pay that amount, especially if they think its price will continue to grow. Under supply and demand laws, if the popularity of Bitcoin continues to rise, the price will also continue to rise as supply will not be sufficient for demand, but in the event that popularity falls along with demand, the price will fall. It can be assumed that the popularity of Bitcoin has grown, among other things, precisely because of the perceived freedom of management and trade, the desire of people to operate without the influence of an umbrella financial institution

and to invest in new technology. The initial complete lack of understanding of the functioning of Bitcoin has been replaced by the exceptional media coverage of Bitcoin trading and, indirectly, the growing awareness of people about this cryptocurrency. The possibility of quick earnings has always encouraged many people to invest in risky ventures, but investing in Bitcoin, especially in its infancy, required long-term entry into positions, with no guarantee that the investment will pay off.

## 5. CONCLUSION

From the initial perception of digital currency for technical enthusiasts and enthusiasts, Bitcoin has become a global phenomenon whose principles and way of functioning are understood by more and more people. The rapid rise in the prices of cryptocurrencies, especially Bitcoin, seems to defy hitherto known economic laws and seems to suggest the emergence of a new economic paradigm. Warnings about the similarity of Bitcoin with investment bubbles in the past have not come true so far, so one gets the impression that the new economic paradigm is indeed at work. The sudden fall in the price of Bitcoin after some time was replaced by its even greater increases, thus bringing unprecedented profits to investors. Bitcoin seems to be a financial instrument that serves not as money but as a means of preserving value, a safe haven, a means of portfolio diversification, a medium for making a profit and a means with many other positive characteristics, although it has no intrinsic value and is not based on anything hitherto recognized. However, there are indications of the possibility of a more permanent price correction, so investors are turning to short sales, which further creates the preconditions for the formation of a market corner. Because short selling is common, and markets can be volatile and operate under various influences, they can create a situation where certain participants manipulate the prices of securities or commodities or create a shortage of commodities and securities. This shortfall can cause a situation where a trader cannot redeem cryptocurrencies at a bargain price that he must return. However, although it is unknown and almost unpredictable what will happen to the price of Bitcoin and other cryptocurrencies in the future, it seems that the formation of a market corner is unlikely at the moment. It is possible that future research will achieve more accurate results that will then be applicable to other types of virtual assets. It should not be forgotten that investing in any type of property, including participation in financial markets, requires education, patience and a great deal of responsibility.

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# THE IMPACT OF DIGITAL MARKETING ON CUSTOMER SATISFACTION

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## ABSTRACT

*In today's highly competitive business environment, innovation has become a critical factor in driving success and growth. One of the most significant areas where innovation has a direct impact is marketing. As companies strive to attract and retain customers, they are increasingly turning to innovative marketing strategies to differentiate themselves from their competitors. This study explores the link between innovation and customer satisfaction, particularly in marketing. The research finding revealed that digital marketing has a fundamental impact on the satisfaction of customers to a massive extent. The research also indicated that database marketing depending on technology has a significant role in establishing customer relationships. Nonetheless, some pieces of the literature indicated that network marketing and the presence of a good relationship among the customers' suppliers, distributors, and other competitors was utilized to some extent. The findings are in agreement with the previous and present literature. Interactive marketing practices are based on the physical modalities that boost the social procedures and connection between the potential buyer and seller. The connection or relationship is viewed both as, formal and informal, depending on the consumer's requirement. However, the connection is mutual and beneficial to all parties. In short, the study's findings unveil that digital marketing, database marketing, network marketing, and interactive marketing play a significant role in the satisfaction of customers.*

**Keywords:** *Customer Satisfaction, Digital Marketing, Database Marketing, Interactive Marketing*

## 1. INTRODUCTION

The contemporary space within which organisations operate has become more competitive. Hence, the technique of market promotion is viewed as a game changer for businesses to make a difference and prosper. More alterations have unfolded regarding the challenging markets in technological innovation. In an unprecedented environment, the models of the rising business and adaptation of contemporary marketing activities help sustain organisational growth.

In the past decades, traditional marketing techniques aimed to pull customers to a particular product. However, today, there are massive improvements in marketing services and products. New technological innovations have completely changed the marketing system in modern society. For example, different organisations and individual businesses have adopted social media use in product promotion. Modern technological marketing majorly focuses on customer satisfaction, where customers' needs, tastes, and preferences come first. Contemporary marketing is understood as embracing new technology in carrying out promotional or marketing activities to accomplish the objectives of an organisation. The latest digital innovation in marketing includes digital, database, network and interactive marketing. Customer satisfaction is the optimum level of customer utility on their needs superscribed as required (Wu et al., 2022). The shift in customer requirements and wants precipitates alterations in the parameters of customer satisfaction. Most companies in the modern business sector aim to offer their customers a satisfying service. Typically, when the services and products are provided in the best quantity, quality, time, and place, they meet the needs and expectations of the customers. Therefore, technological innovations are essential components for the development and growth of the marketing industry owing to the emerging competition and tight business environment. Secondary data was gathered from various previously published primary research sources, including peer-reviewed journals, case studies, periodicals, newspapers and books.

## **2. LITERATURE REVIEW**

This study section contains the prerequisite literature regarding the relationship between innovation and customer satisfaction in marketing. Also, the theories and the empirical literature regarding the research variables are utilised in this part. (Mishra & Singh, 2023) explains the relationship between innovation and customer satisfaction in marketing through the Expectancy Disconfirmation Theory. The theory emerges from utility determinants. Mishra and Singh say that the theory holds the differences between the perceived performances of an organisation and the customer expectation. The theory's emphasis is put on the fact that comparing the supposed performances and customer expectations is critical in changing the business modalities and the organisation's performance. Based on this, Mishra and Singh say that organisational performance and customer expectation are essential components in identifying consumer satisfaction. The theory postulates that for a company to improve its customers' satisfaction, it is expected to boost the product's quality while, at the same time, lowering the client's expectations. Usually, customers have different expectations regarding product and service consumption. Furthermore, the author adds that every organisation is responsible for ensuring that customer services are enhanced for the benefit of both the organisation and the customer. (Lye & Santoso, 2021) Talks about machine learning (ML) and Artificial Intelligence (AI) as digital marketing tools that boost customer satisfaction. The authors indicate that ML and AI technologies have been instrumental in promoting effectiveness and accuracy in marketing promotions, making it easier for organisations to automate their activities and make data-driven decisions. In short, they insinuate that the use of ML and AI helps companies link with their consumers more efficiently and personally. (Suryawardana & Nurdeagraha, 2020) On the other hand, it addresses the influence that machine learning and Artificial intelligence have on digital marketing and how the impacts contribute to the satisfaction of customers. They state that one of the benefits that ML and AI have is helping in predictive analytics. According to them, this instrument helps the organisation project customers' behaviour and preferences. Customers' behaviour and preferences can only be predicted by utilising predictive analytics, which involves enormous amounts of data to determine the trends and patterns in the market. Suryawardana and Nurdeagraha also add that ML and AI boost consumer experience; for instance, they indicate that AI-powered chatbots have changed customers' service by offering effective and instant

help to customers. Chatbots can handle many consumer inquiries and help them with quick responses. Apart from the theories, different scholars also researched and published empirical literature. The empirical literature also gives more insight related to the current study, including the connection between innovation and customer satisfaction in marketing. Typically, numerous studies are conducted and published to prove how technological innovations directly or indirectly relate to the satisfaction of customers across the world. Yazid (2020), for instance, carried out a study on social media marketing. He states that social marketing is a platform that helps convince customers and potential customers that the current services and products of the organisation are the best and are for their benefit; Yazid, including Twitter, Facebook, and LinkedIn, lists these social media channels. (Suharto et al., 2022) researched how digital marketing helps promote the satisfaction of customers. The scholar indicated that the latest technological innovation has a transformative impact on customer utility in different industries worldwide. (Singh, 2018) also researched social media marketing and how the method influences consumers' satisfaction by appropriately establishing the brand image. The outcome of this study unveiled that social media marketing significantly impacts customer satisfaction and that more consumers prefer to utilise different social media channels to advertise their businesses and products. (Al-Dmour et al., 2019) investigated how social media help promotes the satisfaction of customers and maintain customers. The output of this research reveals that social media marketing is statistically essential to the retention of consumers worldwide. Database management for marketing investment is highly motivated because it is essential in controllable marketing within an organisation, ensuring customers are satisfied over time. (Kuruppu et al., 2018) They have explored the impacts of the technical and functional aspects of service quality on the satisfaction of the customers. The author discovered that service quality has a crucial impact on the loyalty of customers, corporate image, and satisfaction of customers. According to the author, these aspects are mutually related and fundamental to each other in the market promotion industry. (Yari, 2018) explains how industrial marketers link the services to database marketing in various developed markets. The analysis in this study by Yari is significant to many managers because it helps formulate and set marketing policies to satisfy customers and improve business growth and development. (Hasanin, 2018) investigated the way sellers communicate their prices on different social media networks. He discovered that the seller performs a competitive analysis of the prices and adjusts prices based on the market demands and needs. The comparison of prices by the investors is a concept utilised to establish harmony in the market prices and regulate such prices whenever needed to ensure that customers are satisfied with the product, price, and service. According to Pinyo and Worapishet (2018), customer satisfaction and interactive marketing are events that the buyer and seller investigate through familiarity, trust, service personalisation, and the quality of information. Pinyo and Worapishet indicate a special interactive connection between a seller and a buyer in the marketing interaction. Pinyo and Worapishet study the impacts of marketing through social media networks, particularly on product sales performance. They realised that using social media platforms like Facebook, Twitter, YouTube, and blogs significantly affects organisational performance in various business sectors. Also, the outcome of the investigation revealed that marketing through social media platforms has a greater significance as far as the influence of businesses is concerned. Network marketing is a contemporary way of selling goods and services through communication tools through social media. It is conducted by good organisations and customers who comment positively concerning a particular organisational product and service without necessarily involving the traditional intermediaries like Televisions, Newspapers, and radios. (Kunal & Sharma, 2022) Indicates that most companies still spend a considerable sum of money on advertising on traditional media, which is then passed on to consumers by adding prices to goods and services. Therefore, Kunal and Sharma suggest that online marketing is the alternative cheap marketing platform for any organisation

or individuals who want to cut the costs of products. (Visser, 2021) explored how social media marketing affects the performance of the real estate industry. The investigation unveiled that most organisations in various industries from 2010 utilise social network product promotion to the consumers, hence, building critical efficiencies required for their development. (Gerasimenko, 2021) researched the opportunities that social media technology offers and how social media technology impacts the promotion of products and services to customers. After some findings, the researcher deduced that businesses and organisations highly prefer communication through social media platforms to promote their products and share information that helps give customers feedback and satisfy their needs and requirements. Customer satisfaction involves many things, including the utility obtained through services and products the organisations and sellers provide to the customers. (Al hawary et al., 2021) argues that the satisfaction of customers entails the optimum utility level for the needs and desires of consumers to be addressed. They added that the alterations in the customers' needs and requirements precipitate the changes within the perimeters of customer satisfaction. Most firms' primary focus is to provide satisfying services and products to their clients. When goods and services are provided at the right time, place, and quality and quantity, it is considered a service that satisfies a customer (Al hawary et al., 2021). They added that this aspect applies to profit-making organisations while non-profit-making companies work for the money value. According to Eagle et al. (2020), customer satisfaction is the most important aspect of business success. According to Stürze et al. (2022), the technique of client satisfaction is utilised as a benchmark for identifying the service and product quality provided to the consumers, eventually boosting its effectiveness. (Chaffey & Smith, 2022) indicates that a customer's satisfaction is measured through a client's willingness to pay the premium price through positive communication and cross-purchasing financial services. Conversely, Khan (2021) highlights that the prompt opening time of a business, strategic ATMs, product reliability, and efficient and effective delivery improve the customers' privacy and can be a suitable identification in measuring clients' satisfaction in various industries. Eagle et al.(2020) indicate that organisations not keen on investing in digital platforms for product advertisement may fail. According to them, in this digital era, most of the population utilising products and social media platforms is youthful. Therefore, any organisation that needs to succeed must consider the target market and the best way to reach the market. In short, the satisfaction of customers and the success of a business, according to them, are interdependent.

### **3. METHODOLOGY**

This part of the study provides insight into the primary elements of how information and data were gathered and analysed. The design of this study enumerated the accumulation of data and information and analysis of the same based on the goals of the research and the empirical evidence highlighted. Typically, this study utilised a descriptive study design, where a group of research variables is incorporated and how such variables link with each other to build feedback. However, mostly, the study utilised the empirical literature or previous research to make its findings and conclusion. The population of the research involved different groups of business organisations across the countries in the world.

### **4. FINDINGS AND ANALYSIS**

The information gathered from different articles was verified, and analysis was conducted to reveal the outcome through regression analysis and descriptive information. The information from the above previous literature established that the marketing interaction was embraced to a greater extent by involving some people across the stages and functions in an organisation. Interactive marketing has a fundamental impact on the satisfaction of customers to a more significant degree.

Again, the output indicated that the new technological marketing was embraced more significantly. Other pieces of literature also showed that database marketing by marketers depends on the data and information technology to establish connections, and the clients have a massive role in delivering the information sharing was moderate. Nevertheless, some works of the literature showed that digital marketing through sharing information on the services and products to the consumers through the different social media platforms and the presence of the link between competitors, distributors and consumers were embraced. The study's findings were based on the collaboration of the previous literature and the present literature. The interactive marketing practices presented in the various kinds of literature were based on the physical or face-to-face modalities that boost the social procedures and the links between the potential buyer and the seller. The connection is viewed as informal and formal; however, this depends on the customer's needs and requirements.

*Table 1: The analysis*

	Innovation	Consumer satisfaction
Consumer Satisfaction	.647	
Brand loyalty	.620	645

N=75, and correlation is significant at level 0.01

The analysis indicates that the client's satisfaction is linked to technological innovation and has a greater and more beneficial significance, .647 relationships. The subsequent variable, brand loyalty, also shows a high positive result on the relationship between innovation and customer satisfaction; in this case, the significance level is 0.62. The other variables, including brand loyalty and customer satisfaction, are also correlated and critical to the connection. Ideally, these links describe how all the variables affect the other.

*Table 2: The analysis*

Model	Q	Q Square	Adjusted Square	Q	Std. error
1	.647	.473	.468		.28132

Dependent variable: Satisfaction of the customers

Independent variable: Innovation

Q value .647 demonstrates that innovation in different services and products was the reason for consumer satisfaction. In this table two, summary 1, the Q analysis indicates that technological innovation represents excellent customer satisfaction. It reflects a good connection between technological innovation and customer satisfaction in marketing.

*Table 3: The analysis*

Model	Q	Q Square	Adjusted Square	Q	STD. ERROR
1	.620	.418	.412		.28132

Dependent variable: Brand loyalty

Independent variable: Innovation

In this Table 3: Summary 2, Q analysis indicates that innovation is behind the highly recorded brand loyalty. It further indicates a positive link between brand loyalty and innovation. The Q value of .647 is a reflection that there is a powerful connection between brand loyalty and innovation.

## 5. DISCUSSION

The research offers insight into the relationship between innovation and customer satisfaction in marketing. The acceptance of the initial hypothesis highlighted that customers' satisfaction is influenced by new products advertised through digital marketing. The outcome indicates that this link is great. In digital marketing, organisations can become competitive by achieving high satisfaction by utilising digital media platforms. Also, the results reflect on the customers' conduct to the adaptation of the new marketing techniques and the methods to accomplish the present demand in the business environment. Technological innovation and products significantly attract a particular market for online products. The acceptance of the second hypothesis indicates that innovation also has a strong link with brand loyalty. Usually, organisations with loyal clients are viewed as the most advantageous because they maintain the services and the products for a long time. The price of attracting and getting new customers is more than the cost incurred in maintaining clients. When organisations introduce new products, customers tend to buy them. When such products and services satisfy the customers, they stick around. However, for the organisation to maintain such customers, they must go with the trend; in the sense that they must offer innovative products and they must use the digital platforms that most people in this new era utilise.

## 6. CONCLUSION

This study was intended to understand the connection between innovation and customer satisfaction in marketing. In the research, this link is observed in different organisations and worldwide. The study developed another hypothesis based on a literature review and highlighted them through a hypothesis model. The information and data in the study were gathered through literature sampling. Subsequently, the results from the investigation were analysed through a regression technique. The study's outcome highlighted the essential link between the independent variables, brand loyalty and satisfaction of customers, and the dependent variable, innovation. These research outcomes indicate that technological innovation, such as using social media platforms for product marketing, leads to the satisfaction and loyalty of customers. The advantage of this research is that this type of study is at a minor stage in the technology and digital marketing industry. So the research offers information and data concerning the conduct of the consumers towards the newly invented online marketing promotion.

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# REAL WORLD ENVIRONMENT APPLICATION OF AUGMENTED REALITY

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## ABSTRACT

*Augmented reality is a broad term and encompasses all technology between the real world and virtual reality. Augmented reality consists of virtual 3D objects integrated into a real 3D environment in real time. The medical, educational, entertainment, industrial and marketing purposes and applications of augmented reality were researched, as well as examples that illustrate the use of augmented reality in this area well. Augmented reality brings virtual information or objects into any indirect view of the user's real environment to enhance the user's perception and interaction with the real world. Augmented reality connects virtual and real objects and even scenes to maximize the natural and intuitive real-time user experience. It is an interactive environment in which real life is enhanced by virtual things in real time. This paper provides a summary and describes the current state of technology, systems, and augmented reality applications. The aim of this paper is to explain the many possibilities that augmented reality technology offers us and how to apply it in different areas.*

**Keywords:** *augmented reality, virtuality, application, examples, virtual objects*

## 1. INTRODUCTION

Augmented reality (AR) is an interactive real-world experience in which objects in reality are enhanced by computer generated perceptual information. The main value of augmented reality is the way in which the digital world merges into the human's perception of the real world. AR is defined as a system with three basic parts: a combination of real and virtual worlds, real-time interaction, and accurate 3D reading of virtual and real objects. Unlike virtual reality, AR interfaces allow users to see the real world simultaneously with virtual images attached to real places and objects. In the AR interface, the user views the world through a hand held screen or through a Head Mounted Display (HMD) that is either transparent or puts 3D graphics on a live video of the environment that is streamed from the camera. AR interfaces enhance the real-world experience, unlike other computer interfaces that distract users from the real world. Without replacing the real world that the user experience, this technology expands virtual information on top of the real world with continuous and implicit user control of viewpoints and interactivity. It provides a complex view for the user by combining the actual scene viewed by the user and computer generated virtual scenes. This new approach increases the efficiency and attractiveness of research and learning. The ability to overlay computer generated virtual objects into the real world changes the way we communicate, and educational, business, or

entertainment content becomes real because it allows for interaction and can be seen in real time. According to Azuma, augmented reality must have three characteristics: combining real and virtual worlds, real-time user interactions, and registering 3D space [1]. The study [2] addresses the lack of a comprehensive understanding of Augmented Reality (AR) in marketing. It aims to systematically review the existing literature on AR marketing and identify gaps for future research. The study concludes that AR marketing is a rapidly evolving field with significant potential for businesses. However, more research is needed to fully understand its implications and how to effectively implement it in different marketing contexts. The conference proceeding [3] discusses the applications of Virtual, Augmented and Mixed Reality (VAMR) in various fields such as education, aviation, and industry. It addresses the challenges and opportunities associated with implementing these technologies. The proceeding concludes that VAMR technologies have significant potential to enhance various sectors. However, there are still many challenges to overcome, including technical issues, user acceptance, and ethical considerations. The paper [4] addresses some epistemological issues posed by AR systems. It focuses on a near-future version of AR technology called the Real-World Web, which promises to radically transform the nature of our relationship to digital information by mixing the virtual with the physical. The paper argues that the Real-World Web (RWW) threatens to exacerbate three existing epistemic problems in the digital age: the problem of digital distraction, the problem of digital deception, and the problem of digital divergence. The RWW is poised to present new versions of these problems in the form of what Turner calls the augmented attention economy, augmented scepticism, and the problem of other augmented minds. The paper draws on a range of empirical research on AR and offers a phenomenological analysis of virtual objects as perceptual affordances to help ground and guide the speculative nature of the discussion. It also considers a few policy-based and designed-based proposals to mitigate the epistemic threats posed by AR technology.

## 2. TECHNOLOGY WITHIN AUGMENTED REALITY SYSTEMS

The main augmented reality devices are screens, computers, input and tracking devices. Transparent screens and monitor-based screens are the two main types of screens used in augmented reality. Transparent screens place both images of the real and virtual environment above the user's view of the world. Video see through and Optical see through systems are two types of transparent screens. Video see through systems (Figure 1 left) are useful when the user need to experience something remotely or using an image enhancement system [5].

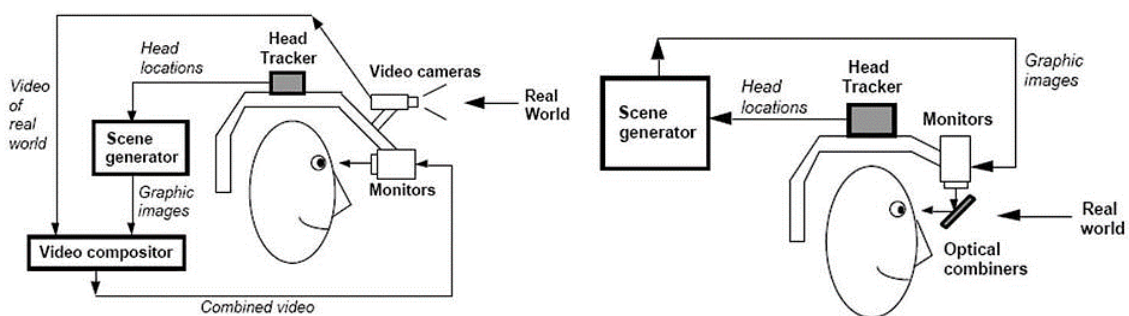


Figure 1: Video see through system (left) and Optical see through system (right)

Optical see through systems (Figure 1 right) combine computer generated scenes with a real-world image “through glasses”. An oblique translucent mirror is generally used for this. This mirror technology allows a view of the physical world through the lens and graphically overlays the information reflected in the user's eyes [5].

Another type of device that uses video-transparent techniques to cover graphics in a real environment are Handheld Displays. These are small computer devices with a screen that the user can hold in their hands. The two main benefits of a handheld augmented reality are the portable nature of handheld devices and the ubiquitous nature of a camera phone. Disadvantages are the physical limitations that the user has to hold the handheld device in front of them at all times, as well as the distorting effect of classic wide-angle cell phone cameras compared to the real world as perceived through an eye. These are smartphones, PDAs and tablets with cameras, digital compasses, GPS system with its six levels of freedom tracking sensors used in augmented reality [6]. Spatial displays use video projectors, optical elements, holograms, and other tracking technologies to display graphic data directly on physical objects without the need for the user to carry or hold the screen. Another method used to combine physical objects and computer generated information are projection screens. In this physical 3D model, a computer image is projected to create a realistic looking object [7].



*Figure 2: Projection screens on a building facade*

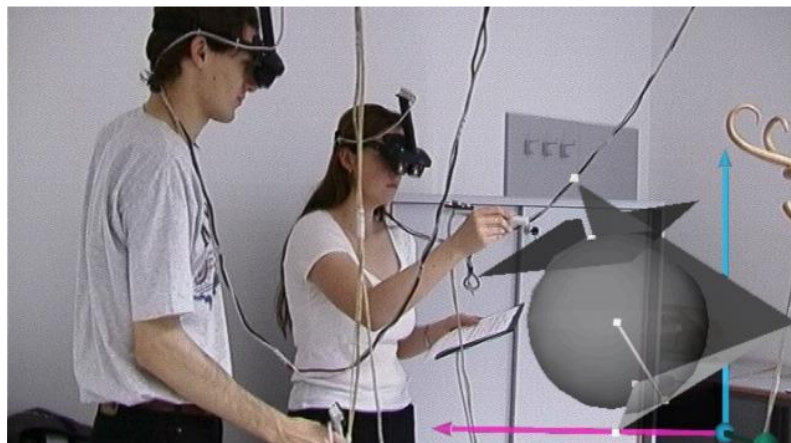
The primary input devices in augmented reality include pinch gloves, button-equipped sticks, and smartphones that determine their position and orientation through camera-based image tracking. Pinch gloves, composed of flexible fabric with fingertip sensors, enable gesture-based control and interaction with 3D objects. The pinch gesture, for instance, can capture virtual objects, offering a natural and reliable method of interaction. [8]. Digital cameras, optical sensors, accelerometers, GPS, gyroscopes, RFID, and wireless sensors track user positions and orientations. Computers analyze this data and create extensions for user display devices. Device type and system-user interaction define the interface in augmented reality apps. Augmented reality interfaces include tangible, collaborative, hybrid, and emerging multimodal ones, leading to five system types: fixed indoor/outdoor, mobile indoor/outdoor, and mobile indoor/outdoor systems. Mobile systems enable user movement, while fixed systems lack flexibility [9].

### **3. AUGMENTED REALITY IN EDUCATION**

While 2D media is simple, familiar, portable, and cost-effective in education, it lacks dynamism. 3D virtual environments demand expensive computer graphics. Virtual worlds offer teaching opportunities but may lack realism. AR is increasingly applicable, especially in education. [10-12]. The educational experience that augmented reality offers for a variety of reasons are:

- Interactions between real and virtual environment
- Tangible interface for object manipulation
- Smooth transition between reality and virtuality

Interaction – In a classroom, students collaborate best when sharing a common workspace, fostering natural communication. However, computer-based education often isolates students at separate screens, impeding collaborative interaction. Augmented reality overcomes this by enabling students to sit together, see both each other and virtual objects, and enhance face-to-face collaboration, making it more conducive to learning than screen-based methods. Tangible experience – In educational contexts, physical objects convey meaning and facilitate social interaction. Augmented reality enhances physical objects by enabling dynamic data overlay, public/private data display, context-sensitive appearance, and physical interaction. This enriches the interactive experience, making it accessible to users without computer expertise, such as children, who can manipulate 3D virtual objects by moving real-world props attached to virtual models, eliminating the need for a mouse and keyboard. Transitional interfaces – computer interfaces can vary depending on how much of the user's world the computer generates. Moving from left to right, a virtual image is magnified and the connection to reality is lost. Augmented reality can be used for a smooth transition from reality to virtuality [10-12]. Some users prefer the control and awareness of the real world that augmented reality (AR) offers over being locked in a virtual network. In mobile AR systems, particularly in classrooms, safety and freedom of vision for movement are crucial. Developers should consider these factors when creating educational AR environments. While AR may not suit every educational scenario, its potential should be explored. Construct3D (as an example for 3D geometry) is based on the Studierstube system. Studierstube uses augmented reality to allow multiple users to share virtual space. Transparent HMDs are used that display computer generated images on real surfaces, thus achieving a combination of virtual and real world, enabling natural communication among users. The latest version allows mixing and matching of different output devices such as personal HMDs, virtual desktops, conventional monitors, and input through various monitoring devices. All of these devices seem to act as interfaces for a single distribution system. Construct3D offers a basic set of construction functions such as points, lines, planes, cubes, spheres, cylinders, and cones [13].



*Figure 3: Construct3D example of work*

In AR, real-world objects are captured by the camera and displayed on the screen through a transformation from camera to real-world coordinates. The pinhole camera model is used for this, where 3D real-world points are projected onto a 2D image plane. This projection is known as perspective projection, and it's represented by a projection matrix. With a calibrated camera and known internal parameters, an AR system can determine the relative position of objects by matching three or more paired points between 3D and projected 2D coordinates. These technologies enable the overlay of virtual objects on the screen in AR systems.

## 4. AUGMENTED REALITY IN THE ENTERTAINMENT INDUSTRY EDUCATION

### 4.1. Pokemon Go and Niantic Real World platform

Pokémon Go is a highly popular AR game where players capture and battle Pokémon in the real world. Virtual Pokémon creatures appear on the user's device as if they are in the user's actual surroundings. Players can train their Pokémon and engage in battles with others. Its release sparked intense and mixed reactions, with supporters highlighting its potential for promoting physical activity and critics expressing concerns about accidents, disruptions, and privacy issues. Pokémon Go has also shown significant potential in the tourism industry, with players traveling long distances to play, highlighting the impact of mobile AR games on tourism. [14]. Consumer attitudes to mobile AR games are influenced by enjoyment, image, nostalgia, experience, and physical activity. However, injury risks can dampen this attitude. The company behind Pokémon Go, Niantic, has developed the Niantic Real World Platform, which seamlessly integrates shared AR worlds into the real world. This platform handles key functions like condition monitoring, communication, security, mapping, and AR. Players actively contribute to the Niantic Real World platform, identifying interesting locations via the Niantic Wayfarer program. Through this program, high-level players report new locations with details, photos, and titles, enriching the game board with over 9.4 million user-contributed locations. [14], [15].

### 4.2. AR Serious games

Serious games are part of a new field that focuses on computer games designed for non-entertainment and often for educational purposes. Over the last few years, there has been an explosion of serious gaming mainly due to the evolution of computers, communications, intelligent software agents, and accurate physical models.

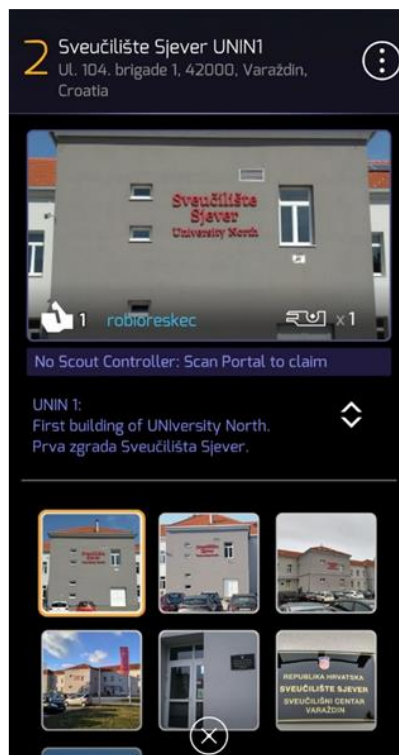


Figure 4: University North in the Niantic Real world

Serious games offer advantages beyond traditional ones, serving various commercial sectors like military, medical education, and emergency management. They transform gaming tech from leisure to a valuable tool.

Serious games emerged as a response to the view that games are purely entertainment, drawing inspiration from Plato's concept of play for teaching. This academic movement sees gaming's potential in supporting education and training, spanning from basic quizzes to immersive first-person experiences. [16]. Othlinghaus-Wulhorst and Hoppe's article outlines a framework for role-playing games in 2D virtual learning environments using chatbots. Their system architecture includes adaptive AI chatbots, a multi-agent blackboard system for independence and performance, and automated performance evaluation with feedback. [17] The article by Hammady and Arnab is a systematic review of serious gaming for behavior change<sup>2</sup>. The authors identified key theories of behavior change that inform the game design process and provided insights that can be adopted by game designers for informing considerations on the use of game features for moderating behavior in their own games. [18] The article by Parekh et al. presents a detailed review of the applications of augmented reality (AR) in three important fields where AR use is currently increasing: entertainment, medicine, and retail. The authors concluded that AR improves and enhances the user experience in these fields. [19]

### **4.3. Augmented reality in the industry**

Industrial Augmented Reality (IAR) enhances worker tasks, aiding in maintenance, quality control, and material management. Common IAR applications assist workers with instructions, displayed seamlessly, reducing context switching. Remote work and real-time data access benefit remote machine installations. IAR supports decision-making in real-world scenarios and provides quick access to documentation. Advances in electronics, sensors, IoT, and robotics enable IAR in various industries, including energy efficiency, home automation, precision agriculture, security, transportation, defense, and public safety.[20] [21] IAR aids training with precise task instructions, reducing the need for user manuals and speeding up skill acquisition. It tailors instructions to a worker's experience level, enhancing learning. It preserves valuable knowledge from retiring, experienced workers by incorporating it into training programs. Engineers benefit from IAR's 3D models for design and product evaluation, ensuring proper fit and enabling on-site CAD corrections. IAR also assists in quality assurance controls throughout product production. [20], [21]. Manufacturing can also benefit from IAR, in which IAR can provide the right information at the right time to avoid mistakes and increase productivity. This is especially important in hazardous production facilities, where a mistake can mean that a worker is injured, or expensive equipment is damaged. In addition, in such situations, the IAR solution could be used as a monitoring and diagnostic tool that records information provided by the control and management system and sensors. Virtual reality and augmented reality (VR / AR) are key technologies for virtual engineering. They are the basis for functional virtual prototyping, which allows engineers to analyze the shape, size, and functional behavior of future products in an interactive virtual environment. The application of these technologies greatly improves communication in product design and production development: It helps to identify and avoid design errors in the early stages of the development process, reduces the number of physical prototypes and saves time and costs for companies. VR / AR are considered valuable tools to improve and accelerate production and development processes in many industrial applications. The following 8 uses are the most commonly used and the most promising in terms of possible performance improvements achieved by applying IAR:

- 1) Quality control – Its goal is to automate quality control process using computer vision techniques. Product modelling would be performed using 3D cameras and reconstruction software. Once the actual product model is obtained, it would be possible to detect deviations from the CAD model.
- 2) Assistance in the production process – This case is intended to assist operators in production process within a workshop by visualizing 3D models on tangible interfaces located on the desktop. The use of tangible interfaces involves the introduction of a visual marker /

identifier into the work environment that acts as a spatial reference for the IAR system. The marker can be printed on a fixed surface located on the table of the pro-output station or on a mobile support that allows operator handling.

- 3) Product and tool location visualization – Thanks to the already developed system based on RFID tags, at Navantia shipyard in Ferrol it is possible to visualize the 2D location of products and tools in portable devices such as tablets or IAR glasses. This system would use sensors and artificial markings arranged throughout the workshop that allow the position of users in the shipyard to be determined.
- 4) Warehouse management – This case is intended to assist warehouse operators in the processes of warehousing, localization, relocation, and collection of parts. The immediate advantage of displaying information on IAR devices is the reduction of human errors and time associated with the various processes involved in warehouse management.
- 5) Intended maintenance using data – The purpose of this use case is to carry out planned maintenance operations using data mining techniques. For this purpose, information related to process quality control is collected, as well as data from sensors in machines and during a workshop. The data can then be analyzed and displayed to operators via an IAR device.
- 6) Communication in AR – IAR facilitates extended communication between operators and controllers / experts via portable IAR devices. It allows one to manage or resolve incidents on the spot, share the point of view (POV) of the operator regardless of location, allowing the display of data over an actual image seen by the operator, recording notes and audio video communication.
- 7) Visualization of installations in hidden areas – This case is used in the visualization of hidden installations behind partitions, roofs, or ceilings, by overlapping 3D virtual elements in a real environment. An ideal IAR system would assist operators during the assembly process, both during pre-assembly and the block assembly, to detect internal elements that would otherwise be difficult to see. In addition, such a system would facilitate maintenance or repair of breakdowns.
- 8) Remote operation of IIoT (Industry IoT) and smart connected devices – Virtual control panel (digital user interface) can be installed on a smart device that is directly controlled by IAR headset, hand gesture, voice commands or even by another smart device.

## 5. DISCUSSION

Augmented Reality (AR) is a technology that integrates digital information with the user's environment in real-time. It has many benefits and real-life applications, ranging from entertainment to education, medicine, and enhancing independence for those with disabilities. According to an article by Forbes, there are several problems and concerns associated with the adoption of extended reality technologies like AR. One of the biggest concerns is the legal aspect, as the technology is advancing faster than legal systems can cope with, leaving regulators and lawmakers playing catch-up. This results in a lack of clear laws on what is acceptable and unacceptable in virtual environments, and even which jurisdictions those environments come under. Another issue is the moral aspect, as immersive technologies can allow people to act out whatever they want, seemingly without any real-world consequences. This crossing of moral boundaries that exist in the real world can be concerning. [22][23] One of the most powerful applications of AR is in the field of medical training. AR can be used to teach students the ins and outs of anatomy using AR headsets or augmented reality glasses. This technology can also be used for MRI applications and performing highly delicate surgery. AR is also a powerful aid for industry and the general public at large. It can be used for interactive and immersive weather reports, helping fighter pilots find their targets day or night, and much more. The potential for future applications of AR is limited only by our collective imagination. [24]

In addition, AR provides an excellent tool for showcasing data by placing it in a visual context and bringing it to life. Applications of VR and AR will take visualization a step higher, providing immersive experiences to people studying and discussing data and prototypes.[25] Overall, AR has the potential to dramatically change the way we solve problems and interact with our world. It reduces the line between the real world and the virtual world, enhances perceptions and interactions with the real world, and allows us to experience existing reality in a more heightened and engaging way. Following are the benefits or advantages of Augmented Reality (AR) [26]:

- The AR system is highly interactive in nature and operates simultaneously with real time environment.
- It reduces line between real world and virtual world.
- It enhances perceptions and interactions with the real world.
- Due to its use in medical industry, life of patients have become safer. It helps in efficient diagnosis of diseases and in early detection of them.
- It can be used by anyone as per applications.
- It can save money by testing critical situations in order to confirm their success without actually implementing in real time. Once it is proven, it can be implemented in real world.
- It can be used by military people without putting their life in danger by way of battle field simulation.
- It can be applied to part of training programs as it makes things memorable and eye catching.

Drawbacks or disadvantages of Augmented Reality (AR)

Following are the drawbacks or disadvantages of Augmented Reality (AR):

- It is expensive to develop the AR technology based projects and to maintain it. More over production of AR based devices is costly.
- Lack of privacy is a concern in AR based applications.
- In AR, people are missing out on important moments.
- Low performance level is a concern which needs to be addressed during testing process.
- It requires basic learning to effectively use AR compliant devices.

## 6. CONCLUSION

Augmented reality offers unique possibilities combining real and virtual world. Without replacing the real world that the user experience, this technology extends virtual information to the real world and provides a complex view for the user by combining a real scene viewed by the user and computer generated virtual scenes. In education, augmented reality offers the possibility of interpersonal communication during learning among students. In medicine, augmented reality complements human skills and knowledge and allows the user to look at things that could not be seen with the naked eye. The games have been given a new perspective with augmented reality, with the possibility of traveling around the world from the comfort of home or exploring new attractions in these areas with real world travel. In industry, it offers us new ways of economical production and logistics, and product design in easier and simpler ways. AR in industry is slightly different compared to AR in personal usage. The main difference is sole purpose of this technology. Mainly AR in personal use is used for fun, various filters (Snapchat, Instagram, Messenger, etc.), AR table-top games and tourist help/guidelines. In industry AR is oriented to make things more useful, to boost user experience as well as user interface for specific equipment. i.e. Mercedes and VW head up display shows driver several information right in the field of view. By that the driver is more focused and the eyes are always on the road.



CPUs of modern machines are very powerful and can show several (5-10) 2D information combined with GPS, gyroscope and other sensor that are relevant to its performance. BMW on the other hand, has AR solutions for their technicians. The application helps them with (dis)assembling determine faulty parts, choosing repair module etc. Augmented reality can also reshape the shopping experience via mobile devices and create more significant consumer-brand relationships. This will change the way we communicate with computers, and it will also change the way we shop. It all starts now, and all the user need is a smartphone. No manual or assembly required. As for teachers and universities goes, AR could be next level in knowledge transferring methods, but there is huge problem with the new and new materials. AR applications are time consuming to create and often there are several people needed in the team such as graphic artist, programmers and experts from one field. To create one AR app a finance plan needs to be approved by University or Ministry of Education, but those funding's are often cut out and teachers should create their own materials. The problem is that teachers don't have enough knowledge to do so, some of them never heard for Unity3D, or Unreal Engine. And those who could actually create something like that... often don't have time or motivation to do so.

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# AI APPLICATIONS IN THE PUBLIC SECTOR IN JORDAN USING AIMA

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## ABSTRACT

*The development of Artificial Intelligence (AI) has drawn increased attention from both practitioners and researchers. Additionally, it has helped to open up a number of doors for the successful integration of AI in the public sector. Because of this, it is essential to have a thorough understanding of the effect, scope and uses of AI in the public sector, as well as the issues that come along with it. The use of AI and the difficulties that come with it have never been explored together; only separately. This implies that a comprehensive assessment of applications that are focused on AI and diverse concerns within the public sector is lacking. This study proposes a model using an AIMA application that analyse and compile pertinent ideas from literature reviews in order to present an overview of AI technology and the difficulties it faces. In addition, the study reviews the Jordan government's plans for its future transformation and the difficulties that come with using AI technology. The reviews in this paper concentrate on certain applications of AI in the public sector. The paper also looks into important aspects of the difficulties brought on by AI. Finally, insights and conclusions are drawn from literature studies, their ramifications for theory and practise are explored, and recommendations for further study of AI in the public sector are given*

**Keywords:** *AI, Public Sector, AIMA Applications*

## 1. INTRODUCTION

AI describes a computer system's ability to solve problems and behave intelligently in a manner akin to that of a human through particular learning, action, understanding, compromised perception and fundamental competencies. The public sector as a whole and governments everywhere are growing increasingly interested in AI. This significance is largely explained by AI's capacity to greatly help the public sector resolve a number of problems, such as language barriers, service delivery delays, protracted waits in queues, insurmountable caseloads, and a high turnover rate (Audibert *et al.*, 2022). Because of this, AI will likely significantly advance society, the public sector and governments, resulting in better work, reduced administrative burden, and automated business procedures. The basic objectives of AI research include manipulating and moving objects; realising and processing natural language; learning, planning and displaying knowledge; as well as reasoning. All of these are regarded as long-term goals across the whole area of AI. Numerous government organisations are working to advance AI technologies in order to improve their public services. The results of adopting AI are empirically supported by limited research since it will likely significantly improve governmental operations, programmes and policies (Ahmed and Amir, 2019). This study evaluation on developing a theoretical framework for a more in-depth examination of the effects

of AI on the public sector in Jordan. The suggested model's elements take into account the necessity for more societal advancements to maximise their influence, while building on the current state of scientific knowledge regarding the individuals driving AI adoption. The study offers a public benefit paradigm for use in Jordanian public benefit paradigm of AI on the internal makeup of the public, the effectiveness of the public sector, and broader societal implications.

## **2. BACKGROUND**

Humans are creating AI systems that are capable of performing tasks that mimic human mental abilities and work patterns, analysing the surroundings, and learn from mistakes to make a prediction, give recommendations, decide things, or take actions that impact real or virtual environments with some degree of autonomy (Ajibade and Mutula, 2019). This advancement is influenced by the steady increase in computational capacity, the availability of large amounts of data, and the use of digital technology. The Jordanian government has released the Jordanian Artificial Intelligence Policy 2020 in order to facilitate the use of artificial intelligence technology in digital government services and to generate opportunities that are conducive to innovation and entrepreneurship (Alhashmi *et al.*, 2019). Additionally, the government is dedicated to the preparation of sectorial plans and strategies for artificial intelligence. These plans and strategies will elucidate the market assessments that are necessary for the expansion of artificial intelligence in the Hashemite Kingdom of Jordan. In a statement that was released by the commission on , The Jordan Investment Commission JIC Acting Chairman Farida Hartouqa said the inclusion of such tools is intended to promote Jordanian exports, reduce expenditures on construction and public services, and register and licence economic activity (Baloch and Rehman, 2019). Additionally, it intends to carry out feasibility studies and present investment prospects by utilising technical developments based on massive amounts of data, artificial intelligence, machine learning, virtual reality, and block-chain technology, amongst other tools and technical applications. The Jordan Investment Commission (JIC) is the first government entity in Jordan to evaluate the level of AI and future management tools' institutional maturity.

## **3. LITERATURE REVIEW**

It has been demonstrated that AI has the ability to create benefits in a variety of fields and applications, which presents it with a significant opportunity to contribute to the public sector, society and economy as a whole. AI, which is currently in the process of being redefining as either a technology or a science, is not, fortunately, particularly well defined as a crucial technology among society's politicians and academic institutions (Barry and Doskey, 2020). As a result, it is highly challenging to assist in determining the spectrum of what is meant by AI within the public sector due to the fact that AI has so many different meanings. A select few people define AI as either the overarching science or practise of producing intelligent technology, which is a topic of research that has been around since the 1950s (Cai, 2020). In addition, the realm of artificial intelligence encompasses a variety of methodologies, priorities and goals within the context of this area of research. In addition to this, industrial processes and machines that are backed by AI systems considerably augment the human capacity to provide digital help and decision-making in situations that are both vital and extremely troublesome (Campion *et al.*, 2022). After taking all of this into consideration, there is a higher incentive for the governmental institutions to collect the maximum benefits that are brought about by AI in the public sector. Specifically, this interest lies in the areas of Artificial intelligence is not a technology of the future, because it already exists and its development cannot be stopped at any point in the foreseeable future. The earliest government agencies to employ artificial intelligence were able to make the assertion that the economy improves in direct proportion to

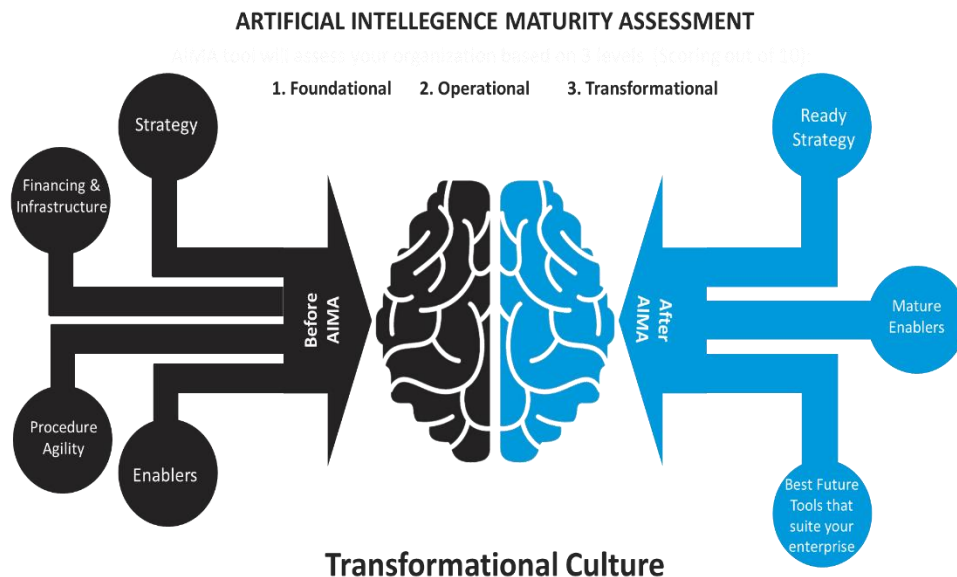
the cost-effectiveness of AI technology as it becomes more widespread (Dignum, 2018). As a result of the many different applications that public employees find for AI, various sectors of the public sector benefit from its use. This includes the establishment of drone flight paths, the triage of health care cases, the adjudication of bail hearings, the answering of citizen questions, the planning of new projects for infrastructure, the detection of fraud, decisions regarding immigration, and the distribution of welfare benefits. In addition to this, there is an increased requirement to comprehend the dangers, prospects, challenges and motivations behind the implementation of AI in the public sector (Fayyumi and Idwan, 2020). In addition, there is still a need to analyse the possible impacts caused by the application of AI in the public sector, regardless of whether those impacts will be beneficial and/or harmful. Early research suggests that there are a number of barriers to public adoption of AI, which are not directly related to the technology itself. These difficulties stem from various academic fields. The conceptual framework suggested draws perspectives from earlier research on public sector and government innovation in order to further emphasise the need for maybe having appropriate enabling conditions in place before AI would truly have a beneficial impact. Second, the method aims to be more analytical while building on investigations into evaluations of the technological consequences or risks of AI (Jordan *et al.*, 2020). Due to the lack of counterfactual metrics, data or research to show causal links between ICT investment on the one side and repercussions on the other side, current research frameworks that analyse the governmental impact of ICT have been judged insufficient (Kumar *et al.*, 2021). While AI technology opens up new possibilities, this opening up does not always translate into a real-world application. The influence is not caused by technology per se, but rather by how it is applied and how it modifies pre-existing structures and procedures. As a result, this implies that the actual influence of AI varies depending on the context and the application area (Leminen *et al.*, 2018). Additionally, a citizen's response may range greatly depending on their traits, culture or geography. Furthermore, when AI systems are made available to the general public, even civil workers may behave differently than expected. This could affect their input data and workflows, which in turn has an impact on AI technology. Furthermore, it might be more difficult to gauge how AI technology will affect society than suggested by other assessments (Marda, 2018). To effectively understand the repercussions, any estimate of how AI will affect society must have a thorough understanding of the AI system and of the effects on people. The systematic comparison of the public situation or policy before and after the introduction of AI will considerably boost the short-term impact of comprehending AI's impact. In the past, algorithm research has used this form of study methodology, most notably in more critical investigations. Therefore, it will work effectively in conjunction with the present policy research techniques (Pillai *et al.*, 2018). Even though the framework should under no circumstances be considered an operational structure, it will be seen as a conceptual framework to attract and assist adequate researchers. The researchers will evaluate the prevalent presumptions used when analysing the effects of AI on the public sector. According to a 2001 research study, 85% of Jordanians had never signed on to the internet and had never accessed any significant information there (Rossi, 2018). The situation has evolved over the course of over 8 years, though. [This report's focus is on Jordan since it is a developed nation with an ecosystem that is ready to deploy AI, and the researchers are worried about the outcomes that have shaped Jordan's history.] Microsoft has certified that the majority of local businesses are prepared to employ AI, giving Jordan's business environment a trustworthy accreditation. The government's efforts to build out its infrastructure and promote Arab and foreign investment is another major factor in the development of AI in Jordan. The research also revealed that 62 percent of Jordanian organisations think that leaders and artificial intelligence are related, and 48 percent are looking for ways to integrate AI into their operations (Rossi, 2018). The development of AI and its potential social impacts have been greatly aided by recent technology advancements in both

hardware and software. Continuously expanding data collection and use accelerates machine learning processes and improves the effectiveness of AI systems that rely heavily on data (Ryan and Stahl, 2020.) Additionally, agencies still struggle with a number of obstacles to attain a high rate of performance and utilise such technologies, because of how public sectors currently function and will be revolutionised by AI. According to an earlier study on other technology innovations, businesses must effectively coordinate and implement the necessary complementary resources. Therefore, the public needs to develop AI capability and promote it because they have yet to notice any appreciable superior performance from their AI resources. Understanding where the AI will be stationed is crucial in order to provide the appropriate practises for deploying AI infusions and broadcasting application procedures (Sabani and Deng, 2019). Similar to the adoption of any other technology, if proper measures are not done in the early stages of initiatives, vicious effects and impediments are likely to have a negative impact during AI implementation, or reduce the public sector's future performance.

#### **4. PROPOSED MODEL – AN AIMA APPLICATION ROADMAP IN JORDAN**

Over the last few years, many organizations understanding of AI and future management tools and its potential value has grown steadily. Yet many have been unable to translate their acquired knowledge into actionable transformation plans. According to a 2018 McKinsey survey of manufacturing companies, while 75 per cent of respondents recognised that AI and future management tools solutions could improve business performance, only 13 per cent had embarked on AI and future management tool initiatives. Many organizations that completed the Artificial Intelligence maturity assessment also reflected the same uncertainty regarding next steps. This gap between awareness and implementation is usually due to companies lacking an overall AI and future management tools roadmap. Consequently, prioritisation is a critical exercise for companies that enables them to formulate an effective AI and future management tools roadmap, as it helps them identify focus areas that will generate the greatest value. Having clearly identified focus areas drives both informed decision making and effective resource allocation. Despite the importance of prioritisation, there has been little assistance and guidance available for organizations – big and small – that wish to embark on this process in a robust and comprehensive way. AIMA is a deliberate attempt to help companies approach prioritisation in a systematic fashion that is both robust and comprehensive. The application of AI is having a profound impact on the function of society and industry. It is a crucial technology advancement that creates new working practises, business opportunities, and improved efficiency. There will be new professions and a shift in the nature of labour. How to most effectively make use of the potential presented by digitalisation and AI for adding value and boosting efficiency is a key concern. Both the public and private sectors should be aware of this (Saboor et al., 2020). When decision-making is shifted partially from humans to robots, there are ethical issues to consider as well. AIMA is a tool built on AI and ML algorithms that was created to evaluate all stakeholders in an organization's overall adoption of AI and potential management tools through diagnostic analysis. AIMA takes into account pillars and enablers in addition to the strategic organisational plan, services, and tools in order to provide customised recommendations to assist organisations in aligning their strategy with best practises, while offering advice on corrective actions that enablers need to take. As a result, AIMA is the optimal tool for helping to set priorities and create a clear road map for integrating AI and future management tools into organisational culture. To help companies translate the main principles and components into practice, the Prioritisation Matrix was developed with the support of leading practices from the OECD, WEF, EFQM model. Designed as a management planning tool, the Prioritisation Matrix brings together four inputs, which each reflect a key principle of prioritisation represented in strategic observations, finance and infrastructure, procedure agility, and business enablers. The goal is to assist companies in quantitatively identifying the high-

priority Index Dimensions where improvements will bring the most benefit. AIMA's objectives are to assess the organization's level of readiness to transition from a traditional organisation to one based on Artificial Intelligence; to identify opportunities, risks, strengths, and weaknesses; and to develop a clear strategy to carry out the transition and ensure that recommendations, initiatives, and plans are carried out, as well as to convert traditional services into services based on AI, thereby achieving an advantageous, preferential use of Artificial Intelligence (Sanni and Olawale, 2020). In order to develop a proactive system for the organisational transformation process and come up with a clear roadmap for the inclusion of Artificial Intelligence and future machine learning, it is crucial that the project equip the JIC's team with the training and qualifications they need through Artificial Intelligence best practises in the field of transformation, and the adoption of an organisational maturity standard for Artificial Intelligence using the AIMA tool. The three levels of the AIMA model are nascent or foundational, operational and transformational. As a research methodology, the Design Science Research (DSR) approach is employed. The method serves as the foundation for both the creation of a design artefact and the growth of the profound AIMA model.



*Figure 1: AIMA Model Group Assessment*

The suggested model has a four-step iterative design process, with sub-steps including choosing the design level, choosing the approach, designing the model section and evaluating the outcomes. This suggests that the design level should be mentioned first. At this point, the maturity model's dimensions (primary, and if necessary, subcategories) should be specified, along with the general idea of the maturity stages and level structure. The following phase offers two distinct design methods that have been used in the real world. The maturity levels and their descriptions are then derived using the bottom-up methodology by first defining the dimensions (Sanni and Olawale, 2020). In contrast, the top-down approach specifies the dimensions and their descriptions before defining the maturity levels. The third stage entails selecting an appropriate design model for each degree of abstraction. The last stage of the iterative model creation process must be planned using the selected methodology. The completeness, consistency, and problem-adequacy of the requirements should all be checked against the outcome. Understanding the key components of a future-ready entity is a critical first step in any effective transformation journey. In response, the AIMA framework draws on the [Reference Different international Leading Practices] to provide a practical, yet comprehensive illustration of all the necessary ingredients.

The AIMA framework comprises two layers. The left layer identifies three fundamental building blocks of AI and FMTs: Strategy, Governance and Budgeting. All three building blocks must be considered to harness the full potential of AI and FMTs. Underpinning each building blocks are different pillars, which represent critical aspects that entities must focus on in order to become future-ready organisations. The right layer comprises three main fundamentals that combine technology, process and organization. There are nineteen dimensions that companies should reference when evaluating the current maturity levels of their facilities.

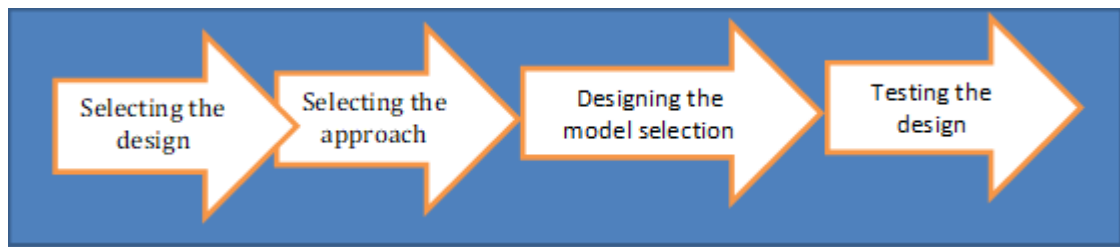


Figure 2: Proposed model (AIMA application roadmap)

As shown in Figure 2., we started by deciding on the design level. In this context, a multidimensional maturity stage meets various AI dimensions with a one-dimensional sequence of discrete stages. The selection of a method for implementation is covered in the second phase. According to literature and scientific sources, the bottom-up strategy is appropriate. The vast earlier work building on the understanding of other AIMA researchers is followed in identifying the AI dimensions. As a result, the following categorisation of AI dimensions is helpful: Data, ethics, organisational structure, technology, strategy and privacy (Santa *et al.*, 2019). The definition of AI maturity stages comes after the identification of the AI dimension and the previously specified values. Here, we also rely on a five-stage maturity framework that has been successfully applied, such as the Capability Maturity Model Integration (CMMI) framework (Sieras, 2020). The choosing of the model is covered in the third phase. AIMM's design is developed here. A matrix is used to compare the chosen AI dimensions to the five maturity levels. The corresponding AI dimension assessments are based on the five development levels. This stage involves visualising the AIMM structure and assigning the topics to the various levels.

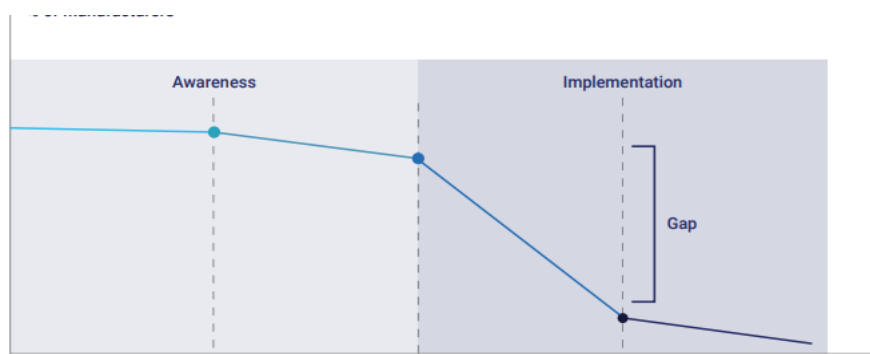


Figure 3: Created by authors

Since its launch, the AIMA model has helped many companies better understand AI and future management tools and its potential value to their organizations and government entities. Despite the increased knowledge, most firms remained noncommittal about developing and executing action plans, exposing a significant gap between awareness and implementation of AI and future management tools solutions.



## 5. DISCUSSION

The two most important technological forces influencing information systems are about to be digital transformation and AI. In order to achieve the goal of, businesses must evaluate their capabilities and critical next steps, with a strong emphasis on the need for AI-specific maturity models (AIMA). An AIMA model must be based on empirical data and metrics as well as incorporate a practical methodology. A comprehensive literature review uncovered a number of AIMA methods. However, the majority of these methods lack critical AIMA properties or have methodological and scientific flaws (Wall, 2018). There are only three reliable models. It might be argued that these span a relatively small solution space and point out weaknesses in the evaluation after further research and classification. Our analysis adds to the evaluation of the current AIMA model, while also pointing at significant room for growth. It seems reasonable to continue to develop the currently used AIMM that has been deemed promising. The aforementioned criticisms must be addressed in this process, and data privacy and ethical concerns must also be taken into account. Next, we will attempt to extend the AIMA development process by moving into phases five through seven of development. Our draft AIMA model has four levels of maturity and seven total dimensions. With the target group (SME stakeholders), a thorough evaluation is required. Based on this, concrete actionable suggestions for management of the proper application of the AIMA model may be created (Yu *et al.*, 2018). A concrete and user-friendly AIMM evaluation method must also be created in order for businesses to gauge current state and future trends. Additionally, the extension of AIMA's development through automated generation of subsequent phases is an intriguing topic. As a matter of fact, AI may serve as the co-pilot to suggest subsequent activities, and businesses may automatically be advised as to whether it is necessary to advance to a higher level of AIMA (on a corporate, departmental and/or application level). AI obligations can be made clearer and their duties set by considering government relations and AI as a contractual obligation. Numerous potential issues, such as those with data privacy and safety, capacities and experience, consumer and customer preparedness, legal and regulatory environments, infrastructure, market strategy, costs, knowledge and awareness, could hinder the implementation of AI. The lack of new teaching methods, as well as knowledge and comprehension gaps, are obstacles to organisational readiness. These issues delayed the adoption of AI systems in Jordan (Wall, 2018). The immaturity of AI technology may be the biggest barrier to adoption. The greatest business development solutions are finding it difficult to keep up with the growing number of business intelligence solutions, and data analysis is another major barrier to the adoption of AI. Data analysts and computer scientists could want to work for other companies that offer them better compensation. This may mean that firms may eventually have to recruit partners to assist in launching their AI products. In this instance, the cost of adoption may become a new challenge. The research on AI has immense potential for improving healthcare, accelerating scientific research and promoting all Americans' welfare and well-being. This is particularly important because, as part of the international response to healthcare and public demands, AI technology will use public sector services in Jordan. In this new age of AI, Jordan has long been a worldwide leader, largely due to its extensive innovation environment. The country is positioned to sustain its dominance longer. It takes the cooperation of government, academia and industry to realise AI's potential for the country (Sanni and Olawale, 2020). The investigation also examines the goodness of the people. It is because it engages the government, which has been active in formulating regulations and implementing projects that improve AI innovation within the U.S.

## 6. CONCLUSION

Artificial Intelligence holds the promise of enhancing performance, performing laborious chores, aiding in decision-making and enabling a wide range of other fascinating technologies.

One of the most significant problems that society is presently dealing with is the possibility of widespread job loss due to automation. Sadly, there is a cost associated with using Artificial Intelligence for good. It is unclear at this time how various kinds of government will be impacted by this recently developed technology. On the other hand, organisations are utilising AI at every level to help with data analysis, the execution of manual tasks, and pattern identification. There are several limitations in this study. To find more pertinent publications, more study is needed, either in other libraries or by using different keywords, like evaluation maturity and AI, or maturity matrix and AI. For a lot longer than a decade, government officials from various agencies have been discussing Artificial Intelligence. The impact on the public sector, which is more important than ever, is being examined more and more as legislation and technology develop. In the area of machine learning, which is the process by which computers may independently modify and improve their own algorithms as they acquire fresh inputs, exciting new advancements have also been made. Government officials at all levels are looking at machine learning and artificial intelligence in an effort to strengthen the country's position as a worldwide leader in a field that will shape the foreseeable future.

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# THE IMPACT OF NON-PERFORMING LOANS ON BANK PROFITABILITY: EVIDENCE FROM COMMERCIAL BANKS OF UZBEKISTAN

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## ABSTRACT

*The goal of this research was to investigate the link between bank-specific factors, specifically the impact of non-performing loans and macroeconomic factors on bank performance of commercial banks of Uzbekistan. By gaining an understanding of the connection between these factors on bank profitability, it can help to ensure that the financial system remains stable. Furthermore, determining profitability measure could help to adequately allocate capital, increase the financial stability. This study will provide new insight into Uzbek commercial banks and attempt to fill and address research gaps. To provide empirical evidence, quantitative research designs were adopted to determine bank profitability indicators, ROE and ROA. The study employed Random Effects, Fixed Effects and Pooled OLS methods of estimations. A total of 20 banks, with 9 state-owned and 11 private and joint-stock commercial banks were chosen for the years of 2014 to 2021. Our findings will suggest that NPLs have a negative impact on bank profitability in Uzbekistan. Specifically, we expect to find that an increase in NPLs reduces both ROA and ROE, indicating that banks with high levels of NPLs are less profitable. Our results will be robust to various sensitivity tests, including controlling for bank-specific and macroeconomic factors. Moreover, our results expected to show that the impact of NPLs on bank profitability is more pronounced in state-owned banks compared to other banks. This suggests that state-owned banks are more vulnerable to the negative effects of NPLs and may need to take additional measures to manage their credit risk. As Uzbekistan is in the important economic area and the study for Uzbek commercial banks had not been widely studied and lacked enough discussion, this study would contribute to fill the research gap in Uzbek financial market and provide solid policy recommendations for government stakeholders and individuals. The following research will apply wider range of determinant variable on bank performance in the context of Uzbek commercial banks. The variables to be included are Capital Adequacy, Liquidity ratio, Deposits ratio, Ownership, Capital account openness, which had not been widely researched in Uzbek commercial banks. In addition, two dependent variables are presented in the study. To analyze data, various econometric model fit test applied.*

**Keywords:** *Bank performance, Uzbekistan's commercial banks, Bank-specific factors, Macroeconomic factors*

## 1. INTRODUCTION

### 1.1. Background of the study

Commercial banks have a pivotal role in the formation of a healthy economy. Bank's lending activity towards businesses, consumers and firms encourages consumption that consolidates the prosperity of the economy. Its principal activity is to provide credits and advances and to function as depositories for public funds. It earns money by collecting interest on loans and interest or dividend payments on the securities it owns. Loans are therefore the bank's main production, although they are a risk output (Li, 2003). As a consequence, the bank normally prefers that it be a performing one. The caliber of bank performance is determined by credit. As a result, controlling credit risk should be given special attention, as the quality of credit risk management determines the success or failure of financial organizations (Abdullaeva, 2013).

Therefore, there is a high likelihood of a bank collapse given that there exists a high level of non-performing loans on the bank. In 2021, there were 33 commercial banks, including 11 state banks, 11 joint stock commercial banks, 7 private commercial banks, and 5 banks with foreign involvement (CBU, 2023). The total banking assets to GDP ratio was 49.3%, whereas in 2011, loans to GDP were 15.4% and deposits to GDP were 11.8%, owing mostly to state budgetary entities (Coleman and Goffe, 2012). The banking sector's capital levels were 32%, much exceeding the Basel II and Central Bank of Uzbekistan norms (NBU, 2016). In comparison to other CIS nations (such as Russia and Ukraine), the ratio of bank assets to GDP is low (Figure 1). This might be owing to a shortage of loans to private firms and people, as well as a buildup of term deposits from consumers (Akimov and Dollery, 2004).

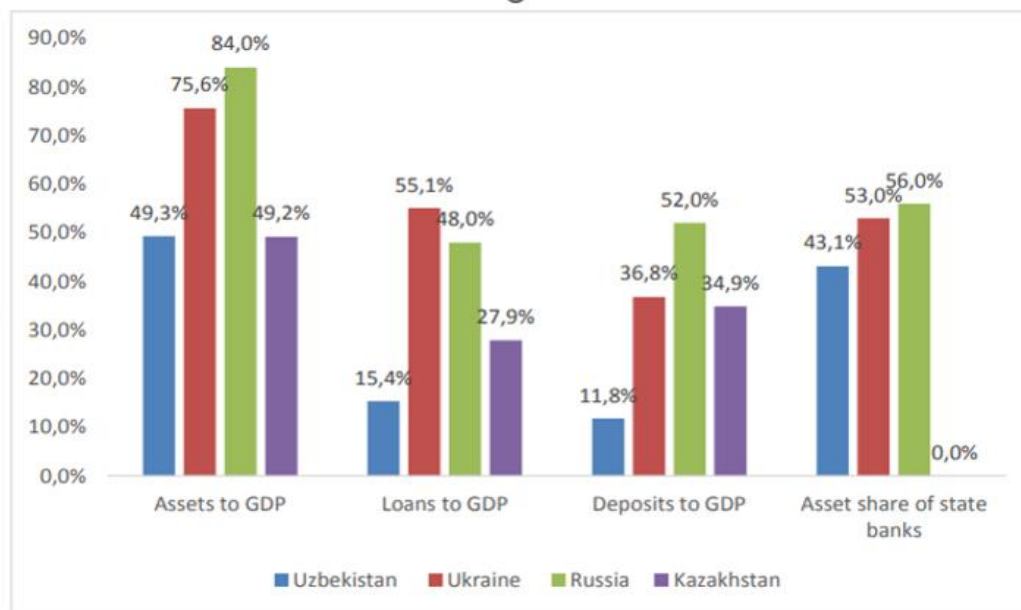


Figure 1: Key indicators of banking sector of Uzbekistan and selected CIS countries  
(Source: Coleman and Goffe, 2012)

Experiencing a high level of non-performing loans (NPL's) might pose danger on the stability of the banking industry and the financial systems respectively. NPLs among other factors are primary determinants of bank performance and profitability. NPLs generally refer to loans which do not generate income for a relatively long period of time, that is, the principal and/or interest on these loans has been left unpaid for at least 90 days. This case scenario might create a distrustful outcome for banks to operate financially sound and effective. Increased levels of gross non-performing loans pose a significant danger to banks, the financial industry, and the economy as a whole. Similarly, inability to handle non-performing loans are steadily affecting commercial banks' profits over time. As a result, nonperforming loans typically result in significant loan provisioning, which leads to a decline in profitability for many banks (Kithinji, 2010) and eventually reduces the bank sector's capacity to play a part in the economy's development. The objective of this paper is to figure out the primary determinants bank profitability and identify the potential effect of NPLs on the profitability levels of commercial banks of Uzbekistan.

## 1.2. Significance of the study

Previous studies have been focused primarily on Western and Eastern Asia, Central Europe and African countries (Flamini et al., 2009). Even though, the studies were conducted abovementioned developing countries, little evidence was found in the case of Uzbekistan.

The research on the determinants and impact of NPLs on commercial banks of Uzbekistan has not been previously broadly researched. Hence, the author of this paper has made an attempt to fill the literature gap in the study through identifying internal and external factors affecting bank performance of commercial banks of Uzbekistan. Furthermore, findings in the study might create value for commercial banks in Uzbekistan in determining which factors have statistically significant impact on bank profitability both bank-specific and macro factors and to what extent NPLs contribute to the bank performance. Based on the empirical results, the study proposes policy implications on how to maintain profitability and stable growth in the banking sector of Uzbekistan.

### **1.3. Research question**

To what extent non-performing loans could impact on bank profitability in Uzbekistan?

The main research objective of this paper is:

- 1) To investigate the main determinants of profitability indicators in Uzbekistan's commercial banks.
- 2) To identify the impact of non-performing loans on the profitability of commercial banks in Uzbekistan.
- 3) To explore whether a higher level of NPL refer to a lower profitability for commercial banks.
- 4) To propose potential policy recommendation to mitigate credit risk associated with NPL's.

### **1.4. Research hypothesis**

Bank-specific factors

- H<sub>1</sub>: Non-performing loans (NPLs) negatively affect bank performance of commercial banks in Uzbekistan.
- H<sub>2</sub>: Loan Growth negatively affects bank performance of commercial banks in Uzbekistan.
- H<sub>3</sub> Bank size positively influences the bank performance of commercial banks in Uzbekistan.
- H<sub>4</sub>: Capital Adequacy ratio positively influences the bank performance of commercial banks in Uzbekistan.
- H<sub>5</sub>: Liquidity ratio has a positive effect on the bank performance of commercial banks in Uzbekistan.
- H<sub>6</sub>: Deposits ratio positively influences on the bank performance of commercial banks in Uzbekistan.

Macroeconomic factors

- H<sub>7</sub> GDP growth positively influences on the bank performance of commercial banks in Uzbekistan.
- H<sub>8</sub> Inflation positively impacts of bank performance of commercial banks in Uzbekistan.
- H<sub>9</sub> Public debt negatively impacts on bank performance of commercial banks in Uzbekistan.
- H<sub>10</sub> Unemployment negatively affects bank performance of commercial banks in Uzbekistan.
- H<sub>11</sub> Bank ownership depending on the type both positively and negatively affects bank performance in Uzbekistan's commercial banks. It has been taken as a dummy variable. If it is state-owned bank then it is (1), if it is private-owned, then the sign is (0).
- H<sub>12</sub> The Chinn-Ito index (KAOPEN) has been taken as binary dummy (between the ranges of 0 to 1) variable. If it is 1, then the index value indicates "the most financially open" for

the country's financial market, if it is 0, then "the least financially open". The Chinn-Ito index (KAOPEN) positively affects bank performance if it is close to 1 or 1 and vice versa.

The organization of the paper is structured as follows; literature review, methodology, empirical results, and discussion followed by conclusion and policy implications. In literature review part, a previous scholarly works had been studied on bank performance determinants, identified what factors ( both bank-specific and macroeconomic factors ) could affect on bank performance. The Methodology part discussed what methods had been applied in the study, what research design and model are suitable and why it is suitable. Described data sources and variables in the study. The empirical part of the study revealed results of the variables by different statistical and econometric tools and techniques. Discussed the obtained results with research hypothesis and previous literature and compared them with the paper's own results. Lastly, the study has been finished with concluding remarks, provided some limitations of the study, and provided some policy recommendations based on the acquired results.

## **2. LITERATURE REVIEW**

Non-performing loans (NPLs) have been a persistent problem for commercial banks, especially in developing countries. These loans represent a significant risk to the financial stability of banks and can negatively impact their profitability. This literature review aims to examine the empirical studies conducted on the impact of non-performing loans on bank profitability of commercial banks in developing countries.

### **2.1. Conceptual frameworks**

In their study on the impact of NPLs on bank profitability in China, Guo et al. (2019) used panel data regression analysis to investigate the impact of NPLs on the profitability of commercial banks. The authors found that NPLs had a significant negative impact on bank profitability, as measured by return on assets (ROA) and return on equity (ROE). The authors also used a fixed-effects model and found similar results. In a study on the impact of NPLs on bank profitability in India, Singh and Kalirajan (2016) used a fixed-effects panel data regression model to investigate the relationship between NPLs and bank profitability. The authors found that NPLs had a significant negative impact on bank profitability, as measured by ROA and ROE. The authors also found that the impact of NPLs on bank profitability was greater for public sector banks than for private sector banks. Aria et al., (2020) investigated the impact of NPLs on the profitability of Indonesian banks using a fixed-effects panel data regression model. The authors found that NPLs had a significant negative impact on bank profitability, as measured by net interest margin (NIM) and ROA. The authors also found that the impact of NPLs on bank profitability was greater for small and medium-sized banks than for large banks. In a study on the impact of NPLs on bank profitability in Nigeria, Oke et al. (2019) used a multiple regression analysis to investigate the impact of NPLs on bank profitability, as measured by NIM, ROA, and ROE. The authors found that NPLs had a significant negative impact on all three measures of profitability. The authors also used a random-effects model and found similar results. Haider and Arshad (2017) investigated the impact of NPLs on bank profitability in Pakistan using a fixed-effects panel data regression model. The authors found that NPLs had a significant negative impact on bank profitability, as measured by, ROA, and ROE. The authors also found that the impact of NPLs on bank profitability was greater for public sector banks than for private sector banks. Different researchers have studied the determinants of bank profitability and the potential effect of NPLs on bank profitability respectively. There two factors contributing to the bank profitability of banks examined by researchers: bank-specific (internal) and macroeconomic (external) factors.

## 2.2. Bank-specific factors: Dependent variables

### 2.2.1. Bank performance (ROA and ROE)

There is abundant number of research on bank performance and NPLs. Researchers investigated the influence of lagging profitability on bank bad loans. For example, Louzis et al. (2012) defined poor management theory explaining the inverse relationship between bank profitability and NPLs. The author demonstrates that low-profitable banks have bigger loan losses because of their ineffective lending practices and weak management capabilities. In between 1984 and 1990, a study examined 50 US banks in this area of research 2013 confirms previous findings and implies that, profitable banks, on the other hand, are less willing to take bigger risks, which benefits the economy their creditworthiness (Ghosh, 2017). According to Rajan (1994), banks may increase up-front costs in order to increase profits their existing earnings by disguising the extent of their NPLs, resulting in significant future loan losses. Furthermore, research done on a between 1993 and 2000, a sample of Spanish banks was collected presents evidence that there is a favorable link between lagged and NPLs and profitability. The author claims that poorly performing banks are more likely to get engaged in more thoughtful lending activities via adoption of conservative credit policy to prevent future loan losses.

$$ROA = \frac{Net\ income}{Total\ Assets}$$

$$ROE = \frac{Net\ income}{Shareholder's\ Equity}$$

Manifold indicators could be used to measure bank profitability. The measures mentioned above are the best indicators (Goudreau and Whitehead, 1989).

## 2.3. Bank-specific factors: Independent variables

### 2.3.1. NPLs (non-performing loans)

Many empirical research, spanning a variety of approaches, datasets, and geographical areas, have examined the effect of NPLs on bank performance. For instance, Zhang and Jiang's (2020) research examined the effect of nonperforming loans (NPLs) on bank profitability using panel data from 23 Chinese financial institutions. NPLs were revealed to have a negative impact on bank profitability using both fixed-effects and random-effects regression models. Ali and Mohammed's (2020) research also used data from 19 banks in Iraq to analyze the effect of NPLs on bank stability. The authors utilised an OLS regression model and discovered that NPLs significantly impacted bank stability in a negative way. In addition, Krasniqi et al. (2021) used panel data from 52 banks in the Western Balkans to examine the effect of nonperforming loans on bank performance. Using a dynamic panel data model, the authors determined that nonperforming loans (NPLs) had a negative impact on bank performance. (ROE). Additionally, Syed et al. (2021) looked at how nonperforming loans (NPLs) affected the profitability of Islamic and conventional banks in Malaysia. Using an OLS regression model, the authors discovered that nonperforming loans had a devastating effect on the profitability of both retail and investment banks.

### 2.3.2. Loan growth

Numerous literatures suggests that loan growth has significant impact on NPLs. According to Naili and Lahrichi (2020), loan growth was the main reason contributing to the recent financial crises. The authors argue that when credit growth, loan screening and credit standards deteriorate.



Research was carried out on a sample of 16 nations between 1997 and 2009 yields persuasive results, implying that banks will be more inclined to relax their loan requirements in the future in order to achieve planned loan growth, which leads in hefty potential losses (Foos et al., 2010). Other research contradicts previous findings, indicating a negative relationship between loan growth and NPLs. For example, Boudriga et al. (2010) discovered that banks that want to increase their lending are more likely to in order to deal with defaulters, lenders are more likely to do adequate lending and screening. Furthermore, a negative relationship between NPLs and credit risk was discovered research done in the MENA area between 2003 and 2005 and 2016.

### *2.3.3. Bank size*

There is plentiful research conducted that addresses the link between bank size and NPLs. However, the authors view differs and there is no clear-cut evidence in regard to this relationship. According to Alhassan et al., (2014) and Louzis et al. (2012), imply that larger banks are more prone to incur lower loan losses. This negative correlation was explained by the fact that larger banks, with their advanced risk management systems, are better equipped to undertake adequate loan screening. Similarly, larger banks are better positioned to commit appropriate resources to loan study and evaluation, which prevents them from making loans to low-quality borrowers (Louzis et al. 2012). Nevertheless, other authors have pointed out contradicting views towards the relationship between bank performance and NPLs. Literature has given insight on the "too big to fail" hypothesis, which suggests that larger banks regard themselves as necessary and, as a result, engage in unsafe loan portfolio. Those large banks ponder that in the case of poor loan portfolio they would get bailed-out by government support (Stern and Feldman, 2004). Haq and Heaney (2012) observed 15 large European banks and confirmed the abovementioned hypothesis. The large-sized banks, based on above authors view, whose role in the financial system of the country crucial, incur excessive risky loan portfolios assuming that they could be backed up by the government.

### *2.3.4. Capital Adequacy Ratio (CAR)*

Sinkey and Greenawalt (1991) states that Capital Adequacy Ratio (CAR) has possess strong effect on loan loss rates. This impinged capital is oftentimes utilized as a buffer against excessive risk. A body of studies shows that banks with significant deposits lower lending rates are experienced by banks with higher capital as a proportion of their risk-weighted assets losses (Shrieves and Dahl, 1992). The underlying rationale behind this is linked with the fact that high CAR are more likely to be engaged in more thoughtful and considerate lending behavior to sustain capital set aside (Shrieves and Dahl, 1992). The views were contradicted by the studies of Ghosh (2017) and Rime (2001) who suggest that there exists negative relationship between CAR and NPLs. Using data from a sample of US commercial banks from 1992 to 2016, Ghosh (2017) shows that loan losses typically occur when capital adequacy levels are high (Ghosh, 2017). This latter causes banks to engage in riskier lending with insufficient risk appraisal and assessment.

### *2.3.5. Liquidity Ratio*

The capacity of a commercial bank to satisfy short-term deposit commitments with liquid assets (cash on hand, securities that may be swiftly converted to cash) is referred to as liquidity. Tariq et al. (2014) identified that liquidity has a positive impact on profitability. A study conducted by Samad's (2015) also found out that there is a positive relationship between liquidity and bank performance. In fact, Samad (2015) concluded that liquidity is a significant factor in determining bank profitability in Bangladesh.

### *2.3.6. Deposits*

According to Rasiah (2010), deposits are primary sources of funds directed at generating income. Hence, it can be concluded that there is a positive relationship between deposits and bank profitability. Tariq et al. (2014) empirical research shows a favorable association between bank profitability and overall deposits. The argument is that because total deposits signify the size of the bank, large banks outperform small banks. Furthermore, it was thought that deposits were the most important and least expensive source of capital for banks.

### *2.3.7. Bank Ownership*

A study conducted by Gua et al. (2018) on the impact of state-ownership on performance difference on commercial banks profitability versus privately owned banks determined that those state-owned banks operated less profitably with increased level of NPL ratios, held less core capital and exposed to greater credit risk compared to privately-owned banks. The study employed data ranging from the years of 1989 and 2004 from BankScope database, and Pooled OLS methods of estimation was applied to determine the impact. Suresh et al. (2021) analyzed the impact of ownership structure on the performance and profitability of banks for Asia and Eastern Europe suggests that a higher credit risk for banks that are owned by the government are observed. Higher levels of government ownership are correlated with greater overdue loans and worse capital adequacy ratios; this is consistent with findings from the public sector banks of European nations (Lin, 2011) and Taiwanese banks (Lin, 2011). This is supported by the claim that many disagreements, social goals, and political interests arise because of the ineffectiveness of government ownership banks and other financial institutions.

## **2.4. Macroeconomic factors (external)**

### *2.4.1. GDP growth*

There are ample research and evidence on the linkage between macroeconomic factors and credit quality. Firms and households are more vulnerable during difficult times due to the drop in asset prices, which serves as collateral, resulting in a rise in NPLs. Numerous empirical studies confirmed that, the level of NPLs dropped during economic booms and increased during economic downturns (Jabbouri and Naili, 2019).

### *2.4.2. Inflation*

According to the research conducted by Klein (2013) the high inflation rates decreases real value of borrowers purchasing power parity and revenue which surely restrict their ability to repay their debts. Under inflationary conditions, the probability of a borrower's default increases, which might severely affect the probability of commercial banks and leads to the increase in the levels NPLs level. However, a study conducted Nkusu (2011), the author documents that the inflation decreases the value of outstanding debts, resulting in the repayment capacity of the borrowers.

### *2.4.3. Public debt*

Previous research offers solid evidence for the association between governmental debt, often known as sovereign debt, and the amount of NPL- a link that does not appear obvious at first glance. Research conducted by Leaven and Valencia (2013) concludes that public debt triggers financial crises. Furthermore, it also concluded that the negative relationship between public debt and bank performance. Huge public debts lead to a serious bank collapses and underperformance.

#### *2.4.4. Unemployment*

The rate of unemployment is one of the most important elements that has an effect on how well banks accomplish their responsibilities. Borrowers may have difficulty paying back their loans as unemployment rates rise, which can lead to an increase in non-performing loans (NPLs). In order to investigate the connection between unemployment and NPLs, a variety of different econometric models have been utilized. The Vector Autoregression (VAR) model, which assesses the interdependence between two or more variables across time, is the model that is utilized the vast majority of the time. For instance, Jimenez et al. (2014) examined the association between high unemployment and non-performing loans in Spain by employing a VAR model in their research. The author discovered that there is a correlation between a one percentage point rise in unemployment and a 0.37 percentage point increase in NPLs. Furthermore, Barrios et al. (2017), analyzed the connection between high unemployment and nonperforming loans (NPLs) across Europe by means of a panel data model. In nations with weaker institutions and stricter labor restrictions, the impact of unemployment on NPLs was found to be more pronounced.

#### *2.4.5. Capital account openness*

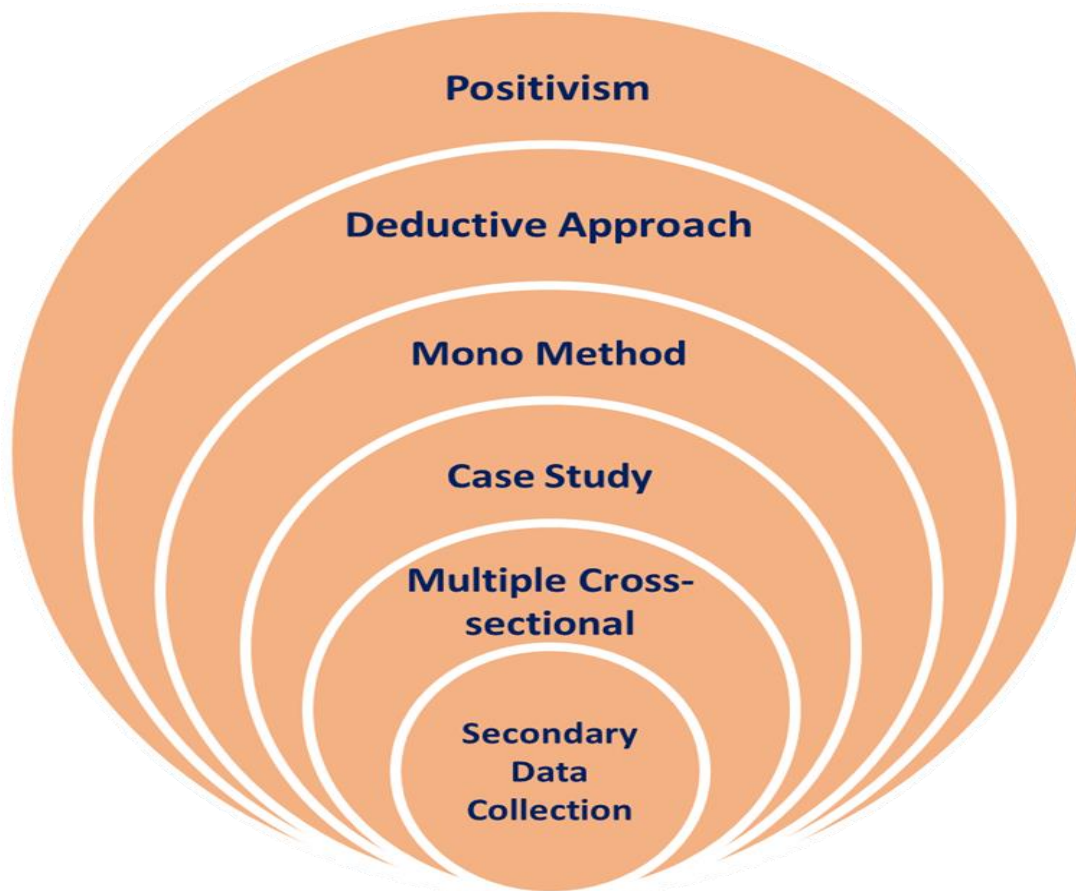
Portland and Wisconsin (2022), implied that The Chinn-Ito index (KAOPEN) is an index measuring a countries capital account openness. The prevailing index was initially introduced by Chinn and Ito in Journal of Development economics in 2006. KAOPEN index refers to the financial openness and liberalization index for a country encompassing the variables of zero to one, zero inferring the “least financially open, while one infers “the most financial open” for the given country in  $i^{\text{th}}$  year. According to the empirical study of National Bureau of Economic Research (2005) proposes that a higher level of financial openness well contributes to the development of financial and equity markets. Through financial openness the authors state that a higher-level of bureaucratic quality and law and order, as well as lower levels of corruption, may enhance the effect of financial opening in financial market development including the performance of commercial banks. According to the regression estimates of the empirical study suggests that one-unit increase in capital account index (KAOPEN) has positive impact on financial market development (NBER, 2005). Banks needs more financial liberalization and openness executed by the state authorities which significantly affect their performance and efficiency. In order to get on par with more advanced financial markets equivocal, the need for liberal, open and less bureaucratic market is of vital importance. Hence, the author used KAOPEN index as a macroeconomic determinant affecting indirectly on the performance of commercial banks in Uzbekistan.

### **3. METHODOLOGICAL FRAMEWORK**

#### **3.1. Research design**

The following study's research philosophy is positivism because the knowledge gathered from observations is "factual" and trustworthy because measurements are included. This research employs the deductive approach, which entails developing a hypothesis based on a previously established theoretical framework and then devising an experiment to test that hypothesis. Furthermore, a mono quantitative technique utilized to collect secondary data from official websites of the commercial banks of Uzbekistan, from Bankfocus website, World Bank database and from the website of the Central Bank of Uzbekistan. As case study research, which best fits into my research involving real life examples of empirical investigation by utilizing multiple sources of evidence. The case study research best fits into the paper because the author attempts to gain rich and thorough understanding of the context of the research and the processes being enacted. The data collected from official website of Bank Focus of commercial banks of Uzbekistan both private and state-owned and joint-stock banks, from the years

between 2014-2021. The sole data is collected from secondary sources as my research is deductive and there is strict tight deadline. Due to the time-constrain, the multiple cross-sectional data is be used.



### **3.2. Data and Model estimation**

The study initially employed an analytical approach by using consolidated panel data for the 30 commercial banks in Uzbekistan in order to achieve the intended objectives. However, panel data had been reduced to 20 commercial banks due to the unavailability of data for the study period of 2014-2021, and financial statements for some newly launched banks were unavailable. This reduction would help in obtaining precise and accurate results for the banks and make plausible policy implications in turn. The data for bank-specific factors used is collected by the commercial bank's scope database, BankFocus and Central Bank of Uzbekistan's database in annual published financial statements as well as balance sheets of commercial banks. Macroeconomic factors of the data derived from World Bank Database, Central Bank of Uzbekistan's annual macroeconomic indicators. The paper has applied three panel estimation methods such as Pooled regression model (OLS), Fixed Effects (FE) model and Random Effects (RE) model. Pooled OLS approach assumes that because we have a panel dataset, which consists of data on the same set of cross-sectional units over multiple time periods therefore, we can use the Pooled OLS method to estimate the parameters of a linear regression model that accounts for both within-unit and across-unit variation. OLS presumes that all subjects are homogenous which discounts the heterogeneity (individuality or uniqueness) that might exist among various subjects under the study of regression model. Another reason to use the Pooled OLS method is that our data have a large and diverse dataset with multiple cross-sectional units, and at the same time to estimate a linear regression model that includes both time-invariant and time-varying variables.

The Fixed Effects (FE) model takes into consideration that each entity is given its own intercept value to capture variations between entities, thus accounting for heterogeneity or individuality among cross-section units. The Random Effects (RE) Model, on the other hand, is based on the assumption that the unobserved individual heterogeneity is uncorrelated with the independent variables that are included in the model. The RE estimator assumes that the intercept of a single unit is a random component that is selected from a wider population with a constant mean value. This assumption is based on the fact that the RE estimator has been implemented. In this study, the data analysis technique encompassed are panel data regression models. Hence, model diagnostic test statistics have been used in order to determine the most appropriate and suitable model for the study. Determination and testing of appropriate model for the study, a number of econometric assumption tests have been utilized such as, the Hausman test, Breusch Pagan Lagrangian multiplier, Modified Walt test for groupwise heteroscedasticity, Vector Inflation Factor (VIF) and correlation matrix tests for avoiding multicollinearity problems.

### 3.3. Variables description

Dependent variables

ROA and ROE (Dependent variables)

As a dependent variable in the study ROE and ROA has been used as best suitable variables for profitability measurement. Profitability is estimated using ROE and ROA of previous years. Below is the potential method of calculation of bank profitability indicators:

$$ROA = \frac{\text{Net income}}{\text{Total Assets}}$$

$$ROE = \frac{\text{Net income}}{\text{Shareholder's Equity}}$$

### Independent variables

Independent variables have been chosen both from bank-specific and macroeconomic factors. The following variables below are selected as factors which impact bank performance of commercial banks.

#### *Bank-specific factors*

##### *NPLs*

The percentage of loans that are considered non-performing is one indicator of the overall quality of the loans. These are the loans that the debtors to the bank are unable to pay back within the allotted time period of ninety days. It also pertains to the loans that have already defaulted on or are on the verge of doing so. The following equation is a measurement of the percentage of banks' credit portfolios that are comprised of non-performing loans (Zhang and Jiang's, 2020).

$$NPL = \frac{\text{Non – performing loans}}{\text{Gross loans}}$$

As a result, there is the presumption that the higher this ratio is, the lower the profitability of the bank will become due to the increased amount of money that will be set aside by banks for potential loan losses.

### ***Loan growth***

Loan growth: loans as a percentage of the previous years are used to proxy for loan growth.

### ***Bank Size***

Bank (SIZE): Natural logarithm of bank's total assets is utilized to estimate bank size.

### ***Capital Adequacy Ratio***

Capital adequacy ratio (CAR): This ratio refers to the level of capital a bank should set aside as a proportion of its risky assets. The capital adequacy ratio is measured as total capital to total risk-weighted assets.

### ***Liquidity Ratio***

Liquidity ratio (LQR): the ratio of total loans to total deposits ratio. When the liquidity ratio increases, the profitability of the bank correspondingly increases.

$$LQR = \frac{\text{Total loans}}{\text{Total deposits}}$$

### ***Deposits Ratio***

DEEPL: total deposits to total assets ratio. Increased level of deposits impacts positively on the bank performance, and it is the cheapest source of funding for the banks.

$$DEEPL = \frac{\text{Total deposits}}{\text{Total assets}}$$

### ***Bank ownership***

Bank ownership has been chosen as a dummy variable where if it is state-owned bank, then the variable is one, if it belongs to other banks (private, joint-stock commercial banks) then value is zero.

### ***Macroeconomic factors:***

#### ***GDP growth***

GDP growth: GDP growth is defined as the yearly change in the natural logarithm of real GDP in each country.

#### ***Inflation***

Inflation (INF): the annual inflation rate in Uzbekistan

#### ***Public debt***

Public debt (DEBT): Public debt is proxied by the gross government debt as percentage of GDP.

#### ***Unemployment rate***

Unemployment (UNEMP): Unemployment is gauged by the unemployment rate in the country.

#### ***Capital Account Openness***

KAOPEN index has been chosen as a dummy variable between the values of zero to one, indicating that if it is one, then "the most financial stable", if it is zero, then "the least financial stable". KAOPEN index measures financial openness and financial liberalization of a country for its equity and financial markets.

### ***Empirical model***

The empirical model used in this study is presented as follows:

#### ***This is for determinants of ROE***

$$ROE_{jt} = B_0 + B_1 NPL_{jt} + B_2 LG_{jt} + B_3 SIZE_{jt} + B_4 CAR_{jt} + B_5 LQR_{jt} + B_6 DEEPL_{jt} + B_7 Ln\Delta GDP_{jt} \\ + B_8 INF_{jt} + B_9 DEBT_{jt} + B_{10} UNEMP_{jt} + B_{11} OWNERSHIP (DUMMY) \\ + B_{12} KAOPEN (DUMMY) + \varepsilon_{it}$$

***This is for determinants of ROA***

$$ROA_{jt} = B_0 + B_1 NPL_{jt} + B_2 LG_{jt} + B_3 SIZE_{jt} + B_4 CAR_{jt} + B_5 LQR_{jt} + B_6 DEEPL_{jt} + B_7 Ln\Delta GDP_{jt} \\ + B_8 INF_{jt} + B_9 DEBT_{jt} + B_{10} UNEMP_{jt} + B_{11} OWNERSHIP (DUMMY) \\ + B_{12} KAOPEN (DUMMY) + \epsilon_{it}$$

The following table illustrates the variable description for each category of variables, their proxies, expected signs, symbols and sources used in the literature.

	Category	Variables	Proxy	Symbol	Expected sign	Sources
Independent variables	Bank performance	Return on assets	$ROA = \frac{Net\ income}{Total\ Assets}$	ROA	+	Louzis et al. (2012), Rajan (1994)
		Return on equity	$ROE = \frac{Net\ income}{Shareholder's\ Equity}$	ROE		Louzis et al. (2012), Rajan (1994)
Dependent variables	Bank-specific determinants	Bank's Size	Natural(normal) log of total assets of the bank	SIZE	+	Alhassan et al., (2014) and Louzis et al. (2012)
		Bank Deposits	Total deposits/Total assets	DEPL	+	Rasiah (2010, Tariq et al. (2014)
		Capital Adequacy	Equity to total assets	CAR	+	Sinkey and Greenawalt (1991), (Shrieves and Dahl, 1992).
		Liquidity	Net loans to total assets	LD	-	Tariq et al. (2014), Samad's (2015)
		Loan growth	Percentage growth of total loans between two consecutive years	GROWTH	-	Naili and Lahrichi (2020), Boudriga et al. (2010)
	Dummy	Bank ownership (state-owned or privately owned)	(0) or (1)	OWNERSHIP	+/-	Gua et al. (2018), (Lin, 2011)
		Non-performing loans	Ratio of non-performing loans over gross loans	NPL	-	Zhang and Jiang's (2020), Ali and Mohammed's (2020)
	Macroeconomic determinants	GDP per capita growth	Annual percentage growth rate of GDP	GDP	+	(Jabbouri and Naili, 2019).
	Inflation	Annual Inflation Rate (Consumer Price Index, CPI)	INF	+	Klein (2013), Nkusu (2011)	
	Public debt	Gross government debt as % of GDP	DEBT	-	Leaven and Valencia (2013)	
	Unemployment	Percentage (%) of unemployment in year t	UNEMP	-	Jimenez et al. (2014), Barrios et al. (2017)	
	Capital account openness	one if "the most financially open", zero if "the least financially open"	KAOPEN	+/-	Portland and Wisconsin (2022), (NBER, 2005).	

*Table 1: Variable description*

## 4. EMPIRICAL PART

Various econometric tests have been applied to estimate the various bank specific and macroeconomic factors that impact on bank performance. Descriptive statistics of the variables are provided in the Appendix. Table 2 depicts descriptive summary statistics for ROA and ROE respectively.

### 4.1. Model choice test

Empirical evidence for Random Effects and Pooled OLS model choice to fixed effects model is decided by applying Hausman test. Based on the results of Hausman test, it can be concluded that Fixed effects model is not appropriate in the data set, since the p-value for Hausman test is equal to 0.65 and 0.71 for both estimations respectively. If p-value is less than 0.5, we reject null hypothesis and follow the assumption. In our case, we fail to reject the null hypothesis, since the values are larger than p-value of 0.5 and confirm that fixed effects model is not suitable in our estimations (see table 6 and table 7). Furthermore, The Modified Wald test and The Breusch and Pagan Lagrangian multiplier test also applied to test heteroskedasticity availability assumption (see Table 4 and Table 5 in Appendix). The Breusch and Pagan Lagrangian multiplier test is used to test for the presence of heteroscedasticity in a random effects model. The null hypothesis of the test is that there is no heteroscedasticity, which means that the variance of the random effects is constant for all individuals. In the estimation, the estimated results show that the variance of the random effects ( $u$ ) is 96.45767, with a standard deviation of 9.821286. The test statistic ( $\chi^2$ ) is 72.28, which has a probability ( $\text{Prob} > \chi^2$ ) of 0.0000. Since the probability is less than the significance level (usually 0.05), we reject the null hypothesis and conclude that there is evidence of heteroscedasticity in the random effects model. This means that the variance of the random effects is not constant for all individuals, and we need to take this into account when interpreting the results of the model. The Modified Wald test is a statistical test used to check for heteroscedasticity in fixed-effect regression models. It tests whether the variance of the error term is constant across groups. The null hypothesis is that the variance of the error term is equal across all groups. In my case, the null hypothesis is:

$H_0: \sigma(i)^2 = \sigma^2$  for all  $i$

where  $\sigma(i)^2$  is the variance of the error term for group  $i$ , and  $\sigma^2$  is the common variance of the error term across all groups.

The test statistic for the Modified Wald test follows a chi-squared distribution with degrees of freedom equal to the number of groups minus one. There are 21 groups ( 20 degrees of freedom), and the test statistic is 167.41. The p-value associated with this test statistic is 0.0000, which is less than the conventional significance level of 0.05. Therefore, I can reject the null hypothesis and conclude that there is evidence of groupwise heteroskedasticity in the fixed-effect regression model (see Table 5 and Table 6 in Appendix). In addition, correlation matrix test has also been utilized to determine whether there exists multicollinearity problem in the model. Based on the estimations of correlation matrix test, it can be concluded that there is no multicollinearity problem with independent variables ( see Table 3).

### 4.2. Results and Discussion

#### 4.2.1. Independent variable ROE (for regression model results, refer to Table 6)

The results of the Random Effects model for ROE in bank-specific factors reveal that there is strongly significant positive relationship between LG and ROE, to be more precise, 1 point percentage increase in LG (loan growth) would lead to 7.9 percent point increase in ROE, response variable. Similar results were estimated in Pooled OLS estimation results, where 1 percentage point increase in LG would lead to 8.2 percentage point increase in ROE.



This relationship contradicts the hypothesis and with previous literature (Naili and Lahrichi (2020) and Boudriga et al. (2010)). Increased level of loan growth might be critical in short-term profitability for commercial banks because it enables banks to obtain profits from interest rates charged. However, in the long run this might negatively affect on the quality of loans and become non-performing ones. Non-performing loans (NPLs) in Pooled OLS method has showed strong negative statistically significant relationship with ROE while in random effects model there is negative relationship but not significant. To be more precise, the results illustrate that a 1 percentage point increase in NPL levels would lead to 0.67 and 0.18 percentage point decrease in ROE (reduce banks profitability by 0.67 and 0.18 percents respectively) for both models respectively. The estimations are in line with previous literature and conducted by Zhang and Jiang's (2020), Ali and Mohammed's (2020) and with the authors initial research hypothesis. The expected sign was negative, so the model results are precise. An increased level of non-performing loans would deteriorate the bank profitability indicator, specifically for ROE. Other remaining bank-specific variables such as CAR, SIZE and LQR were found to be insignificant in both model estimations. For instance, there was a negative relationship between capital adequacy ratio liquidity ratio and ROE in both models, inferring that banks should maintain enough capital and liquidity ratios to maintain profitable. Dummy variable ownership has also been found to be strongly significant and has a strong negative relationship with bank performance. To be precise, a 1 percentage point increase in ownership (referring to state-owned banks) would lead to a 16 percent point decrease in ROE. This is consistent with past literature that state-owned banks perform poorly and there is high level of NPLs (Gua et al., 2018, Suresh et al., 2021). Regarding the macroeconomic factors, Inflation and GDP had significant positive relationship with bank performance measurement variable ROE, specifically, 1 percentage point increase in inflation would result in 2.065 percentage point increase in ROE (pooled OLS estimation). A 1 percentage point increase in GDP would lead to 3.024 increase in ROE (pooled OLS estimation). The results are almost similar to the random effects model. The interpretation of the results reveals that GDP growth and Inflation increase would accelerate the profitability of the banks. Higher inflation means banks could provide loans at higher rates (Jabbouri and Naili, 2019, and Klein, 2013). Public debt (Debt to GDP ratio) was significant explanatory variables in both methods of estimation. The results depict that 1 percentage point increase in Debt to GDP ratio would lead to 0.4 percent increase in bank performance. However, the results are inconsistent macroeconomic variable with past literature. The KAOPEN index was notably a significant factor in predicting dependent variable of ROE. It seems that Uzbekistan financial openness index lacks with increased ownership, censorship, and low-level bureaucracy, triggering negatively on the performance of banks. R-squared of 0.32 indicates that 32 percent of variation could be explained by independent variables for ROE in random effects model, almost 40 percent for Pooled OLS model. When the model was checked for robustness test, the results showed almost similar results with models.

#### *4.2.2. Independent variable ROA (for regression model results, refer to Table 7).*

The results for ROA model indicated that there is strong negative relationship between NPLs and ROA (bank performance) in both Random Effects and Pooled OLS estimation models. Specifically, a 1 percentage point increase in NPL level would lead to 0.034 and 0.079 percentage point decrease in bank profitability. This negative relationship is consistent with research hypothesis and Zhang and Jiang's (2020) study. Increased level of non-performing loans deteriorates bank profitability remarkably. Another independent variable, LG is a good predictor in predicting experimental variable of ROA. To be more precise, 1 point increase in loan growth would lead to 1.24 and 1.266 percentage point increase in ROA in both Random Effects and Pooled OLS model estimations (Jabbouri and Naili, 2019, and Klein, 2013). The underlying result indicates that loan growth could be profitable in short-term period for banks.

However, in the longer-term, it might damage loan quality with late payments, leading to loans become non-performing. CAR variables are found to have a statistically strong significant positive relationship with ROA in Random effects model. To illustrate the results, 1 percentage point increase on capital adequacy ratio would result in 0.14 percent increase in bank performance. The estimated results are consistent with the research hypothesis and past literature. This LQR (liquidity ratio) on the other hand had a strong negative relationship with ROA. 1 point increase in liquidity ratio would lead to 0.049 and 0.023 percentage point decrease in ROA. This indicates that, maintaining a lower level of liquidity ratio negatively affects bank performance. Other remained bank-specific factors affecting bank performance has been found to be insignificant. Regarding macroeconomic factors affecting bank performance, inflation and GDP had strong positive relationship with ROA, precisely, 1 percentage point increase in inflation would lead to 0.170 percentage point increase in ROA and, 1 percentage point increase in GDP would result in 0.326 percentage point increase in bank performance indicator (Jabbouri and Naili, 2019). The results correspond to research hypothesis and the past literature. With the higher GDP growth in the country, the economy of a given country boosts, as a result aggregately affects the whole economy. Dummy variable bank ownership is defined to have strong negative relationship with ROA. It means that, 1 percentage point increase in state owned banks would lead to average 3 percentage point decrease in bank performance of commercial banks of Uzbekistan. This indicator suggests that, state-owned banks negatively affect on bank performance and their increase in numbers would lead inefficiency and underperformance of banks. Other remaining macroeconomic variables were not significant predictors of dependent variable ROA. R-squared of 0.24 indicates that 24 percent of variation could be explained by independent variables for ROA in random effects model, almost 35 percent for Pooled OLS model. When the model was checked for robustness test, the results showed almost similar results with models.

## 5. CONCLUSION

The study explores some of the key factors affecting bank performance of commercial banks of Uzbekistan, both bank-specific and macroeconomic factors. The main aim of the study was to determine the potential impact of non-performing loans on bank performance of Uzbek commercial banks. To get the expected results, the author has used various econometric tools and methods. Random Effects and Pooled OLS methods, after several different model fit tests were chosen for the study. The results of the study indicated that NPLs (non-performing loans) have strong statistically significant negative relationship with bank performance indicators, namely ROE and ROA in both RE and Pooled OLS models. The estimated results confirm with the initial research hypothesis and past scholarly works. Increased level of non-performing loans certainly deteriorates performance indicators (ROE and ROA) of commercial banks of Uzbekistan. Other bank-specific variables, such as CAR, LG, and LQR were also slightly significant in predicting bank performance measurement in the study. State-owned banks proved to perform inefficiently with increased level of NPLs in Uzbek commercial banks. This could be derived from the KAOPEN index that those banks are more influenced by political factors which could result in their inefficient management and poor profitability performance. The research is restricted to the variables that were researched and the years of observations that were chosen. As a result of the data being readily available, the study looked at the variables that explain things throughout the course of the years 2014-2021. The time period covered by the observed data should not be the exclusive focus of research in the future. Manifold banks were included due to data unavailability for the research period in Uzbekistan. In addition, this research focused on the selection of five macroeconomic variables in addition to eight bank-specific variables. Future research in the same field can also expand bank-specific factors (such as asset size and expenditure structure) and macroeconomic factors (such as interest rate and

refinance rate), as well as investigate the influence of industry-specific factors on the profitability of commercial banks. This has the potential to evolve into a more in-depth analysis of the banking system in Uzbekistan. In conclusion, additional advancements in the empirical model selection for the study can be done in the future. The robustness of the model that was employed in the research could be improved by the inclusion of determinants of bank profitability that are to be investigated by other empirical models. Findings of the study reveal could be helpful for the policy makers in terms of the potential detrimental effect of NPLs on bank performance. Decreasing the level of ownership structure and privatizing state-owned banks into private ones would be a good policy implication. With reduced level of censorship and exposure to political factors, more freedom and financially viable banks would operate more efficiently and effectively. In addition, banks should maintain capital adequacy ratio in accordance with Basel accords and monitor efficiently on loan quality, which in the long run could negatively affect on bank performance. Overall, strong financial institutions and financial markets are needed for Uzbekistan in order to make commercial banks more competitive and efficient.

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**APPENDIX**

**Table 2: Descriptive summary statistics for variables**

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA	160	2.093	3.471	-5.092	35.893
ROE	160	15.677	17.724	-33.572	84.077
NPL	160	4.691	7.245	0	49.858
LG	160	.462	.492	-.999	1.986
SIZE	160	18.496	3.001	12.734	23.716
CAR	160	14.241	7.289	5.583	49.776
LQR	160	27.975	18.203	4.615	92.792
Ownership	160	.45	.499	0	1
INF	160	11.976	3.079	8.131	17.524
GDP	160	3.72	1.689	-.052	5.365
UNEMP	160	7.468	2.195	5.1	10.5
DEBTtoGDP	160	18.749	11.541	7.68	44.34
KAOPEN	160	.082	.082	0	.164

**Table 3: Correlation matrix for variables**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) ROA	1.000											
(2) NPL	-0.228	1.000										
(3) LG	0.304	-0.163	1.000									
(4) SIZE	0.148	-0.299	0.123	1.000								
(5) CAR	0.352	-0.191	0.191	0.297	1.000							
(6) LQR	0.171	-0.158	0.059	0.247	-0.027	1.000						
(7) Ownership	-0.353	-0.072	-0.040	-0.031	-0.036	-0.537	1.000					
(8) INF	0.014	-0.017	0.095	0.135	0.210	-0.137	0.000	1.000				
(9) GDP	-0.023	-0.040	-0.104	-0.120	-0.099	0.090	-0.000	-0.450	1.000			
(10) UNEMP	-0.116	0.140	-0.124	0.207	0.158	-0.205	0.000	0.630	-0.488	1.000		
(11) DEBTtoGDP	-0.083	0.165	-0.116	0.126	0.069	-0.109	-0.000	0.035	-0.619	0.614	1.000	
(12) KAOPEN	-0.129	0.131	-0.145	0.198	0.161	-0.205	-0.000	0.640	-0.346	0.980	0.540	1.000

**Table 4: Modified Wald test for groupwise heteroskedasticity in fixed effect regression model for ROA**

H0: $\sigma(i)^2 = \sigma^2$ for all i		
chi2 (20)	1966.32	
Prob>chi2	0.0000	
<b>Breusch and Pagan Lagrangian multiplier test for random effects</b>		
<b>ROA[<i>ID,t</i>] = Xb + <math>\mu</math>[<i>ID</i>] + <math>\varepsilon</math>[<i>ID,t</i>]</b>		
	Var	SD = sqrt(Var)
<b>ROA</b>	12.05044	3.471375
e	6.467155	2.54306
u	2.298931	1.516222
Test: Var(u) = 0		
chibar2(01)	17.82	
Prob > chibar2	0.0000	

<b>Table 5: Modified Wald test for groupwise heteroskedasticity in fixed effect regression model for ROE</b>		
H0: $\sigma(i)^2 = \sigma^2$ for all i		
chi2 (20)	33.59	
Prob>chi2	0.0000	
<b>Breusch and Pagan Lagrangian multiplier test for random effects</b>		
ROE[ID,t] = Xb + $\mu$ [ID] + $\varepsilon$ [ID,t]		
	Var	SD = sqrt(Var)
<b>ROE</b>	314.143	17.72408
e	117.5857	10.8437
u	96.45767	9.821286
Test: Var(u) = 0		
chibar2(01)	167.41	
Prob > chibar2	0.0000	

<b>Table 6: Regression model test for ROE</b>					
VARIABLES	re	fe	Pooled OLS	fe with robust	re with robust
NPL	-0.185 (0.175)	-0.038 (0.188)	-0.675*** (0.190)	-0.038 (0.205)	-0.185 (0.163)
LG	7.994*** (1.965)	7.685*** (2.048)	8.288** (3.918)	7.685** (3.088)	7.994** (3.117)
SIZE	1.166 (0.754)	2.086 (1.431)	0.485 (0.704)	2.086* (1.089)	1.166* (0.661)
CAR	-0.325 (0.201)	-0.278 (0.228)	-0.475* (0.256)	-0.278 (0.329)	-0.325 (0.296)
LQR	-0.122 (0.109)	-0.175 (0.134)	-0.067 (0.150)	-0.175 (0.249)	-0.122 (0.189)
Ownership	-16.464*** (5.225)		-16.074** (6.405)		-16.464** (6.931)
INF	1.969** (0.820)	1.973** (0.822)	2.065*** (0.571)	1.973*** (0.550)	1.969*** (0.564)
GDP	2.519 (1.682)	2.426 (1.675)	3.024** (1.175)	2.426** (1.140)	2.519** (1.144)
UNEMP	2.860 (3.832)	2.126 (3.834)	4.335 (3.215)	2.126 (3.286)	2.860 (3.158)
DEBTtoGDP	0.345* (0.206)	0.336 (0.206)	0.412*** (0.114)	0.336*** (0.115)	0.345*** (0.119)
KAOPEN	-184.360* (109.574)	-176.838 (108.946)	-211.218** (93.975)	-176.838* (94.388)	-184.360** (92.181)
o.Ownership		-		-	
Constant	-38.966 (35.560)	-57.798 (40.823)	-36.907 (26.855)	-57.798* (32.632)	-38.966 (28.262)
Observations	160	160	160	160	160
R-squared		0.323	0.395	0.323	
Hausman test	7.78 (0.6504)				
Number of ID	20	20		20	20

**Table 7: Regression model test for ROA**

VARIABLES	Fixed effect	random effect	Pooled OLS	re with robust	fe with robust
NPL	0.013 (0.044)	-0.034 (0.039)	-0.079* (0.038)	-0.034 (0.037)	0.013 (0.059)
LG	1.303*** (0.480)	1.241*** (0.457)	1.266* (0.614)	1.241** (0.592)	1.303* (0.678)
SIZE	0.159 (0.336)	0.133 (0.139)	0.048 (0.098)	0.133 (0.099)	0.159 (0.233)
CAR	0.131** (0.053)	0.139*** (0.043)	0.131 (0.091)	0.139 (0.106)	0.131 (0.108)
LQR	-0.098*** (0.032)	-0.049** (0.022)	-0.023 (0.027)	-0.049 (0.049)	-0.098 (0.088)
o.Ownership	-	-	-	-	-
INF	0.187 (0.193)	0.170 (0.192)	0.167* (0.092)	0.170** (0.086)	0.187** (0.088)
GDP	0.302 (0.393)	0.300 (0.394)	0.326** (0.154)	0.300* (0.162)	0.302 (0.189)
UNEMP	0.556 (0.899)	0.667 (0.898)	0.807 (0.708)	0.667 (0.678)	0.556 (0.679)
DEBTtoGDP	0.034 (0.048)	0.033 (0.048)	0.036** (0.014)	0.033** (0.015)	0.034** (0.015)
KAOPEN	-31.439 (25.550)	-31.058 (25.704)	-32.278 (22.595)	-31.058 (22.850)	-31.439 (23.756)
Ownership		-3.300*** (0.911)	-2.859** (1.092)	-3.300** (1.392)	
Constant	-6.192 (9.574)	-6.111 (8.130)	-6.217 (5.318)	-6.111 (5.366)	-6.192 (6.009)
Observations	160	160	160	160	160
R-squared	0.241		0.347		0.241
Hausman test	7.10 (0.7161)				
Number of ID	20	20		20	20



# GLOBAL MINIMUM TAX: A SUSTAINABLE MODEL FOR REVENUE ADMINISTRATION

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## **ABSTRACT**

*The Organisation for Economic Co-operations and Development (OECD) introduced the Global Minimum Tax (GMT) as a means to prevent or reduce revenue loss resulting from profit shifting activities, a practice commonly engaged by firms to move profits to lower tax regimes in order to reduce or eliminate tax liabilities. This article seeks to provide a comprehensive understanding of the GMT system which is planned for full implementation in 2024, and the impact it would have on both developed and developing countries. This article also provides a discussion on how multinational corporations may respond to this new tax system. In many perspectives, the GMT could be viewed in the context of supporting the United Nations' Sustainable Development Goals, including those on reducing inequalities, economic growth and international partnerships.*

**Keywords:** *GMT, profit shifting, tax haven, tax avoidance*

## **1. INTRODUCTION**

For decades, governments across the world have been contemplating mechanisms to prevent or at least reduce revenue loss as a result of shifting profits. Known as tax havens, these jurisdictions have very low tax rates and are attractive for foreign investors as a means to reduce tax burden by way of moving out profits from the home country where the tax payer operates. It is estimated that tax havens collectively cost governments \$500 billion to \$600 billion in lost corporate tax revenue (Cobham & Janský, 2019). Owing to this adversity, the Organisation for Economic Co-operations and Development (OECD) has worked on a proposal to introduce the Global Minimum Tax (GMT) to address the issue of profit shifting, typically carried out by multinational firms (MNCs). Set at a rate of 15%, the GMT initiative has been agreed in 2021 by more than 130 countries, and is planned for full implementation in 2024. Under this new tax mechanism, business profits would be taxed at a minimum effective rate of 15%, regardless of the jurisdiction where revenue is booked. If the profits are booked in a jurisdiction of lower tax rate (such as that in a tax haven), the home country would impose an additional tax liability of up to the minimum global tax rate. For example, if a tax haven imposes just 1% of effective tax rate, the home country of the MNC who has transferred its profit to the tax haven would be allowed to collect additional 14% of taxes from the MNC's transferred profits. Although the main intent was targeted at revenue lost from tax havens, the introduction of GMT would also curb the fierce competition among governments in reducing corporate tax rates in a bid to attract foreign investments. The consistent reduction of tax rates puts pressure on government's revenue and tax base, eventually affecting its spending ability. The GMT contributes positively to several dimensions within the United Nation's Sustainable Development Goals. One obvious goal would be from Goal 17 on partnerships. The objective of this goal is to promote an equitable trading and commercial system that is fair and open to all. Target 17.1 provides for the international support towards developing country by way of enhancing domestic capacity for tax and revenue collection. Another example where the GMT plays a role in the Sustainable Development Goals is the aspect on economic growth, under Goal 8. As governments recover the tax losses from profit shifting, improved revenue collection would mean better economic outcome and growth for beneficiary governments.

## **2. PROFIT SHIFTING**

Corporations across the world, large and small, engage in various strategies to reduce, defer or even eliminate tax liability. These tax planning exercises are often motivated by substantial financial savings that would result from the tax planning strategies. Cooper and Nguyen (2019) defined tax planning as an approach that firms undertake to lower tax payments through the implementation of various mechanisms or methods while staying within the provisions of legal boundaries. One common example of tax planning is known as profit shifting. This involves shifting of income and expenses between related parties (entities) for the purpose of transferring profits to jurisdictions with lower tax rate. Multinationals (MNC) are particularly in the position to engage in sophisticated tax planning activities as they possess the resources to do so. Given their international presence and access to multiple resources and networks, large MNCs are in a position to take advantage of the differing tax regimes. Dharmapala (2014) pointed out that some highly profitable MNCs were paying almost zero taxes due to aggressive tax planning strategies. Regimes with extremely low tax rates are also commonly known as tax havens. There has not been a single definition for tax haven, based on current literature. However, tax havens could be identified from the perspective of law, economics or even political (Orlov, 2004). Despite the differing perspectives when it comes to tax haven, there are several commonalities where tax haven is concerned, such as high level of financial secrecy, lack of control over currencies and low levels of regulations over financial institutions (Orlov, 2004).

## **3. WHAT IS GLOBAL MINIMUM TAX**

With globalization becoming the norm, governments across the globe are competing to attract foreign investments. Once such tool is through the lowering of tax rates. However, the continuous lowering of tax rates is not sustainable for the long run (Kiss, 2012) and would result in lower revenues for governments. The global competition for the lower tax rates would have the following implication (OECD, 2021; Ross, 2022):

- Erosion of tax base - this refers to the reduction of tax revenue as profits have been transferred to countries with lower taxes.
- To maintain the same level of revenue collection, governments may find other means to impose taxes, indirectly increasing the tax burden of the citizens.
- Taxpayers losing confidence and trust in the government, thus affecting level of compliance.

Since the 1990s, the Organisation for Economic Co-operation and Development (OECD) has been actively leading efforts in addressing the issue of tax evasion and avoidance. The existing global laws on taxation, which were developed in 1920s, were inadequate to tackle the issue of tax avoidance. Under the old law, firms with foreign profits can only be taxed by the foreign jurisdiction if it has a physical presence in that foreign jurisdiction. In addition, many governments only tax domestic profits made by MNCs. In response to these issues of tax avoidance, there has been co-operation at the international level to discuss and formulate strategies to plug the loophole in profit shifting. One key starting point was the OECD's 1998 publication of the report on the harmful effects of international tax competition. Titled "Harmful Tax Competition: An Emerging Global Issue", the report sought to highlight the harmful effect of global tax competition towards investments and trade (Development Committee on Fiscal Affairs, 1998). As globalization and international trade flourishes, governments around the world became increasingly concerned with loss of tax revenues. In 2013, the Group of 20 (G20) identified tax avoidance as a priority and were unified in supporting the call for open exchange of tax information among countries and supported OECD's call for preventing businesses' practices of profit shifting. A key milestone was achieved in 2016 where the OECD and G20 countries established the Inclusive Framework on Base Erosion and Profit Shifting, which has

the support of more than 140 countries. This was an international effort to develop a framework to prevent large MNCs from using profit-shifting tool as a mean to avoid taxes. This effort has, in 2020, led to the development of a two-pillar approach to tackle cross-border avoidance. The two-pillar solution will see MNCs being taxed at a minimum rate of 15%, and certain profits of the MNCs would be re-allocated to jurisdictions or governments based on the location of the customers (OECD, 2021). These two tax mechanisms were to take effect from 2023 onwards. Table 1 summarises the main features for each of the pillar.

Pillar One	Pillar Two
Imposed on MNCs with annual turnover exceeding 20 billion euro	A GMT rate of 15% on all MNCs with annual turnover exceeding 750 million euros.
Offers jurisdiction the right to tax MNCs without the need for physical presence.	Tax competition will be limited by the GMT rate in jurisdictions where the MNCs operate.
Allows for the reallocation of 25% of residual profits of the most profitable MNCs to jurisdictions where the MNC's customers are based. The total value of this portion of allocatable profit is expected to be USD 125 billion.	Countries can still offer tax incentives for business activities of real substances
Includes features to address risk of double taxation.	

*Table 1: Two Pillars Solution*

#### 4. CURRENT RESEARCH IN GMT

Given the recency of its implementation, there are limited studies on the topic of GMT in the existing literature. One study by Johannesan (2022) found that the introduction of GMT significantly alters the tax incentives of tax havens. One notable change is the raising of tax rates by tax havens to the range of the global minimum, which directly affects the tax liabilities of profit shifting firms. On the other hand, some studies found that the GMT may not be as promising as it seems to be in terms of achieving its objectives. For example, Devereux (2023) found that the GMT would raise little revenue for some jurisdictions, due to the complexity of international tax arrangements and the maintenance of certain tax provisions or incentives that are still allowable under Pillar Two. This motion is supported by Hanlon (2023), who argued that no matter what policies are introduced, it is very challenging to navigate through the complexity of international tax rules and regulations. In a separate study, Janeba and Schjelderup (2023) studied the effects of GMT on government revenue through the lens of tax rates and tax subsidies. Using a simulation of one tax haven country and two non-tax haven countries, the study found that governments competing on the basis of subsidies experience no extra revenue as the revenue gains from lesser profit shifting is offset by higher cost of subsidies. However, when governments compete through tax rates to attract investments, the revenue may increase. The authors went further to point out that there is no guarantee of a net increase in tax revenue as governments may compete through non-tax rates instruments, such as enticing investments through tax holidays, subsidies and free trade areas.

#### 5. CONCLUSION AND FUTURE STUDIES

The GMT is probably the most significant global tax reform in history. This initiative has come a long way and is a bold move towards a more sustainable tax collection model. As the GMT has just been implemented, there are ample opportunities for future research in this area of study.

One potential area for future research is the impact of GMT on firm strategies, especially those that engage heavily in cross-border corporate tax planning. Another area that could be investigated is the impact of foreign investments, especially on nations which were considered attractive tax havens.

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# THE IMPACT OF THE COVID-19 PANDEMIC ON THE BUSINESS RESULT OF THE ETSY PLATFORM

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## **ABSTRACT**

*The aim - is to research and analyse the impact of the global Covid-19 pandemic on the overall business result of the Etsy platform. The results of the research are the basis for comparing the impact of the pandemic on the operations of corporations in the model of the platform economy. Methodology / Design – selected financial indicators of the platform's operations, as well as the trend of the number of platform users, were used in the research and analysis. The research used financial and statistical analysis models to investigate how the pandemic affected the platform's business performance. The result - the research results indicated a significant positive correlation between the development of the pandemic and financial indicators, as well as the increase in the number of platform users. Conclusion - the research results proved the correlation between the development of the pandemic and the business performance of the corporation. The growth of income and profits, as well as the growth of the number of users, is directly related to the global development of the pandemic.*

**Keywords:** Covid-19, Etsy, disruption, online retail, platform economy

## **1. INTRODUCTION**

Corporations Etsy uses the platform economy organizational model in the retail industry. The business model is based on the construction of a platform infrastructure that enables the interaction of buyers and sellers, that is, the interaction of users on both sides of the platform (Parker et.al. 2016). With the increase in the number of users and the growth in the number of conversions on the platform, the network effect grows, which is a fundamental factor in the stability of organizations in the platform economy model (Moazed, Johnson 2016). The platform builds the infrastructure of the ecosystem, while users invest in their own business, as is the case with similar platforms such as AirBnb or Uber. Users pay a subscription fee for published content, which is a fixed cost, and the number of views and other services are not associated with variable costs. This means that sellers use the zero marginal cost model (Rifkin 2015) as well as the effects of the long tail economy (Anderson 2006; Lozić et.al. 2022). The basic income of the platform includes a fixed fee for each item placed in the sales window, and a percentage of the selling price that is advertised on the item. Other income includes income from "Sales Promotion" that users can pay to the platform for its promotional activities, and income from activities that are not directly related to the sale of items (Etsy Annual Report). The platform's business model is very similar to eBay and Shopify. According to the business model, the most similar platform is Shopify, but the fundamental difference is that with Shopify you need to open a company on the platform, while on the Etsy platform, products of natural persons are sold. Fleming and Head (2021) point out that the Shopify and Etsy platforms have made it possible for small business owners to sell physical products in a way that is more affordable than it has ever been in history. The paper investigates and analyses the impact of the Covid-19 pandemic on the corporation's business results. The research covered a period of six years to analyse the business performance of the corporation before and during the pandemic.

## 2. LITERATURE REVIEW

The platform got its name from an apparently meaningless word that one of the founders heard in a Fellini film, and translated it as "etsy". The real truth is that the actors often uttered the term "eh, si", which would mean "oh, yes", and the rest was remembered as "etsy", which was taken as the name of the platform (Dalenberg 2014). In terms of its business strategy, it is most similar to the eBay platform, because both platforms enable user interaction and conclusion of transactions, unlike the Shopify platform, where code needs to be installed (Dushnitsky, Stroube 2021). Etsy is a platform that follows the strategy and tactics of continuous improvements. The impact of these newer methods can be seen in the ongoing implementation at Etsy.com, a rapidly growing billion-dollar online marketplace that implements more than 30 software enhancements every day (Denning 2015). The scientific interest of continuous improvement research includes two fundamental categories, on which the progress of the entire ecosystem is based, namely the production of items that are sold and the process of trading these items, as a comprehensive study of the business process. In this context, the subject of research is defined as the term "social infrastructure" that combines the process of making and trading objects on the platform (Aspers, Darr 2021). The Etsy and Big Cartel platforms enable the advertising and sale of handmade items, in support of a firmly rooted ethos of individuality, which rests on the foundations of neoliberalism, personal realization and entrepreneurship in its original form. This form of work is often a second source of income because it is far below the rate needed to ensure life's needs (Robertson, Vinebaum 2016). Etsy is an online marketplace for small businesses that deal in artisanal, vintage or handmade goods, adapted to the fandom model of production and sale (King, Ridgway 2019). Dartnell and Kish (2021) investigate behavioural patterns associated with a new way of production in accordance with the ecological economy, and the fourth wave of DIY culture. As a result of individual efforts and opportunities provided by the infrastructure and ecosystem of the Etsy platform, consumers enjoy convenient and efficient access to a wide range of handmade as well as second-hand products. The platform provides users with comprehensive assistance in building entrepreneurial ambitions, all with the aim of developing competitive advantages compared to users of other platforms. In addition to the Etsy platform, a similar product offer can also be found on the eBay and Facebook platforms (Yrjölä et.al. 2021). Today, post-mortem photographs of the 19th and early 20th centuries have found new life on Etsy and other sales platforms as digitally reproduced curiosities or emotional relics of the past. The photographs examine how the sellers of "vintage post mortem" photographs attempt to re-charge the photographs with emotion in order to create affective experiences of mourning (Stylianou-Lambert, Widmaier 2023). A special phenomenon is the popularity of "template letters to buyers of houses and apartments" (Lowery 2023), which resemble love letters. In researching the lifestyles and sales strategies of smallholder farmers, Black (2020) explores the characteristics of small businesses that make animal fibre products that later form the basis for the production of handicrafts sold on Etsy. The research is conducted with the purpose of reviving interest in small businesses in rural areas, and creating broad support for the sustainable growth of businesses and the communities they belong to (Black 2020). In addition to handicrafts, photographs and old art objects, some forgotten magazines or special editions and issues of magazines that have disappeared from the public space can be found on the platform (Berthoud 2017). On the Etsy platform, unlike some much larger platforms, the seller's name is clearly displayed (Dillaway 2021), thus trying to avoid lawsuits about non-functionality and defective products. Research on the connection between users on the platform, as well as users from different platforms connected to Etsy, proved the existence of cooperation between users of platform services and mutual tagging and tracking in order to highlight individual services on the platform. A special connection exists between users on the Tumblr and Etsy platforms, and this connection results in a rich tagging practice that proves the desire of the

communities on the platforms for sincere and strong collaboration. Mutual tagging of users on the Etsy platform is more traditional, which is understandable due to the structure of business activity on the platform (Price, Robinson 2020). However, the boundaries between handicrafts and rapid prototyping and small series production in smart factories are blurred, and it is difficult to distinguish at which stage of production serial production begins (Unterfrauner, Voigt 2017). The Arts and Crafts movement failed to implement guild socialism focused on workshop production. Workshops like Morris and Co. and Century Guild could not maintain their cooperative ideal. Although Etsy has grown tremendously over the past nine years, it is still a tiny part of the global economy. The fundamental problem is that most of the craft products sold on Etsy are not essential items for everyday life. As a good example, jewellery can be highlighted, with more than five million items for sale, it is the largest category of handicrafts sold (Krug 2014).

### **3. METHODOLOGY, RESEARCH QUESTIONS AND DATA**

In the research and analysis of the impact of the global pandemic on the business performance of the Etsy platform, the annual report of the corporation published in the form of a "Form 10-K" document will be used. In European legislation, such a document would be closest to a combination of an audit report and management notes. The form or document "Form 10-K" is an official report for business on the stock exchanges, and it was approved by the competent financial institutions. In addition to the official report of the corporation, the paper will also use other scientific literature relevant to researching the topic of the paper. The analysis of the impact of the pandemic on the financial efficiency of the corporation is based on three research questions:

- 1) In what way and how significantly did the Covid 19 pandemic affect the revenues and net profit of the platform?  
Due to the pandemic, consumers have turned more towards shopping on global platforms such as Amazon, but at the same time they have significantly increased their interest in local and specialized platforms (Cambefort 2020). Amazon and Etsy saw a strong increase in searches in December 2019, which were associated with the purchase of Christmas gifts. After that, interest declines to start growing exponentially at the beginning of the second quarter of the following year (Dartnell and Kish 2021).
- 2) In what way and how significant was the impact of the Covid 19 pandemic on the assets of the platform?  
Etsy is known as a platform that continuously improves its infrastructure (Denning 2015), so it is interesting to analyse how the pandemic affected the value of the platform. Church and Oakley (2018) provide empirical evidence that handmade products sell for an average of 78% above the price of machine-made products. The sale of handmade products and the growth of the number of users directly affects the growth of the value of the platform. Very soon after its inception, the platform came under pressure from the theory of the "mission of the company gone astray" and became known as a case where pressures on stock values and owner earnings can transform even the most idealistic companies (Thomas 2022).
- 3) What was the trend of platform users before and during the pandemic?  
The crisis associated with the pandemic has increased interest in new forms of DIY products related to 3D printing models, as well as in P2P communication, information sharing, and distribution of goods (Dartnell and Kish 2021). The number of buyers and sellers on the platform is continuously growing, so it is important to understand what attracts users to the platform (Droege 2022).

The research will use financial analysis models in combination with statistical regression models so that the results can be compared with the results of other research in this area.

The research and analysis are presented in the next chapter, and the research results are presented in the Conclusion chapter.

#### 4. BUSINESS PERFORMANCE ANALYSIS

The platform's business performance research is divided into three basic areas: analysis of selected financial parameters, trend analysis of platform assets and user trend analysis.

##### 4.1. Selected financial parameters analysis

The fundamental difference between classic craft production, created at the end of the 19th century, and modern forms of production and distribution of products from individual production that are distributed on the platform is precisely the connection of producers and consumers in the model of P2P nodes. The combination of the use of physical and digital forms of production and distribution of products is precisely the basis of what is called the Fourth Industrial Revolution (Dartnell and Kish 2021).

*Table 1: Selected financial parameters (\$; mill)*

	2016	2017	2018	2019	2020	2021
Revenue	364.967	441.231	603.693	818.379	1.726.625	2.329.114
Cost of Goods sold	123.328	150.986	190.762	271.036	464.745	654.512
Gross Profit	241.639	290.245	412.931	547.343	1.261.880	1.674.602
%	66,2%	65,8%	68,4%	66,9%	73,1%	71,9%
Operating Income	17.677	11.896	74.786	88.761	425.009	465.732
Net Income	-29.901	82	77.491	95.894	349.246	493.507

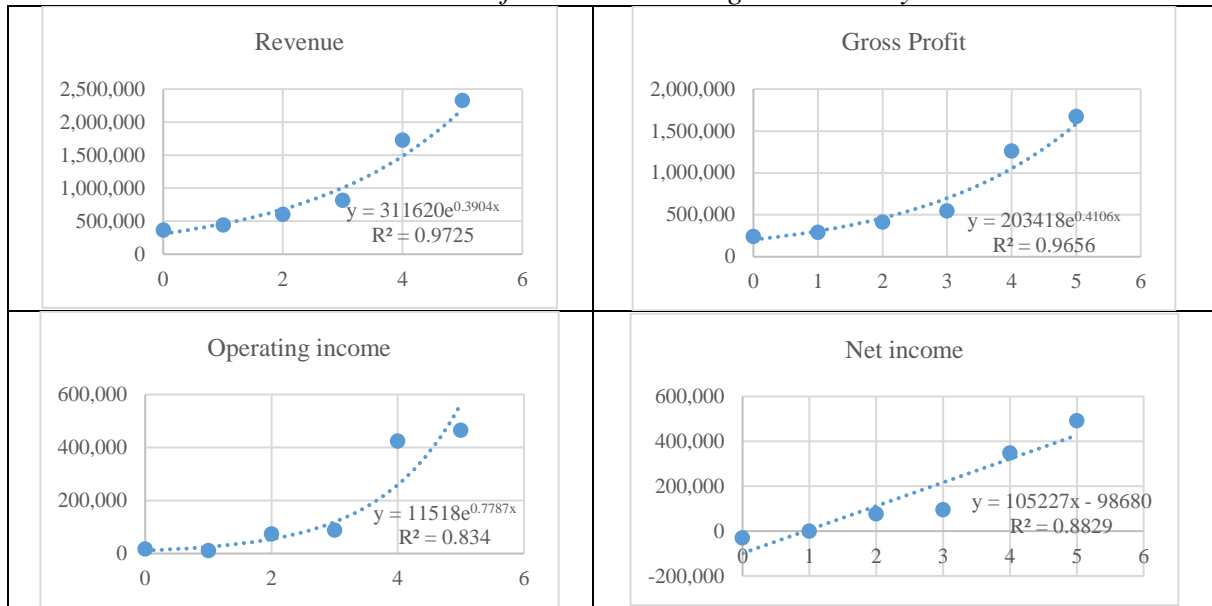
*Source: Own illustration (Etsy annual report)*

In the analysis of selected financial parameters, the period of six years from 2016 to 2021 is researched. In the selected period, platform revenues increased by 538.2%, while Gross profit increased by 593%. On average, Gross Profit grew faster than revenue, but in the last analysed period, Cost of Goods sold grew faster than Gross Profit. Operating income increased by 2534.7%, or from 17.67 million dollars to 465.73 million dollars. Net income was negative in the first analysed period, and in 2021 it would amount to 493.51 million dollars. The biggest increase in revenue, operating profit and net profit was achieved in 2020. The results of the analysis are shown in the table 1.

*Table following on the next page*



Table 2: Selected financial items regression analysis



Source: Own illustration (Etsy annual report)

Revenues grew at an average annual rate of 47.8% ( $s=47.76$ ), interpreted by the exponential regression curve of the trend  $y = 311620e^{0.3904x}$ , with a regression coefficient of 96.05% ( $R^2=0.9605$ ). Income growth in the first four analysed periods was below the average growth rate. In 2020, the inflection point is above the average trend curve, as in the last analysed period. Gross profit grew at an average annual rate of 50.8% ( $s=50.77$ ), interpreted by the exponential regression curve of the trend  $y=203418e^{0.4106x}$ , with a regression coefficient of 95.5% ( $R^2=0.9545$ ). The growth trend of gross profit follows the growth trend of revenue, and in the penultimate period, the point of inflection is above the exponential curve of average growth. The average gross profit is 69%, which means that it is above the average in all periods in which the global pandemic is present. Operating income grew on average annually at a rate of 117.9% ( $s=117.86$ ), interpreted by the exponential regression curve of the trend  $y = 11518e^{0.7787x}$ , with a regression coefficient of 89.79% ( $R^2 = 0.8979$ ). The inflection point in the penultimate period is above the trend curve, but the inflection curve in the last analysed period is below the trend curve, which implies an increase in income lower than the average for the analysed period. Direct operating costs are rising, which implies a decline in operating profit. Net profit grew at an average annual rate of 64% ( $s=64.01$ ) interpreted by the linear regression equation  $y=105,227x - 98,680$  with a regression coefficient of 88.29% ( $R^2 = 0.8829$ ). The linear regression equation was chosen because of the higher accuracy of the regression coefficient than the exponential regression equation. The inflection point in 2019 was still below the linear regression curve, and was above the regression curve in the last two analysed periods. The results of the research are presented in table 2. Analysing the trend of revenue, operating profit and net profit, it can be concluded that there is a correlation between the origin and development of the pandemic and the financial efficiency of the platform's business results. Comparing the results of the platform's operational business with the platforms Lyft (Lozić et.al. 2022a) and Uber (Lozić et.al. 2022b), which use the same business model of the platform economy, no similarity can be found because both passenger transport platforms recorded continuous losses from operational business before and during the pandemic. In the context of the analysis of retail platforms, Etsy and Shopify achieved the highest revenue growth (Dartnell and Kish 2021).

#### 4.2. Platform assets analysis

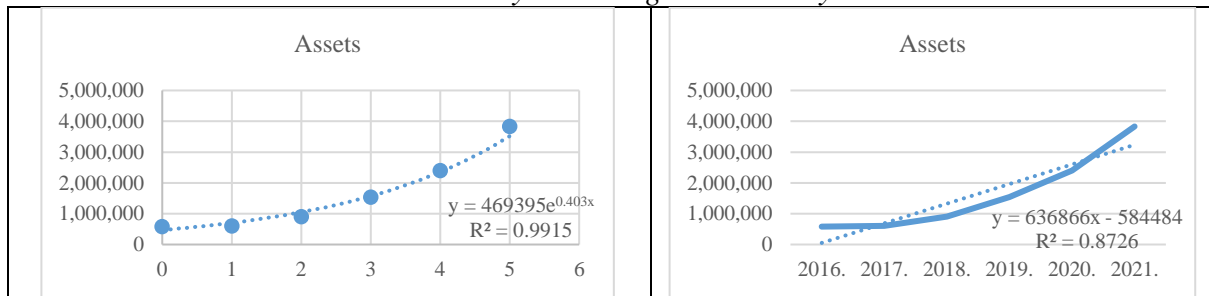
In the analysed period, the assets of the platform increased by 559.3%, i.e. from 581.19 million dollars to 3.831 billion dollars. In 2020, Current assets are 3.7 times higher than Long time assets, which proves the significant liquidity of the platform. Platforms do not have Inventory because they do not control the value chain in the production of goods and services on the platform. The largest increase in assets on the platform was in 2020, i.e. the increase was 71% compared to the previous year, and in 2021 the increase was 55%. The biggest increase in revenue and gross profit was in 2020, but remained within the limits of the increase in the value of assets on the platform. The results of the analysis are shown in table 3.

Table 3: Etsy assets (\$; mill)

	2016	2017	2018	2019	2020	2021
Assets	581.193	605.583	901.851	1.542.352	2.404.489	3.831.809

Source: Own illustration (Etsy annual report)

Table 4: Etsy assets regression analysis



Source: Own illustration (Etsy annual report)

A regression analysis of the trend proves a strong connection between the development of the Covid-19 pandemic and the increase in the value of the platform's assets. The growth of property value is determined by the exponential regression equation  $y=469395e^{0.403x}$ , with a regression coefficient of 96.63% ( $R^2 = 0.9663$ ). The average property value in the analysed period grew at a rate of 49.63% ( $s=0.4963$ ). The average value of assets grew proportionally to the growth of the platform's income, that is, income and assets grew at an average rate of 48% per year. By linear analysis of the value growth trend, it is noticeable that the platform achieved an above average asset value in the last two analysed periods, which indicates the growth of capitalization as a result of the growth of income with the development of the pandemic. The regression coefficient of the linear trend equation is smaller than the regression coefficient of the exponential regression of the trend, so the exponential trend is accepted as more significant in the interpretation of the results. Aguirre (2021) points out that Etsy was the jewel in the crown of socially responsible business, because its priorities were female entrepreneurship, employee rights and environmental protection. However, after it went through the IPO process, the fundamental principles as well as the financial efficiency fell apart. Aguirre points the finger at greedy investors, capitalism and short-term goals, yet the analysis shows an increase in the value of the platform.

#### 4.3. Platform users trend analysis

In the second quarter of 2020, the platform achieved growth of 18.7 million new users (Dartnell and Kish 2021), which is evidence of the impact of the pandemic on the platform's business performance. The corporation uses the ecosystem model of the platform economy, which implies a two-side market, that is, enables the interaction of sellers and buyers. In the analyzed period, the number of Sellers increased by 806.3%, while the number of Buyers increased by

933.7%. The increase in the number of Buyers directly affects the growth of the network effect on both sides of the platform, because the increased demand maintains the existing and creates new value on the supply side.

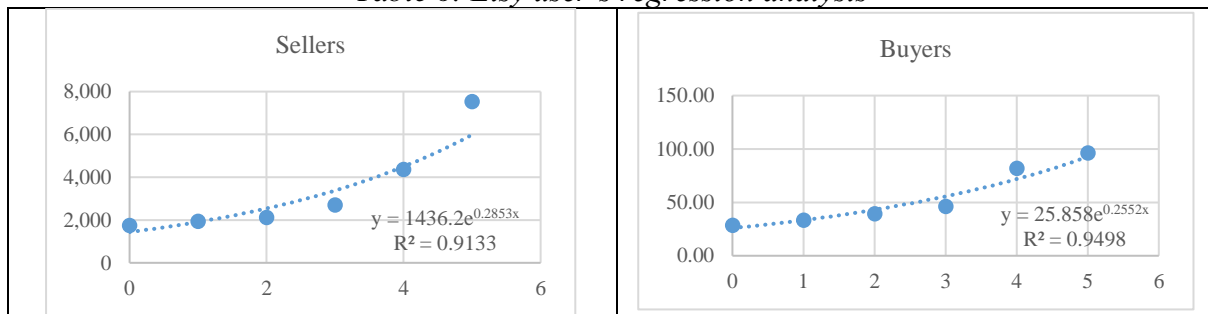
*Table 5: Etsy users*

	Sellers (000)	Buyers (mill)
2016	1.748	28,57
2017	1.933	33,36
2018	2.115	39,45
2019	2.699	46,35
2020	4.365	81,90
2021	7.522	96,34

*Source: Own illustration (Etsy annual report)*

In 2020, the number of Buyers increased by 76% compared to the previous period, and the number of Sellers by 61% compared to the previous period. It was arguably the most significant increase from period to period, which was reflected in the increase in Cost of good sales and a lower percentage of Gross Profit compared to the previous period. For one Seller on the platform, there were an average of 16.83 buyers. In 2020, there were more Buyers than Sellers, i.e. 18.76 Buyers to one Seller. The penultimate period marked the peak of the pandemic according to the increase in the number of users, as well as the increase in income, gross profit and net profit.

*Table 6: Etsy user's regression analysis*



*Source: Own illustration (Etsy annual report)*

The average annual increase in the number of Sellers was 22.97% ( $s=0.2297$ ), interpreted by the exponential trend equation  $y = 1436.2e^{0.2853x}$ , with a regression coefficient of 88.97% ( $R^2 = 0.8897$ ). In the last analysed period, the inflection point is above the exponential regression curve, which indicates a large increase in the number of sellers compared to the previous period. The average annual growth of Buyers was 29.07% ( $s=0.2907$ ), interpreted by the exponential trend equation  $y = 25,858e^{0.2552x}$ , with a regression coefficient of 94.23% ( $R^2 = 0.9423$ ). In the last analysed period, the inflection point is located on the trend curve, which is different from the point of inflection at Sellers. The development of the pandemic significantly affected the increase in the number of Sellers in order to compensate for part of the lost earnings due to the lock-down model.

*Table following on the next page*

*Table 7: Description statistical analysis (mill.)*

	Buyers	Sellers
Mean	54,32833	3397
Standard Error	11,42126	911,8822
Median	42,9	2407
Standard Deviation	27,97627	2233,646
Sample Variance	782,6717	4989175
Kurtosis	-1,24531	2,336543
Skewness	0,890546	1,642877
Range	67,77	5774
Minimum	28,57	1748
Maximum	96,34	7522
Sum	325,97	20382
Count	6	6

*Source: Own illustration*

The results of the descriptive analysis of the trend of the number of Sellers and Buyers determine the direction and trend model of platform users. The mean for both groups of users is between the fourth and fifth frequencies, which proves a strong and significant increase in the number of users during the pandemic. The Kurtosis value determines the fundamental difference in trend movement. The value of Buyers is negative (-1.24531), which means that the distribution is somewhat flatter. The value of the frequencies increases, but less than the average of the normal distribution. At Sellers, the situation is reversed, the value is positive (1.642877), which means that the distribution is sharp and high. The average growth in the number of Sellers is significantly higher than the average growth in the number of Buyers. The Skewness value opens a new dimension of analysis because for both frequencies the value is positive, which means that the distributions are slightly positively asymmetric, that is, lower values prevail. In the context of the trend analysis of the number of users on the platform, it can be concluded that the number of users increased sharply during the pandemic, but that this increase is digressive, i.e. the growth of the number of users is slowing down. In addition to analysing the quantitative trend of users, qualitative research on the soap market (Fuchs 2015), proved that users are willing to pay 17% more for hand-made soap than machine-made soap. In some future research, it is necessary to bring the quantitative indicators into the context of qualitative indicators, in order to correctly assess the value potential of the platform and development possibilities.

#### **4.4. Model ANOVA analysis**

In the analysis of the ANOVA model, the influence of the independent variables Sellers and Buyers on the dependent variable revenue was analysed, that is, the research sought an answer to the question of how the change in the variables sellers and buyers affects the variable revenue. A given period of six years was analysed, and the results of the analysis showed a significant connection between the given variables, that is, the multiple correlation coefficient is 99.84% (MultipleR = 0.99841). The coefficient of interpretation for strings of less than 30 frequencies is 99.95% with a standard error of 18369.84. The multiple linear regression model is significant (R>0.8).

*Table following on the next page*

*Table 8: ANOVA analysis*

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0,999841143							
R Square	0,999682311							
Adjusted R S	0,999470519							
Standard Error	18369,83549							
Observations	6							
ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	2	3,18561E+12	1,5928E+12	4720,1053	5,66242E-06			
Residual	3	1012352568	337450856					
Total	5	3,18662E+12						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95,0%</i>	<i>Upper 95,0%</i>
Intercept	-427696,756	19776,47328	-21,6265433	0,0002164	-490634,3201	-364759,191	-490634,3201	-364759,1914
Sellers	94,94819516	12,15704235	7,81013938	0,0043696	56,25906066	133,6373297	56,25906066	133,6373297
Buyers	21213,47186	970,6272642	21,8554255	0,0002097	18124,5027	24302,44101	18124,5027	24302,44101

*Source: Own illustration (Etsy annual report)*

The results of the analysis proved a significant connection and influence of independent variables, i.e. the coefficient of significance is 5.66242E-06 (Significance F = 5.66242E-06), which means that at least one of the independent variables has a statistically significant effect on the value of the dependent variable. The value of independent variables proves the significant influence of independent variables on total income, that is, the value of independent variables expressed as P-value is  $p < 0.05$  at the 95% significance level. The influence of buyers with P-value = 0.0002097 proves the very significant influence of buyers on income, that is, the P-value coefficient is much more significant for Buyers compared to Sellers. When drawing conclusions in the analysis of the ANOVA model, one should be very careful because the business model of the platform economy is significantly different from the industrial model according to which the model was made. A part of the income is generated by the platform from subscriptions, so it remains an open problem to investigate how subscription revenues affect the final results of the ANOVA model. In addition, the platform was under pressure from the expectations of the employees themselves from the very beginning, and the problems grew with the necessary scaling and the first layoffs. The success of the platform is related to the overall business performance (Bishara 2020), and not only to quantitative indicators about user interactions and their impact on revenues.

## 5. CONCLUSION

In the context of the impact of the global Covid-19 pandemic, it can be concluded that there is a correlation between the development of the pandemic and the growth of the platform's income. Analysis of the revenue structure and trends of the user community on the platform showed very interesting results. The first research results highlighted five very interesting conclusions:

- Revenues, gross profit, operating profit and net profit had the highest percentage growth in 2020, from which it can be concluded that this was the year when the pandemic peaked in the context of trading on the platform.
- In 2019, the gross profit decreases compared to the previous year, only to be the highest in the analyzed period already in the next period. Gross profit is above the average in the last three analyzed periods, which implicitly indicates the positive effects of the pandemic on the financial performance of the Etsy platform.

- Operating costs are increasing and operating profit is below average in the last analyzed period. It will be interesting to follow the trend of operating profit in the post-pandemic period.
- The platform's revenues and assets grew at an average rate of 48% per year, which proves the correlation between the development of the pandemic and the increase in the value of the platform's assets.
- The number of buyers grew at a higher rate than sellers, which had a positive effect on the growth of the platform's income.

In the context of the first research question, it can be concluded that the pandemic had a significant effect on the growth of the platform's income, that is, there is a significant correlation between the development of the pandemic and the growth of the platform's income. This is especially reflected in the penultimate analysed period, when the pandemic was at its peak. The corporation recorded the highest increase in revenue and the highest gross profit in relation to all other analysed periods. In the context of the second research question, the research results prove the correlation between the development of the pandemic and the growth of the value of the property platform. The growth in value is continuous, and is the highest in the last two analysed periods, which proves the strong and positive connection between the pandemic and the growth of property values. In the context of the third research question, the results of the research proved a strong connection between the development of the pandemic and the growth of the number of users. The largest growth in the number of users was recorded in the last two analysed periods, which proves the correlation between the development of the pandemic and the growth in the number of users. All three research questions prove the strong impact of the Covid-19 pandemic on the business results of the Etsy platform. As the pandemic developed, incomes, property values and the number of users grew. While linear business corporations had a negative trend, Etsy took advantage of working from home and increased all significant parameters for the further development of the corporation. When interpreting the results, one should be careful because classic financial analysis, and especially the ANOVA model, can be an uncertain method in the final conclusion. The growth of the platform's income is partly due to the increase in subscriptions, which does not mean that the number of transactions is also increasing. Analysis using the ANOVA model proves the strong influence of the independent variable Buyers on total revenue, but it should be taken into account that revenue growth partly comes from subscriptions from products that are sold, and not from concluded interactions on the platform. Both specificities are directly related to the platform economy model, so one should be careful in interpreting how analysis models adapted to linear business are used.

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## **EFFECTUATION AND HEXACO MODEL AS A CONSIDERABLE ELEMENTS FOR UNDERSTANDING THE CHARACTERISTICS THAT MAKE ENETREPERENURS PROSPEROUS**

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### **ABSTRACT**

*Entrepreneurship is a key source for economic development and prosperity. Entrepreneurs have very challenging role, especially in time of economic crisis. Entrepreneurs' personal characteristics are seen as the crucial factor for business success. Not all environments provide equal opportunities and not all entrepreneurs are equal on abilities to recognize opportunities. Most of entrepreneurs do not succeed in creating lasting organizations (Kuratko, 2009). According to Shane and Venkatarman, individuals and the way they use their prospects are the essential of the entrepreneurship phenomenon (Shane and Venkatarman, 2000). Person who leads the company has a liable role of company's directions and outcomes, therefore we can conclude that top management, in our case entrepreneurs have important role of guiding and shaping the companies outcomes We will also put our consideration at some personality traits and models (self-efficacy, recognizing opportunities, and perseverance, human and social capital and social skills) that makes entrepreneur successful. Furthermore we will analyze the role of effectuation that successful entrepreneur should have as a tool for his business viewpoint and company should use adequate tools for recognizing specific personality traits and recognizing talented entrepreneur. To maintain motivated and good performance entrepreneurs it is crucial to manage entrepreneurship and explore required skills through statistical models. This paper will explore the definition of entrepreneurship, effectuation as well as HEXACO model as a possible tips how to manage entrepreneurial evaluation and development based on previous researches.*

**Keywords:** *effectuation, HEXACO model, entrepreneur, business model*

### **1. INTRODUCTION**

Entrepreneurship is a unique discipline which allows individual to function independently as well as interdisciplinary. Word interdisciplinary means combining various factors of production and coordinating other inputs and outputs into economic framework (Darma 2013). Nowadays, entrepreneurship is seen as a part of business life and is often seen as a dynamic process which involves elements such as creation, vision, and passion towards creating and inventing new solutions (Diandra et al, 2020). Successful entrepreneur will be beneficial for any organization therefore it is crucial to know methods for managing entrepreneurs. We will review some of the qualitative research based on literature review and highlight the importance of entrepreneurial skills. Entrepreneur should be an innovator or developer who will recognize opportunities and transform them into innovation. Often entrepreneurs are the one who will come up with 'big ideas'.

Entrepreneurs should have a capacity to gain, process, apply and disseminate knowledge regarded resources and to create new opportunities. Company have a duty to continuously strive to match person-organization fit which explains why individuals are choosing working environment according to their own beliefs, personality, values and attitudes, looking to equal organizational norms and culture (Philips and Gully, 2012). The entrepreneur is often responsible for company's achievement, but not all entrepreneurs are the same and each one of them will have their own skill and method of creating new ideas. In this paper we aim to highlight the importance of recognizing effectuation and HEXACO model for creating entrepreneurial tools for future selection and career improvement technique for future managerial talents.

## **2. CHALLENGES OF MODERN ENTREPRENEUR**

According to Donald F.Kuratko entrepreneurship is seen as a dynamic process which involves elements such as creation, vision, and passion towards creating and inventing new solutions. On the other side from the evolutionary theorist entrepreneur character is irrelevant. According to Aldrich "entrepreneurial knowledge ultimately derives from a mix of individual experience, connections within networks, learning from others, and blind variation," Aldrich (2001) raises the puzzle about how entrepreneurs transform this knowledge into competence-destroying organizational innovations (Sarashvathy, 2008). Nowadays, we live in digital and challenging era and entrepreneur should be an innovator or developer who will recognize opportunities and transform them into innovation. When we look at definition it seems easy, but most creative and simplest ideas can be the hardest one. The Entrepreneur should be the one who constantly searches for new ideas and has to have positive attitude towards innovation (Kuratko, 2009). That is usually someone who is very optimistic and has intense commitment to work hard (Kuratko, 2009). Entrepreneurship can exist within business or nonbusiness organization just as long as it follows the rules that entrepreneur brings certain level of innovation. We were looking at different sources and came to term entrepreneurial management which focuses on the techniques and principles of entrepreneurship that lead to successful entrepreneurial economy (Kuratko 2009). According to Shane entrepreneurship requires actuality of opportunities in which people have possibility to assembly resources in a way that they will profit. Every entrepreneur has different perception of those opportunities and different method of developing new business strategies (Shane, 2003). That brought us to conclusion that person who wants to be successful entrepreneur needs to have certain traits. Various readings confirmed that entrepreneurship requires alterations between people. One needs to have ability to recognize opportunities and certain level of decisiveness; furthermore entrepreneurship also requires good organization (Shane 2003). Those specific traits do not necessarily mean that anyone who has them can fit the role of entrepreneur. Every entrepreneur should have entrepreneurial cognition which explains how entrepreneurs think and make their decisions (Baron and Shane, 2008). According to Diandra and Azmy entrepreneurship is closely linked to opportunity recognition and puts emphasis on the importance of knowledge and skills matched with entrepreneurial ability, furthermore that ability will lead to innovation and learning which will at the bring company profit and economic growth (Diandra et al, 2020.)

## **3. MODELS FOR PREDICTING INDIVIDUAL DIFFERENCES OF ENTREPRENEUR**

According to Gifford model (1993) we are able to predict (based on abilities) individual decide on of career and whether person will be entrepreneur, manager or employee (Baum et all, 2007). To make a distinction of abilities we have to state that there are two types of entrepreneurships. First one is opportunity based which is explained in the way that entrepreneur perceives a business opportunity and develops the business as his career choice. Second type are necessity-based entrepreneurship; when entrepreneur has no option to earn for living and they have no

other option except labor market (Diandra et al, 2020). Innovators are focused on bringing new idea, while reproducers tend to start business based on routines and competencies which are already established. Furthermore, according to Aldrich and Martinez, we can add third type; when refreshing someone's existing idea (Aldrich and Martinez, 2001). If we focus on all listed types of entrepreneurs then we can mention Markman and Baron's model list of several personal abilities and skills relevant to start a new business. If a person has some of those attributes developed to a greater extent it has a better chance to match person-entrepreneurship fit. Person – entrepreneurship fit tries to look at which are specific personal characteristics that make good entrepreneur. Person-entrepreneurship fit proposes that person with good human and social capital skills as well as opportunity appreciation that will have a greater ultimate success as entrepreneur. According to Markman and Baron, self-efficacy is defined as a person's capability to organize and effectively organize assignments. It is often suggested that entrepreneurs high in self-efficacy will be better than everyone else with lower self-efficacy. Entrepreneurs will score better if they believe in the outcome. It is also important to have high efficacy when entrepreneur is starting new business. Starting new business requires high level of self-efficacy and conviction (Markman and Baron, 2003). Another skill is Opportunity recognition as entrepreneurial ability to recognize and capture new possibility in business. It is often the case that entrepreneurs spent more time on seeking opportunities than real work. Individuals who have high perseverance perform in entrepreneurship more adeptly while other who fail to persevere have increased anxiety and negative effect. In entrepreneurship it is extremely important to quickly overcome hard times (Markman and Baron, 2003). According to Kauffmann and Hausmann future oriented entrepreneur seems imperative to mention because research showed that entrepreneurs who are more future oriented will be better at decision making, goal-setting, control business satisfaction (Kauffman and Hausman, 2004).

#### **4. ENTREPRENEURIAL RESEARCH FINDINGS**

Since the early 90s, research has discovered the factors influencing entrepreneurial intention (Carr & Sequeira, 2007). The research which they conducted showed that individual entrepreneurial self-construction has a positive impact on entrepreneurial intentions and that institutional context always moderates the relationship between individual and personal intentions (Carr & Sequeira, 2007). Different methodologies or samples were used in different studies examining the relationship between personality factors and entrepreneurial intention (Rauch & Frese, 2007; Sahinidis, Xanthopoulou, Tsaknis, & Vassiliou, 2021). The trait perspective was principally used in several studies to study the characteristics of entrepreneurs (Zhao, Seibert, & Lumpkin, 2010). Zhao et al used study with a broad range of scales and categorized them using five model of personality, furthermore they suggested that personality plays a role in entrepreneurial success. Career adaptability research is lacking, within the context of entrepreneurial careers, despite the vital role that adaptability plays in the creation of new companies. Human capital resources, including career adaptability, are significantly needed for entrepreneurship in contrast with traditional careers (Savickas, 2013). Specific set of skills play a key role in entrepreneurial career. Therefore, we will put focus on models which offer combining all entrepreneurial traits into model. Furthermore, we will list set of most relevant studies which confirm the importance of specific skills and usage of appropriate method. We can conclude that individual differences do matter for entrepreneurial role, the closer person-entrepreneurship fit the greater is success. Not all individuals are equipped with same skills and abilities, but that give a free space to investigate more person characteristics that will make us better entrepreneur. Baron and Markman conducted a study where they compared two opposite industries and as a result, they confirmed their hypothesis which said that higher the entrepreneurs' social skills are, the greater financial success. They also proved that social skills are especially important during forming new business.

In conclusion they suggest that hiring and investment decisions should be based on candidate's human and social skill as well as sound social skills. Study conducted by Aulet and Murray in 2013. Divided entrepreneurship into 2 categories (innovation driven which put focus on the idea of innovation and secondly small medium enterprises) they used two very different types (Aulet et al, 2013.) which they explained in the detail the main difference between SME entrepreneurship and IDE Entrepreneurship. SME typically grows at a linear rate and will respond quickly to cash injection while IDE will have exponential growth; the company starts by losing money, but if successful it will have exponential growth (Aulet et al, 2013.) One of the simplest ways to find out what expert entrepreneurs have learned from their experience is to ask them. Interviews of entrepreneurs and their stakeholders, triangulated with published data, can and do form the basis of valid studies with interesting results (Donald, 2001; Jennifer & William, 1999; Norman & John, 1983). But expert entrepreneurs are usually good storytellers (Lounsbury & Glynn, 2001). Therefore, studies based on their stories after the fact may be subject to retrospective bias. To get around this bias, I used think-aloud verbal protocols. In this method, subjects in the study are given a set of typical problems from their domain of expertise and asked to think aloud continuously as they solve the problems. Another research paper aimed to examine the direct effect of the HEXACO personality traits on entrepreneurial intention and career adaptability, the indirect effect of personality traits on entrepreneurial intention through career adaptability, and the direct effect of career adaptability on entrepreneurial intention. A 55-item questionnaire was employed to measure the personality traits of HEXACO, career adaptability, and entrepreneurial intention. The study sample includes more than half of the students of the business department (n = 485) of a public university based in Athens. The results direct that extraversion, conscientiousness, and openness have a direct and positive impact on entrepreneurial intention, while emotionality has a negative one. Also, career adaptability relates positively to entrepreneurial intention. Openness, conscientiousness, extraversion, and humility affect positively career adaptability. Finally, it is indicated that openness, conscientiousness, extraversion, and humility have an indirect and positive relationship with entrepreneurial intention through career adaptability. The concept of individual traits is a continuously the central concept of personality study. At the same time, there is little research that deals with the study of the personality features of individuals engaged in specific professions, so we found research of personality characteristics of individuals engaged in the diplomatic profession. Research showed that Personality traits are important for understanding the diplomatic profession and this research evaluated how individual opinion of personality traits of diplomats differ, depending on how the diplomatic profession is assessed by different individuals. The aim of the study was to check some personality features that are recognized as a significant predictor for evaluating the diplomatic profession, as well as contribution to a possible selection model for candidates in diplomacy and to study the personality characteristics of individuals engaged in the diplomatic profession. Totally 250 respondents participated in the survey (Bilić, 2023).

## **5. EFFECTUATION**

In order to be good manager and accomplish effective organizational culture and performance it is expected to have high task performance and solve problems quickly. According to Sarasvathy effectuation is a control-oriented decision judgement that applies a set of existing personal and social means as given, and focuses on potential effects that can be co-created with those means, furthermore entrepreneurs should focus on controlling rather than predicting the future (Sarasvathy, 2008) Effectuation of those managers is usually viewed as individual characteristics, but through reading we can consider effectuation as complex phenomenon that has to use various approaches in order to understand it (Sarasvathy, 2008) Additionally we agreed that effectuation influences organizational culture and its components.

Effectuation combined with and model of organizational culture can bring new look at already existing phenomena of entrepreneurship. The effectual entrepreneur is one who fabricates opportunities that pre-exist in the world; the effectual entrepreneur is one who fabricates opportunities from value systems. We believe that effectuation will power organizational culture. Organizational culture can be novice or already established, as well as managers, furthermore we will develop clear criteria how to assess our thesis topic. The view from entrepreneurial expertise, however, turns the spotlight on the performance of the entrepreneur, sometimes in harmony with, but at other times in opposition to, the presentation of the firm. Entrepreneurs, in current scholarship, are seen as instruments in the birth and growth of firms. Entrepreneurial expertise proposes an instrumental view of the firm instead. Studies of expertise suggest that although expertise often overlaps with and explains success, expertise is not the same as success (Gardner, 1995). Organizational culture is formed by its employees as well as management. Furthermore, we will make the linkage between effectuation, performance on organizational culture. Entrepreneurs have to be aware that our mindset is constantly changing as a result of our constant adaptation to surroundings. Effectuators see the world as open, still in-the-making. They see a genuine role for human action. In fact, they see both firms and markets as human-made artifacts. In this sense, effectual entrepreneurship is not a social science. It is a science of the artificial (Simon, 1996). • Effectuators very rarely see opportunities as given or outside of their control. For the most part, they work to fabricate, as well as recognize and discover opportunities (Saravathy, Dew, Velamuri, & Venkataraman, 2003). • Effectuators often have an instrumental view of firms and markets. They do not act as though they were the agents of the firm or as suppliers catering to demand – firms are a way for them to create valuable novelty for themselves and/or for the world; markets are more likely made than found; and a variety of stakeholders including customers are partners in an adventure of their own making. • Effectuators do not seek to avoid failure; they seek to make success happen. This entails a recognition that failing is an integral part of venturing well. Through their willingness to fail, effectuators create temporal portfolios of ventures whose successes and failures they manage – learning to outlive failures by keeping them small and killing them young, and cumulating successes through continual leveraging. In an effectual universe, success/failure is not a Boolean variable and the success/failure of the entrepreneur does not equal the success/failure of the firm. At the end of the last century, many researchers agreed that individual variation in personality could best be described in terms of five broad, independent dimensions known as the Big Five, which were later popularized within the five-factor model of personality structure. However, in recent years, a significant amount of scientific papers have accumulated that favor a model that represents the personality structure with six factors, more popularly called the HEXACO model of personality (Vukasović, 2021). This model consists of the following dimensions: sincerity-humility (honesty, honesty, avoidance of greed and modesty), emotionality (fearfulness, anxiety, dependence on others, sentimentality), extraversion (social self-esteem, social boldness, sociability and liveliness), agreeableness ( tendency to forgive, tenderness, flexibility and patience), conscientiousness (organization, diligence, perfectionism and prudence) and openness to experiences (appreciation of aesthetics, curiosity, creativity and unconventionality) (Vdović, 2020). For years, the five-factor model of personality was the dominant model by which personality traits were operationalized, and most of the research that focused on personality and its correlates used this personality model. In recent times, the HEXACO model of personality with six factors, by Lee and Ashton (2004), has become increasingly popular, who saw how six personality factors appear in numerous languages and cultures in lexical analyses. Respecting the mentioned criticisms and the results of the latest research in the field of personality psychology, we decided to use the HEXACO model, which is actually an extended version of the five-factor model.

## 6. CONCLUSION

Entrepreneurs are involved daily in dynamic process of business creation and often perceived as individuals with specific skills. Nowadays the progress of economies worldwide is considerably influenced by entrepreneurship. Through literature research it is obvious that certain traits are required for individuals to involve in entrepreneurial role and put focus on detecting, keeping and developing leadership capabilities. According to Shane entrepreneurship provides opportunities to individuals with certain psychological and creative attributes. Entrepreneurial role is very complex and modern economy strives for people who can both be promoter and manager of their company (Shane and Venkataraman, 2000) This paper examined and highlighted the importance of entrepreneurial attributes and detecting entrepreneurial traits. Effectuation as a logic method can contribute to better entrepreneurial understanding in every profession, but with focus on more demanding and dynamic professions which include long term plans and dynamic environments. According to Matalamaki and his study effectuation theory should no longer be associated only with new ventures and start-ups. The majority of recent studies have presented the results of effectuation logic in the context of established companies (Matalamaki, 2017). As Shultz argued, entrepreneur ability can be increased by investing in personal development and focusing on individual traits with appropriate tools (Shultz, 1980). There is a huge space for improvement and possibly application of HEXACO model on a large number of entrepreneurs and possibly longitudinal study of conducting international entrepreneurial study. We found entrepreneurship challenging because it has to combine both economic analysis and relation between character and qualities of each entrepreneur and achievement of each entrepreneur depends on tools which each one will use to combine psychological traits and business needs. Nowadays we live in age when top managers have to take entrepreneurial decisions on an ongoing basis. This challenges modern companies to meet customer needs with organizational needs and entrepreneurial profile which will fit their company the best possible way therefore entrepreneurship is definitely interdisciplinary subject and has plenty of research space for explaining entrepreneurial spectacles.

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## CHALLENGE AND OPPORTUNITY OF SUSTAINABLE TOURISM: CASE OF MOROCCO

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### **ABSTRACT**

*tourism has not failed to demonstrate its limits following the selections it has operated: territorial dependence, socio-economic inequalities, poverty, rural exodus it is then that a more egalitarian development affecting all populations imposes itself and brings out the concepts of proximity, participation, partnership and territory. It is high people admitted tourism has its limits as there have been consequences. Indeed, several NGOS as well as international organizations aiming at the protection of the environment see that destructive or harmful tourism is losing ground it is being substituted or replaced by eco-friendly tourism. This latter target the preservation of mother earth as well as its natural resources by providing tourists with organic products. This green or sustainable tourism tries at all costs to promote commodities and cultures. Sustainable tourism is actually more prosperity and progress but on condition that the local authorities and the government cooperate more to give a push to this kind of business via perfect human resources the adhesion of the populations are valued. Of the profound socio-cultural changes have taken place, changing the demand for the product sightseeing. Customers adopt new behaviors, they demand a product different tourism and changes its consumption patterns.*

**Keywords:** *Sustainable tourism, rural tourism, sustainable development*

### **1. INTRODUCTION**

Mass tourism often causes economic problems such as inflation on basic necessities, the deterioration of cultural heritage, the increase in the cost of land, the deprivation of farmers and fishermen of their subsistence areas, etc.... It enclaves the modern sector, destabilizes traditional sectors and accelerates imports for consumption. It cannot therefore be measured solely by the contribution of foreign currencies. On a socio-cultural level, mass tourism, through its human groups of different cultures, can have negative effects on the host society: alcohol consumption, prostitution, loss of religious values, crime, theft, etc. Concerning physical pressures, there is clear competition for the use of certain resources between tourism and certain local populations, these resources mainly relate to water, energy and transport. The development of mass tourism has already degraded many ecosystems, especially in coastal and rural regions.

### **2. SUSTAINABLE DEVELOPMENT**

« Sustainable development is intended to be a development process that reconciles ecology, economics and society»<sup>1</sup>. It works to ensure the continuity and protection of natural resources, balance and respect for ecosystems, to guarantee an efficient economy without hazards and to favor the consideration of social purposes focused on the fight against poverty, inequalities and the exclusion. This triple economic, social and ecological point of view must constitute the central core of any sustainable development strategy going in the real direction of the objectives outlined.

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<sup>1</sup> [http://www.actu-environnement.com/ae/dossiers/dd/dd\\_definitions\\_1.php4](http://www.actu-environnement.com/ae/dossiers/dd/dd_definitions_1.php4)



It is therefore, within the framework of a systemic, that is to say global, approach that all aspects must be designed and treated in a sectoral manner. Sustainable development is « development that strives to meet the needs of the present without compromising the ability of future generations to meet their own needs»<sup>2</sup>. It is also « a policy and strategy aimed at ensuring the continuity over time of economic and social development, while respecting the environment, and without compromising the natural resources essential to human activity »<sup>3</sup>. The notion and idea of environmental protection have taken root in people's minds to the point where environmental institutions have emerged with very strong sensitivity. « Sustainable development must be based on sustainability criteria: it must be ecologically sustainable in the long term, economically viable, ethically and socially equitable for local populations. »<sup>4</sup>. Sustainable development allows economic activities to meet current needs while protecting the human, cultural and natural resources that will be needed in the future. Sustainable development traces as a basic principle the concept of responsibility towards future generations to whom will be transmitted a witness relating to the economic, social and cultural points of view which must meet the conditions of a healthy and risk-free life. This is of course a global, universal responsibility, not defined in time which is dependent on individual and local responsibility considering the actions of each person. It is the synchronization between the local and the global, between the individual and the collective which constitutes the essential objective to achieve. Sustainable development requires and imposes a revolution in terms of principles, methods, approaches and strategies aimed at improving well-being, social justice and respect for ecosystems.

### **3. SUSTAINABLE TOURISM - DEFINITION**

According to the Awakening charter <sup>5</sup>: Sustainable tourism refers to any form of development, planning or tourist activity which respects and preserves natural, cultural and social resources in the long term and contributes in a positive and equitable to the development and fulfillment of individuals who live, work and stay in these spaces It is a tourism or leisure activity which implements practices respectful of the natural and cultural environment and which participates ethically in the local economic development. It thus promotes tourist awareness of the impacts they can have on the territory and makes them active in their consumption. A vision focused on the protection and maintenance of living resources, in parallel with the economic objectives of tourism development, the concept and the very essence of sustainable tourism. It is therefore a question of tourism based on an equation seeking a balance between the following two elements: economic development and long term. The aim would therefore be to ensure long-term economic development with respect for environmental and socio-cultural resources and human consideration in all its components. According to Harribey Jean-Marie <sup>6</sup>« Sustainable tourism development meets the needs of tourists and the regions that host them, while providing and improving future opportunities. It must result in management of all resources to satisfy economic, aesthetic and social needs, and to preserve cultural integrity, ecosystems, biodiversity and life support systems. ». This definition is based on different considerations: Natural, cultural and historical resources are particularly important for tourism because it depends on attractions and activities related to the natural environment, historical and cultural heritage of a region. If these resources are degraded, tourism will no longer prosper.

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<sup>2</sup> The Brundtland report, the global commission on the environment, 1987

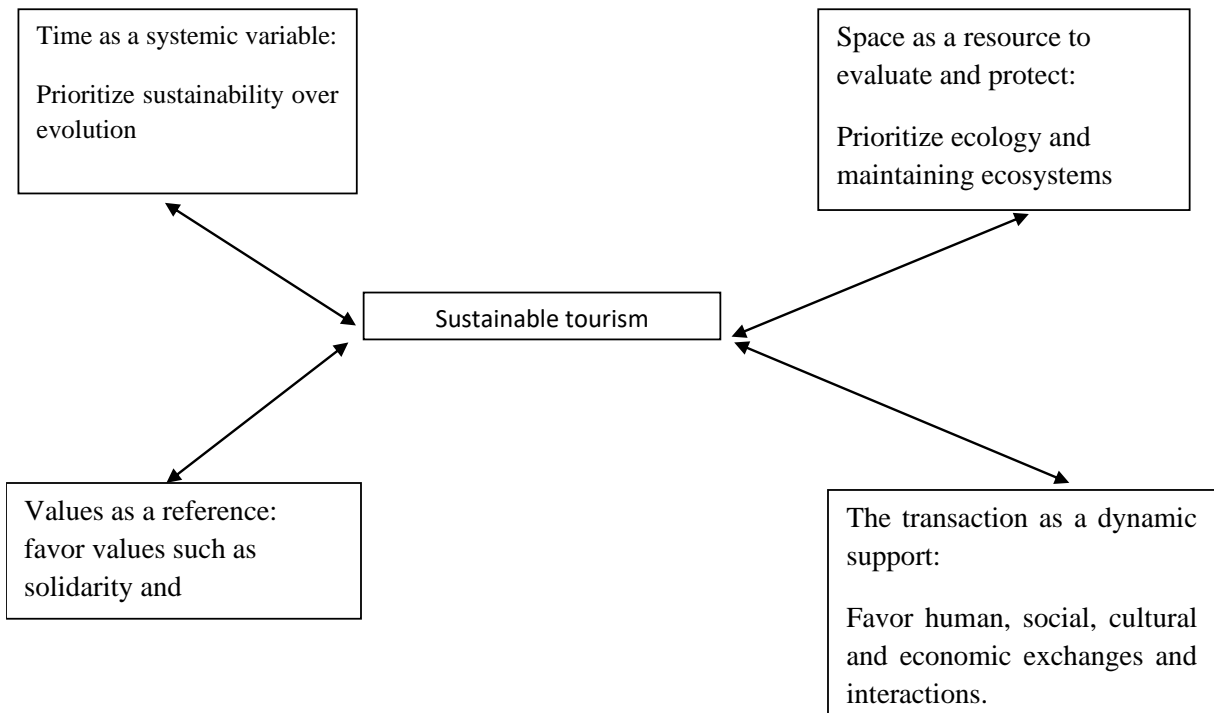
<sup>3</sup> Commission of the European Communities, mars 1992

<sup>4</sup> World Commission on Culture and Development

<sup>5</sup> Eveil-Tourisme was created in 2004 by the Citoyens de la Terre association which carries out actions linked to the preservation of biological resources and international solidarity.

<sup>6</sup> Jean-Marie Harribey is a French economist, Professor at Montesquieu University – Bordeaux

Which amounts to saying, in terms of production, that sustainable tourism mainly consists of developing practices, allowing managers of tourist activity to optimize the creation of wealth, while contributing to the preservation and improvement of environmental and human capital of the territory, necessary for the attractiveness and sustainability of the tourist destination.



*Figure 1: Systemic perspectives of sustainable development*  
(Source : C. Pigeassou, *Cahiers Espaces*, n°67, novembre 2000, P.13)

Generally speaking, we can say that sustainable tourism is a form of tourism that meets the needs of the host community, the requirements of the territories, the evolving demand of tourists and the tourism industry, without compromising the ability of future generations to meet their needs.

#### **4. RURAL TOURISM AND SUSTAINABLE DEVELOPMENT**

Sustainable rural tourism refers to thoughtful and controlled long-term growth, which while ensuring economic and social progress considers respect for nature and the environment, the preservation of cultural heritage and quality of life. in general. Sustainable rural tourism consists of forms of tourism that integrate the principles of sustainable development and are based on the following five dimensions:

- **Ethics:** sustainable tourism respects the rules of participatory democracy, transparency, solidarity and tolerance;
- **The environment:** sustainable tourism promotes heritage management of non-renewable resources, taking into consideration the impact of projects on the preservation of heritage (landscape, biodiversity, etc.) and resources (water, air, energy, etc.) essential for the future of future generations;
- **Social:** sustainable tourism projects consider the effects on host populations and contribute to the reduction of inequalities and to human development and development in rural areas;
- **Cultural:** sustainable tourism does not consist of eliminating the identities of populations but of anchoring their differences, by revaluing the community spirit, traditions, machines and traditional objects, by recreating the dynamics of safeguarding existing cultural heritage

and by restoring the old villages. It consists of promoting exchange between cultures and populations including knowledge and mutual respect as a factor of solidarity and social cohesion.

- The economy: sustainable rural tourism constitutes a means of human service and makes it possible to optimize a logic of creation and distribution of wealth. It provides local populations with an additional source of income which allows them to face the crisis in agricultural systems and rural societies.

To emerge and establish itself as such, sustainable development requires the existence of four domains (economic, social, environmental and cultural) of which it constitutes the point of intersection. In this regard, sustainable tourism meets this condition since it touches on the four dimensions already mentioned: it exploits the heritage of natural, social and human resources, it ensures economic growth, it safeguards the integrity of ecosystems and preserves the base Resource.

- Restricted number of tourist-travelers.
- Significant management and decision-making role granted to indigenous people.
- Preference for places located “off the beaten track”.
- Predilection for immersion in the rural and/or cultural environment.
- Willingness to adapt to local conditions (food, accommodation, etc.).
- Desire to better understand the culture and nature of elsewhere.
- Desire to meet, share and exchange, quest for knowledge.
- Interest in living an experience with responsible travel ethics.

*Figure 2 : alternative sustainable tourism*  
(Source : F.Michel, *Revue Espaces*, n°171, mai 2000, P.20)

## 5. DEVELOPMENT OF RURAL TOURISM

From the beginning of the protectorate to the present day, there have been several modes of intervention for the development of rural tourism in Morocco.

### 1) Punctual and spontaneous intervention

Travelers and explorers from Morocco were at the origin of the discovery of the mountain as a tourist potential, since the beginning of the 19th century. Their missions led to the launch of a certain number of equipment and tools (roads, bridges, maps, etc.) which will subsequently facilitate the birth of mountain tourism.

### 2) Territorial partnership approach

In an overall context of the new tourism policy in Morocco, the rural tourism development strategy brings a new vision of approach for rural tourism in Morocco. It is expressed concretely by the establishment of territorial units called tourist host countries, aim to consolidate what exists by making traditional tourist activity areas like tourist host countries to be consolidated. The notion of the country is based on economic utility, on experience and internal dynamism, on natural and cultural potential, on proximity to already existing tourist centers and on accessibility. As a result, any identity country-territory cannot be tourist host countries, and any tourist host countries cannot easily attract tourist activity.

## 6. RURAL TOURISM AND LOCAL DEVELOPMENT

« Throughout history, and until recently, rural tourism has been associated, in the eyes of observers, with a more or less accounting vision. »<sup>7</sup>. As if morals, habits and customs have always preferred quantity to quality and are only interested in the number of operations carried out in tourist activity. Economic and financial profitability is considered essential in tourism activity. Certainly, the mercantile vision is important for the viability of tourism projects, but this is a short-term vision and is not very coherent with the notion of sustainable development. The economic justification of rural tourism as a development factor for receiving regions has always been and still remains self-evident, tourism consumption not only generates a sector of activity that creates profits and provides jobs but, stimulates, also, other sectors of activity (crafts, cultural services, etc.). This evidence is rarely called into question within economic argumentation; it is social and environmental criticism that has destabilized this evidence. For the ecological argument: intensive tourist exploitation of natural resources and cultural sites can endanger the conditions for their renewal and thereby threaten the sustainability of the tourist activity itself. Social criticism has also focused on the asymmetry between local populations and tourists in receiving regions where tourism is not an indigenous social practice and where contact with tourists can lead to the weakening of local and social solidarity. to the emergence of deviant behavior. Social and environmental criticism therefore calls into question the development of tourism based solely on economic criticism and it is this questioning that the reference to sustainable tourism refers to. This criticism finds its argument in the main trends in the qualitative evolution of tourism: increased market segmentation, the development of new forms of tourism linked, in particular, to nature, to rural areas, etc. Several points determine and guide the choices of demanding and selective tourists: firstly, the quality of the tourist experience, the interest given to the environment and traditional culture, hence the need for excellent training of guides and all stakeholders concerned. With this new trend in the tourist market, demand is refocusing on the appreciation of heritage, so much so that they can now be considered as factors in the tourist appeal of the territory. Preserving heritage is no longer an external constraint on tourist activity but becomes the very condition of tourist competitiveness. If a territory wants to remain or become competitive in terms of tourism, it must ensure the protection and enhancement of its cultural and natural heritage. « Tourism is therefore positioned as a promising alternative for local development».<sup>8</sup> « The local dimension of development is more essential than ever, and this is because, as we have seen, the failures of top-down development strategies which make no reference to the local and take no account of the realities of the territory».<sup>9</sup> Rural tourism is thus the new reality of the tourist market and the benchmark for sustainable tourism, which calls on a logic that reconciles local, economic development and heritage conservation. This logic has much more force than a simple moral principle because it redefines the conditions for the tourist competitiveness of territories.

## 7. CONCLUSION

Sustainable tourism integrates principles based on the dimensions of ethics, environment, social, cultural and economic. Sustainable tourism refers to any form of development or tourist activity that respects and preserves natural and social resources in the long term and contributes in a positive and equitable manner to the development and development of individuals who live, work and stay in these spaces. Morocco, through the generosity of its nature, the diversity of its landscapes, its Saharan and forest spaces, its estuaries and lakes, its strategic positioning, the variety of its human types, its urban and rural architecture, its music and its folklore, its

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<sup>7</sup> Hicham El Bayed, *Tourisme durable et développement local, approche par la dynamique territoriale et les indicateurs de durabilité*, P.1

<sup>8</sup> Hassan Ramou, *Maroc, Tourisme et développement local*, l'harmattan italia, 2005, P.177

<sup>9</sup> Taoufik Dagghi, *Economie du développement, les fondements théoriques*, 2006, P.45

Saharan and oriental dialect, its centuries-old civilizational and cultural heritage, its reliefs and its climatic varieties, adopts the strategy of sustainable tourism by trying to develop rural tourism thanks to the assets at its disposal. It is unwaveringly part of this dynamic and already some rural inns are functioning in the best way.

**LITERATURE:**

1. Commission of the European Communities, mars 1992
2. F.Michel, Revue Espaces, n°171, mai 2000, P.20
3. Hassan Ramou, Maroc, Tourisme et développement local, l'harmattan italia, 2005, P.177
4. Hicham El Bayed, Tourisme durable et développement local, approche par la dynamique territoriale et les indicateurs de durabilité, P.1
5. Taoufik Dagabri, Economie du développement, les fondements théoriques, 2006, P.45
6. The Brundtland report, the global commission on the environment, 1987

## ECONOMIC ASPECT OF THE TECHNOLOGY TRANSFER PROCESS IN THE BIOTECHNOLOGY SECTOR

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### **ABSTRACT**

*Since the 1980s biotechnology has been recognized and accepted as a strategic technology sector by most industrialized countries. Biotechnology is one of the fastest-growing industries and stimulates economy competitiveness on a national and global scale. In general, biotechnology plays an important role in sustainable socio-economic development. Technology transfer in the field of biotechnology is a process of transferring and commercialization of scientific research results, methods, procedures, and techniques from one company, organization, or country to another. This paper aims to investigate and explain the economic aspect of the technology transfer concept and process in the biotechnology sector and to determine the relevant factors crucial for its successful implementation. Besides the definition and conceptualization of the relevant steps in the technology transfer process, the key factors for the successful process such as patents and R&D investments in the biotechnology sector and their interconnection are analyzed and elaborated. The results confirm that patents and R&D investments are important factors for the successful technology transfer process in the biotechnology sector and have a positive impact on the national economy competitiveness. The results of the conducted research will serve as a basis for future research on the definition of relevant factors for successful technology transfer processes in the biotechnology sector with a particular focus on developing countries.*

**Keywords:** *biotechnology sector, competitiveness, technology transfer process*

### **1. INTRODUCTION**

Technology transfer is the process of transferring knowledge and technological solutions from one company, organization, or country to another for further development and commercialization. Globalization has accelerated the intensity of technology transfer, which contributes to a higher level of productivity and economy competitiveness in developed countries, and enables developing countries to access technologies that they could not develop on their own due to the limited infrastructure and financial resources. Intellectual property rights (IPRs) play a significant role in fostering innovation, new product development, and technological change. IPRs are an important component of the technology transfer process, so by introducing a stronger system of IPR protection (through e.g., TRIPS), developing countries need to find a balance between the need to acquire modern technology, access to the global market and technology expansion (Karanikic, 2020). Investments in Research and Development (R&D) are an important factor for a successful knowledge and technology transfer process since R&D creates new knowledge and technologies that can be further protected by an adequate form of intellectual property rights (primarily by patents) if they are unique and specific products and services (Bezic and Karanikic, 2014). R&D is an important component in the successful discovery and development of new drugs, processes, and medical devices entering the globalized market. Investing in R&D, despite its costs, is essential for the competitiveness of the biotechnology sector.

R&D also contributes to economy competitiveness on a global scale since in the biotechnology sector, R&D generates revenue for biotechnology companies through the commercialization of innovative products. Biotechnological innovations are important for improving life and global health, but their creation and development require significant financial resources. Investments in R&D in the biotechnology field are constantly growing and are crucial for a successful technology transfer process. This paper aims to investigate and determine the key factors for successful technology transfer in the biotechnology field, the importance of patents as the most effective form of intellectual property rights (IPRs) protection, and the importance of R&D investments and their positive impact on the national economy competitiveness. Besides the theoretical presentation and overview of the main terms and concepts, the empirical part of the research is based on the available data at the World Intellectual Property Office (WIPO), the European Patent Office (EPO), and the Statistical Office of the European Union (EUROSTAT) databases. The paper is organized as follows. In the introduction part, the research topic is introduced and elaborated. In the second part of the paper, the biotechnology and technology transfer process are defined and elaborated in the economic context. In the third part of the paper, the role of IPR protection in the biotechnology sector is presented and elaborated based on the currently available literature. The fourth part of the paper analyses the economic aspect of the technology transfer process in the biotechnology field through a specific focus on important factors of its implementation: patent applications and granted patents, investments in R&D activities worldwide, and in Europe. The final part of the paper, the conclusion, summarizes relevant findings based on the literature review and conducted analysis and proposes the elements for future research on this topic.

## **2. BIOTECHNOLOGY AND TECHNOLOGY TRANSFER PROCESS**

The European Federation of Biotechnology (EFB) defines biotechnology as the integration of natural sciences and engineering sciences to use living organisms, cells, and their parts for products and services. The definition of the EFB applies to both »traditional or old« and »new or modern« biotechnology. Since the 1980s, biotechnology has been recognized and accepted as a strategic technology by most industrialized countries. Biotechnology stimulates economy competitiveness at local, regional, national, or even global levels, by using new biotechnological methods and new raw materials (Smith, 2009). Biotechnology has touched human lives in many aspects such as health, food, flora and fauna, and environment (Verma et al., 2011). It covers many different applications such as beer production, wine, and cheese, to very complex molecular processes reflected in the use of recombinant DNA technologies for the development of new drugs (Smith, 2009). Currently, the greatest impact and value of biotechnology are realized in the health sector with the development of revolutionary therapies and medicines that save lives or improve the patient's quality of life (Haaf, et al., 2021). Technology transfer in the biotechnology field is a topic that has been discussed since the early 1980s (Ukropcova and Sturdik, 2011). In general, biotechnology plays an important role in the sustainable socio-economic development of a given country. The acquisition of different types of technologies such as those in the biotechnology field is important for the national economy competitiveness improvement and capacity building. Nowadays, when exponential progress is occurring in the biotechnology field, the market for biotechnology products is growing both locally and globally (Singh, 2014). Biotechnology innovations are increasingly recognized as an important tool for global health improvement. However, a large gap has emerged between developed and developing countries in access to available drugs and therapies due to the focus of the pharmaceutical industry on the most profitable areas (Salicrup and Fedorková, 2006). Therefore, technology transfer in the field of biotechnology can be particularly beneficial for developing countries.

By enabling further R&D, technology transfer ensures a wide application of scientific discoveries, methods, procedures, techniques, and equipment to promote health and economic development. There are several mechanisms used to facilitate the technology transfer process, such as patenting and licensing of inventions, scientific publications for the knowledge exchange, transfers of unique biological materials, and scientific collaborations for basic and applied research. The main channel is the licensing of patented inventions, which usually involves the purchase of manufacturing or distribution rights and underlying technical information and know-how (Salicrup and Fedorková, 2006). The technology transfer process, or commercialization, consists of several activities for the transformation of innovations into concrete products or services. It is a way of bringing new technologies to the market to achieve a return on investment in R&D activities, or to make the technologies useful for society as a whole. The typical commercialization process in the biotech and pharmaceutical industries is complex, lengthy, and unique. The technology transfer process of new drugs is usually grouped into three phases: (1) before marketing the product, (2) marketing and sales, and (3) post-exclusivity. In the first phase, before marketing the product, R&D and clinical trials are carried out. In the second phase, new products are sold. A sale typically involves the transfer of exclusive intellectual property rights to a large biotech or pharmaceutical company. The post-exclusivity phase occurs when a new product is widely available to the population and competitors can copy it (Gbadegeshin, 2019).

### **3. THE ROLE OF IPRS PROTECTION IN BIOTECHNOLOGY FIELD**

There are two economic objectives of the IPRs protection: to promote investments in knowledge and technology creation and business innovation through the exclusivity rights to use and sell the newly developed technologies and to promote the dissemination of new knowledge and technology by encouraging rightsholders to place their inventions on the market (Maskus, 2000). IPRs in a broader sense are the rights that result from an individual creative and intellectual effort and fall into the scientific, literary, and artistic domains. There are several forms of IPRs such as copyrights, patents, trademarks, industrial design, and trade secrets. Various strategies of IPR protection will be developed and implemented according to the specific form of IPRs and their commercialization to the new or existing market (Karanikic, 2023). Three main features of IPRs apply to all forms of IPRs: exclusivity, territoriality, and limited protection duration. The exclusivity feature refers to the fact that the owner or IPR holder enjoys exclusivity over the concerned IP and that no one can use his IP in any manner without his permission. The territoriality feature refers to the fact that IP protection is valid only in the country where the IP rights are granted. The limited protection duration means that the duration of IP protection is limited in a defined period (e.g., 20 years of protection for patents) and after the protection period expires it becomes a public good. IPR protection enables inventors to protect their inventions and to gain a competitive advantage in the market by rewarding them for their innovative efforts and compensating them for the resources invested in R&D. Many countries are strengthening their IPR systems to encourage R&D, increasing innovation levels and achieve greater long-term economic growth and competitiveness. The effectiveness of IPR protection varies from country to country and depends on their level of development and capacity for innovation. In the biotechnology field, significant financial resources are needed for the research, while IPR protection presents a powerful means by which both researchers and investors can protect their investments. Patents, as one of the forms of IPR protection, are extremely important means of IPR protection for biotechnology inventions. In addition, patents present a valuable source of information since the invention must be disclosed in a sufficiently clear and complete manner in a patent application (Giugni and Giugni, 2010).



There are two main regulative documents important for the protection of biotechnological inventions: Agreement on Trade Aspects of Intellectual Property Rights (TRIPS) and Directive 98/44/EC on the Legal Protection of Biotechnological Inventions. Although the TRIPS Agreement has had a great influence on the formation of national laws on intellectual property rights and has led to a certain degree of harmonization of such laws, there is still space for World Trade Organization (WTO) members to implement the provisions of the Agreement in different ways. The Agreement provides an unnecessarily strong protection of IPRs in developing countries, thus, for example, hindering access to basic medicines. In addition, Article 7 of the TRIPS Agreement emphasizes the transfer and dissemination of technology as one of the main objectives of intellectual property rights protection. Due to the great progress of biotechnology and the ethical issues arising from it, biotechnological inventions have been much debated all over the world due to the different approaches in different countries. In Europe, the Directive 98/44/EC of the European Parliament on the legal protection of biotechnological inventions entered into force in 1998 aimed to harmonize the rules on patent protection for biotechnological inventions (WIPO, 2008). However, there are many visible shortcomings of the Directive, especially in contradictions of particular articles. The Directive was intended to harmonize patent protection in biotechnology and genetic engineering across Europe, but instead, it created confusion and uncertainty as some EU member states implemented the Directive while others did not (Hing and Back, 2009).

#### 4. ANALYSIS

In the last fifteen years, the pharmaceutical industry has transformed into the so-called biopharmaceutical industry. Today, the drugs produced based on molecular biotechnology are increasingly influencing the pharmaceutical sector, complementing conventional drugs that are mainly produced by chemical synthesis. The direct contribution of the European biotechnology industry to the gross domestic product (GDP) of the 28 EU member states was 34.5 billion euros in 2018. The European biotechnology industry, with an average GDP growth rate of 4.1%, for the period from 2008 to 2018, showed growth twice as fast as the total economy of the European Union, which was 1.9% (Haaf et al., 2021). It is visible that the biotechnology industry positively contributes to the GDP growth rate and in that way improves the national economy competitiveness. In the analysis of the technology transfer process, many indicators can be used (i.e., intellectual property indicators, R&D indicators, etc.) and the impact of these indicators also affects the national economy competitiveness (Bezic and Karanikic, 2014). Patents reflect inventive activity and demonstrate the ability to exploit knowledge and turn it into potential economic profit. Indicators based on patent statistics are widely used to assess the inventive performance of countries or regions. Therefore, patent statistics is used as one of the indicators of R&D results. Biotechnology is a growing area of R&D activity within the European Union and this growth is reflected in the number of biotechnology patents<sup>1</sup>. One of the main goals of the European Union over the last few decades has been to encourage ever-increasing levels of investment in R&D to boost the EU's economy competitiveness<sup>2</sup>. The analysis of the IPR protection for the technology transfer process in the biotechnology field was carried out through patent statistics based on the number of patent applications and granted patents with a special focus on the biotechnology field in the world and Europe. The R&D expenditures by sector in the world and Europe are also analyzed and discussed. Despite the problems in the global economy caused by the coronavirus pandemic, innovators worldwide filed 3.3 million patent applications in 2020, which is an increase of 1.6% compared to 2019. However, compared to the record year of 2018, around 50.000 fewer patent applications were granted worldwide. In 2020, 1.6 million patents were granted, which is an increase of 6%

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<sup>1</sup> [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Patent\\_statistics](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Archive:Patent_statistics)

<sup>2</sup> [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=R%26D\\_expenditure&oldid=551418](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=R%26D_expenditure&oldid=551418)

compared to 2019. The number of granted patents is significantly lower than the number of patent applications, but growth is recorded every year (WIPO, 2021). With the progress of biotechnology over the past forty years, the number of granted patents has also grown. Since 1980, when 2.742 patents were granted, the number of granted patents has increased to 30.472 in 2020, as shown in Figure 1.

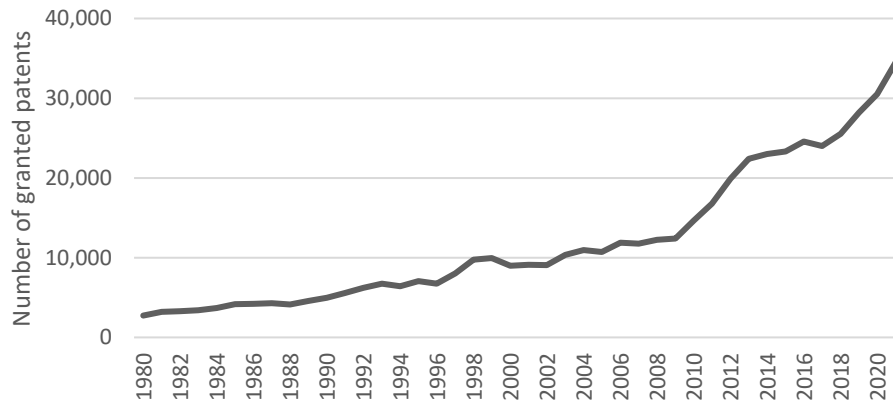


Figure 1: The number of granted patents in the biotechnology field in the world in the observed period from 1980 to 2020  
 (Source: WIPO; adapted by Authors)

In the field of biotechnology in 2020, at the world level, 68,898 patent applications were recorded which represents a decrease of 2.3% compared to 2019, but the number of granted patents increased by 8.4% which is presented in Figure 2.

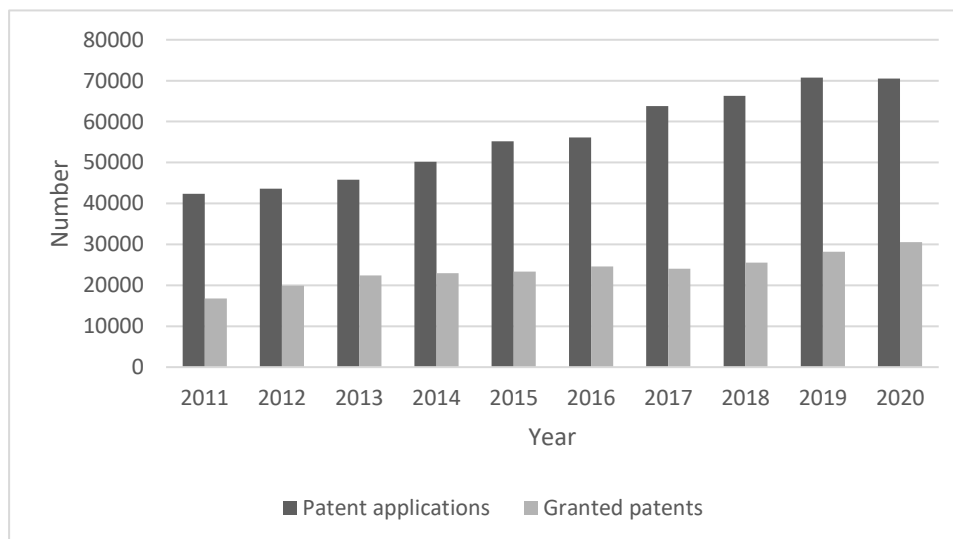
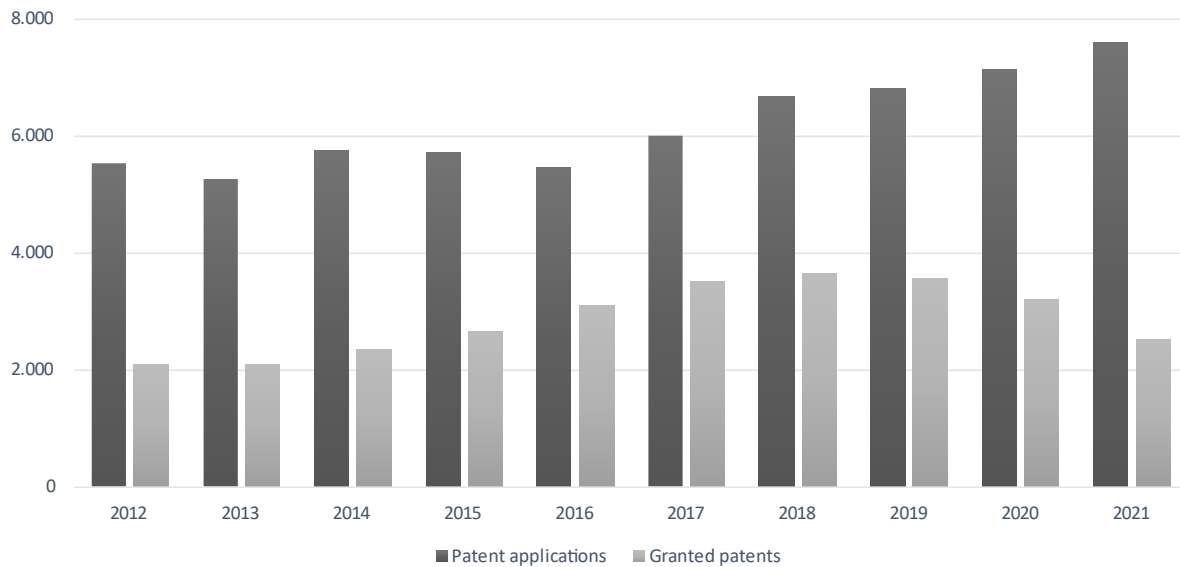


Figure 2: Number of patent applications and granted patents in the biotechnology field in the observed period from 2011 to 2020  
 (Source: WIPO; adapted by Authors)

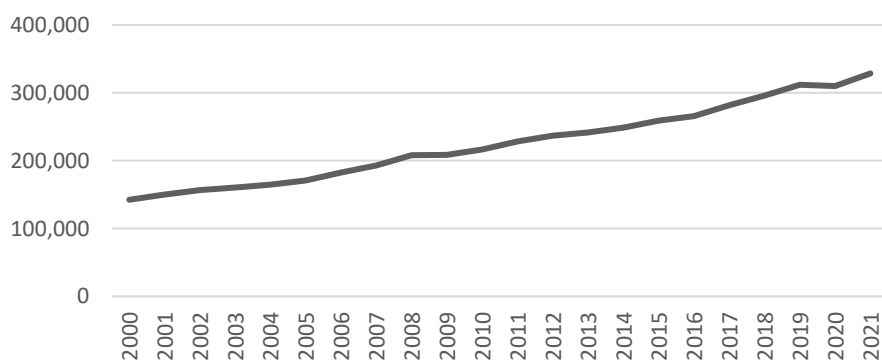
In 2021, 188,600 patent applications were submitted to the European Patent Office (EPO). European patent applications include direct European applications and international (PCT) applications. Compared to 2020, the 188,600 patent applications submitted to the EPO in 2021 represent a growth of 4.5%. The ten most popular technological fields include biotechnology, but also the related fields of medical technology and pharmaceuticals.

Biotechnology with 7,611 patent applications recorded a growth of 6.6% compared to 2019. In the field of biotechnology, the number of patent applications submitted to the EPO exceeded 6,000 in 2017, and since then a continuous increase has been recorded, as shown in Figure 3. However, the number of granted patents is decreasing. In 2021, 2,523 patents were granted in the biotechnology field, which represents a decrease of 21% compared to 2020.



*Figure 3: The number of patent applications and granted patents to EPO in the biotechnology field in the observed period from 2012 to 2021*  
 (Source: EPO; adapted by Authors)

In 2021, 3,202 (48%) patent applications filed at the EPO in the field of biotechnology came from EPO member states, while a greater part of 4,409 (58%) came from non-EPO member states. The USA submitted most of the patent applications in 2021 in the biotechnology field to the EPO, 2,611 (34%), which is an increase of 11.2% compared to 2020. Other countries that stand out with the number of patent applications are Japan (546), China (518), and the Republic of Korea (273) (EPO, 2021). According to the available data from Eurostat, the Statistical Office of the European Union, investments in R&D from 2000 to 2020 have grown tremendously. In that period, the Gross domestic expenditure on research and development (GERD) in the European Union grew from EUR 142,339 million to EUR 311,150 million, which is shown in Figure 4.



*Figure 4: GERD in the EU in the observed period from 2000 to 2020 (mil. eur)*  
 (Source: Eurostat; adapted by Authors)

The data presented in Figure 5 shows that in the European Union in 2020, the GERD in all sectors amounted to 311,150 million euros, which is a decrease of 0.2% compared to the record year 2019. In the period from 2011 to 2020, most investments in R&D came from the business sector and amounted to EUR 204,830 million. The business sector demonstrated the highest growth in that period, but still in 2020, a decrease of 1.5% was recorded compared to 2019. The higher education sector has recorded an increase of 2% compared to 2019 which amounted to EUR 68,079 million, while the government sector recorded an increase of 2.3% and amounted to EUR 36,271 million. The private non-profit sector had the least investments in R&D, EUR 1,969 million, despite it recorded an increase of 7.7% compared to 2019.

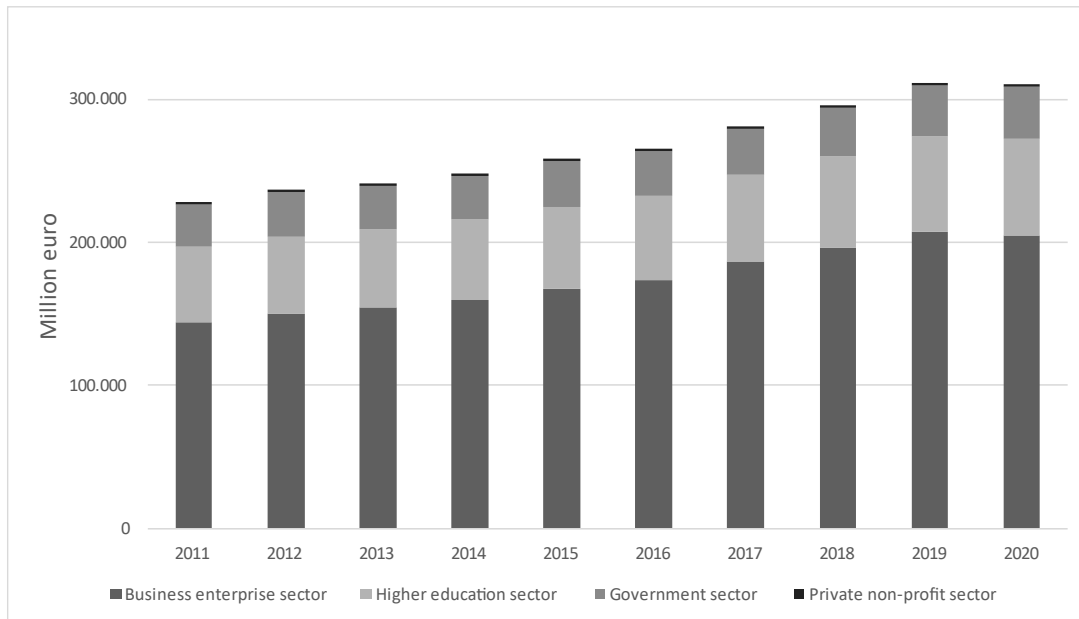


Figure 5: GERD in the EU by sector of performance in the observed period from 2011 to 2020

(Source: Eurostat; adapted by Authors)

Comparing the European Union with the four strategically important countries, Figure 6 shows that the United States of America invested a total of EUR 587,279 million in R&D in 2019, which is EUR 275,387 million more than the member states of the European Union (EUR 311,892 million). China invested EUR 286,259 million, which is EUR 25,633 million less than the European Union. Gross domestic expenditures for R&D in Japan amounted to EUR 147,159 million, and in the Republic of Korea to EUR 68,219 million. The business sectors of the USA with EUR 433,967 million and China with EUR 218,755 million exceed the investments of the EU business sector, which had R&D expenditures of EUR 207,890 million. The public sectors of the USA (EUR 58,027 million) and China (EUR 44,279 million) also invested more in R&D than EU member state governments (EUR 35,455 million). The higher education sector in the European Union financed the R&D less than the USA, but more than China.

Figure following on the next page

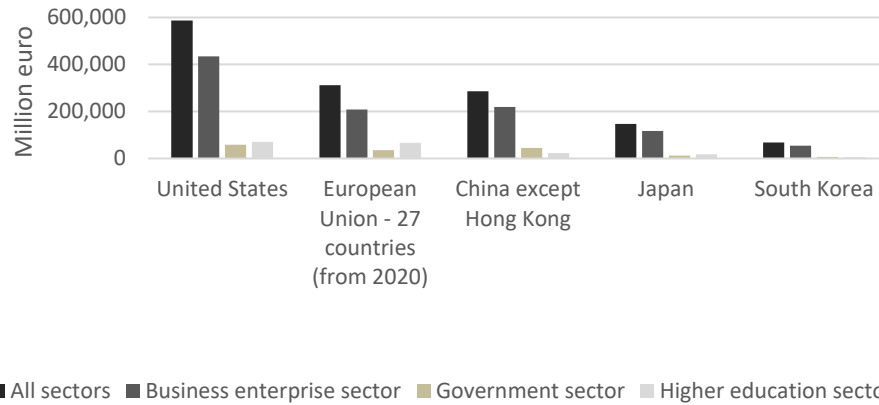


Figure 6: GERD by sector of performance for the USA, EU, China, Japan, and the Republic of Korea in 2019  
 (Source: Eurostat; adapted by Authors)

Since both patent applications and granted patents are indicators, i.e., outputs of R&D activities it can be concluded that the continuous growth in the number of both patent applications and granted patents is positively linked with the investments in R&D activities on a European and global level, also applicable to the biotechnology sector. All countries that continuously invested in R&D activities demonstrated a higher number of patent applications, and consequently granted patents which had a positive effect on the technology transfer process, also demonstrated in the biotechnology field, and national economy competitiveness.

## 5. CONCLUSION

Biotechnology is considered one of the fastest-growing innovative industries in the world, while biotechnology innovations are recognized as an important factor for the quality of life improvement and global health. Biotechnology plays an important role in the sustainable socio-economic development in a given country, while the technology transfer process through the acquisition of different technologies in the biotechnology field is important for capacity building and national economy competitiveness. Despite the problems caused by the coronavirus pandemic, the number of patent applications and granted patents increased globally which brings us to the conclusion that IPR protection is recognized as important with all the benefits it provides for innovators on the global level since it enables them a competitive advantage and ensures the return on investments in R&D. The biotechnology field follows the technological progress and accelerated development what is visible in the continuous growth of number of granted patents in the world. The number of granted patents increased eleven times from 1980 to 2020 when the number of granted patents was 30,472. Even though a large number of patent applications will not end with a positive outcome, i.e., granted patents, the inventions disclosed in patent applications will become a public good and will be important for future R&D activities and technology transfer process. Biotechnology is among the ten technological areas in the European Union with the highest number of patent applications. In 2021, 7,611 patent applications were submitted in the field of biotechnology, 6.6% more than in 2020, which implies large investments in R&D activities. Investments in the R&D activities in the biotechnology field are important for the successful technology transfer process and therefore national economy competitiveness. The European Union's gross domestic expenditure on research and development (GERD) has grown tremendously over the past twenty years, and in 2020 it amounted to EUR 311.150 million. There is a positive correlation between the R&D investments and the number of patent applications in the biotechnology field which is visible and confirmed from the analyzed data. Development of new biotechnology inventions and obtaining patent protection for these inventions require large investments in R&D.

The results of the analysis within this paper demonstrate that large R&D expenditures usually result in an increased number of patent applications and consequently granted patents. R&D investments are important because they lead to a larger number of patent applications and granted patents in the field of biotechnology, while patents facilitate the technology transfer process. The process of technology transfer has a positive impact on the biotechnology sector development at the global level because it encourages the new research and development of biotechnology innovations, thus positively affecting the national economy competitiveness. The conducted analysis confirmed patents and R&D investments as important factors for a successful technology transfer process in the biotechnology sector and national economy competitiveness in the European Union and globally. Future research on this topic could be focused on developing countries to investigate how these factors impact the technology transfer process in these countries and to include the particular provisions in the TRIPS Agreement related to the technology transfer process.

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## COUNTRY OF ORIGIN EFFECT ON CONSUMER BEHAVIOR: EXPLORING CONCEPTUAL AND THEORETICAL FRAMEWORKS

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### ABSTRACT

*In the context of globalization, businesses have extended their operations across numerous international marketplaces. This review paper indicates that consumer perceptions pertaining to the product's Country of Origin (CoO) wield a significant impact on both how consumers evaluate the product and their likelihood to proceed with a purchase. CoO functions as a strategic marketing tool, forging a connection between companies and their geographical origins, thus enabling consumers to correlate their assessments of a product with its inherent value. The central focus of this paper is to delve into the definition and constituent elements of the CoO concept, while simultaneously exploring pivotal aspects of consumer behavior. Furthermore, it aims to delve into the theoretical models that are employed to elucidate the influence of CoO on consumer purchasing behavior and also to investigate the effect of CoO and its treatment within the realm of academic research.*

**Keywords:** *Country of Origin (CoO) effect, Consumer Behavior, Cue Utilization Theory, Elaboration Likelihood Model, Categorization Theory, "Made In", Country Image, Brand Origin*

### 1. INTRODUCTION

With globalization, companies have expanded their reach to various markets worldwide. Research indicates that consumers develop specific perceptions associated with Country-Of-Origin (CoO), which in turn affect their evaluations of products from a particular country and their buying intentions (Berbel-Pineda et al., 2018). Country-Of-Origin is a marketing practice that associates brands with their country of origin, enabling consumers to connect their perception of a product to its value. For example, Japanese products are often associated with quality, and Swiss products with precision (Juneja, 2020). CoO continues to play a crucial role in product evaluations as it influences pre-purchase decisions (Bandyopadhyay, 2014). Consumers consider various dimensions while evaluating a product, including quality, convenience, disposal, and durability (Sevanandee & Damar-Ladkoo, 2018). Defining CoO in the modern marketplace poses challenges (Al-Sulaiti & Baker, 1998). Perceptions and stereotypes developed from buying experiences or a country's image can influence consumers' brand preferences based on how they view the country of origin. Associating a brand or product with a place can be confusing; some brands emphasize the "made in..." label, while others refer to the brand's home country. For instance, the brand "Miniso" draws inspiration from Japanese culture and presents itself as Japanese-inspired, but its products are manufactured and operated in China (Tai, 2018). Conversely, the final production process following the European Union's rule of origin, does not take the origin of other manufacturing efforts into account. Some of most esteemed fashion's brands are using "Made in France" and/or "Made in Milan" labels even if their products were mainly made outside of their domestic factories and maintain the



allure of domestic workshops and old-school craftsmanship (TFL, 2020). In this context, the "made in" label and the country of origin are crucial pieces of information added to a brand or product to reduce consumer uncertainty and assist in making purchase decisions (Berbel-Pineda et al., 2018). Consumers associate perceptions regarding a country with the country of origin and the "Made in" label. The purpose of this paper is to address key inquiries related to consumer behavior, with a focus on the definition and constituent dimensions of Country-Of-Origin (CoO). The paper aims to explore the CoO effect and how this concept has been studied in academic research. Additionally, the paper seeks to investigate the theoretical models that have been used to explain the impact of CoO on consumer purchase behavior. The ultimate goal is to provide valuable insights into the field of research by shedding light on the role of CoO in influencing consumer decision-making.

The specific questions that the paper intends to address are as follows:

- 1) What is the CoO effect, and how does it impact consumer behavior?
- 2) How has the concept of CoO been studied in academic research?
- 3) What theoretical models have been employed to explain the CoO effect on consumer purchase behavior?

By exploring these questions, the paper aims to contribute valuable knowledge to the existing body of research on the effect of Country-Of-Origin on consumers' behavior and the theories dedicated to a better understanding.

## **2. CONCEPTUAL FRAMEWORK:**

### **2.1. Evolution of Country-of-Origin (CoO) concept**

In 2003, Dinnie asserted that the concept of Country of Origin (CoO) originated from Schooler's research in 1965. According to Dinnie, the development of the CoO concept can be categorized into three main periods until 2004 (refer to Table 1). The first period, spanning from 1965 to 1982, focused primarily on studying the CoO effect as a single cue without delving into its various dimensions. During this time, researchers examined how CoO influenced consumer perceptions and purchase decisions without considering other factors. In the second period, from 1983 to 1992, more complex investigations were conducted to gain a better understanding of Product Image (PI) and the impact of Product Country Image (PCI) on global marketing strategies. Researchers began to explore how the image of a product and its association with a specific country influenced consumer behavior on a broader scale. Finally, from 1993 to 2004, the scope of research expanded to include other intrinsic and extrinsic information cues such as taste, design, performance, price, brand, and warranties in the context of CoO studies. This period saw a more comprehensive approach to understanding how various factors interacted with CoO to influence consumer perceptions and choices. Overall, Dinnie's analysis suggests that the understanding of the CoO concept has evolved over time, moving from a single cue investigation to a more intricate exploration of its impact on consumer behavior, product image, and global marketing strategies, encompassing various information cues.

*Table following on the next page*

Period	Key Characteristics	Notable studies
1965-1982	<ul style="list-style-type: none"> <li>▪ Introduction of country-of-origin concept with Schooler's study in 1965</li> <li>▪ CoO is considered as a cue influencing consumers' products evaluation</li> <li>▪ CoO is one cue among others (price, brand name etc.)</li> </ul>	<ul style="list-style-type: none"> <li>▪ First study, established country-of-origin effect on product evaluation(Schooler, 1965);</li> <li>▪ Identified the "made in" label's effect on consumer perceptions(Bilkey &amp; Nes, 1982);</li> <li>▪ Explored how ethnocentrism have an impact on country-of-origin effect(Frenzen &amp; Nakamoto, 1993).</li> </ul>
1983-1992	<ul style="list-style-type: none"> <li>▪ Increased interest in linking country image with products with examining the different facets of CoO</li> <li>▪ Adoption of multi-attribute approaches to assess country-of-origin effects</li> <li>▪ Studies were not only conducted and concern western countries but also non one</li> </ul>	<ul style="list-style-type: none"> <li>▪ Framework for managing country-of-origin effects based on product-category fit(M. S. Roth &amp; Romeo, 1992).</li> <li>▪ Introduction to "product-country image" concept, reconceptualizing country-of-origin(Papadopoulos &amp; Heslop, 1993)</li> <li>▪ Study about the three facets of country-of-origin image(Parameswaran &amp; Pisharodi, 1994)</li> </ul>
1993-2004	<ul style="list-style-type: none"> <li>▪ Reconceptualization of country-of-origin concept</li> <li>▪ Introduction of new streams of research, including product-country image and contextualized product-place image</li> <li>▪ Focus on nation branding and geopolitics</li> <li>▪ Diversification of research topics and approaches</li> </ul>	<ul style="list-style-type: none"> <li>▪ Exploring the effect of brand origin on consumer perceptions(M. V. Thakor &amp; Kohli, 1996)</li> <li>▪ Proposing "contextualized product-place image" concept(Askegaard &amp; Ger, 1998)</li> <li>▪ Examining country-of-origin image perceptions over time(Nebenzahl et al., 1997)</li> <li>▪ Leo Burnett Worldwide agency surveyed Asian attitudes towards foreign brands(Madden, 2003)</li> </ul>

*Table 1: Evolution of Country-of-Origin Research from 1965-2004  
 (Source: Dinnie (2003))*

## 2.2. The effect of Country-of-origin (CoO)

In the marketing literature, different definitions have been attributed to the concept of the Country of Origin (CoO) effect. Schooler (1965) defines it as the attitude developed about a country's people and how it influences products from that country. According to Samiee (1994), CoO refers to the country with which a firm is associated, typically the home country of the company. For instance, IBM and Sony imply U.S. and Japan origins, respectively, as famous examples provided by the author. The CoO effect is acknowledged for its ability to trigger associations, whether positive or negative, in the consumer's mind (Aaker, 2012; Keller, 2003). These associations subsequently influence the consumer's inclination to purchase or avoid products from a specific country of origin (Chen, 2004; Hamzaoui & Merunka, 2006).

Primarily, the CoO effect operates through the perception of the country's image (Papadopoulos & Heslop, 1993). Both, the country image (CI) and the brand image represent a set of associations related to the country of origin (CoO), structured into significant categories (Keller, 2003; Pappu et al., 2007; Pegan et al., 2020). The country of origin (CoO) has an impact on how consumers perceive product quality, behaviors, and purchase intentions. Consumers' perceptions of product quality in relation to the CoO are significantly influenced by their familiarity with the country and its level of economic development. The CoO serves as an external cue for consumers when assessing the quality of the product (Knežević et al., 2019).

### 2.3. Other related concepts

The concept of country of origin (CoO) effect has garnered considerable attention in the marketing literature and has been defined and studied from various perspectives. It turns, it's a perceived image that can significantly impact consumers' purchase intention behavior (K. P. Roth & Diamantopoulos, 2009). In studying the CoO concept, it is important to consider other related concepts:

- Country Image (CI): Kotler et al. (1993) describe the image of a place as the sum of all those emotional, and aesthetic qualities such as experience, beliefs, ideas, recollections and impressions, that a person has of a place (Kleppe et al., 2002).
- Product-Country Image (PCI): Defined by Martin & Eroglu (1993) as "the total of all descriptive, inferential, and informational beliefs one has about a particular country".
- Product Image (PI): Emphasizes the quality image of specific products marketed by firms associated with different countries (Bertoli & Resciniti, 2013).

Within the global market context, there have been various studies to distinguish between related concepts surrounding CoO. It is essential to differentiate between Brand Origin (BO), Country of Manufacture (CoM), and CoO. CoO specifically refers to the alignment between the brand's origin and the product's origin. When both the brand and product originate from the same country, this alignment creates a sense of fit between them (Johnson & Lee, 2009; Visbal et al., 2017). In contrast, take Nike, a prominent US brand, as an example, which has significantly expanded its manufacturing operations to countries like China and Brazil. This phenomenon of disconnect between the country where the product is made and the country of the brand's origin can be observed across various product categories, ranging from home appliances and automobiles to fast-moving consumer goods (Wu & Fu, 2007). A BO can be considered both a demographic variable and an integral part of a brand's personality, influencing how consumers relate to and form a perception about the product. It's an information about the origin place of the brand (Saran & Gupta, 2012). Marketing researchers are currently investigating both the Country of Origin (CoO) effect and the "Made in" concept, as existing research has not definitively clarified why the original brand design (e.g., Dior or Nike) holds more significance than the country of origin. While some studies from 1995 suggested that the brand of the country of origin carries greater importance than the product's brand, the landscape has changed significantly since then. Today, major brands in industries such as automotive, fashion, and electronics have established their manufacturing facilities in entirely different countries from their brand representation, primarily driven by financial considerations (Apetrei & Petrușca, 2010). This last fact did not lead to a decline in sales or a deterioration of the reputation of the brand in the international market. From a marketing standpoint, CoO serves as a means to distinguish a product from its competitors. By establishing a unique product identity that sets it apart, CoO aims to enhance the product's appeal to a specific target market. This differentiation is considered a competitive advantage (Hastak & Hong, 1991). By expressing their CoO or the CoO of their goods, businesses expect loyalty from domestic consumers and favorable stereotypes from foreign consumers.

That's why, many CoO studies rely heavily on the "made in *Country*" as a factor determining brand origin perception. The "made in" is an information beside multiple inputs draw brand origin cues which help consumers formulate perceived brand origins, which they use to devise more general perceptions, attitudes, expectations and intentions about the product and the brand(Thakor & Lavack, 2003). According to a study by Cerviño et al., 2005, the "made in effect" showed that country image has an impact on brand performance through overall products. This impact could be negative or positive. Despite the increasing globalization of many industries, the national background of firms continues to hold significance. This is particularly evident for latecomers from emerging markets, like China, who encounter notable competitive disadvantages because of negative country-of-origin effects. These effects are especially pronounced in countries where strong local competitors exist (Holtbrügge & Zeier, 2017).

### **3. THEORETICAL FRAMEWORK**

To shed light on the impact of CoO on consumers, three key theoretical approaches are relevant: cue utilization theory, elaboration likelihood model (ELM), and categorization theory (Pegan et al., 2020). These theories offer valuable insights into understanding how consumers form perceptions and attitudes towards products based on their country of origin.

#### **3.1. Cue Utilization Theory**

CoO cues hold significant influence during the product assessment and decision-making process. According to the Cue Utilization Theory(Jacoby et al., 1971), consumers rely on various cues, including country of origin or production, along with factors like color, price, and packaging, to infer the quality of a product. Due to the wide array of available goods, consumers often lack the capacity to thoroughly test each product, leading them to make quality inferences based on available data. To overcome this challenge, consumers indirectly determine product quality through cues, which take the form of signals. Products consist of multiple cues that consumers use to evaluate their quality, with these cues serving as functions of product attributes(Yang, 2012).As an extrinsic signal, CoO simplifies the decision-making process and reduces cognitive effort when no other information is readily accessible(Pegan et al., 2020). The mere presence of a CoO cue triggers already memorized comparisons and country-specific stereotypes, leading to an unconscious and largely affective reaction related to consumers' identity or pride in owning products from a particular country(Batra et al., 2000; Oberecker & Diamantopoulos, 2011). A study exploring the influence of visual symbols on product evaluation in the Swiss market(Visbal et al., 2017) provides a social psychological explanation for these phenomena. The study suggests that specific stereotypes automatically associated with products when participants see the Swiss flag can have a halo-effect<sup>1</sup>. This means that one stereotype related to the nation, such as high quality, tends to overshadow all other product qualities in consumers' evaluations.

#### **3.2. Elaboration Likelihood Model (ELM)**

Introduced by Richard E. Petty and John Cacioppo in 1986, the ELM model of persuasion states that the sum and essence of one's thoughts about a persuasive message such as an advertisement is a very important determinant of the form of persuasion that takes place.The aim of the model is to show different ways of interpreting stimuli, the reasons for their use and their effects on attitude change. The ELM provides two basic paths of persuasion: the central and the peripheral path.

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<sup>1</sup>The halo effect is a cognitive bias that shapes people's perception of individuals or brands, involving a selective interpretation of information that aligns with their initial impression.

The ELM outlines two distinct approaches that individuals can adopt when processing information. The initial path, termed the central route, involves deliberate and meticulous consideration of various informational cues. This route presupposes that the individual possesses both the incentive and cognitive capacity to engage with the stimuli. Conversely, the second peripheral route presents a superficial and automatic mechanism for information processing, drawing upon emotional reactions, stereotypes, and habitual responses. In this scenario, the individual's involvement is reduced, resulting in diminished motivation for expending cognitive effort in processing the information (Pegan et al., 2020). According to the ELM theory, the two paths of persuasion have different consequences. Changes in attitude via the central pathway appear to be more persistent, more resistant and more predictive of behavior than changes induced by the peripheral pathway (Petty & Cacioppo, 1986). Later, a study offers clear suggestions on how to treat the country-of-origin index according to consumers' opinions of the country's products. The CoO-ELM model suggests accentuating country-of-origin stimuli when opinions are favorable, and camouflaging them when opinions are unfavorable. In addition, the model identifies cases where the country of origin has a limited influence on product evaluation. By providing information on how consumers use CoO stimuli, the CoO-ELM model contributes to better management of this information. This practical approach has not yet been proposed in the literature (Bloemer et al., 2009).

### **3.3. Categorization Theory**

To better understand the effect of CoO on consumer decision-making, categorization theory has provided another explanation of what influences consumer behavior. To recognize the different information related to new and existing products and services on the market, consumers create and use categorical representations to identify, perceive and value the knowledge they accumulate about these goods and services. We talk about a consumer category to express a set of products, services, brands or other marketing entities, states or events that appear related in some way to consumers. Most researchers in cognitive science define category representation as the integrated knowledge gained from experience with members of a category and from reasoning about them (Loken et al., 2008). According to this conceptual framework, categorization embodies the cognitive procedure by which individuals structure and arrange the sensory inputs derived from their external surroundings (Block et al., 1981; Pegan et al., 2020). Subsequently, these groupings wield an influence over the assimilation of consumer-related information, serving as cognitive shortcuts to streamline decision-making processes (Hadjimarcou & Hu, 1999). Consumers have a tendency to systematize their comprehension of distinct product options into categorical frameworks (Gutman, 1982; Punj & Moon, 2002), which they subsequently employ to systematize and distinguish between various products and brands. Regarding the context of the CoO effect, this theoretical perspective underscores the significance of concentrating on brand and product typicality as a means to comprehensively grasp its impact on consumer behavior. The intensity of the link between a product's origin and its brand pertains to the degree to which an object epitomizes a category. With the increasing globalization, consumers today are faced with a multitude of choices, diverse products, and services, each with specific characteristics. Tendencies and lifestyles change rapidly in our daily lives. According to the categorization theory, attitudes associated with a particular stimulus are linked to attitudes associated with activated groups. Consequently, when consumers encounter a country with a positive image, they are likely to form positive opinions about products produced in that country (Bertagnolli, 2014). Conversely, when the image of a country is negative, consumers' opinions of products associated with that country will also be negative (Chowdhury & Ahmed, 2009). Indeed, such country images can strongly influence and shape customers' perceptions of a specific brand related to that region or country.

This is because the understanding of other characteristics of those products may also be affected when considering the product's country of origin. The categorization theory provides valuable insights into the cognitive processes underlying the CoO effect on consumer behavior. Understanding how consumers categorize and structure information about products and brands based on their country of origin is essential for marketers to effectively position their products in a global market.

#### **4. DISCUSSION & LIMITATION**

This article offers a comprehensive overview of the concept of Country of Origin (CoO), with the primary objective of providing an introduction for novice academicians and researchers in this field. The findings underscore the substantial role played by CoO in shaping consumer perceptions and purchase intentions. Consumers tend to associate specific product qualities with particular countries, and these associations wield considerable influence over their decision-making processes. Defining CoO in the context of the modern market presents a challenge, as brands often emphasize either the "made in" label or their home country. This ambiguity has the potential to impact consumer perceptions and buying choices. Furthermore, the dynamic nature of the CoO concept is evident, as it has transitioned from a narrow investigation of a single cue to a more holistic exploration of its far-reaching effects on consumer behavior and global marketing strategies. It is prudent to also consider CoO alongside related concepts such as Country Image (CI) and Product-Country Image (PCI) within the realm of consumer research. Turning to theoretical frameworks, researchers have drawn upon a range of theories to elucidate the CoO effect on consumer purchase behavior. For the purposes of this paper, three distinct theories have been selected:

- 1) Cue Utilization Theory: This theory elucidates how CoO cues function as external indicators that streamline decision-making and mitigate cognitive effort for consumers.
- 2) Elaboration Likelihood Model (ELM): The ELM highlights two pathways of persuasion adopted by consumers, with the central path leading to more enduring and predictive changes in attitude.
- 3) Categorization Theory: This theory underscores the significance of brand and product typicality in shaping consumer behavior based on CoO.

It is noteworthy that these theories are not exhaustive, as other theories can also shed light on the CoO effect on consumer purchase behavior. However, a limitation of this paper lies in its approach towards the aspect of purchase behavior studied. In consumer behavior studies, purchase intention diverges from actual purchase behavior and the decision-making process. While related, these elements are not identical. This research does not singularly focus on one facet of consumer behavior studies, representing a research constraint. Moreover, this article lacks an ample number of references pertaining to CoO in the context of the post-COVID-19 landscape. While the majority of references are foundational, they are crucial for gaining a comprehensive understanding of the concept. Incorporating references from the post-COVID-19 era would undoubtedly enrich the study.

#### **5. CONCLUSION**

The CoO concept is fundamentally introduced in this study, which also explores how it effects consumer perceptions and behavior. Its complexity and importance are highlighted by how CoO, consumer behavior, and theoretical frameworks interact. The work establishes a solid platform for further research in this developing topic, despite its limitations. By highlighting the importance of the effect of CoO on consumer decision-making behavior, this overview adds significant knowledge to the research field. The results highlight the significance of taking CoO into account in marketing strategies, along with related concepts like Country Image and

Product-Country Image etc. This knowledge can help marketers place their goods in a global market efficiently and profit from the associations that consumers have with particular nations. As the world continues to globalize, the effect of CoO on consumer behavior is likely to remain a crucial area of research and consideration for businesses operating on an international scale.

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# REGULATORY FRAMEWORK REGARDING THE ISSUE OF ROTATION OF AUDITING COMPANIES IN RELATION TO THE INDEPENDENCE AND QUALITY OF AUDITORS

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## **ABSTRACT**

*Member States, auditors and supervisors should benefit from more harmonised requirements, legislation and standards. However, it is necessary to further harmonise those rules at Union level in order to allow for greater transparency and predictability of the requirements imposed on those persons and to strengthen their independence and objectivity in the performance of their duties. In order to enhance investor protection, it is important to bolster public oversight of statutory auditors and audit firms by reinforcing the independence of Union public oversight bodies and providing them with adequate powers, including investigatory powers and the power to impose sanctions. The aim is to detect and prevent breaches of the applicable rules in relation to the provision of audit services by approved statutory auditors and audit firms. Given the general importance of public interest entities resulting from the size and complexity of their business or the nature of their activities, it is necessary to strengthen the credibility of the audited financial statements of public interest entities. Therefore, the specific provisions on statutory audits of public interest entities introduced by Directive 2014/56/ EC have been further developed in Regulation 537/2014 on statutory audits.*

**Keywords:** *rotation, directive, regulation, European Union, independence, quality*

## **1. INTRODUCTION**

In case of long-term business relations, the client and the auditor deepen their relationship, possibly affecting the quality of the auditor's work. If the same auditor audits the company for several years, this may lead to an insufficient number of audit procedures and an over-reliance on the results of previous years and established audit programmes. However, if the maximum period in which the auditor can audit a company is reduced, auditors will be forced to pay more attention to detail and become more sceptical in their work, which will subsequently lead to better audit quality and greater auditor independence. The results of the research by Azizkhani et al. (2018) show that audit quality deteriorates when the auditor's mandate is extended and that the probability of misstatements in the financial statements is significantly lower in the first two years of the audit mandate compared to a longer mandate. In addition to the rotation of key audit partners, Regulation 537/2014 provides that each EU Member State must rotate audit firms in order to prevent close relationships between auditors and clients and to improve the quality and independence of auditors. The rotation of audit firms would further strengthen auditor independence and also reduce concentration in the audit market, as smaller firms would have the opportunity to compete more strongly in the market. Internal and external rotation is a way to improve audit quality as it prevents the development of close relationships between

auditors and the management of the audited entity. It is believed that the auditor is more rigorous and accurate in the audit when there is rotation. It also reduces the possibility of friendly relationships developing between the auditor and the client and the auditor being pressured by the management to use questionable accounting policies and procedures. Ultimately, rotation improves the public perception of auditor independence and audit quality by providing a clearer view of reporting. The paper discusses in detail the legal framework and treatment of statutory auditors (audit firms) and the way the issue of mandatory rotation is regulated. Therefore, the establishment of a more solid theoretical framework can better contribute to a general understanding of the impact of mandatory rotation on auditor independence. The paper aims to provide an insight into the scope and completeness of the legislation dealing with the auditor's position and the regulation of rotation, as well as to give an overview of individual provisions in relation to the observed problems. The final objective of the paper is to provide a theoretical framework to systematise the regulatory context of the research constructs. The object of research comprises legal-normative frameworks that regulate the position of statutory auditors, audit firms and institutes of mandatory rotation with regard to independence and quality.

## **2. THEORETICAL FRAMEWORK**

In 2014, the European Union began reforming the audit market through Directive 2014/56/EU amending the previous Statutory Audit Directive (2006/43/ EC) and Regulation 537/2014 on statutory audit as the main legal framework for mandatory rotation in the European Union, setting out general guidelines and requirements for audit firm rotation in the EU. Directive 2014/56/EU is a key legislative framework amending Directive 2006/43/EC on statutory audits of annual accounts and consolidated accounts. Essentially, the Directive provides a general framework, while Regulation 537/2014 provides specific requirements regarding statutory audit of public-interest entities. In addition, the Directive sets out the duties of approved statutory auditors and introduces public oversight of the audit profession and regulatory cooperation in the EU. In order to ensure that audit firms rotate the main audit partner and the audit firm itself, Member States are required to implement rotation in accordance with the Directive. Each Member State is free to decide on details such as the duration of the rotation. This strategy allows for a high degree of flexibility as it takes into account the different conditions and legal practises in the EU Member States. The reform of the regulatory framework for auditing emerged after the financial crisis, i.e. the bankruptcies of Enron in 2001 and Lehman Brothers in 2008, when the independence of auditors from their main clients was called into question at the international level, especially when they audited financial statements and at the same time provided other advisory services to the same clients (European Commission, 2022). When the last financial and economic crisis raised doubts among investors and academics about the reliability and quality of audited financial statements of public limited companies and other large European companies, the European Commission (2022) stated that the reform had four objectives: (i) to increase transparency for investors, (ii) to strengthen auditors' independence vis-à-vis their clients, (iii) to promote competition in a highly concentrated market dominated by the "Big Four", and (iv) to strengthen pan-European oversight. In this context, the European Commission has commissioned a detailed study to gather the data and analyse how the transposition and implementation of the specific provisions of the Statutory Audit Directive and Regulation affect the achievement of the objectives of the reform. These provisions include assurance and reporting requirements for approved auditors, mandatory rotation and appointment of auditors, prohibition of providing certain non-audit services and caps on non-audit fees (European Commission, 2022).

## **2.1. Directive 2014/56/EU on statutory audits of annual accounts and consolidated accounts**

Directive 2014/56/EU is an essential piece of legislation aimed at improving and harmonising auditing standards and practises among the Member States of the European Union in order to restore public confidence in financial reporting, promote openness and contribute to the stability of the European financial system by focusing on improving the reliability and quality of audit procedures. The former Directive 2006/43/EC on statutory audit served as the basic legal framework for addressing audit deficiencies. However, over time, the need to ensure high audit quality while reducing the risk of financial irregularities and misstatements became apparent. The latter led to the publication of Directive 2014/56/EU on statutory audits, which strengthened the existing legislation. The Directive sets strict requirements for the mandatory rotation of statutory auditors and audit firms and thus reduces potential conflicts of interest arising from long-term audit engagements. In addition, Furthermore, the Directive emphasises auditor independence to ensure the objectivity and integrity of the statutory audit. A stronger framework for public oversight of approved statutory auditors and audit firms is established and independent audit oversight committees are provided with the powers and resources necessary for successful oversight of statutory auditors. In addition, audit firms are required to publish relevant information on their corporate governance, internal quality control processes and organisational structure, and auditors are required to ask key questions in their reports to increase transparency. By asking key questions, auditors provide specific information on key audit areas, which would make financial reporting more informative and complete. In addition, Directive 2014/56/EU supports consistent audit practices across EU Member States and establishes a standard framework for audit quality that promotes cooperation and coordination between national authorities responsible for overseeing statutory audits. The ultimate objective of Directive 2014/56/EU, in addition to restoring public confidence, is to protect investors and promote economic growth in the EU.

## **2.2. Regulation (EU) No. 537/2014 on specific requirements regarding statutory audit of public-interest entities**

Article 17 of the Statutory Audit Regulation introduces a new provision in the statutory audit legal framework requiring public interest entities to change their appointed audit firm every 10 years in order to eliminate potential conflicts of interest and to strengthen the independence of approved statutory auditors and audit firms. After the expiry of the maximum engagement period, including possible extensions stipulated in paragraphs 4 and 6 of Article 17, the approved statutory auditor, audit firm or members of their networks in the European Union shall not carry out a statutory audit of the same public interest entity within the next four years. The maximum time limits for audit engagements set out in the Statutory Audit Regulation or in the national frameworks apply to each public interest entity individually and not to the group as a whole. Therefore, if a group has several public interest entities in the EU, this does not necessarily mean that the approved statutory auditor or the audit firm auditing the consolidated accounts of the group has to change. If the entity to be audited is not a public interest entity, the approved statutory auditor or audit firm does not need to be changed under the Statutory Audit Regulation, regardless of the subsidiaries. If it is a public interest entity, it is subject to the rotation rules of the Member State in which it is established. In addition to audit firm rotation, the Regulation also defines internal rotation, i.e. rotation of key partners. However, the Statutory Audit Regulation leaves considerable discretion to Member States as it provides for four different options regarding the minimum number of initial engagements and the maximum duration of engagements. The key audit partners responsible for carrying out a statutory audit shall cease their participation in the statutory audit of the audited entity not later than seven years from the date of their appointment (Regulation, Article 17, paragraph 7).

They shall not participate again in the statutory audit of the audited entity before three years have elapsed following that cessation (Regulation, Article 17, paragraph 7). By way of derogation, Member States may require that key audit partners responsible for carrying out a statutory audit cease their participation in the statutory audit of the audited entity earlier than seven years from the date of their respective appointment (Regulation, Article 17, paragraph 7). According to Article 17, paragraph 1 of the Regulation, the minimum duration of the engagement is one year, while the maximum duration of the audit engagement is 10 years. EU Member States have the possibility to adjust both time limits; a minimum duration of more than 1 year and a maximum duration of less than 10 years (Regulation, Article 17, paragraph 2). In addition, based on the above requirements, the conduct of joint audits is encouraged in order to increase professional scepticism and improve audit quality, protect independence and promote competition in the audit market and the participation of smaller audit firms. Member States may, in certain circumstances, decide to extend this timeframe to a total of 20 years. (Regulation, Art. 17, paragraph 4 point a). The longest duration of the audit engagement only refers to statutory audits during the period in which the entrepreneur has continuous public interest entity status. In the event that an entrepreneur becomes a public interest entity for the first time during its business activity or ceases to be a public interest entity and later becomes a public interest entity again, the calculation of the longest duration of the audit engagement starts with the financial year following the year in which the entrepreneur acquired the status of a public interest entity (Croatian Audit Chamber, 2018). The initial engagement of a particular approved auditor or audit firm and the combination of that engagement and its renewal may not exceed the longest duration of ten years. However, Member States have the possibility to extend the duration of the audit engagement by making use of the following options: (i) 20 years in the context of the public tender procedure for statutory audits (Regulation, Art. 17, paragraph 4) or (ii) 24 years in the case of a joint audit. The mandate can only be extended upon recommendation of the audit committee and the extended mandate period can be extended for a maximum of 2 years with the approval of the authority responsible for overseeing the statutory auditor (Regulation, Art. 17, paragraph 4). In addition, a "cooling-off period" is established during which the auditor or audit firm is prohibited from auditing the same public interest entity for a specified period after the end of the rotation period for a period of 3 years (Regulation, Art. 17, paragraph 3).

### **2.3. Literature review**

The debate over whether the introduction of mandatory rotation has more advantages than disadvantages has led to several studies examining the arguments for and against mandatory auditor rotation, e.g. Healey and Kim (2003) and Arel et al. (2005). According to Healey and Kim (2003), the main argument for mandatory external auditor rotation is the issue of gradual decline in the quality and expertise of the auditor's work over time. If the same client is audited year after year, the auditor develops a close relationship with the client, which can lead to a deterioration of the auditor's independence. In addition, research has shown that strengthening the auditor's independence also has an impact on the quality of the audit performed, which ultimately leads to a better public perception of objectivity and an adequate presentation of data on the audited entity's activities. The above argument is supported by the research findings of Arel et al. (2005), who point out that auditors can avoid conflict of interest and act more freely the shorter the audit engagement. On the other hand, Ewelt-Knauer et al. (2012) find that auditor rotation leads to higher audit costs. It is assumed that the rotation of auditors under the regulation would increase audit costs, especially in the first years of their audit mandate. Although mandatory rotation is intended to improve audit quality and increase auditor independence, there are concerns that this practice could lead to higher audit costs due to the time and resources required for new auditors to understand the client's business, systems and

processes. The first engagement may require additional efforts to establish effective communication channels and adapt to the client's particular needs. Auditors who maintain long-term client relationships develop a deep understanding of the client's business, risks and financial reporting processes. However, when the new auditors start the assignment, they may feel compelled to conduct more extensive due diligence to mitigate the potential risks associated with taking on a new client, resulting in higher audit costs. This argument can be supported by the research of Ebimobowei and Keretu (2011), who used the Spearman correlation coefficient to determine how audit costs increase in the first year after the appointment of a new principal audit partner or audit firm compared to the previous period. Higher audit costs may be due to insufficient expertise on the part of the auditor, who must first become familiar with the client, its systems and procedures before being able to perform an audit. This is also confirmed by the research findings Steccolini (2002) and Aruñada (2004). In the field of auditing, independence is a fundamental principle that guarantees the auditor's objectivity and freedom from any bias or conflict of interest. The results of previous research show that the long-term engagement of auditors significantly compromises auditor independence (Junaidi et al., 2016). Audit firm rotation aims to reduce the long-term relationship between the auditor and the client and to ensure the issuance of an unbiased audit opinion based solely on the facts and evidence obtained through insights into the client's financial statements. Buck and Michaels (2005) state that a long-term relationship between auditors and clients leads to excessive closeness that could compromise their independence. An unlimited audit mandate could undermine auditor independence as objectivity and scepticism would decrease over time (Al-Khoury et al. 2015). This is also confirmed by the research of Dattin (2017) and Ottaway (2014), who found that an "overly familiar" relationship between the auditor and the client compromises independence in the conduct of an audit and calls into question its quality. In lengthy audit engagements, auditors might not perform objective audit procedures and collect adequate audit evidence. In that case, they would perform an audit based on their past experience and make unjustified assumptions instead of making an objective assessment of the evidence. Such an audit would not be effective in detecting misstatements in the financial statements. In addition, research has shown that auditors are more likely to report material misstatements when rotation is required than when the auditor-client relationship is not constrained (Ottaway, 2014). As far as terminology is concerned, independence is described as a state of mind that is not affected by circumstances that could impair professional judgement (Croatian Audit Chamber, 2020). The European Commission (2022) indicates that the interviewed representatives of the audit committee, auditors, users and companies largely agree that rotation has contributed to increasing auditors' independence in auditing and reporting. Thus, a total of 35% of the representatives stated that the independence of auditors and audit firms has been strengthened by mandatory rotation. Therefore, the original assumption can be formulated as (H1): The application of mandatory audit firm rotation has an impact on auditor independence and quality.

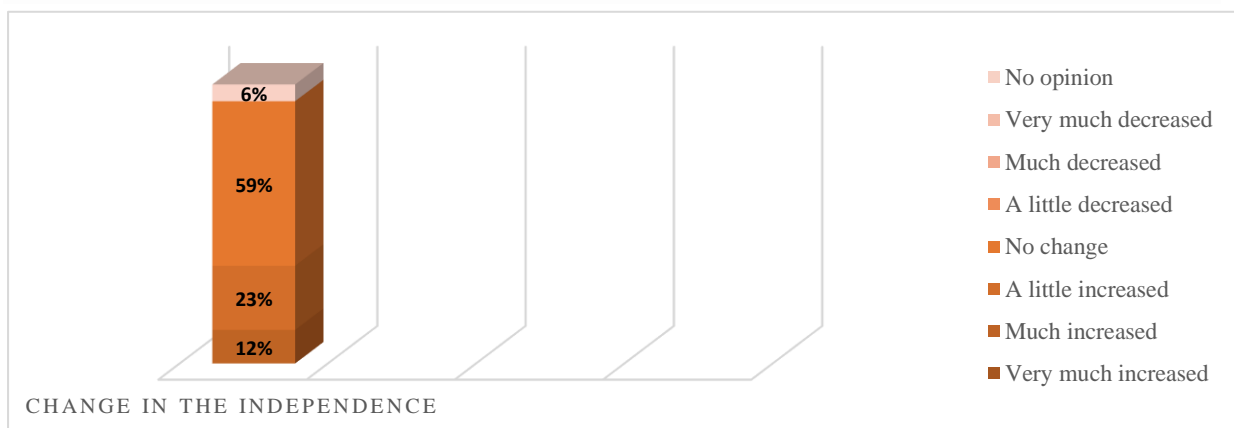
### **3. RESEARCH METHODOLOGY**

This chapter analyses the elements that influence the mandatory rotation of audit firms. In addition, a comparative analysis of the duration of the audit engagement in the European Union and the Republic of Croatia shows the link between the mandatory rotation of auditors and audit performance and independence of reporting. It analyses the study published by the European Commission in early December 2022, which is available on the official website of the Publications Office of the European Union. 137 representatives of audit committees, 34 auditors (Big Four and smaller audit firms) and 21 users (investors, regulators and non-governmental organisations) participated in the said study. The experiences and opinions of audit committee, auditor and user representatives on the 2016 audit reform were collected in the second half of 2021 and in 2022.

In preparing the report, the European Commission also used data available on the Audit Analytics website. This website contains most of the data on public interest entities listed on EU Member States' stock exchanges, audit engagements, audit opinions and fees. The purpose of the research conducted by the European Commission is to provide data to Commission services and Delegations as part of the continuous monitoring of the implementation of the Statutory Audit Directive and the Statutory Audit Regulation and to inform the public about the results of their implementation. In addition, the research findings and the data obtained from the analysis also served the Commission services and Delegations for the evaluation of EU Regulation No 537/2014 and EU Directive 2014/56.

### 3.1. Results and discussion

The audit reform introduced stricter requirements for auditor independence by improving organisational requirements and limiting the possibility of providing non-audit services. (European Commission, 2022) The largest proportion of audit committee representatives (59%) indicated that the implementation of the requirements to strengthen independence did not have an impact on independence (Figure 1), which is explained by the fact that the requirements already existed in many countries before the audit reform. On the other hand, 12% of audit committee representatives (17 out of 137 respondents) agreed that audit firm independence has increased a lot, while 32 audit committee representatives had a similar opinion, i.e. 23% of them stated that independence has increased slightly. Only 6% had no opinion (8 of them). The respondents who participated in the survey conducted on behalf of the European Commission were evenly distributed. 17 of the 34 auditors surveyed, i.e. 50% of the auditors, believe that the audit reform has not affected auditor independence, while the other 50% believe that the reform has had a positive impact on independence. Auditors who believe that there have been no changes in auditor independence point to the inconsistency of the EU framework as the main reason for the gap that has arisen. The reasons why 50% of the auditors believe that independence has increased are mainly due to the restrictions on the provision of non-audit services and the application of mandatory auditor rotation, highlighted by 35% of the auditors. In addition, 2% of the auditors believe that the tendering process could play a greater role in improving independence. On the other hand, looking at the opinions of the users surveyed (21 in total), auditor independence seems to have either increased or remained unchanged as a result of the reform, while very few of them indicated that it has decreased.

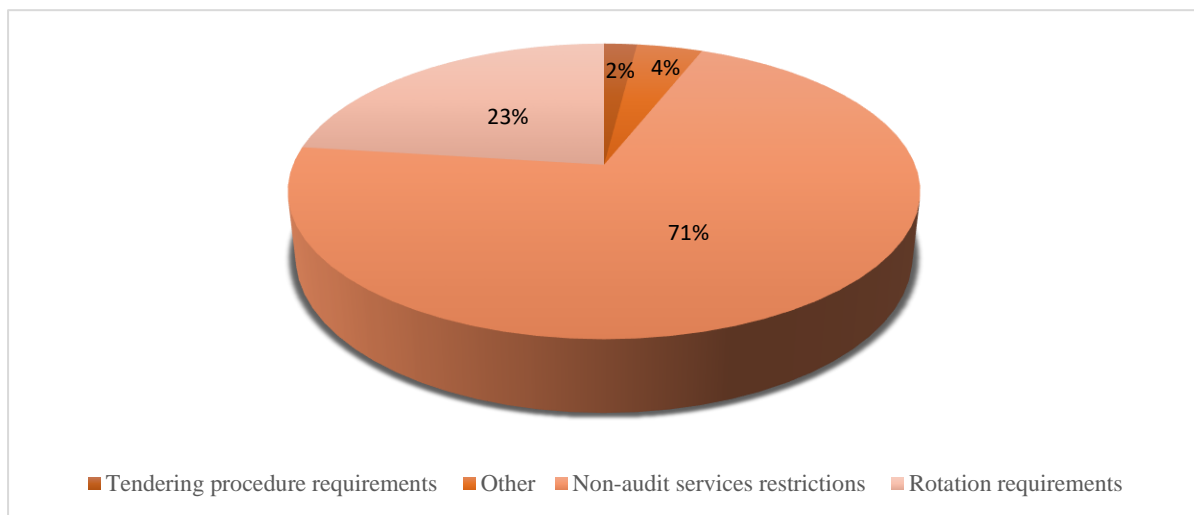


*Figure 1: Change in the independence of statutory audit firm  
(Source: Authors' preparation according to the European Commission (2022))*

More than two-fifths of users thought that auditor independence had improved, with more than half citing the introduction of mandatory rotation as the main reason.



The other half mentioned the restriction of non-audit services, which reduced the likelihood of a conflict of interest. Almost half of the users said that independence had not changed. However, some pointed to the deterioration of auditor independence, arguing that the risk in providing non-audit services increases when companies switch from one auditor to another and non-audit services are no longer included in annual reports (and thus no longer visible to investors). The last point is particularly important as investors wanted to know whether the auditors in charge of the audit had previously provided non-audit services to the company, which was difficult to determine. Respondents also had to answer the question of which of the requirements they thought had the greatest impact on increasing independence. They received the following answers: the requirements of the tendering process, the mandatory rotation of the auditor, the restriction on the provision of non-audit services and others. 49 of the audit committee representatives surveyed (71%) indicated that the restriction of non-audit services has the greatest impact on independence. At the same time, 71% of audit committee representatives believe that limiting non-audit services has the greatest impact on increasing independence, while 23% of representatives claimed that mandatory rotation has increased auditor and audit firm independence. 2% of audit committee representatives believe that tendering requirements have decreased independence, while 4% of representatives believe that other reasons have had the greatest impact on increasing independence (Figure 2).



*Figure 2: Main reason for increased independence of statutory audit firm  
(Source: Authors' preparation according to the European Commission (2022))*

The results suggest that audit quality is impaired when the auditor's independence is compromised, e.g. by developing a deeper relationship with the client, as in this case the auditor is more inclined to make a biased rather than an objective judgement on the client's business and its financial statements. To prevent friendly ties between the auditor and the client that violates the auditor's professional scepticism and calls into question the auditor's compliance with auditing principles and standards when conducting an audit, the study by Cameran et al. (2016) suggest that the introduction of mandatory rotation is one of the best tools to prevent the auditor from making a biased judgement and to enhance public trust. Similarly, the study by Harymawan et al. (2019) shows that 280 respondents from the 2010-2017 study believe that improvement in audit quality is related to the entry of a new audit partner. In addition, respondents believe that audit quality improvement is solely related to the rotation of the main audit partner and not to the audit firm as a whole. According to this research, the rotation of the audit firm or the need for such rotation is questioned.

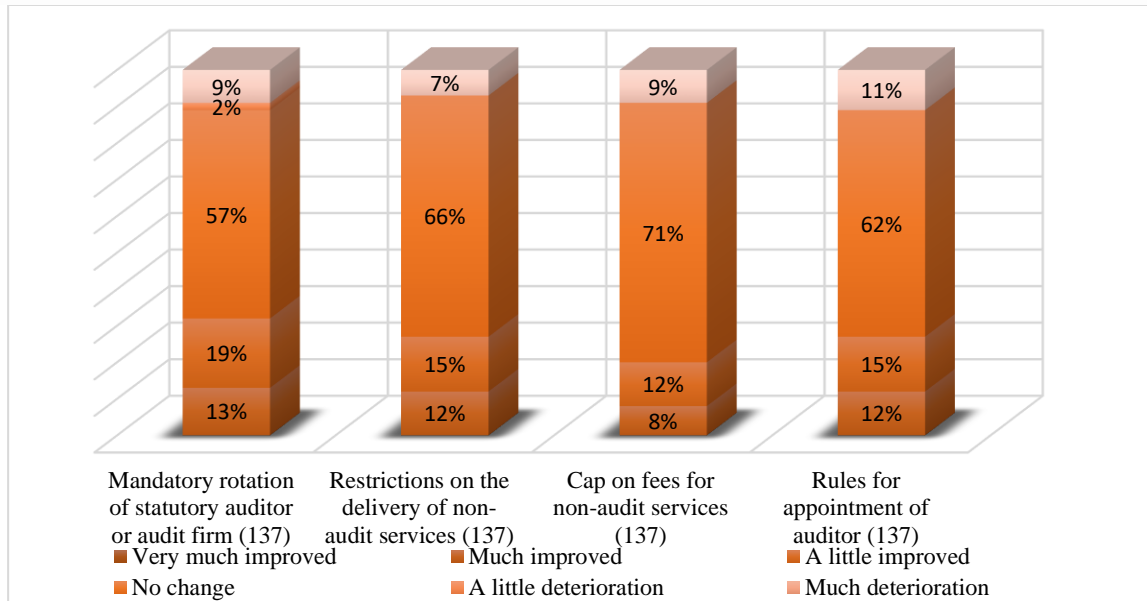


Figure 3: Changes in audit quality after the audit reform according to the opinion of audit committee representatives

(Source: Authors' preparation according to the European Commission (2022))

However, an alternative explanation is that mandatory audit firm rotation is a necessary condition for audit partner rotation to be effective. On the other hand, Lennox et al. (2014) point out that an auditor who audits a public interest entity one year before the rotation tries to improve the quality of the audit, as the next auditor will analyse his work. Knowing that the new audit firm will take over, the current partner is exposed to the risk that the new auditor will ask for a correction of his work. Therefore, the current partner is likely to increase his audit efforts, resulting in improved audit quality in the last year before the rotation. In other words, both partners are exposed to a potential "embarrassment effect" if the new audit firm discovers the poor quality of the previous audit. Research by Ebimobowei and Keretu (2011) shows that auditor and audit firm rotation is statistically significantly related to audit quality. Their result is also consistent with the studies of Dopuch et al. (2001) and Vanstraelen (2000) who found that audit quality was improved by mandatory auditor rotation. Ebimobowei and Keretu (2011) found that mandatory rotation is a tool for auditor independence and the elimination of conflicts of interest, which is confirmed by Healey and Kim (2003), as rotation increases investor confidence and auditor independence. The majority of audit committee representatives believe that the quality of the audit has not changed after the reform (Figure 4). The proportion that found no change in quality ranged from 57% in favour of mandatory rotation, 71% in favour of limiting fees for non-audit services, 66% in favour of limiting the provision of non-audit services and 62% in favour of the rules on the appointment of auditors. A smaller proportion of representatives, between 8% and 13%, pointed out that audit quality has greatly improved. 13% of them believe this is due to mandatory auditor rotation, while a similar proportion, between 7% and 11%, have no opinion on the impact on audit quality. The results for auditors did not differ significantly, but they found that the problems observed were more related to independence than to quality (between 68% and 86%). Looking only at the first column of Figure 4, we find that most audit committee representatives (as many as 57%) believe that the introduction of mandatory rotation has not affected audit quality, as companies were already obliged to change auditors. On the other hand, 19% of audit committee representatives believe that rotation has slightly improved quality, while 13% of them state that rotation has significantly or very significantly improved audit quality.

In contrast, 2% of representatives believe that the application of mandatory rotation has reduced quality due to the difficulty in finding a new audit firm that ensures a high quality audit to the same extent as the previous audit firm that audited a public interest entity. In addition, 9% of the representatives did not comment on the impact of mandatory rotation on audit quality. The auditors surveyed were of the same opinion. The largest proportion of auditors (68%) stated that mandatory rotation had not improved audit quality. A positive improvement in quality was noted by 24% of the auditors, while 9% of the auditors stated that quality had decreased.

#### **4. CONCLUSION**

The "final product" of the audit process is the auditor's report, prepared by an auditor who has undergone specific and continuous training and knows the rules of the audit control process. In other words, the input is the auditor's personal qualification, i.e. his knowledge and skills, while the output is the audit reports. The auditor's report is based on the facts obtained through the audit of the audited entity's financial statements and assesses the objectivity and truthfulness of the presentation of the data in the financial statements. In order to maintain public confidence in the credibility of the auditor's report and to strengthen the professional scepticism of the auditor, the main audit partners and audit firms are required to rotate under Regulation 537/2014. This brings advantages and disadvantages, such as insufficient expertise in detecting hidden and unintentional errors in the audited entity's financial statements or insufficient knowledge of the entity and its activities to make the audit opinion as complete and high quality as possible. On the other hand, a change of principal partner or audit firm may have advantages, such as disrupting the subject's long-standing relationship with the previous auditor and biased conclusions about its business, thereby calling into question its independence in preparing the report. Auditors are expected to adopt an objective stance when evaluating the financial statements of the entity for which they provide audit services. In this regard, mandatory rotation of auditors is essential to ensure that auditors remain impartial and free from influences that may arise from long-term client relationships. Apart from the fact that auditors' reports should be objective and contain truthful data on the company's operations, the quality of the audit opinion is also crucial for users' confidence in the financial reporting on the audited company's operations. Therefore, rotation can bring in new perspectives and new teams that contribute to the development of innovative audit methodologies and challenge existing assumptions, thereby improving the quality of the audit process (Horton et al., 2021). In order to improve the quality of reports due to rotation, when a new auditor takes over, there is a transition period during which the previous and new audit firms work together to ensure continuity in the performance of quality audit procedures. The transition period is crucial for new auditors as it helps to understand the company's operations, accounting practices and any specific risks related to the audited company's operations (de Jong et al., 2020). Different audit firms may use different risk assessment methodologies and procedures. Therefore, when the auditor changes, the new audit firm may take a different perspective and focus on different risk areas, which may lead to changes in the audit approach. Against this background, the scope of the audit may differ from previous years, which will affect the content and presentation of the audit report (Horton et al., 2021). Finally, despite changing auditors, the audit report should maintain a consistent format and presentation of information to facilitate comparability across different reporting periods. The report should comply with relevant auditing standards and regulatory requirements to ensure the accuracy and reliability of the information. The provision of audit services to public interest entities obliges audit firms to publish a transparency report, which must comply with the provisions of EU Regulation 537/2014. Therefore, transparency, accuracy and clear communication in the audit report are extremely important, especially during the period of auditor rotation.

Finally, the research conducted by the European Commission and previous academic research indicate that the use of mandatory auditor rotation increases independence, which does not necessarily include the quality of the audit process.

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## APPLICABILITY OF DIFFERENT OPTIONS ON MANDATORY ROTATION – ANALYTICAL APPROACH

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### **ABSTRACT**

*Regulation (EU) No 537/2014, which relates to specific requirements for the statutory audit of public interest entities, has, in addition to the requirements for carrying out the statutory audit of annual financial statements and consolidated financial statements of public interest entities, also laid down organisational rules and rules for the selection of audit firms and approved statutory auditors in order to promote their independence, i.e. to avoid conflicts of interest and to reduce the impact on the quality of the audit carried out. In addition to strengthening the monitoring and control of the reliability of financial reporting and reviewing the procedures for applying the laws and regulations of the audit committee, the regulation also prescribes the mandatory rotation of audit firms and statutory auditors, limiting non-audit services and determining the percentage value of fees from the provision of non-audit services received by the statutory auditor. Mandatory audit firm rotation sets a cap on the number of years an audit firm may audit a client's financial statements and has been proposed as a means of maintaining auditor independence and enhancing public confidence. The threats to auditor quality and independence, as well as the risk of conflict of interest are often related to the duration of the audit engagement, i.e. the development of a long-term relationship between auditors and clients. This paper examines in more detail the applicability of the different options for mandatory rotation in EU countries.*

**Keywords:** *rotation, audit firms, audit engagement, public interest entities, EU*

### **1. INTRODUCTION**

One of the main reasons for the introduction of EU Regulation No 537/2014, which requires mandatory rotation for all audit firms and the lead partner in statutory audits of public interest entities, is to shorten the duration of the audit engagement on the grounds that this would compromise the independence and quality of the statutory auditor when carrying out the statutory audit of public interest entities, although opinions differ. Monroe and Hossain (2013), Bratten et al. (2019), Kurnianingsih and Rohman (2014), Sari and Indarto (2018), Lennox et al. (2014) are of the view that a longer duration of the audit engagement has a positive impact on the formation of the audit opinion, i.e. on the firm auditing an individual company having a better understanding of the company's operations and the way its financial statements are prepared. Arel et al. (2005), Bratten et al. (2019), Nadia (2015) and Rickett et al. (2016) indicate that a deepening of the relationship with the company has a negative impact on the independence and quality of the audit performed, which might consequently lead to a biased

judgement of the auditor on the company's business. Following the adoption of the EU Directive, the objective was to achieve independence of audit firms and statutory auditors in the provision of audit services through mandatory rotation. Mandatory rotation means a change of the signatory of the audit opinion, but a change of the audit firm is not mandatory. Upon accession to the EU, the Republic of Croatia was obliged to apply the rotation of approved auditors in the procedures for the audit of public interest entities, therefore the amendments to the Audit Act have been aligned with the EU Directive. Considering the fact that Regulation 537/2014 prescribes the minimum and maximum duration of the audit engagement, while leaving it to individual Member States to set the time limits for the duration of the engagement itself, the Republic of Croatia has decided that each signatory of the audit report is obliged to rotate every seven years when providing services to public interest entities. During the aforementioned period, the principal auditor may again provide services to the public interest entity he/she previously audited, but only after the period of at least 3 years, the so-called cooling-off period. In addition to the Directive and the Regulation, the duration of the audit engagement is more strictly regulated by the Code of Ethics, Section 290 (Independence - audit and inspection engagements) and 291 (Independence - other audit engagements). The subject of the paper is the analysis of compulsory rotation in EU countries. The aim of the paper is to show the characteristics of rotation in the European Union and in the Republic of Croatia and to determine the degree of harmonisation of EU countries with the observed regime, taking into account the time lag.

## **2. LITERATURE REVIEW**

Lennox and Wu (2018) note that the requirement for auditor rotation in accounting and corporate governance has led to much discussion and research. In order to improve independence and objectivity as well as the quality of financial reporting, the process provides for mandatory rotation of audit firms after a certain period of time. According to the results of previous studies by Raiborn et al. (2006), Jackson et al. (2008), Ebimobowei and Keretu (2011), Casterella and Johnston (2013) and DeFond and Zhang (2014), mandatory rotation reduces the risk of excessive connections, eliminates potential conflicts of interest and increases audit accuracy. On the other hand, Dandago and Zamro (2013), Kramer et al. (2011), Siregar et al. (2012), Chen et al. (2008), Daugherty et al. (2013) consider that rotation contributes to an increase in the cost and formation of the audit opinion that relies on the results of certified auditors who performed the audit in the last year before rotation. Similarly, Carey and Simnett (2006) and Rickett et al. (2016) argue that mandatory rotation can increase audit quality, while Lennox, Wu and Zhang (2018), Monroe and Hossain (2013), Bratten et al. (2019) and Nadia (2015) conclude that it could lead to higher costs and a loss of auditor competence. In this situation, it is important to understand the advantages and disadvantages of mandatory rotation and to consider alternative strategies to promote auditor independence and the quality of the audit process. The objective of mandatory rotation, in addition to ensuring objectivity and independence, is to introduce new perspectives and a "healthy" level of scepticism through regular rotation of audit firms, thereby improving the quality, accuracy and reliability of audits. Proponents of mandatory rotation, Bamber and Iyer, (2007), Chen et al, (2008), Daugherty et al (2012), Carey and Simnett (2006), Phil and Adebisi (2013), Hamilton et al. (2005) explain that this promotes auditor independence, as a long-standing audit mandate and familiarity with the operations, key personnel and financial procedures of the audited entity may eventually lead to a close relationship that carries the potential risk that the auditor may be biased in their conclusions due to partiality and the relationships with management. Therefore, such knowledge may lead to a conflict of interest, as auditors may be reluctant to challenge questionable accounting or management decisions for fear of losing a trusted client.

Mandatory rotation aims to break up these potentially "convenient" alliances and encourage more professional scepticism. It is also seen as a tool to promote competition within the audit sector. According to Laurion et al. (2017), Daugherty et al. (2012), Carey and Simnett (2006), longer audit engagements can lead to an oligopoly where a few larger audit firms control the market. Lack of incentives to improve quality, increasing complacency and lack of creativity could be the result of this concentration of power. According to Ewelt-Knauer et al. (2013) and Jackson, Moldrich and Roebuck (2008), requiring rotation gives competitors a chance to compete, which can improve quality, efficiency and value for money. However, opponents of rotation, Bandyopadhyay, Chen and Yu (2013), PWC (2012), Kroll (2012), Comunale and Sexton (2005), Daugherty (2013), Ionescu (2014), Jenkins and Vermeer, (2013) and Pinnel (2011) highlight real concerns about possible negative effects. The loss of the auditor's accumulated industry-specific knowledge and skills is one of the major drawbacks. Conducting an effective audit requires a thorough understanding of the specifics of a particular industry and its issues and legal requirements. Kroll (2012), Jenkins and Vermeer (2013) and Pinnel (2011) also claim that mandatory rotation can lead to higher costs; both the company and the new auditor have to invest a lot of time and resources in the process. These costs could be particularly difficult for smaller companies or those operating in specialised areas. Mandatory rotation may encourage auditors to address the issue of compliance with minimum standards and help provide insightful and thorough analysis. On the other hand, the possibility of disrupting organisational continuity and long-term strategic planning increases. For better communication, deeper understanding of the business and the development of tailored audit methods it is necessary to build close relationships with the subject. The ability to properly plan and implement long-term goals can be hindered by frequent changes of audit firms, which can have a detrimental effect on corporate governance. Ewelt-Knauer et al. (2013) and Lennox and Wu (2018) note that there are many different arguments highlighting the advantages and disadvantages of auditing. Promoting independence and improving audit quality is a worthy goal, one that warranted special legislation, but it is impossible to ignore potential negative effects such as the loss of firm-specific knowledge and higher fees. According to Lennox and Wu (2018) and Ewelt-Knauer et al. (2013), in order to promote effective corporate governance and maintain public confidence in financial reporting, it is crucial to strike a balance between the advantages and disadvantages of mandatory rotation. Research by Kurnianingsih and Rohman (2014), Carey and Simnett (2006), Rahmat and Ali (2016) and Rickett et al. (2016) supports the argument that audit firm rotation could improve audit quality by increasing auditor independence. Furthermore, the introduction of rotation aims to reduce the risk of potential conflicts of interest that may arise from long-term relationships between the auditor and the client. Furthermore, rotation offers auditors the opportunity to gain new knowledge and experience from different industries. By working with different audit teams and facing a variety of challenges, auditors can develop a more comprehensive understanding of auditing principles, risk assessment and control evaluation. The observed increase in auditors' knowledge and skills can have a positive impact on audit quality by encouraging continuous learning and improvement. In addition, rotation also achieves a higher level of professional scepticism, which can lead to stronger and more effective audit procedures. Consequently, mandatory rotation of audit partners could increase audit quality in the years before and after rotation, as suggested by the findings of Lennox et al. (2014).

### **3. RESEARCH METHODOLOGY**

This chapter analyses the elements that influence the obligation to rotate audit firms. It also contains a comparative analysis of the duration of audit engagements in the European Union and in the Republic of Croatia, i.e. it explains EU Regulation No. 537/2014 and EU Directive 2014/56 regulating the duration of mandatory rotation.



It relies on the document published by the European Commission in December 2022 "*Study on the Audit Directive (Directive 2006/43/EC as amended by Directive 2014/56/EU) and the Audit Regulation (Regulation (EU) 537/2014) – Final report*", which is available on the official website of the Publications Office of the European Union. It analyses the research published by the European Commission in 2022, available on the official website of the Publications Office of the European Union. 137 representatives of audit committees, 34 auditors (Big Four and smaller audit firms) and 21 users (investors, regulators and non-governmental organisations) participated in the said survey. The experiences and opinions of audit committee, auditor and user representatives on the 2016 audit reform were collected in the second half of 2021 and in 2022. In preparing the report, the European Commission also used the data available on the Audit Analytics website. This website contains the largest amount of data on public interest entities listed on EU Member States' stock exchanges, audit engagements, audit opinions and fees. The purpose of the research conducted by the European Commission was to provide data to the Commission services and Delegations as part of the continuous monitoring of the implementation of the Statutory Audit Directive and the Statutory Audit Regulation and to inform the public about the results of their implementation. In addition, the research results and the data obtained from the analysis also served the Commission services and Delegations for the evaluation of EU Regulation No 537/2014 and EU Directive 2014/56. The number of public interest entities that changed audit firm and auditor in the period from 2015 to 2018 was analysed. 2,782 public interest entities were included in the analysis. Table 1 shows the structure of public interest entities.

Rotation of audit firms	Number of public interest entities	Number of public interest entities (%)
Public interest entity has not changed the audit firm	2,233	80,27
Public interest entity has changed the audit firm at least once	549	19,73
UKUPNO:	2,782	100

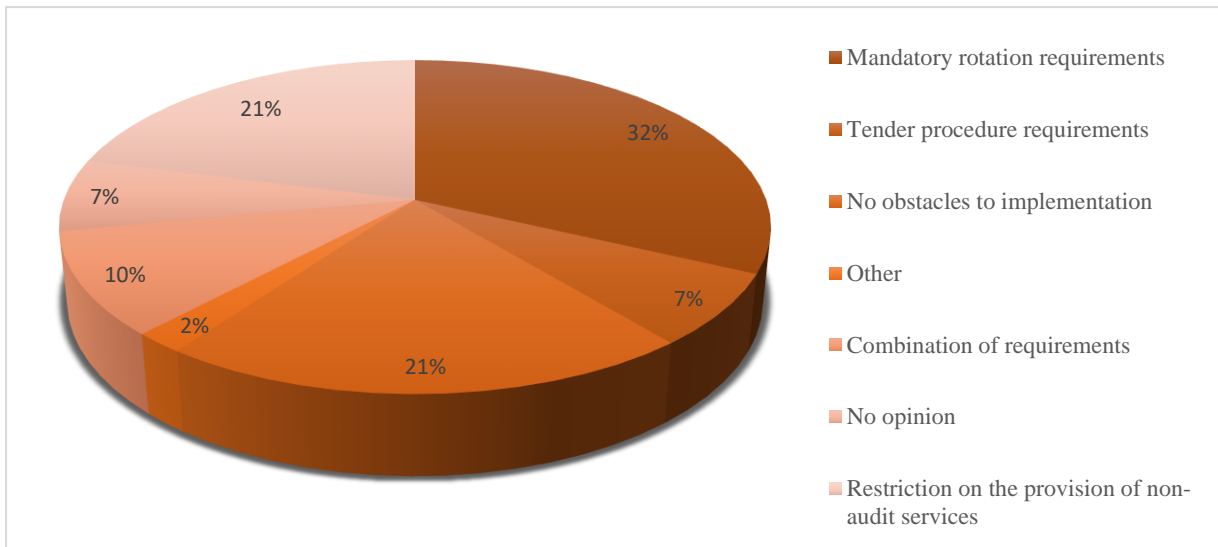
*Table 1: Number of public interest entities that changed audit firms from 2015 to 2018 (Source: European Commission (2022))*

It can be seen that only one fifth of the public interest entities changed audit firms, which ultimately means that the remaining entities did not change audit firms even once during the observed period. In addition to the analysis of the number of public interest entities that changed audit firm, an analysis of the implementation of the different options for mandatory rotation in 2022, which can be seen in Table 2, was also carried out with the aim of identifying the initial and the longest duration of the mandate as well as the existence of certain exceptions.

### **3.1. Research results**

#### *3.1.1 Obstacles in the implementation of the audit reform*

The reform presented some challenges in the implementation itself. As shown in Figure 1, the biggest challenge in implementing the reform was related to the introduction of compulsory rotation. 32% of the representatives of the audit committees consider this to be the case. This is due to the challenges related to getting acquainted with the legal requirements in all EU Member States, coordinating the rotation, attracting audit firms that would perform high quality audits through the tendering process, and administrative and organisational costs.



*Figure 1: The biggest obstacles in implementing the audit reform  
(Source: European Commission (2022))*

The next biggest challenge related to implementation was the requirement to limit the provision of non-audit services, which was mentioned by 21% of audit committee representatives. They felt that the definition of non-audit services was not explained with enough detail. Furthermore, they thought that a decision-making structure needs to be put in place within the audit firm to ensure that revenue from non-audit services does not exceed the legal limits and that other audit firms need to be found to take over the provision of non-audit services (European Commission, 2022). 21% of representatives also stated that they have not encountered any challenges in implementing the reform. The requirements for the tendering process are a barrier to the implementation of the reform according to 7% of the representatives, and the same number have no opinion on the challenges in implementation. Three representatives of the audit committees (2%) mention other challenges as an obstacle to the implementation of the reform, such as the organisation of joint audits. Of the remaining representatives of the audit committees, 10% think that the combination of requirements has created obstacles to the implementation of the audit reform. On the other hand, the majority of auditors (57%) consider that the main obstacles to implementation are due to the lack of harmonisation between EU countries in the implementation and interpretation of the different requirements, which has made the provision of audit services more complex. They also state that "duplicate" audits have occurred precisely because of non-compliance, resulting in higher costs than the benefits of the audit performed.

### *3.1.2. Rotation of audit firms in the European Union and the Republic of Croatia*

Ten of the 27 Member States of the European Union (Belgium, Estonia, Spain, France, Italy, Lithuania, Poland, Portugal, Slovenia and Slovakia) have made use of the option in Article 17(2)(a) of the Statutory Audit Regulation, according to which the initial engagement from paragraph 1 must last longer than one year. Compared to other EU countries, it is noticeable that France and Italy have set a very high initial minimum audit engagement period. France has set it at six years, while in Italy the minimum initial engagement period is nine years for audit firms and seven years for statutory auditors, with a grace period of four years, and the minimum initial engagement period is equal to the maximum engagement period for audit firms and statutory auditors. Belgium, Slovenia and Spain have decided that the minimum initial engagement is three years, while Estonia, Lithuania, Poland and Slovakia have set it at two years.

Other EU Member States have decided that "a public interest entity shall appoint a statutory auditor or an audit firm for an initial engagement of at least one year" (Regulation, Art. 17, paragraph 1).

Member State	Minimum initial engagement (years)	Maximum duration of engagement		Maximum duration can be extended to 20 years godina in case of public tender	Maximum duration can be extended to 24 years in case of joint audits
		Audit firms	Key audit partners		
Austria	1	10	5	20	20
Belgium	3	9	6	18	24
Bulgaria	1	7	5	n/a	12
Cyprus	1	9	7	20 max. duration for credit institutions is 9 years	24 max. duration for credit institutions is 9 years
Czechia	1	10	7	20	n/a
Germany	1	10	7	20, excluding credit institutions and insurance companies	24, excluding credit institutions and insurance companies
Denmark	n/a	10	7	20	24
Estonia	2	10	7	20	n/a
Greece	1	10	5	n/a	n/a
Spain	3	10	7	n/a	Possible, but only up to 4 years
Finland	1	10	7	20	24
France	6	10	6	16	24
Croatia	1	7	7	n/a	n/a
Hungary	1	10	7	n/a	n/a
Ireland	1	10	5	n/a	n/a
Italy	9 years for audit firms; 7 years for statutory auditors	9	7	n/a	n/a
Lithuania	2	10	5 for public interest entities, 7 for other companies	n/a	n/a
Luxembourg	1	10	7	20	n/a
Latvia	1	10	7	20	n/a
Malta	1	10	7	20	n/a
Netherlands	1	10	7	n/a	n/a
Poland	2	10	5	n/a	n/a
Portugal	2	10 (up to 12 in exceptional circumstances)	7	n/a	n/a
Romania	1	10	7	20	n/a
Sweden	1	7	7	20	24
Slovenia	3	10	7	n/a	n/a
Slovakia	2	10	5	10	14

*Table 2: Implementation of different mandatory rotation options in 2022 - overview (Source: Adapted according to the EC (2022), Ewelt-Knauer et al. (2012), Cameran et al. (2015))*

Table 2 shows that seven countries (Belgium, Bulgaria, Cyprus, Croatia, Italy, Poland and Sweden) have made use of the option in Article 17(2)(b) of the Statutory Audit Regulation, which allows Member States to set a maximum duration of less than ten years for audit engagements, with Cyprus having made use of the option for credit institutions (nine years), while Poland has set a maximum duration of five years for approved statutory auditors and ten years for audit firms. Bulgaria, Croatia, Italy (for approved statutory auditors) and Sweden have set a maximum duration of seven years. Portugal, in line with Portuguese legislation, has decided that the longest duration of the audit engagement can be shorter than 10 years when approved statutory auditors are appointed for two terms of four years or three terms of three years, and that the maximum duration can only be extended to a maximum of 12 years if the administrative or supervisory body, upon recommendation of the audit committee, proposes the extension of the engagement to the shareholders' or partners' meeting and the latter approves the proposal. Nineteen countries have applied the derogation under Article 17(7) of the Statutory Audit Regulation, which requires the audit partners responsible for carrying out the statutory audit to rotate every 7 years, while Slovakia, Poland, Lithuania, Ireland, Bulgaria and Austria as well as Greece require rotation of audit partners every 5 years. Belgium and France are the only EU countries that require rotation of key audit partners every 6 years. In addition, thirteen countries (Austria, Cyprus, Czechia, Germany, Denmark, Estonia, Finland, Luxembourg, Latvia, Malta, Romania, Sweden and Slovakia) have made use of the option provided for in Article 17(4)(a) of the Revision Regulation and extended the duration to 20 years in the case of a public tender, while only Belgium, France, Croatia and Slovakia have taken a different decision on the maximum duration of 18, 16 and 10 years respectively in the case of a public tender. Austria, Belgium, Bulgaria, Cyprus, Germany, Denmark, Estonia, Finland, France, Sweden and Slovakia, i.e. all 11 countries have made use of the possibility under Article 17(4)(b), but the extension of the maximum duration in case of a joint audit varies from state to state. For example, Austria has set a maximum duration of 20 years, while Bulgaria has set a maximum duration of 12 years and Slovakia, like Croatia, has set a maximum duration of 14 years in the case of a joint audit. Spain has specified in its national legislation that the maximum duration of the mandate can be extended to a maximum of 4 years in the case of a joint audit.

#### **4. DISCUSSION**

Nine Member States of the European Union have stipulated that the first mandate shall take longer than one year, which already indicates at the outset that the implementation of the reform will encounter complexities, such as increased costs due to harmonisation of rules during the audit, which was confirmed by the representatives of audit committees and the auditors interviewed. In addition to the fact that the minimum engagement period varies between EU Member States, there are also differences in the maximum engagement period, which is set individually by each Member State in accordance with Regulation (EU) 537/2014. Therefore, the analysis shows that six countries, including Croatia, have set a shorter duration than the ten-year maximum audit engagement duration for audit firms and seven countries have taken a different decision than the other twenty when it comes to the duration of the engagement of the key audit partner. In addition, thirteen of the twenty-seven countries have extended the duration to 20 years in the case of a public tender and 11 countries have made use of the possibility to extend the maximum duration in the case of a joint audit. The analysis of the countries of the European Union and the Republic of Croatia shows that the reform presented certain challenges in the implementation itself, especially in relation to the introduction of compulsory rotation. Also, when analysing the period from 2015 to 2018, it was found that most public interest entities did not rotate the audit firm. Based on the analysis of Directive 2014/56/EU and Regulation 537/2014, which together form the legal framework regulating mandatory audit firm

rotation, and previously conducted research, opinions are still divided on whether mandatory audit firm rotation has actually had an impact on improving audit quality. The European Commission's research shows that the majority (57%) of audit committee representatives believe that mandatory rotation of audit firms and key audit partners has not changed audit quality. Only 19% of respondents said that they have noticed an improvement in quality, while 13% think that rotation has contributed a lot to improving quality. There is no clear evidence of quality improvement, with representatives expressing the view that increasing independence has led to quality improvement. This is also due to the fact that the company was already obliged to change auditors according to the national framework. In addition, 2% of audit committee representatives stated that mandatory rotation has reduced audit quality and other representatives did not comment (9%). At the same time, 68% of the surveyed auditors stated that they did not notice any change in quality due to mandatory rotation. They saw no difference in audit quality due to the engagement of an audit firm, with several noting that similar requirements already exist in their countries. On the other hand, 8% of auditors felt that mandatory rotation negatively affected audit quality to a lesser extent. Representatives of large audit firms expressed concern about the impact of rotation and the adjustment period on initial audits as well as on the quality of audits performed by smaller firms. The users interviewed had different views on the impact of mandatory rotation on quality. Some noted a deterioration in quality as a result of mandatory rotation and stated that it requires more resources and leads to higher costs. These findings from the European Commission's 2022 survey are also supported by research by Johnson et al. (2002) and Shafie et al. (2004), who also conclude that rotation of statutory auditors does not improve the quality of financial reporting, but actually increases audit costs. Zawawi (2007) asserts that given the complexity and size of modern companies, the auditor spends more time with the client to learn about the company's business systems and believes that this knowledge is acquired through audit experience over a longer period of several years. Mandatory rotation of external auditors limits the time that auditors spend understanding the company and has a negative impact on audit quality. According to Li (2007), audit quality is reflected in a market valuation of the joint probability that the auditor will detect a breach of the client's accounting system. The determination of probability depends on a broad concept of the auditor's professional conduct, which includes factors such as objectivity, professional scepticism of the auditor and conflicts of interest. As a result, there are different views on the issue of mandatory rotation of external auditors. One opinion comes from the auditing profession, which argues that rotation is unnecessary because it would be costly to clients and could reduce the quality of audits (Asein, 2007), and another opinion comes from regulators, who believe in the rotation of external auditors because they believe it could solve problems with independence and protection of public interest. Research on audit engagements has found that a higher rate of audit errors is made in the early stages of the engagement (Geiger and Raghunandan, 2002) and that audit quality is lower in the first two to three years (Johnson et al., 2002).

## **5. CONCLUSION**

The main legal framework for mandatory rotation of audit partners, i.e. audit firms, is Directive 2014/56/EU on statutory audits and Regulation 537/2014 on statutory audits. The introduction of mandatory rotation was one of the most important parts of the audit reform. Regulators sought to increase impartiality and professional scepticism by requiring auditor rotation, which increases the reliability and credibility of financial reporting. In addition, the European Union's objective was to find a compromise between promoting competition and addressing potential threats related to long-term relationships between auditors and clients by setting ground rules and giving Member States the freedom to independently adapt their national legislation depending on the threats to the audit profession in their area of operation.

Article 17 of Regulation (EU) 537/2014, which refers to mandatory rotation, requires audit firms to regularly rotate their auditors after 7 years from the start of the audit engagement. In addition to the rotation of the key partner, the audit firm as a whole is also subject to rotation, which must take place after a maximum of 10 years of the mandate. By limiting the period during which the audit firm can provide its services to the client, it can be concluded that the main objective of mandatory rotation is to reduce the possibility of long-term relationships between audit firms and their clients, which could subsequently compromise auditor independence and audit quality. Rotation is intended to encourage new ideas, eliminate threats to independence and improve the overall quality and reliability of audit engagements. The success and effectiveness of these regulatory measures and their ongoing adaptation to the changing needs of the audit profession and the business environment will depend largely on ongoing monitoring, review and discussion among stakeholders. The impact of mandatory rotation on auditor independence was evidenced by a comprehensive study carried out by the European Commission in 2021-2022 with the participation of representatives of audit committees, auditors and users. The limited duration of the audit engagement and the auditors' awareness that their work will be reviewed by the newly selected audit firm has an impact on the elimination of potential threats to independence and the auditor's pursuit of high quality performance of audit procedures. On the other hand, mandatory rotation of auditors may lead to a loss of industry-specific knowledge and expertise, which ultimately affects audit quality. The study also suggests that the costs of auditor rotation may outweigh the benefits, especially for companies that require specialised audit skills. In addition, the analysis revealed a lack of alignment of the rotation systems in the Member States, which led to certain difficulties in determining who is subject to rotation due to the different definitions of small and medium-sized enterprises in each country. The implementation of the requirements under the audit reform presented various challenges to the companies to which the requirements apply. The majority of audit committee representatives indicated that the biggest challenge was related to the requirement for mandatory rotation. The main challenges related to rotation and the tendering process were familiarity with the legal requirements in all countries where the companies operate, coordination of rotation, attracting a sufficient number of audit firms for the tendering process, the administrative costs associated with the tendering process and the organisational costs associated with engaging a new audit firm. This led to complexity and compliance risks that impacted audits of international companies operating outside the borders of their country. Different rotation periods led to "duplicate" audits in some cases and increased their costs. As for the implementation of the reform, most auditors called for harmonisation of mandatory rotation and the definition of audit and non-audit services at EU level, as the current differences lead to complexity, additional compliance costs and operational difficulties in the market. In summary, the introduction of mandatory rotation rules is an instrument whose use is still under discussion. The risk that the auditor will not object to audited financial statements that are materially misstated in the case of a long-term audit engagement is one of the most common discussions when it comes to rotation. However, the real objective of introducing mandatory rotation is to increase investor confidence in the financial markets by improving the reliability and accuracy of financial reporting.

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## HOUSEHOLDS WITH CHILDREN BY BREADWINNER TYPE: INCOMES, POVERTY AND CHILD CARETAKING

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### **ABSTRACT**

*Women, particularly mothers, confront numerous challenges when striving to attain a balance between their work and personal lives. They often encounter obstacles when entering the job market, earning lower wages, and juggling household responsibilities, childcare, and careers. This study delves into the disparities among households with children based on the gender of the primary earner, investigating their income levels, attitudes, and distribution of childcare tasks. Data from the "Generation and Gender Survey" (GGS) is employed. The GGS is an international survey that examines inter-generational and gender dynamics, family interactions, fertility patterns, and other related aspects. The analysis employs various methods, including descriptive data analysis, comparative assessment and regression modelling. The research focuses on three countries with varying welfare and gender systems, child poverty rates, female workforce participation, and economic development: Bulgaria, France, and the Netherlands. The findings underscore variations in the prevalence of female breadwinner households across these nations. Bulgaria demonstrates the highest proportion, trailed by France and the Netherlands. Households with earnings homogamy generally boast the highest incomes. Notably, Bulgaria exhibits the largest share of economically disadvantaged households. Moreover, the study reveals attitudes concerning women's higher earnings within a household and the division of child caretaking tasks across countries and household types. Given that growing up in financially struggling households often has adverse effects on children, comprehending the contributing factors to this dynamic and disparities within households holds significant importance. This study further contributes insights into the efficacy of family-oriented policies, shedding light on their impact and effectiveness.*

**Keywords:** *economic deprivation, gendered work-life balance, generations and gender survey, household income*

### **1. INTRODUCTION**

Mothers in the labour market face substantial challenges, often resulting in lower incomes and employment rates. Growing up in financially struggling households can have adverse effects on children. Thus, understanding the contributing factors to this dynamic and disparities within households holds significant importance. Topics like earnings homogamy, female breadwinners, and female labour supply have piqued interest in sociology and economics. The importance of comprehending the female position in the labour market, particularly for mothers, was underscored by the 2023 recipient of the Sveriges Riksbank Prize in Economic Sciences, Claudia Goldin, whose research illuminated the negative effects of the first child on gender disparities in the job market (Nobel prize, 2023). Research by Kowalevska and Vitali (2021, 2023) revealed that female breadwinner households face a well-being and earnings penalty compared to male breadwinner households. Moreover, welfare systems fail to compensate for this penalty adequately. Figari et al. (2011) observed variations in within-couple equalisation through tax-benefit systems across countries influenced by the gender of the higher earner. Magda et al. (2023) analysed the Polish GGS survey to explore equality at work and home for couples. They concluded that the female share of total household income is negatively related to women's heavy involvement in housework.

In less traditional households, women are more likely to share housework equally. Colombino and Narazani (2012) explored potential solutions to narrowing the pay gap: gender-based taxation, wage subsidies or basic income. The authors conclude that subsidies for lower wages and unconditional transfers are better in welfare outcomes for the whole population than gender-based taxation. Drago et al. (2005) emphasised the need to differentiate between persistent and temporary female breadwinner households due to their differing characteristics and to distinguish between economic and gender equity in temporary female breadwinner households. Further research is required to explore earnings homogeneity and its impact on (in)equality within households and strategies to bridge these gaps. This study aims to analyse incomes in various household types based on the gender of the primary earner, shed light on child poverty, and explore the division of child caretaking. The comparison of countries with diverse welfare and gender regimes—Bulgaria, France, and the Netherlands—provides valuable insights. The Netherlands, with its low child poverty rates and high mothers' employment, is the most developed country. In contrast, with its high child poverty rates and low maternal employment, Bulgaria represents the least developed. France falls in between, boasting high expenditures on family/children social protection benefits. Table 1 presents the chosen indicators for the three countries.

Country/Indicator	GDP per capita in PPS (2021)	Children at risk of poverty or social exclusion (in %, 2021)	Employment rate of mothers in couples with children (in %, 2021)	Expenditure on Family/Children benefits (% of GDP, 2021)
Bulgaria	57	33	67.1	1.6
France	104	22.8	71.3	2.5*
The Netherlands	129	14.9	81.6	1.3

*Table 1: Socio-economic indicators; \* for 2020  
 (Source: author based on Eurostat (2023))*

Using statistical methods, this preliminary study aims to inform policymakers about the challenges faced by female breadwinner households, with the ultimate goal of enhancing family policies, especially concerning work-family reconciliation. Efforts should be intensified to minimise income and other disparities for mothers. A cross-country comparison has implications by identifying patterns for more EU countries. The structure of this preliminary study is as follows: following this introduction, the second section elaborates on the data and methods used. The third section presents the survey analysis results, and the final section concludes with a summary, limitations, and suggestions for future research.

## 2. DATA AND METHODS

The study utilises data from the Generations and Gender Survey (GGS) (Gauthier et al., 2018), coordinated by the Generations and Gender Programme (GGP) of the Netherlands Interdisciplinary Demographic Institute. The GGS data was collected to investigate demographic behaviours and socio-economic trends in industrialised nations, primarily in Europe. The primary objective of the Generations and Gender Programme is to initiate analyses of the developments and determinants of a wide range of demographic and social phenomena related to family formation processes, demographic changes, intergenerational relationships, and more. GGS is a panel study that provides data at the household level. The survey is currently in its second round, while this study is based on data from round I. The analysis focuses on three countries: Bulgaria (wave 2), France (wave 3), and the Netherlands (wave 3). Interviews were conducted 2007 in Bulgaria, 2010 in France, and 2010/2011 in the Netherlands.

The choice of these waves is motivated by their status as the most recent data available. The sample used in the analysis comprises heterosexual couples with children in the household. In Bulgaria, the sample size consists of 4,447 couples (8,154 children); in France, 1,991 couples (4,360 children); and in the Netherlands, 1,679 couples (4,055 children). The majority of respondents are women. Weighted samples were employed: probability weights for Bulgaria and the Netherlands, and frequency weights for France. The analysis commences by determining the breadwinner type of a household based on the partners' net income share in the household income. Each partner's regular sources of income (received monthly or weekly) are converted to yearly income and summed with irregular income. The mean of the range was used for respondents who provided a range for their income. After calculating each partner's share in the household income, households are categorised into four types:

- 1) Earnings homogamy: if partners contribute to 45-55% of household income
- 2) Male breadwinner household: when the male partner contributes to more than 55% of household income
- 3) Female breadwinner household: when the female partner contributes to more than 55% of household income
- 4) No income household: when household income is equal to zero.

The study then descriptively analyses the income distribution and prevalence of each household type. Furthermore, a regression analysis explores the contributing factors to household income levels. To assess economic deprivation and gain insights into child poverty levels, equivalised household incomes are compared to a relative poverty line (60% of the equivalised median net income in the sample). A square root equivalised scale and a relative poverty line are employed to estimate the poverty headcount (Foster et al., 1984; OECD, 2020). The DASP Stata package was used for calculations (Araar and Duclos, 2007) on the entire survey sample. An analysis of households who are "able to make ends meet" with (great) difficulty, as a subjective measure of economic deprivation, is conducted. Finally, the study examines child caretaking tasks and opinions on parenting and earnings across household breadwinner types and countries. Descriptive analysis is performed, and the chi-square test is used to identify potential statistically significant differences. A logistic regression examines the probability that the mother is the primary child caretaker. The analysis for child caretaking tasks is based on questions for households with children younger than 14 (or 6 in the Netherlands) present in the household.

### **3. RESULTS**

This section summarises the main findings of the study. Results are presented in three subsections.

#### **3.1. Income distribution and determinants**

Table 2 presents basic descriptive statistics for the three countries, categorising households with children into four types based on partners' income share and gender. Male breadwinner households prevail in all three countries. There is a slightly higher presence of female breadwinner households in Bulgaria and the Netherlands compared to earnings homogamy couples. In France, earnings homogamy households are more common than female breadwinner households. Notably, households where partners contribute almost equally to income have the highest average incomes in France and the Netherlands, while in Bulgaria, male breadwinner households boast the highest average incomes. Female breadwinner households, on average, exhibit significantly lower incomes across all countries. Two high outliers, one from the Netherlands and one from France, were removed from the sample.

<i>Bulgaria (in 000 BGN)</i>							
Household type	Observations	Mean	Median	Max	Min	Range	SD
Earnings homogamy	835	6.82	6.10	48.00	0.27	47.73	4.39
Male breadwinner	2,194	7.15	6.25	52.68	0.10	52.58	4.71
Female breadwinner	1,086	4.08	3.00	40.42	0.09	40.33	4.12
No income	328	0	0	0	0	0	0
Total	4,443	5.82	5.1	52.68	0	52.68	4.80
<i>France (in 000 EUR)</i>							
Household type	Observations	Mean	Median	Max	Min	Range	SD
Earnings homogamy	3,345,344	42.76	39.20	406.8	0.02	406.78	23.47
Male breadwinner	9,610,854	40.95	36.00	288	0.90	287.10	26.35
Female breadwinner	2,204,621	40.57	36.60	216	0.02	215.98	26.20
No income	264,736	0	0	0	0	0	0
Total	15,400,000	40.59	36	406.8	0	406.8	26.07
<i>the Netherlands (in 000 EUR)</i>							
Household type	Observations	Mean	Median	Max	Min	Range	SD
Earnings homogamy	184	44.71	43.20	120	0.02	119.98	16.99
Male breadwinner	1,203	39.64	37.20	272	0.01	271.99	19.24
Female breadwinner	190	25.83	20.65	125	0.65	124.35	18.85
No income	69	0	0	0	0	0	0
Total	1,646	36.88	36.25	272	0	272.00	20.70

*Table 2: Descriptive statistics of household income (in thousands of national currency) by household type; only households with children; weighted data (Source: author's calculation)*

Figure 1 illustrates the income distribution by household type for each country. Male breadwinner households exhibit a less skewed, normal distribution. Conversely, female breadwinner households display a skewed distribution towards lower income levels, especially pronounced in Bulgaria and the Netherlands.

*Figure following on the next page*

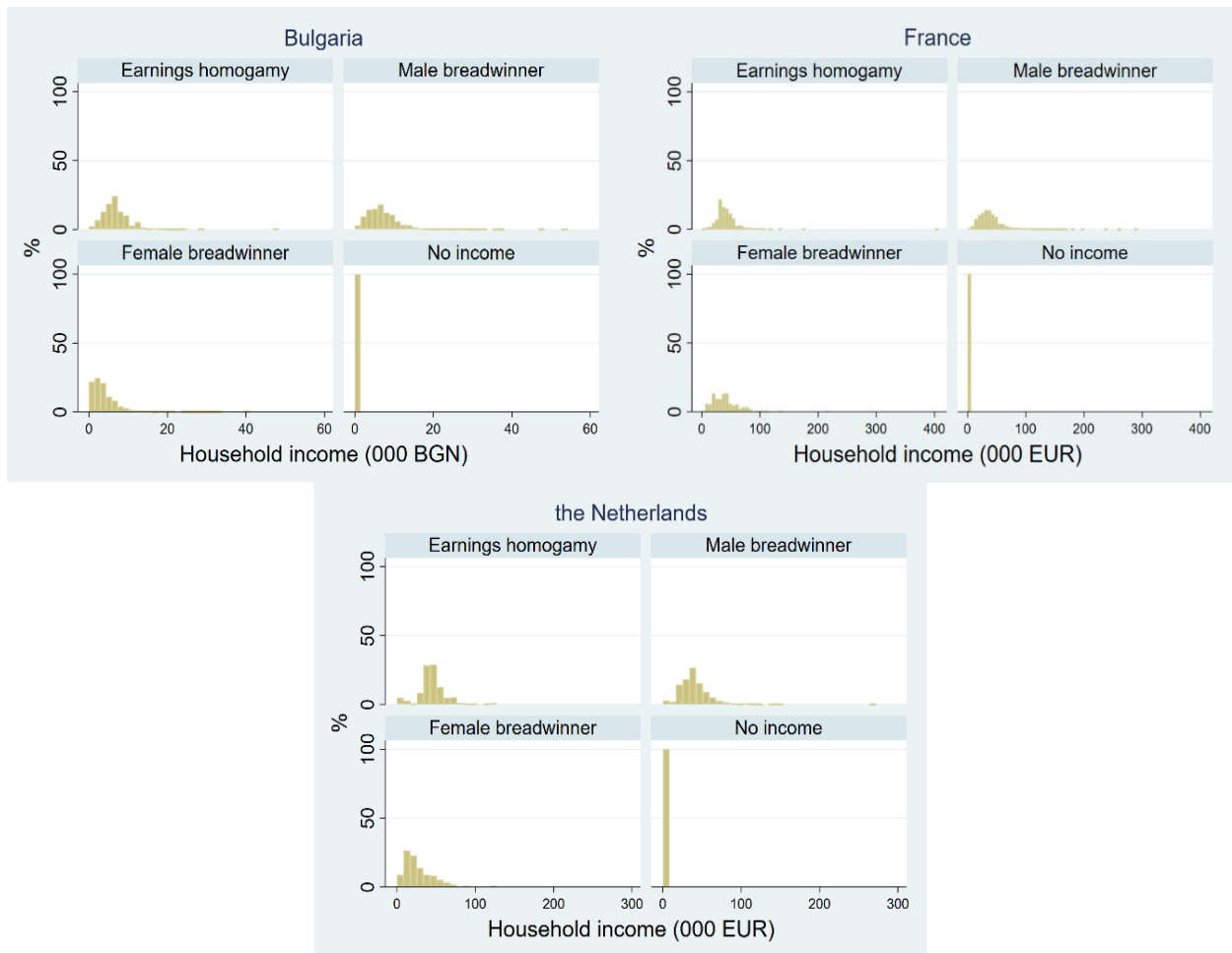


Figure 1: Histogram of household income by household type  
 (Source: author's calculation)

Figure 2, in the form of box plot diagrams, emphasises the gender disparity in income, with female incomes consistently lower, exhibiting narrower ranges and lower maximums.

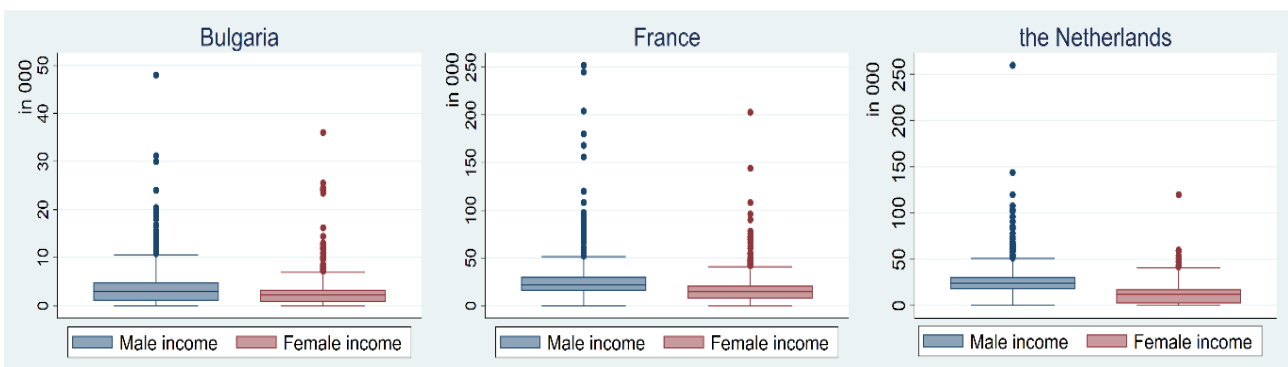


Figure 2: Box plot of income (in national currency) by gender  
 (Source: author's calculation)

Regression analysis (Table 3) confirms that female breadwinner households negatively influence household income. However, higher education levels for both partners positively correlate with household income, highlighting the importance of education in enhancing income for all partners.

	<i>Bulgaria</i>	<i>France</i>	<i>the Netherlands</i>
Observations	4,412	15,240,102	1,646
R <sup>2</sup>	0.3437	0.2819	0.3225
Male breadwinner	0.38** (0.16)	-0.2*** (0.014)	-3.26** (1.31)
Female breadwinner	-2.57*** (0.18)	-4.69*** (0.019)	-18.18*** (1.9)
No income household	-7.22*** (0.18)	-39.22*** (0.045)	-41.05*** (1.65)
Number of children	0.12* (0.06)	-0.74*** (0.005)	-0.33 (0.37)
Age of female partner	-0.02 (0.02)	0.34*** (0.001)	0.03 (0.15)
Age of male partner	-0.02 (0.02)	0.12*** (0.001)	0.06 (0.16)
Secondary education of female partner	1.16*** (0.16)	5.09*** (0.016)	-0.51 (3.05)
Tertiary education of female partner	2.9*** (0.25)	18.73*** (0.018)	8.26** (3.25)
Secondary education of male partner	1.52*** (0.16)	5.92*** (0.016)	5.48** (2.3)
Tertiary education of male partner	3.02*** (0.25)	18.44*** (0.018)	13.33*** (2.45)
Constant term	5.95*** (0.29)	6.49*** (0.036)	28.08*** (4.7)

*Table 3: Determinants of household income (in thousands), OLS regression*

*Note: \*p<0.1, \*\*p<0.05, \*\*\*p<0.01  
 (Source: author's calculation)*

### 3.2. Child poverty

Examining child poverty is crucial to understanding the impact of different household types on children's well-being despite the strong limitations posed by the study's assumptions, data and definitions.

Table 4 presents these poverty indicators, highlighting Bulgaria with the highest child poverty headcount, followed by the Netherlands and France with the lowest child poverty rate. The significantly high child poverty rate in female breadwinner households is particularly concerning, underscoring the need for targeted policy interventions to address this disparity.

<i>Poverty estimate (%)</i>	<i>Bulgaria</i>	<i>France</i>	<i>the Netherlands</i>
Child poverty headcount	15.51	11.20	15.18
in earnings homogeneity households	2.33	0.88	2.75
in male breadwinner households	3.88	4.18	4.03
in female breadwinner households	21.12	21.87	14.75

*Table 4: Poverty estimates  
 (Source: author's calculation)*

Respondents were asked about their household's ability to make ends meet as a subjective measure of poverty and economic deprivation. In France, 20.50% of respondents in households with children faced (great) difficulties in this regard, rising to 21.81% among female breadwinners.

In Bulgaria, over 50% of respondents struggled to make ends meet, exceeding 60% for female breadwinner households. Although subjective, these findings illuminate the economic disparities between the two countries, emphasising the particularly challenging situation faced by female breadwinners in Bulgaria.

### 3.3. Child caretaking tasks and gender norms

Table 5 provides a breakdown of how child caretaking responsibilities are divided between partners, highlighting any significant differences, particularly in female breadwinner households. While mothers predominantly undertake more responsibilities than fathers across all three countries, the division is not rigidly polarised. Notably, both partners often contribute equally to childcare tasks. Mothers typically handle tasks like staying at home with ill children and dressing them.

<i>Country</i>	<i>Dressing the child</i>	<i>Putting the child to bed</i>	<i>Staying at home with children when they are ill</i>
Bulgaria	Mother	Mother	Mother
France	Mother	Both*	Mother***
the Netherlands	Mother	-	Both***
<i>Country</i>	<i>Playing and/or taking part in leisure activities with the child</i>	<i>Homework preparations with the child</i>	<i>Transport of the child</i>
Bulgaria	Both	Mother	Both
France	Both	Mother	Both***
the Netherlands	-	-	Mother***

*Table 5: Partner responsible for child caretaking tasks*

*Notes: Chi-square independence test for household types; "Both" includes other or children themselves, "-" denotes no data  
 \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$   
 (Source: author's calculation)*

A logistic regression analysis was conducted to determine the probability of the mother being the primary child caretaker. The dependent variable was constructed by counting how many childcare tasks from Table 5 each or both parents equally performed. If the mother was responsible for most tasks, the dependent variable was coded as 1; otherwise, it was set to 0. The same variables from the OLS regression of household income determinants were used as independent variables, including household income. Figure 3 presents predictive margins adjusted for other variables in the model. Across all countries, male breadwinner households had the highest probability of mothers being the primary caretakers. This probability slightly decreased in female breadwinner households, reaching its lowest in earnings homogeneity households. Moreover, the likelihood of mothers assuming primary caretaker roles declined with household income growth and increased with the number of children.

*Figure following on the next page*

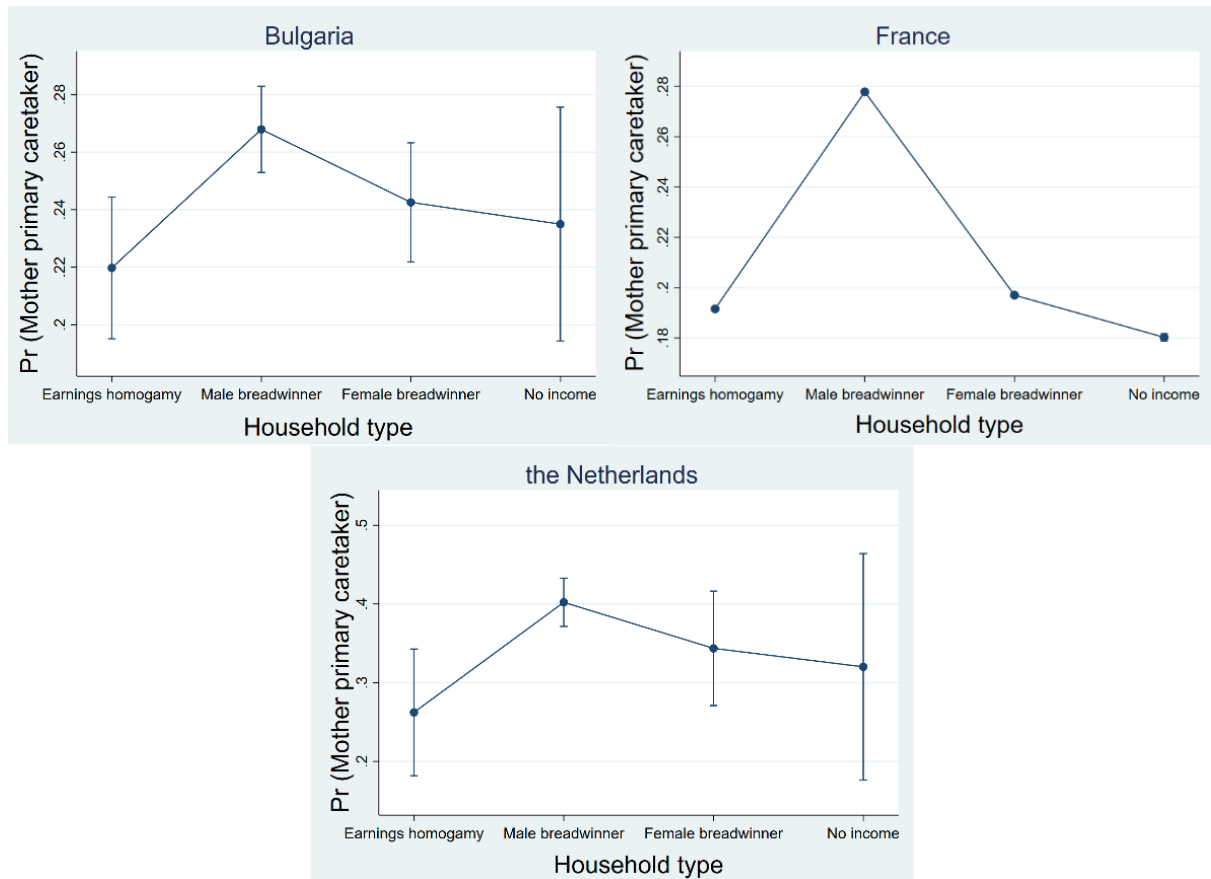


Figure 3: Predictive margins of household type with 95% CIs  
 (Source: author's calculation)

This paragraph provides further insights into attitudes surrounding mothers' earnings and parental work. In Bulgaria and France, respondents generally disagreed with the idea that a woman earning more than her partner harms a relationship. Both countries believed that fulfilling family roles is as rewarding as paid work, though slightly more couples in Bulgaria with earnings homogeneity disagreed. Interestingly, while most French respondents rejected the notion that preschool children suffer if their mothers work, a notable proportion of Bulgarians agreed. Bulgarians also tended to agree that children face challenges when fathers excessively focus on work. In France, the majority agreed, but within households where the mother is the primary or equal breadwinner, there was a leaning towards disagreement.

#### 4. CONCLUSION AND FUTURE RESEARCH

This study delved into household breadwinner types based on gender in households with children across three diverse countries: Bulgaria, France, and the Netherlands, each representing distinct welfare regimes. The research, utilising data from the GGS survey, reaffirmed previous findings that women generally experience lower incomes, leading to a higher prevalence of child poverty in female breadwinner households. While childcaring responsibilities predominantly fall on mothers, there are instances where both partners share these duties. Notably, the highest likelihood of the mother being the primary caretaker occurs in male breadwinner households. Country-specific nuances were observed; Bulgaria, a former communist nation, exhibited a higher prevalence of female breadwinner households, particularly as mothers often work full-time, whereas in the Netherlands, such households were the least common. France displayed fewer disparities in average incomes across household types, possibly due to historical, political, and socio-economic factors influencing opinions on



mothers' earnings and children suffering due to working parents. However, limitations stem from survey data constraints, assumptions, definitions, and methodological choices. The research focused on the last wave of panel data, resulting in a biased and smaller sample. Inconsistencies in questions across countries and variations in weights and definitions further compounded these limitations. The definition of breadwinner-type households could be refined by considering factors such as working hours, types of income, and the ages of children and parents. Distinguishing between different types of female breadwinner households could minimise statistical noise (Drago et al., 2005). Future research could harness the benefits of analysing panel data from all survey waves, particularly with the improved data harmonisation in Round II of the GGS. A comprehensive analysis could provide insights into evolving gender norms and values over time, both within individual countries and through cross-country comparisons. Additionally, investigating policies related to work-life balance across nations would enrich the understanding of the challenges mothers face in diverse societal contexts. Policymakers should focus on implementing initiatives that enable women to balance work and family responsibilities. Crucial instruments include paternal leaves and father quotas, as women often encounter significant hurdles in the labour market while caring for children. Investments in early childhood education and care, and full-day school programmes can further alleviate the burden on mothers. Recognising the multifaceted factors shaping mothers' roles in society, policymakers should adapt policies to modern changes in the labour market and society. Flexibility, increased female employment, and support for non-traditional families should be encouraged, with a simultaneous emphasis on encouraging fathers to assume greater responsibility, thus reshaping societal gender norms.

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## EDUCATION AND EMPLOYMENT MISMATCH IN THE KURDISTAN REGION OF IRAQ: CAUSES AND IMPLICATIONS

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### **ABSTRACT**

*This study aims to explore the causes and implications of the education and employment mismatch in the KRI by investigating two research questions: question one, determining the current ratio of degree holders working in their field of specialization and identifying the factors contributing to the mismatch. Question two, The perspectives of government officials, business leaders, labor unions, and academic experts are analyzed to gain comprehensive insights. To address the first research question, quantitative data is collected through an online survey questionnaire administered to degree holders in the Kurdistan Region of Iraq (KRI). Descriptive statistics, cross-tabulation, and binary logistic regression analysis are used to analyze the data and identify significant predictors of the education-employment mismatch. For the second research question, qualitative data is obtained through in-person interviews with government officials, business leaders, labor unions, and academic experts in the region. Thematic analysis is applied to identify common themes and patterns related to the factors influencing youth unemployment across industries and sectors. The findings of this study provide valuable insights into the education-employment mismatch in the KRI and its implications. The analysis of the quantitative data reveals the current ratio of degree holders working in their field of specialization and identifies significant factors contributing to the mismatch. The qualitative analysis of the interviews sheds light on the key factors influencing youth unemployment and highlights variations across industries and sectors. The implications of this research are multifaceted. It calls for targeted policy interventions and programs aimed at reducing the education-employment mismatch and addressing youth unemployment in the KRI. Recommendations include strengthening public-private partnerships, improving education curriculum, promoting entrepreneurship, encourage youth skills development, implementing social protection measures, promoting governmental programs, promoting ministry monitoring, and spread the importance of labour unions. The study emphasizes the importance of aligning educational curricula with the needs of the labor market. Overall, this research contributes to the understanding of the education and employment mismatch in the KRI and offers valuable insights for policymakers, educational institutions, employers, and other stakeholders. By addressing the underlying causes of the mismatch and implementing appropriate measures, the region can create a more harmonious and sustainable education-to-employment transition to foster economic growth, social stability, and improved livelihoods for its youth population.*

**Keywords:** *Employment Mismatch, Education-Occupation Disparity, Kurdistan Labour Market, Skill Underutilization, Economic Implications*

### **1. INTRODUCTION**

Youth unemployment is a major issue in many regions of the world, including Kurdistan Region of Iraq. Young peoples' economic and mental well-being is being harmed by the lack of job prospects. The Kurdistan Regional Government has established programs to help young people enter the labour force, but their effectiveness and ability to address youth unemployment remain a mystery. This study will investigate the perspectives and experiences of key stakeholders such as government officials, labour unions, academics, and professionals in different sectors.

The research attempts to provide insights into the current programs' strengths and flaws, as well as identify prospective areas for improvement, by examining these viewpoints. To collect data, the research will employ a mixed-methods approach that will include interviews and surveys. This research will examine the causes of youth unemployment, such as lack of access to education and training, inadequate social security systems, and a mismatch between youths' skills and labour market demands. The key stakeholders which were mentioned earlier will be invited to participate in interviews to discuss their perspectives and experiences with programs and efforts to reducing youth unemployment. In addition, a survey will take place online to target the youth from the ages of 15 to 30 in the KRI to freely participate on their own will to obtain their thoughts on the effectiveness of the education system and their labour market experiences. The data gathered from the interviews and surveys will be evaluated thematically. In order to acquire a better knowledge of the positive and negative aspects of the existing programs, as well as possible areas for development, the research will seek for recurring themes and patterns in the data. This research aims to assess the strengths and weaknesses of programs and initiatives to reduce youth unemployment in KRI. The study has two research questions the first research question is "What is the current ratio of degree holders working in their field of specialization in the Kurdistan Region of Iraq, and what factors contribute to the mismatch between education and employment in the region?", and the second research question is "What are the key factors influencing youth unemployment in the Kurdistan Region of Iraq, and how do they vary across different industries and sectors? An analysis of perspectives from government officials, business leaders, labour unions, and academic experts". This research with its respective research questions will identify potential areas for improvement and to guide future policy and program development by studying the opinions of important stakeholders. The study seeks to develop efficient methods to reduce youth unemployment, education system, and promote the economic and social well-being of the region's youth.

## **2. METHODOLOGY**

This research paper conducts a mixed research approach to answer the research questions, including both quantitative as well as qualitative data collection. The online survey questionnaire and in-person interviews were used to accumulate information from participants. In the first research question a quantitative data is analyzed through SPSS and in the second research question a qualitative data is considered through content analysis. It is also important to put into account the barriers or impediments of the research, particularly vis-a-vis secondary data. The limited existing literature on the KRI made it much more difficult to gather sufficient and reliable secondary information, and there was a lack of recent and specific literature focusing on the KRI. However, despite these limitations, this study has not failed to provide valued data into the contemporary situation of employment and education in the region and offers recommendations and suggestions for future research and policy development. Ethical considerations were considered throughout the entire research, including consent of the participants, guaranteeing anonymity and confidentiality, protecting participants from dangers of exposure or maintaining confidentiality of sensitive data, and exploitation merely for the purposes of writing this thesis.

### **2.1. Findings**

The findings and data analysis chapter of this study investigates key factors influencing youth unemployment in the Kurdistan Region of Iraq. This first research question is divided into two parts: first, assessing the current ratio of degree holders working in their field of specialization, and second, identifying the factors that contribute to the mismatch between education and employment. To gather data for this question, SPSS software was employed, utilizing descriptive statistics, cross-tabulation and chi-square analysis, and binary logistic regression

techniques. The second research question posed for this inquiry is: "What are the key factors influencing youth unemployment in the Kurdistan Region of Iraq, and how do they vary across different industries and sectors? An analysis of perspectives from government officials, business leaders, labor unions, and academic experts." The data has been summarized and analyzed to provide insights into the factors influencing youth unemployment in the region.

## **2.2. Interview Findings**

### *2.2.1. Addressing youth unemployment*

Youth unemployment is a significant issue in Kurdistan, according to Dr. Kanar, the General Director of the Ministry of Planning in the KRI. There is a lack of employment opportunities in the private sector, and concerns exist regarding the rights of employees. However, the government is working to update laws to protect employees and promote the private sector. The skills gap is another key factor contributing to youth unemployment. The education system does not provide students with the necessary skills for the job market. The MOP (Ministry of Planning) has updated curricula and offered free vocational training programs to address this issue. The MOP also negotiates with line ministries to implement projects aimed at reducing youth unemployment. MOLSA (Ministry of Labour and Social Affairs) has three main approaches to addressing youth unemployment: job seeker registration, job training, and small loans. The ministry has employment centers across Kurdistan and a website for youth to access job opportunities. The ministry also has nine centers for job training based on market needs. The small loan program, providing loans for young people to start their own projects, although has been put on hold due to the financial crisis caused by ISIS. The Labour Union gives recommendations and suggestions to the Minister of Labor, including supporting vocational training and providing small loans to youth. Dr. Kawa, an academic expert and the previous President of the university of Polytechnic University of Erbil, believes that the lack of training and certification is the main drive of youth unemployment. He suggests looking at Germany and Scandinavian countries as successful examples of technical and vocational education. He emphasizes the need for knowledge in economics to achieve long-term success. While there may be an oversupply of graduates in certain fields, the lack of opportunities is the main issue. Addressing youth unemployment in Kurdistan requires a multi-pronged approach, including updating curricula, offering vocational training programs, providing small loans to youth, and promoting the private sector. Collaborating with international agencies, as Dr. Kawa mentioned, and looking to successful examples from other countries can also be helpful in developing the necessary skills and knowledge for the job market.

### *2.2.2. Reducing youth unemployment*

The issue of youth unemployment in the Kurdistan region requires a comprehensive strategy that includes technical and vocational education, creating new jobs, and improving the situation of the private sector. Dr. Kawa emphasizes the importance of technical and vocational education as a means of preparing students for the labor market. He also suggests opening new and unique departments in universities to help graduates find jobs more easily in the future. However, TVET is divided among three different ministries, making it challenging to develop a cohesive strategy. Dr. Kanar of the MOP highlights the need for updated education programs and curricula to address youth unemployment, but the success of their initiatives is difficult to measure as it is still in the early stages. Mr. Hangaw stresses the need for a strategic plan to organize the labor market of KRG, which includes job centers in every city and town to provide information on job opportunities and match job seekers with potential employers. However, job centers are not yet available in some areas, and the work directories in place lack digital capacity.

Mr. Azmar, the General Director of Ministry of Culture and Youth in the KRI, questions the government's efforts in addressing youth unemployment and highlights the lack of action in providing job opportunities for young people. Education, job development, and efficient labor market structure are all necessary for reducing youth unemployment rates. To solve this problem, we need a well-defined plan that calls for cooperation between government agencies, non- governmental organizations, and international organizations.

### *2.2.3. Education and Training*

The KRI has made efforts to support technical education and vocational education (TEVT) through universities such as The Polytechnic University in Sulaymaniyah, Hawler, and Duhok, which offer technical programs and curricula to prepare students for the labor market. MOHESR (Ministry of Higher Education and Scientific Research) has held workshops and conferences with private sector stakeholders to develop curricula that better prepare graduates for the workforce. However, one critique from the private sector is that graduates have lower quality certificates that do not reflect the skills needed for the job market. The Ministry aims to expand vocational education to include fields such as car and mobile phone repair and to change laws and rules so that people who open shops or workshops in the future need to be certified in their respective fields. Dr. Twana, the General Director of Ministry of Higher Education and Scientific Research in the KRI, notes that any person who has the chance to study in one of the studying institutions of MOHESR can continue their studies in bachelor, master's, or Ph.D., regardless of their background or place of residence. The Ministry facilitates internships and job placement programs for students and graduates through the CDC centers in universities, and students are required to participate in a three-month internship in their third year. However, Dr. Twana notes that more needs to be done in this area, and the Ministry will continue to work on it. Dr. Arif, the Genral Director of Ministry of Labour and Social Affairs in KRI, notes that the ministry coordinates with businesses and organizations to develop vocational training programs. However, private-public partnerships are not yet a cultural norm in Kurdistan, unlike in European countries. Some companies join and sponsor initiatives, while others do not participate due to the lack of cultural acceptance of such partnerships. The government and ministry need to continue their efforts and meetings with companies to promote the culture of private-public partnerships. Dr. Kawa believes that education and training are crucial in reducing youth unemployment in the Kurdistan region. However, the current short training courses offered by the MOHESR, Ministry of Education and Basic Education and Secondary Education, and MOLSA are not well organized and lack necessary facilities and equipment. The issue is compounded by the mindset of parents who do not want to send their children to vocational schools as it is seen as having lower status socially. Nevertheless, Dr. Kawa notes that this mindset is changing, and students are becoming more interested in technical institutes and diplomas in specializations such as medicine. Mr. Bryar (Senior Architect and CEO of SBA Studio – engineering sector), Ms. Dilvin (Recruitment Manager at Pepsi Co. – manufacturing sector), and Ms. Vanya (HR Manager at KAR GP LTD. – oil and gas sector) mention that the companies they work in provides training and development programs for young employees, including internships. However, they complain that the youth are not motivated to learn new things and do not want to develop their skills. They only want to do what they already know and do not aspire to be better than others. This is seen as a big problem, and employers may need to let go of some employees due to this issue. Ms. Dilvin explains that career advancement opportunities for young employees in her company include training, departmental changes, and hard work. She suggests that youth must work on themselves and their skills to create experiences, as most companies do not hire them due to their lack of experience. Volunteering is a helpful option for them.

Ms. Vanya emphasizes the importance of serving oneself, the company, and the community. KAR GP LTD provides support for interns from different universities, including training and supervision from senior engineers. The company also supports the youth and encourages them to broaden their horizons and consider volunteering opportunities.

#### *2.2.4. Labour Market*

Dr. Twana, the general director of the MOHESR, emphasized the ministry's focus on preparing students to create or find jobs on the market rather than finding jobs for them directly. He noted that around 153,200 students graduated in the KRI in 2021 and 2022, making it difficult to employ all of them or distribute them across the government. Therefore, the ministry is shifting towards privatization to create opportunities for students to work in the private sector and contribute to the development of different sectors in the region. The ministry is also placing importance on Technical and Vocational Education and Training (TVET) to prepare graduates with vocational skills that can help them be owners of a vocation on the market. Mr. Azmar, stated that the ministry collaborates with other government agencies and private sector organizations to support youth unemployment and entrepreneurship in the KRI. The ministry works with centers of sports and youth, and other local and international organizations to provide a place and administrative support, and in return, these organizations support the youth in various fields. Mr. Azmar emphasized that their role is not to employ young people but to support them in achieving their goals. Dr. Arif from MOLSA emphasized that discrimination in the labor market is not tolerated in Kurdistan and that all inhabitants have the right to apply for any job they desire. However, private sector hiring depends on the skills, experience, and qualifications of the applicants. The government has implemented Decree 172 to ensure that 75% of workers in each project must be Kurdish, and the remaining 25% can be foreign employees with specialized skills. The ministry provides support for vulnerable and marginalized groups in the labor market such as people with disabilities, women, and refugees. For people with disabilities, the ministry provides a salary and for women, there are special programs to protect them. Pregnant women are guaranteed to come back to work according to the law. A hotline has been established as a resource to address labor-related violations in Kurdistan. Individuals who feel violated and are unable to reach the offices directly can utilize this hotline by providing their address, allowing the appropriate committees to be dispatched to their location and address the issue at hand. The hotline, designated as 5500, aims to provide accessible support and assistance to individuals throughout the region. Dr. Kanar, stated that historically the private sector did not have the desired role in reducing youth unemployment in Kurdistan, but MOP has been implementing programs to change this. The government has set mandates for companies to employ a certain percentage of local people, such as educated youth in agriculture. The Ministry is also looking to promote the tourism sector as a potential area for job creation, but notes that there is a need to develop the necessary skills and education for this industry. Mr. Hangaw, the director of Kurdistan labor union representative, suggests that the main priority for labor unions in promoting the rights and interests of young employees is to raise awareness among employees that there is a syndicate that defends their rights. They recommend a KRG-wide awareness campaign in coordination with the government and affiliated ministries. The labor union also emphasizes the importance of coordination among the ministries of labor and social affairs, higher education, education, and planning to address the skills gap among young workers and improve their access to training and education opportunities. Mr. Bryar from the architect industry and Ms. Dilvin from the manufacturing industry mentioned their respective companies' recruitment processes, which include posting job openings online, evaluating received CVs, and interviewing suitable candidates. Ms. Vanya from the oil and gas industry explained that their company does not advertise job vacancies online and instead directly contacts universities and institutes to receive the CVs and names of

the top graduating students in specific fields. They later shortlist candidates based on their performance in the interview and call them back for acceptance.

#### *2.2.5. Mismatch Between Education and Labour Market*

The mismatch between education and the labor force/job market is a pressing issue in the KRI. Dr. Arif, the general director of MOLSA, highlights the need for coordination between government bodies to address this issue. MOHESR, MOLSA, and the Ministry of Industry have collaborated to create a memorandum of understanding to coordinate their efforts. The government faces challenges in employing all graduates, particularly in fields such as medicine and engineering. Dr. Arif emphasizes the importance of technical education, vocational training, and the middle sector. Furthermore, Dr. Arif stresses the need to teach graduates how to write CVs and prepare for job interviews as he quotes “I have seen some Ph.D. graduates which don’t know how to prepare themselves for a successful interview, in search of a job, or how to write their CV”. Dr. Twana acknowledges the cultural challenge of students having a strong preference for government jobs. To address this, the government needs to change laws and guidelines to encourage students to be self-employed and create their own job opportunities. The recent decision of the Council of Ministers requiring at least 75% of workers in the private sector to be from the Kurdistan Region is a step in the right direction. Dr. Twana emphasizes the need for collaboration with the Kurdish government to change laws and guidelines to help graduates find work easily. Dr. Twana mentions that the Ministry categorizes universities and will only convert degrees for students who study at a university that meets the Shanghai Metrics ranking of 1000 to 2000. The Ministry also uses a system called "Zanko Line" to close departments with less than fifteen student applicants to avoid departments that have limited job opportunities. Mr. Bryar, from the private sector, explains that they have a probation period for new hires to evaluate their work and identify their skill level and areas for improvement. Ms. Dilvin, from another private company, notes that their company continuously provides training to improve their employees' skills but struggles to find qualified candidates among the younger generation and recent graduates due to the low level of education and language proficiency. She advises candidates to seek internships or volunteer opportunities to gain experience. In contrast, Ms. Vanya emphasizes the importance of English language proficiency in the labor market, particularly in industries such as oil and gas, which increasingly attract international companies. Ms. Vanya suggests that universities should focus more on improving students' English language skills.

#### *2.2.6. Challenges faced*

The challenges faced by young workers in the KRI span various industries, including manufacturing, architecture, and the oil and gas industry. Financial crisis, aging equipment, and fast-growing job markets are the biggest obstacles identified by Dr. Arif from MOLSA. Dr. Kawa further explains that weak private sector regulations and a lack of required skills among graduates are challenges faced by businesses in hiring and retaining young employees. The Labour Union faces challenges in attracting young employees due to limited awareness and contact with the unions, and obstacles in forming committees in companies hinder collective bargaining. Additionally, technical issues with programs and a lack of real-life experience are challenges faced by newly graduated students in the architectural industry, according to Mr. Bryar. Ms. Dilvin from the manufacturing industry believes that attracting young talent is hindered by more exciting fields such as AI and e-commerce. In the oil and gas industry, Ms. Vanya believes that the gap between theoretical knowledge and practical skills is a significant challenge in attracting and retaining young talent. Addressing these challenges requires a focus on practical training and internships, developing necessary skills, and strengthening regulations in the private sector.



### *2.2.7. Potential Improvements*

The issue of youth unemployment in the KRI is a significant problem. The Labour Union in the region advises young employees to seek out the syndicate to defend their rights and interests, emphasizing that the labour union to defend the financial rights of workers with business owners. Dr. Kanar from MOP expresses optimism about the future of youth unemployment in the country and mentions that the Ministry is working on different programs to address the issue. Mr. Azmar explains that their organization offers a range of activities designed to support youth development and address various issues such as peace, life skills, gender, health, and employment. The MOHESR is committed to ensuring that the education system remains up to date with the latest developments and trends in different industries and sectors. The Ministry has taken several initiatives, such as obtaining validation for the curricula that students receive and implementing the European Credit Transfer and Accumulation System (ECTS) and the Bologna Process. Dr. Twana from the MOHESR acknowledges the issue of youth unemployment in the KRI and suggests that resolving the issue is not only the task of the MOHESR but requires coordination with the KRG, universities, and affiliated ministries. The MOCY (Ministry of Culture and Youth) faces challenges in promoting culture and youth development in the KRI due to various factors such as the ISIS war and budget constraints faced by the Iraqi government. Mr. Azmar explains that the effectiveness of their ministry's programs and initiatives is measured through feedback obtained from various sources. Additionally, they are working on a law for volunteering to invest in the youth and get an income for them. Overall, the government of the KRI is committed to addressing the issue of youth unemployment and improving the education system. The different ministries are taking several initiatives to address the issue, such as providing activities for youth, working with international organizations, and implementing accreditation programs. However, there are still challenges such as underemployment and pension, retirement benefits in the private sector that need to be addressed.

### *2.2.8. The Youth*

Youth unemployment is a MOCY and the MOLSA have implemented various programs and initiatives to support young people's employment and development. Mr. Azmar from the MOCY explains that the ministry engages with the youth in the region through its centers, directories, and an army of volunteers. The ministry reads the mindset of the youth and works according to their geographic location, as the needs and wants differ between different locations. The youth can easily express their ideas and problems to the ministry by contacting them through their centers' pages and phones. The ministry tries to be helpful to the best of its ability to support the youth and listen to their needs. Dr. Arif from MOLSA discusses several programs and initiatives implemented to support young people in the labor market. These programs include the KAAB and SIYB programs, which focus on training and improving business skills. The ministry also offers a program called "Life Skills" that teaches personal, life, and civilizational skills to help young people handle themselves in government organizations. Another program, "Min Peshangim," where young job seekers are guided on how to prepare a CV, job interview, how to start their own projects, creative thinking, etc., to young individuals interested in working in the labor market. The ministry's professional training programs are based on the labor market's needs, including workshops on CCTV cameras, fixing mobile phones, and solar energy, and a new program on personal services that is unique to Kurdistan. Additionally, the ministry offers courses on event management, electricity, garbage handling, and electronic working.

## 2.3. Questionnaire Findings

For the questionnaire findings, 3 different methods were used to analyze and obtain quantitative data. The first method used is descriptive statistics it is beneficial as it examines and summarizes key characteristics and patterns in the data, providing a comprehensive overview of the data collected. The second method used is the cross-tabulation and chi-square as they enable the exploration of significant relationships between categorical variables. The third and last method used is the binary logical regression model as it allows for the identification and examination of significant predictors. Several tables have been created to summarize the survey results, and these are included in Appendix 3.

### 2.3.1. Descriptive Statistics

The sample consisted of 1031 respondents from the KRI. The age range of respondents was predominantly in the 19-24 category (63.9%), followed by the 25-30 category (29.9%), and the 15-18 category (6.2%) (Table 1). In terms of gender, the majority of respondents were female (60.2%) (Table 2). The largest number of respondents lived in Erbil Governorate (43.0%), followed by Duhok Governorate (30.6%) and Sulaimaniyah Governorate (26.5%) (Table 3). Regarding the highest level of education completed, 47.4% of respondents had completed an undergraduate degree, 26.8% had completed high school, 17.7% had completed an institute degree, 7.1% had completed a postgraduate degree, and 1.1% had completed a PhD degree (Figure 1). The most common field of study among respondents was computer science and IT (9.2%), followed by physical education (8.0%) and engineering (8.1%) (Table 4). In terms of employment status, the majority of respondents (63.5%) were not currently employed (Table 5). Among those who were not employed, 83.2% reported actively seeking employment (Table 6). Of those who had been unemployed since completing their education, 42.0% had been unemployed for more than a year, followed by 15.0% who had been unemployed for 1 to 3 months, and 9.8% who had been unemployed for 3 to 6 months (Table 7). These results provide a comprehensive overview of the demographic and employment characteristics of the sample in the KRI. The predominance of young adults in the sample highlights the importance of addressing the education-employment mismatch among this demographic group. Additionally, the high percentage of respondents actively seeking employment underscores the need for policies and initiatives to promote job creation and economic development in the region.

### 2.3.2. Cross Tabulation and Chi-Square

There are two parts, part one which focuses on the ratio of degree holders working in their field of specialization and part two which focuses on the factors contributing to the mismatch between education and employment.

#### 2.3.2.1. Part One 'the ratio of degree holders working in their field of specialization' 4.3.2.1.1 IV Field of Study & DV Employment in Field of Study

The cross-tabulation shows the frequency distribution of participants based on their field of study and whether they are currently working in their field of study (table 8). The chi-square test indicates that there is no significant association between the two variables. This means that the percentage of participants working in their field of study is not significantly different across different fields of study (table 9). However, it is worth noting that 32.9% of the cells in the table have expected counts less than 5, which could affect the validity of the results (table 10).

##### 2.3.2.1.1. IV Field of Study and DV Satisfaction with Job Opportunities in field of study

The cross-tabulation shows the frequency distribution of participants who have answered both questions related to field of study and satisfaction with job opportunities available in their field of study (table 11). Out of 1031 participants, 581 (56.3%) were not satisfied with the job

opportunities in their field of study, while 450 (43.7%) were satisfied (table 12). The chi-square test results indicate a significant association between the variables with a Pearson chi-square value of 62.055 and a p-value of .002. This indicates that the satisfaction with job opportunities available in their field of study is not independent of the field of study. However, caution should be exercised in interpreting the results since 22 cells (31.4%) have an expected count of less than 5, which is the minimum expected count of 0.44. This violates the assumption of the chi-square test, and thus the results should be interpreted with caution (table 13). Overall, the results suggest that a significant proportion of participants are not satisfied with the job opportunities available in their field of study. Further analysis may be needed to identify the factors contributing to this trend and to develop strategies to improve job opportunities for graduates in their respective fields of study.

#### *2.3.2.1.2. IV Highest Level of Education and DV Job Trainings / Internship in Field of Study*

The cross-tabulation shows the relationship between the highest level of education completed and whether the participants have had any job trainings or internships related to their field of study (table 14). Out of the 1031 participants, the majority had completed an undergraduate degree (n=489) and only a few had completed a PhD degree (n=11). The majority of participants who had job trainings or internships related to their field of study constantly tried to develop their skills and knowledge by their own will (n=549) (table 15). The chi-square test results indicate that there is a significant association between the highest level of education completed and whether participants had job trainings or internships related to their field of study (Pearson chi-square = 53.267, df = 16,  $p < 0.001$ ). The test suggests that there is a relationship between the two variables, indicating that those with higher levels of education completed are more likely to have job trainings or internships related to their field of study. However, it should be noted that 5 cells (20.0%) have expected counts less than 5, so caution should be taken in the interpretation of the results (table 16).

#### *2.3.2.1.3. IV Highest Level of Education and DV Field of Employment*

The cross-tabulation and chi-square test results show that out of 376 participants who answered the question "If yes, in what field are you currently employed in?", 50% of them are currently employed in their field of specialization, while the other 50% are not (table 17 & 18). The chi-square test result indicates a significant relationship between the variables "highest level of education completed" and "employment in field of specialization" with a p-value of less than 0.05. This suggests that the level of education completed may have an impact on employment in the field of specialization (Table 19).

#### *2.3.2.1.4. IV Reason for Employment Difficulties and DV settling for Job Outside of Field of Study*

The cross-tabulation and chi-square test results show that there is a significant association between the reasons for employment difficulties and settling for a job outside of the field of work/study. The majority of the participants who settled for a job outside of their field of work/study did so due to a lack of job opportunities in their field (680 out of 1031 participants). On the other hand, 203 participants did not face any difficulty and did not have to settle for a job outside of their field of work/study (table 20&21). The chi-square test result shows that the association between these variables is statistically significant ( $p < 0.05$ ) (table 22).

### 2.3.2.2. Part Two 'The factors contributing to the mismatch between education and employment'

#### 2.3.2.2.1. IV Highest Level of Education and DV Preparation of Education System

In the tables 23, 24 and 25 cross-tabulation and chi-square test, we can see that the variables are "What is your highest level of education completed?" and "Do you think the education system in the KRI prepared you well for the job market?". The case processing summary shows that there were 1031 valid cases for this analysis. The crosstabulation table shows the frequency distribution of responses for each combination of the two variables. It indicates that 829 respondents (80.3%) answered "No" to the question "Do you think the education system in the KRI prepared you well for the job market?" while 202 (19.6%) answered "Yes". Among the respondents with different levels of education, the highest percentage of "No" answers were given by those with an undergraduate degree (84.2%). The chi-square test was conducted to determine if there was a statistically significant relationship between the two variables. The results show a Pearson chi-square value of 9.794 with 4 degrees of freedom and a p-value of .044. Since the p-value is less than .05, we can conclude that there is a significant association between the two variables. This means that respondents' level of education is related to their perception of whether the education system in the KRI prepared them well for the job market.

#### 2.3.2.2.2. IV Awareness of Policies / Initiatives for Employment / Career Advancement and DV Job Trainings / Internship

The cross-tabulation in table 26 and 27 shows that out of the 1031 participants, 810 (78.5%) are not aware of any specific policies or initiatives in the KRI aimed at supporting employment and career advancements, while 221 (21.5%) are aware. Among those who are not aware, 431 (53.2%) have not had any job trainings or internships related to their field of study, while 209 (25.8%) have not found it easy to find one. The chi-square test in table 28 shows that there is no significant association between awareness of policies or initiatives and having had job trainings or internships related to their field of study (Pearson chi-square = 2.116, df = 4, p = .714). Overall, the results suggest that a majority of participants are not aware of policies or initiatives aimed at supporting employment and career advancements, and that many have not had job trainings or internships related to their field of study. However, there does not appear to be a relationship between these two factors.

#### 2.3.2.2.3. IV Awareness of Policies / Initiatives for Employment / Career Advancement and DV Duration of Unemployment

In this cross-tabulation, we are examining the relationship between two categorical variables: awareness of policies/initiatives aimed at supporting employment and career advancements, and the length of unemployment since completing education. The data was collected from 1031 participants, and all cases were valid (table 29). The chi-square test result shows a significant relationship between the two variables ( $\chi^2(5) = 12.528$ ,  $p = .028$ ). The p-value is less than .05, indicating that we can reject the null hypothesis that there is no association between the two variables and conclude that the alternative hypothesis, that there is a relationship between the two variables, is supported (table 31). Looking at the cross-tabulation table, we see that among those who were aware of policies/initiatives aimed at supporting employment and career advancements, a higher proportion (39%) reported being unemployed for more than a year since completing their education, compared to those who were not aware of such policies/initiatives (30%). On the other hand, a higher proportion (42%) of those who were aware of policies/initiatives reported being employed right after completing their education, compared to those who were not aware (27%) (table 30). Overall, the results suggest that being aware of policies/initiatives aimed at supporting employment and career advancements may be associated with longer periods of unemployment since completing education, but also with a

higher likelihood of being employed right after completing education. However, it is important to note that this is a cross-sectional study, so we cannot establish causality or directionality of the relationship. Further research is needed to explore this relationship in more detail.

#### *2.3.2.2.4. IV Job Seeking Status and DV Experience with Finding Employment Difficulty in field of study*

The cross-tabulation shows the relationship between whether individuals are actively seeking employment and their experience with finding employment in their field of study. The results indicate that out of the 655 individuals who responded, 176 did not experience difficulty finding employment in their field of study, while 479 did. Additionally, out of those who are not actively seeking employment, 44 did experience difficulty finding employment in their field of study while 66 did not. On the other hand, out of those who are actively seeking employment, 435 experienced difficulty finding employment in their field of study while 110 did not (table 32 & 33). The chi-square test shows that there is a significant association between the variables "actively seeking employment" and "experience with finding employment in their field of study". The p-value of the Pearson chi-square test is less than .05, which indicates that the association is statistically significant. This means that there is a relationship between actively seeking employment and experiencing difficulty finding employment in their field of study (table 34).

#### *2.3.3. Logistic Regression*

##### *2.3.3.1. The Ratio of Degree Holders Working in Their Field of Specialization'*

The output of tables 35, and 36 is the frequency table of the categorical variable "What is your field of study?" with the count of responses for each category and the parameter coding used for each category in logistic regression analysis. The variable has 34 categories representing different fields of study found in table 37, such as Agriculture, Psychology, Engineering, Law, etc. The first column shows the category names and the second column shows the frequency or count of responses for each category. The remaining columns show the parameter coding used for each category in logistic regression analysis, with each column representing a different category. This coding scheme is used to create binary variables for each category that can be used as predictors in the logistic regression model. The classification table and logistic regression analysis output in table 38 shows the percentage of correct predictions for whether or not individuals are currently working in their field of study. The logistic regression analysis provides information about the variables that are included in the model and those that are not included. The "Variables in the Equation" in table 39 shows the coefficients, standard errors, Wald statistics, degrees of freedom, p-values, and odds ratios for the variables included in the model. The constant has a negative coefficient (-0.758), indicating that individuals are less likely to be working in their field of study. Individuals' field of study is not affected by other variables in the model. The "Variables not in the Equation" in table 40 shows the scores, degrees of freedom, and p-values for the variables that were not included in the model. Several variables have significant effects on whether or not an individual is working in their field of study, including AgeRange, EmploymentStatus, JobTrainingInternshipInFieldOfStudy, and HighestLevelOfEducationCompleted. However, these variables were not included in the model. The logistic regression analysis suggests that the model has limited predictive power for whether individuals are working in their field of study, with an overall percentage of correct predictions of 68.1% and no significant effects on the outcome variable. The omnibus tests of model coefficients in table 41 shows the results of a chi-square test, which tests the overall significance of the predictors in the model. The results indicate that the model as a whole is significant, with a p-value of .000. The model summary in table 42 shows information about the fit of the model. The -2 log likelihood value represents the goodness-of-fit of the model,

with lower values indicating a better fit. The Cox & Snell R Square and Nagelkerke R Square values indicate the proportion of variance in the dependent variable that is explained by the model, with values closer to 1 indicating a better fit. In this case, the values are .198 and .278, respectively, which suggests that the model explains a moderate amount of variance in the dependent variable. The classification table in table 43 shows how well the model predicts the outcome of interest. The observed and predicted values are displayed, along with the percentage of cases that were classified correctly. In this case, the model correctly classified 75.3% of cases. The "variables in the equation" in table 44 shows the results of the logistic regression analysis. Each predictor variable is listed, along with its coefficient, standard error, Wald statistic, degrees of freedom, significance level, and exponentiated coefficient (Exp(B)). The exponentiated coefficient represents the odds ratio, which indicates the change in odds of the dependent variable given a one-unit increase in the predictor variable. Predictor variables with a p-value less than .05 are considered statistically significant in this analysis.

#### *2.3.3.2 The Factors Contributing to the Mismatch Between Education and Employment*

The other purpose of the survey was aimed to investigate the factors influencing employment difficulties among university graduates in the KRI. The analysis was conducted using binary logistic regression. The results of the bivariate analysis in table 45 and 46 showed that all the independent variables were significantly associated with the dependent variable, which was difficulty finding employment in the field of study. The variables included in the analysis were age range, gender, governorate of residence, highest level of education completed, field of study, employment status, method of job search, duration of unemployment, employment in field of study, reason for employment difficulty, job training/internship in field of study, and settling for a job outside of the field of work/study (table 47). The results of the multivariate analysis showed that several variables were significant predictors of difficulty finding employment in the field of study (table 48). These variables included gender, highest level of education completed, reason for employment difficulty, settling for a job outside of the field of work/study, and awareness of policies/initiatives for employment/career advancements (table 49 and 50). The model had a good overall fit. The classification table in table 51 showed that the model correctly classified 81.8% of cases, while the omnibus tests of model coefficients in table 52 showed that the model was a good fit. The variables in the equation in table 53 included age range, gender, governorate of residence, highest level of education completed, field of study, employment status, method of job search, duration of unemployment, employment in field of study, reason for employment difficulty, job training/internship in field of study, settling for a job outside of the field of work/study, awareness of policies/initiatives for employment/career advancements, preparation of education system for job market, effect of economy/political situations on job market, and consideration of leaving KRI for employment. Overall, the analysis suggests that several factors are associated with difficulty finding employment in the field of study among university graduates in the KRI, including gender, education level, and awareness of policies/initiatives for employment/career advancements.

### **3. DISCUSSION**

The issue of youth unemployment in the Kurdistan region requires urgent attention and effective solutions to address the economic and social challenges facing young people. The study consists of two research questions. The first question aims to determine the current ratio of degree holders working in their field of specialization in the Kurdistan Region of Iraq and identify the factors contributing to the education-employment mismatch in the region. The second question focuses on understanding the key factors influencing youth unemployment in the region, specifically examining how these factors vary across different industries and sectors by analyzing the perspectives of government officials, business leaders, labor unions, and

academic experts. This research aims to identify areas for improvement and provide insights to guide future policy and program development. Ultimately, the study aims to develop effective strategies to reduce youth unemployment, improve the education system, and enhance the economic and social well-being of the region's youth. Let's begin by an overview of the current survey, conducted from the 1031 respondents. The majority of the respondents were aged between 19-24 (63.9%) followed by the age range of 25-30 (29.9%) (table 1), the majority of them (47.4%) have completed an undergraduate degree (figure 1) from the respondents 63.5% reported that they were currently not employed and that 83.2% are actively seeking employment (table 6), and (42%) of those who have been unemployed, were unemployed for more than a year since completing their education (table 7). This gives us an overview of the current state of the youth in the KRI. It's been mentioned by Jiyad et al., and, Baser & Fazil that the KRG's employment record is poor, with young people underrepresented in the public sector and the private sector dependent on the public sector. Prior to the 2014 economic crisis, the KRG planned to expand the public sector, but the economic crisis and ISIS war forced them to freeze public employment and impose harsh austerity measures. In order to overcome such economical issues, as seen in the interviews conducted the MOHESR is shifting towards privatization to create opportunities for students to work in the private sector and contribute to the development of different sectors in the region. Similarly, MOCY collaborates with other government agencies and private sector organizations to support youth unemployment and entrepreneurship in the KRI. MOLSA has ensured that Pregnant women are guaranteed to come back to work according to the law and that it has implemented Decree 172 to ensure 75% of workers in each project must be Kurds and provides support for vulnerable and marginalized groups in the labor market. However, it is crucial for the ministry to actively monitor whether private companies are complying with these laws and regulations, particularly considering that the majority of individuals depend more on the public sector as they lack trust in the private sector. During the interview with Dr. Arif, GD of MOLSA, mentioned the 'Min Peshangim' program where they provide courses for job seekers aimed for career advancement and the existence of a governmental website where all companies can upload their vacancies aimed at supporting job seekers. In contrast, when interviewing the business leaders, Ms. Dilvin, Mr. Bryar, and Ms. Vanya, their company's recruitment process is through posting job openings online on the company's platforms, evaluating CVs, and interviewing suitable candidates. To further enhance the job search process for job seekers, MOLSA should consider enforcing a law or regulation requiring companies to post their job vacancies not only on their own websites but also on the ministry's website. This would offer job seekers a wider range of opportunities and improve the effectiveness of the government's job search platform. Moreover, to the survey conducted with 1031 participants, 78.5% were not aware of any specific policies or initiatives in the KRI aimed at supporting employment and career advancements, while only 21.5% were aware. Among those not aware, 53.2% had not received job trainings or internships related to their field of study, while 25.8% found it difficult to secure them. Therefore, it is evident that MOLSA needs to work towards promoting and ensuring effective implementations of such initiatives to demonstrate the ministry's commitment to supporting the youth. In the KRI, the mismatch between education and the labor market has become a critical issue. MOHESR, MOLSA, and the Ministry of Industry have collaborated to create a memorandum of understanding to address this issue. To further address this challenge, the government needs to change laws and guidelines to encourage students to be self-employed and create their own job opportunities. The MOHESR has taken some measures to address the mismatch, such as categorizing universities and closing departments with less than fifteen student applicants. Private companies can play a crucial role in providing on-the-job training and support for new hires while emphasizing personal improvement and skill-building through courses and staying up to date with industry trends.

Additionally, during the interviews, Mr. Bryar mentioned that graduates should focus on gaining experience through internships or volunteer opportunities, Ms. Vanya emphasized the importance of improving language proficiency, particularly in English, and Ms. Dilvin mentioned the need to develop personal and professional skills. Furthermore, a survey conducted among 1031 participants showed that 80.3% of respondents answered "No" when asked if they thought the education system in the KRI had prepared them well for the job market. The results of a multivariate analysis revealed that several factors, including gender, education level, reason for employment difficulty, settling for a job outside of the field of work/study, and awareness of policies/initiatives for employment/career advancements, were significant predictors of difficulty finding employment in the field of study. Another cross-tabulation analysis showed that there is a significant association between the respondents' level of education and their perception of whether the education system in the KRI had prepared them well for the job market. Moreover, out of those who are actively seeking employment, 435 experienced difficulty finding employment in their field of study while 110 did not. These findings suggest that several factors are associated with difficulty finding employment in the field of study among university graduates in the KRI, including gender, education level, and awareness of policies/initiatives for employment/career advancements. The government and private sector should work together to address these issues and create opportunities for the youth to succeed in the labor force. The KRI has recognized the importance of technical education and vocational training (TEVT) through universities. MOHESR has conducted workshops and conferences with stakeholders from the private sector to develop curricula and expand vocational education to encompass fields like car and mobile phone repair. However, private-public partnerships are not yet ingrained in the culture of Kurdistan. Despite that the government and ministry need to continue their efforts and meetings with private stakeholders to promote the culture of private-public partnerships. Dr. Kawa emphasizes the significance of education and training in reducing youth unemployment in the region. Nevertheless, the current short training courses offered by the MOHESR, Ministry of Basic and Secondary Education, and MOLSA suffer from inadequate organization and lack of necessary facilities and equipment. Furthermore, concerns have been raised by Mr. Bryar, Ms. Dilvin, and Ms. Vanya, who highlight the lack of motivation among young individuals to learn new skills and develop their abilities, despite the provision of internships in their respective companies. Furthermore, the current ratios of degree holders working in their field of specialization in the Kurdistan Region of Iraq were examined through binary regression analysis. Frequency tables and parameter coding were used to create binary variables for each field of study, representing predictors in the logistic regression model.

#### **4. CONCLUSION AND RECOMMENDATIONS**

This study delved into the pressing issue of the education-employment mismatch in the Kurdistan Region of Iraq, offering valuable insights into addressing this challenge. The research questions focused on understanding the key factors influencing youth unemployment in the region and exploring the current ratio of degree holders working in their field of specialization, as well as identifying the factors contributing to the education-employment mismatch. To ensure a comprehensive and rigorous analysis, primary data was collected through an online survey questionnaire and in-person interviews with various stakeholders, including government officials, business leaders, labor unions, and academic experts. This approach allowed for a deeper understanding of the perspectives and experiences of these key actors in the labor market it's also vital to recognize the limitations of relying solely on secondary data in this study. The availability of recent and specific literature focusing on the KRI was limited, which restricted the extent to which secondary data could be utilized. Consequently, primary data collection was crucial in providing reliable and up-to-date information on the research questions at hand.



The findings of this study suggest several strategies to address the education-employment mismatch in the KRI. Collaborative efforts between MOHESR, MOLSA, and the Ministry of Industry have resulted in the creation of a memorandum of understanding, emphasizing the need for legislative changes and guidelines to encourage self-employment and entrepreneurship among students. The Ministry of Higher Education and Scientific Research's policy of closing departments with fewer than 15 students limits the potential for introducing innovative programs, including but not limited to hospitality, data science and big data analytics, renewable energy engineering, and robotics and artificial intelligence. Embracing such programs not only diversifies the academic landscape but also stimulates the economy by paving the way for emerging sectors and generating novel employment opportunities. The current academic landscape often compartmentalizes knowledge into silos, which might not reflect the multifaceted nature of today's job market. Introducing cross-disciplinary programs can bridge this gap. For instance, merging IT with Agriculture can give birth to AgriTech curricula, focusing on tech-driven modern farming solutions. Such combinations not only enrich the academic offerings but also prepare students for hybrid roles in the industry, making them more adaptable and relevant to the ever-evolving job market. While global challenges like climate change, energy sustainability, and food security are universal, their manifestations can vary regionally. Universities in the Kurdistan Region of Iraq can introduce research incubators that focus on these global issues but tailor solutions specific to the region's unique climatic and geographic conditions. Such an approach not only elevates the region's contribution to global problems but also ensures that the solutions are immediately applicable and relevant to local industries. In addition, it is crucial for MOLSA to develop comprehensive rules and regulations, robust social security plans, attractive retirement benefits, and employee initiatives that incentivize individuals to pursue employment in the private sector. This is particularly important given the current predominance of public sector employment among the labor force. By implementing policies that make the private sector more appealing to public sector employees, MOLSA can foster a shift towards private sector employment, thereby diversifying the labor market and reducing the strain on the public sector. Furthermore, MOLSA should enforce regulations mandating companies to post job vacancies on both their own platforms and the Ministry's website, promoting inclusivity and accessibility in the job market. Additionally, active promotion of existing programs like the government's job-seeking website and "Min Peshangim" among students and job seekers can enhance job search efforts and provide valuable resources for finding employment and developing skills. It is recommended that the inclusion of essential information, such as the hotline number 5500, which is dedicated for employees to report any violence which may occur at work, be mandated in every employee contract. Furthermore, there should be monitoring mechanisms in place to ensure compliance with this requirement. By incorporating this information into employment contracts, it will contribute to a sense of security and provide reassurance to the labor force, encouraging individuals to consider employment opportunities in the private sector. Moreover, the importance of private companies in providing on-the-job training, supporting skill development, and fostering personal improvement has been highlighted. Graduates are encouraged to gain practical experience through internships or volunteer opportunities, while also focusing on improving their language proficiency, particularly in English. Due to various emergency situations such as the ISIS war and financial crisis, the MOP has faced significant challenges in implementing their proposed plans. However, it is crucial to actively monitor the progress of these plans and ensure their implementation by other relevant ministries. It is imperative to assess the labor market's needs and align the curriculum of schools, universities, and TVET programs, accordingly, ensuring the quality of education meets the demands of both graduates and employers in terms of job opportunities and qualified candidates.

By establishing effective inter-ministerial coordination and accountability mechanisms, the Kurdistan Regional Government can facilitate the timely and successful implementation of these crucial plans, contributing to the improvement and advancement of the education system and workforce development in the region. Strengthening the role and visibility of labor unions as effective job centers, where individuals can seek support and guidance during work-related challenges and periods of unemployment, is essential. Collaborative efforts among the government, MOLSA, and labor unions are crucial in promoting the significance and relevance of labor unions to the public. Increased awareness and recognition of the vital role played by labor unions in advocating for workers' rights and ensuring fair labor practices are important steps towards enhancing their impact and relevance in the labor market. In conclusion, this study has shed light on the challenges faced by the labor market in the KRI, particularly the education-employment mismatch. By utilizing primary data and considering the perspectives of various stakeholders, valuable insights and recommendations have been provided to address this issue. However, further research and policy development are necessary to effectively tackle youth unemployment and create a conducive labor market environment in the Kurdistan region.

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