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CONTENTS

A Study on Entrepreneurship and Growth Nexus in High and Low-Income Countries - The Application of Panel Regression Estimation

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SUMMARY

While common sense would suggest that entrepreneurship and economic growth are positively related, it remains unclear whether entrepreneurship is a primary predictor of economic growth conceptually and empirically. Evidence from the literature has revealed a mixed result. Some authors conclude that entrepreneurship drives economic growth positively and significantly. However, others found an inverse relationship between entrepreneurship and growth. Within the paper's framework, entrepreneurship's actual impact on growth across some selected high- and low-income countries has been brought to light. The discussion starts by measuring the degree of association among the variables across the selected clusters of countries. A panel estimation technique, more specifically the Generalized Methods of Moments (GMM) technique, is adopted to make the comparison. Data on 39 high-income countries as well as 24 low-income countries from the period of 1999 to 2019 were considered. It was observed that entrepreneurship positively impacts growth across high-income countries. However, entrepreneurship does not necessarily aid growth within low-income countries.

Keywords: Entrepreneurship; Economic growth; High-income countries; Low-income countries; Panel estimation.
Journal of Economic Literature (JEL) codes: L26; O12
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INTRODUCTION

From the eighteenth until the mid-nineteenth century, creating large-scale industries (the so-called Industrial Revolution) was a key driver of economic growth (Burns, 2011). Most of these large-scale enterprises benefited from economies of scale and were considered more efficient. As a result, most economies, particularly industrialized ones, placed a premium on the growth and expansion of huge corporations. In contrast, very little or no attention was given to micro, small, and medium-sized businesses. Notwithstanding the advantages of these large-scale businesses on economic growth, they became unpopular after some historic events. History Crunch (2018) reports that events like the economic crises, the great depression, global competition, and even technological advancement led to the dwindling of the industrial era. Due to this, unemployment rates began to rise, leading to a fall in revenue margins and enormous output losses.

Consequently, in recent years, entrepreneurship has emerged as a major concern, and the focus has switched away from large-scale manufacturing and industrialization toward entrepreneurship. Baumol (2010), Peneder (2009), and other proponent writers have all made similar arguments. In fact, bigger economies like the United States (US) and the United Kingdom (UK) saw the need to encourage the growth of micro, small, and medium-scale enterprises. Their governments started to make policies that stimulated the pursuit of small business (Persson et al., 2006). Other nations also saw the impact of this move on the economy and followed that policy. Although it has been proved that entrepreneurship is an essential tool for growth and development in these economies, whether the influence of entrepreneurship on growth is the same across various

countries with differences in the macroeconomic environments, differences in socio-cultural backgrounds, differences in the political and institutional context and so on, remained an unanswered question. Specifically, does entrepreneurship equally play a positive and significant role in economic growth across high and low-income countries?

The problem statement, therefore, emanates from a gap in the extant literature. There is an undoubtable fact that the number of studies and research works on entrepreneurship is growing. For instance, Acs and Varga (2005), Acs and Armington (2004), Carree and Thurik (2008), Audretsch and Keilbach (2004) etc. elaborate on entrepreneurship's high and significant impact on growth in developed countries. Just a limited number of authors focus on the entrepreneurship growth nexus amongst developing countries, for example, Ogunlana (2018), Omoruyi et al. (2017) and Adusei (2016). The conflict, therefore, stems from the findings of the previous research works. Whereas some authors, Acs and Varga (2005), Carree and Thurik (2008), and Audretsch and Keilbach (2004) found an inverse relationship between entrepreneurship and growth in developing or low-income countries, others, Adusei (2016) and Omoruyi et al. (2017) found a rather positive and significant impact of entrepreneurship on economic growth in developing countries too. The mixed results draw attention to the importance of the topic.

This paper will further investigate entrepreneurship's role in economic growth, focusing on some selected high and low-income countries. The aim is not to provide a conclusive solution but to find the reasons behind the contradictory research results and suggest some operational approaches to understanding or tackling it. Most importantly, this paper seeks to bring a novel perspective into the existing literature and also tries to elucidate the ambiguities in the literature. Understanding the impact of entrepreneurship across diverse economies helps decision-makers to develop specific entrepreneurship-growth policies. With these policies, long-term and sustained economic development can be reached.

EMPIRICAL LITERATURE REVIEW

Entrepreneurship is one of the most widely discussed concepts in economics. The concept's precise meaning is uncertain, making the academic discourse difficult. Entrepreneurship has a myriad of definitions; for instance, Schumpeter (1934), Dao (2018), and Hornaday (1992), as well as Lumpkin and Dess, (1996) have used innovation as a focal point to define entrepreneurship. By extension, Kirzner (1997), Drucker (2007), and Shane and Venkataraman (2000) have relied on the concept of opportunity to explain entrepreneurship. Entrepreneurship, according to Stevenson and Jarillo (1990), is the process through which people look for possibilities, whether on their own or as a part of an organization, regardless of the resources available to them at the moment. According to the Global Entrepreneurship Monitor (GEM), any effort at new business or venture creation, such as a new business organization, self-employment, or the extension of an existing business, by an individual, a team of individuals, or an established business is entrepreneurship (GEM Reports, 2001).

One significant work worth mentioning when issues of entrepreneurship and growth are being discussed is the work of O'Connor et al. (2018). In their work "The Role of Entrepreneurship in Stimulating Economic Growth in Developing and Developed Economies," they investigate how different measures of entrepreneurship can explain economic growth. Using the Gross Domestic Product (GDP) per capita as the proxy for economic growth and fourteen indicators of entrepreneurship to evaluate entrepreneurial activity, entrepreneurial attitudes, and entrepreneurial aspirations, they examine how entrepreneurship varies across high-income and middle/low-income countries using 55 countries over eight years (2004-2011). The results showed that entrepreneurship is an essential tool for economic growth. However, the different types of entrepreneurship (entrepreneurial attitude, entrepreneurial activity, and entrepreneurial aspirations) have a negative relationship with growth in middle/low-income countries and a strong positive relationship in high-income countries. According to O'Connor et al. (2018) the main reason is that entrepreneurship's impact on growth varies based on the stages of economic development. From the results obtained, it was concluded that entrepreneurial attitude is positively correlated with GDP per capita.

In contrast, entrepreneurial activity is negatively related to the GDP per capita. However, their observation showed that in high-income countries, positive entrepreneurial attitudes directly influence economic growth. On the other hand, the type of entrepreneurial activity in the middle/low-income countries also had an inverse relation to growth. In most high-income countries, most individuals have the natural enthusiasm to become entrepreneurs; this is the entrepreneurial attitude. This is because the individual's readiness to explore new opportunities, self-efficacy, and entrepreneurial role models are easy to achieve. The same cannot be said for low-income countries, as they lack an entrepreneurial attitude, and even if people start businesses, their entrepreneurial activity is driven by necessity.

Following from the above Acs (2010) compared the relationship between entrepreneurship and growth using three stages of growth. Acs (2010) adopted the three stages of development model of Porter et al. (2002). These factors are the factor-driven stage, efficiency-

driven stage, and innovative-driven stage, and established a connection between entrepreneurship and growth for developed and developing countries. Porter et al. (2002), explain the three stages of development as follows; the first stage, which is the factor-driven stage, is mainly associated with high levels of agricultural self-employment, low cost of production of goods, and minimum value-added products. In the second stage of development, which is the efficiency-driven stage, countries are characterized by competent production of goods and services in large markets, which allows them to enjoy economies of scale. Countries in this stage are mostly noted for industrialization, manufacturing of goods, and provision of essential services. Onn the other hand, the innovation-driven stage is marked by an upsurge in knowledge-demanding activities (Romer, 1990). In the innovation-driven stage, knowledge provides the critical input, and also, much focus is on technology. With this assertion, Acs (2010), concluded that the relationship between entrepreneurship and growth varies across countries with different growth stages. Acs (2010), posits that entrepreneurship's impact on growth is minimal at the factor-driven stage; however, when the economy progresses to the efficiency and innovative-driven stages, the impact of entrepreneurship on growth increases as well. Entrepreneurial activity increases quickly through the efficiency-driven stage and climaxes at the innovation-driven stage, which has a massive impact on growth as well.

Stam and Van-Stel (2009) examine the impact of entrepreneurship on economic growth at the country level, focusing on high-income, transition, and low-income nations. To obtain data from a wide range of countries to enable them to make a good cross-country analysis, they use data from the Global Entrepreneurship Monitor (GEM). Based on this, they could make a comparative analysis on high-income and transition countries (China, Russia, Poland, Hungary, and Slovenia) as well as low-income countries (Brazil, Chile, Argentina, South Africa, Mexico, Thailand, and India). Stam and Van-Stel (2009) realized that most previous authors used self-employment or new firm registration to measure entrepreneurship. However, this was not a reliable indicator when applied to developing countries (low-income countries). Hence, they introduced a new indicator, Young Businesses (YB), into the equation and defined it as "the percentage of the adult population that is the manager/owner of a business that is less than 42 months old (a young business)". Using OLS regression, the YB for the high, transition, and low-income countries were used as independent variables at each country level. A simple model was therefore created, as shown below.

$$GDP_{it} = a + b1\ YBrich_{t-1} + c1\ YBtransition_{t-1} + d1\ YBpoor_{t-1} + e \quad \ldots \quad (1)$$

The primary conclusion was that entrepreneurship does not affect economic growth in low-income countries, but this was in contrast to transition and high-income countries, where especially growth-oriented entrepreneurship seems to contribute strongly to macroeconomic growth. This is because entrepreneurship in the developing countries is mainly driven by necessity. As explained by Acs (2010), self-employment is often the common occupational choice in most developing countries with high unemployment rates. In short, even though YB was introduced into the equation as a new indicator, it does not erase the fact that the percentage of the adult population that owns businesses in low-income countries is necessity-based entrepreneurship and not growth-oriented entrepreneurship.

Vinco et al. (2016) also test the impact of entrepreneurship on growth with much focus on developed and developing countries. They, however, emphasize that entrepreneurship contributes to growth in diverse economies due to differences in the features of the macroeconomy, differences in entrepreneurial activity, and so on. They outline three main types of entrepreneurship: Opportunity Entrepreneurial Activity (OEA), High-expectation Entrepreneurial Activity (HEA), and Necessity Entrepreneurial Activity (NEA). They then study the impact of the different kinds of entrepreneurship mentioned above on economic growth by comparing 22 developed and developing countries (14 developed and eight developing countries) over three years. Similarly, their results show the effect of entrepreneurship on economic growth in developed countries is higher than that of the developing countries. To attain these results, they specified a regression model as shown below:

$$GDPG = b_0 + b_1 GCF + b_2 FDI + b_3 LF + b_4 OEF + b_5 HEA + b_6 NEA \quad \ldots (2)$$

Where GDPG is the GDP Growth Rate (dependent variable), GCF is the Gross Capital Formation, FDI is Foreign Direct Investment, LF is Labour Force, OEA is Opportunity Entrepreneurial Activity, HEA is High-expectation Entrepreneurship, and NEA is Necessity Entrepreneurial Activity. With the help of the

hierarchical multiple regression approach, they found that in the developed countries, the highest impact on economic growth was Opportunity Entrepreneurial Activity (OEA), followed by High-expectation Entrepreneurial Activity (HEA), and the lowest impact was Necessity Entrepreneurial Activity (NEA). With regards to the developing countries, the highest impact on growth was High-expectation Entrepreneurial Activity (HEA), followed by Necessity Entrepreneurial Activity (NEA), and the lowest was Opportunity Entrepreneurial Activity (OEA). Consequently, it can be summarized that entrepreneurship symbolizes an increasing driving force of economic growth. However, its contribution differs considerably for developed and developing countries. Bruns et al. (2017) also argue in favour of the motion and concluded that, using a sample of 107 European regions from 16 EU member states, they accept the hypothesis that multileveled entrepreneurship promotes regional growth in advanced countries.

Using the Generalized Method of Moments (GMM) as an adopted methodology Mthanti and Ojah (2018) illustrate how institutions and human capital encourage entrepreneurship, aiding economic growth and development. It is interesting how Mthanti and Ojah (2018) begin by providing solid evidence for Adam Smith and Joseph Schumpeter's well-known view that human capital and institutions must be strengthened for the economy to grow in the long run. They propose the Entrepreneurship Orientation (EO) using the Generalized Method of Moments as the basic model, which consists of innovativeness, risk-taking, and proactiveness. They utilize the Generalised Method of Moments (GMM) and a sample of 93 nations from 1980 to 2008 to evaluate institutions and human capital as potential determinants of so-called Schumpeterian entrepreneurship. From the broader literature, however, institutional variables and human capital act as major determinants of growth (Barro, 2000; King & Levine, 1993; Acemoglu et al., 2001), but from the work of Mthanti and Ojah (2018), the major conclusion drawn is that institutions and human capital are seen as catalysts which boost entrepreneurship and in turn aids growth. From the work of these authors, we can critically observe that the causal trend for growth to occur is from institutional growth to human capital growth and then to productivity-enhancing entrepreneurship. According to these authors, we will gradually approach economic growth once this pattern is followed. With the help of the GMM, the overall sample of 98 countries suggests that the quality of institutions, reflected in the reduction of corrupt activities and the development of the banking sector, enhances Entrepreneurship Orientation (EO). On the other hand, human capital has a strong positive correlation with EO, is robust to controlling for institutional quality, and generates economic growth.

Based on the preceding literature, this study adopts a panel estimation approach. It specifies the Generalized Method of Moments (GMM) model, as shown in equation 5 below. Some specific variables of interest like self-employment, Domestic Credit to Private Sector, Employment to Population Ratio, Inflation, Savings, Labour Force Participation Rate, and Economic Openness were used to analyse entrepreneurship and growth across high- and low-income countries. These variables were selected based on the evidence from the literature as well as the availability of data in the respective databases.

METHODOLOGY

To analyze the role of entrepreneurship in economic growth, and more specifically, to analyze the degree of responsiveness of entrepreneurship on economic growth across a cluster of high and low-income countries, a more robust estimation technique is required. A Multilevel modelling is preferred in this situation since it provides a method for dealing with clustered or grouped data (Browne & Rasbash, 2004). Thus, the system Generalized Methods of Moments (GMM) approach is adopted to examine the impact of entrepreneurship on economic growth within the framework of this paper. The concept was formalized by Hansen (1982) and has since been popularized by Arellano and Bond (1991). The system GMM is an improved version of the difference GMM and as such, it is proven to be more efficient. The original version of the model takes the form:

$$y_{it} - y_{i,t-1} = \theta + X'_{it}\gamma + \varphi_t + u_{it} \quad \dots (3)$$

Correspondingly,

$$y_{it} = \theta + \tilde{\rho} y_{i,t-1} + X'_{it}\gamma + \varphi_{it} + u_{it} \quad \dots (4)$$

Transforming this model, the specification of the model to be used in the study can be written as:

$$lnGDPPCG_{it} = \theta + \tilde{\rho}(lnGDPPCG)_{i,t-1} + \gamma(lnSELF)'_{it} + \varphi(controlVar)_{it} + u_{it} \quad (5)$$

From equation 4, y is the natural logarithm of the dependent variable (GDP per capita growth as elaborated in equation 5), i is a country, t is a period of time, $\tilde{\rho}$ is coefficient of the lagged dependent variable, X' represents the set of explanatory variables (Self-employment in this context). φ_{it} is the time-specific effect of the controlled variables and $u_{it} = \mu_i + \nu_{it}$, where μ_i is the observable specific effect and ν_{it} is the corresponding error term.

Table 1

Definition of variables

	Variable	Definition	Data Source
Dependent Variable	Economic Growth (Y)	Gross Domestic Product Per Capita Growth (GDPPCG)	WDI, World Bank
Explanatory Variable	Entrepreneurship (X)	Self-employment (SELF)	ILOSTAT database
Control Variables	Domestic Credit to Private Sector (DCPS)	Readily availability of credit to private sector.	IMF
	Employment to Population Ratio (EPR)	Proportion of the population that is employed.	ILOSTAT database
	Inflation (INF)	Increase in prices, as measured by Consumer Price index.	IMF, IFS
	Savings (SAV)	Gross Domestic Savings.	WDI, World Bank
	Labour Force Participation Rate (LFPR)	Percentage of the labour available to work or already working.	ILOSTAT database
	Economic Openness (ECONOPEN)	Sum of imports and exports as a share of GDP	WDI, World Bank

Source: own compilation

The study consists of annual data from 39 high income countries and 24 low-income countries from the period of 1999 to 2019. This sampling frame as well as the variables of interest were chosen based on the availability of data in the respective databases. Also evidence from existing literature as well as the measure of entrepreneurship were taken into consideration.

HIGH INCOME GROUP OF COUNTRIES

Austria, Bahamas, Bahrain, Barbados, Belgium, Canada, Chile, Croatia, Czech Republic, Denmark, Estonia, France, Germany, Hong Kong SAR China, Hungary, Iceland, Ireland, Italy, Japan, Korea Republic, Kuwait, Latvia, Luxemburg, Malta, Mauritius, Netherlands, Norway, Panama, Poland, Portugal, Romania, Saudi Arabia, Singapore, Slovak Republic, Sweden, Trinidad and Tobago, United Arab Emirates, United Kingdom, United States.

LOW INCOME GROUP OF COUNTRIES

Afghanistan, Burkina Faso, Burundi, Central African Republic, Chad, Congo Dem Rep, Ethiopia, Gambia, Guinea, Guinea Bissau, Haiti, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, Sudan, Tajikistan, Togo, Uganda, Yemen Republic.

MAIN FINDINGS

The correlation matrix helps us to measure the degree of association between the variables. More importantly, before conducting the advanced analysis with the Generalized Methods of Moments approach, the correlation matrix diagnoses and summarizes the data between all variables in the dataset. This helps us know if the variables are significantly correlated in the whole system.

Table 2

Correlation Matrix for Low Income Countries

	lnGDPPCG	**lnSELF**	**lnDCPS**	**lnEPR**	**lnINF**	**lnSAV**	**lnLFPR**	**lnECON**
lnGDPPCG	1							
lnSELF	**-0.3324***	1						
lnDCPS	0.2305*	-0.1046*	1					
lnEPR	0.3996*	0.6551*	0.0960*	1				
lnINF	-0.1128*	-0.2208*	-0.2573*	-0.1092*	1			
lnSAV	0.2179*	-0.0842	0.0354	-0.0638	0.0212	1		
lnLFPR	-0.3804*	0.6372*	0.1029*	0.9915*	-0.0829	-0.053	1	
lnECONOPEN	0.0259	-0.1041*	0.1153*	-0.0719	-0.0616	-0.012	-0.113	1

Source: Author's own calculation

Table 3

Correlation Matrix for High Income Countries

	lnGDPPCG	**lnSELF**	**lnDCPS**	**lnEPR**	**lnINF**	**lnSAV**	**lnLFPR**	**lnECON**
lnGDPPCG	1							
lnSELF	**0.3767***	1						
lnDCPS	0.2855*	0.1667*	1					
lnEPR	0.0882*	-0.4083*	0.3121*	1				
lnINF	0.0806*	0.0664	-0.2209*	0.0127	1			
lnSAV	0.0827*	-0.4160*	-0.0377	0.3163*	-0.1477*	1		
lnLFPR	-0.0890*	-0.3609*	0.2898*	0.9594*	0.023	0.2132*	1	
lnECONOPEN	0.2161*	-0.1157*	-0.0913*	0.0416	-0.017	0.4469*	0.0052	1

Source: Author's own estimation (* = significantly correlated variables)

Since GMM models include the lagged dependent variable as one of the explanatory variables, the lag of GDP per capita growth was also included in the model. For the high-income countries, as seen in table 4, it can be observed that past GDP values influence the current GDP values. A percentage change in past GDP values is associated with a 0.317% increase in economic growth at a 1% significant level, all other things being equal. The effect of entrepreneurship (represented with lnSELF) on economic growth was 0.3195 at a 5% statistical significance level. This means that for the cluster of high-income countries, a percentage change in entrepreneurship will lead to a 0.320% increment in economic growth, ceteris paribus. In other words, an increase in entrepreneurship seems to positively impact growth.

Table 4

System GMM results for High-income countries

Variables	Coefficient	P value
L.1 lnGDPPCG	**0.3165*** **	0.000
lnSELF	**0.3195** **	0.033
lnEPR	0.0746	0.970
lnDCPS	**0.4694*** **	0.000
lnINF	**-0.1164** **	0.040
lnSAV	0.0329	0.896
lnLFPR	0.7874	0.728
lnECONOPEN	**0.1328** **	0.032
No. of observations	438	
No. of groups	38	
No. of instruments	14	
Wald chi2(7)	107.91	
AR (1)	0.001	
AR (2)	0.575	
Hansen test	0.131	
Sargen test	0.274	
Group variable	Country	
Time variable	Year	

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

Source: Author's own calculation

For the controlled variables, Domestic credit to the private sector, Inflation and Economic Openness play a significant role in economic growth. The Table 4 shows that a unit change in Domestic credit to the private sector positively impacts growth. That is to say, the availability of funds to the private sector will significantly increase economic growth by 0.469%. Also, it was observed that there is an inverse relationship between inflation and growth. A percentage change in inflation will decrease economic growth by 0.116%. This means that persistent increases in the general price levels do not aid growth. Economic openness and economic growth also move in the same direction. The results further reveal that a percentage change in economic openness is associated with a 0.133% increase in economic growth. Employment to population ratio, savings, and Labour force participation rate positively impact growth, but the values were not statistically significant. Hence, the main conclusion is that entrepreneurship plays a positive and significant role in economic growth and development for the cluster of high-income countries.

From the results of the low-income countries as seen in Table 5, it can be observed that past GDP values have an impact on the current GDP values. A percentage change in past GDP values is associated with a 0.801% increase in economic growth at a 1% significant level, all other things being equal. The effect of entrepreneurship (measured by lnSELF) on economic growth took a different turn, as it can be observed that there is an inverse relationship between entrepreneurship and growth. At a 1% statistical significance level, a percentage change in entrepreneurship results in a fall in growth by 0.157%. This means that for the cluster of low-income countries, a percentage change in entrepreneurship does not necessarily lead to economic growth in the short run, ceteris paribus. Salgado (2005) obtained similar results in his study where he considers 22 OECD countries; "he discovers a positive association between the proposed measure of productive entrepreneurship - the degree of innovativeness of various countries - and economic growth, whereas the alternative measure, based on self-employment, appears to be negatively correlated with economic growth. For the controlled variables, Domestic credit to the private sector, Labour force participation rate and Economic Openness play a significant role in economic growth. From the table, it can be observed that a unit change in Domestic credit to the private sector positively impacts growth. That is to say that the availability of funds to the private sector will significantly increase economic growth by 0.0206%.

Furthermore, it was discovered that a unit change in the Labour Force Participation rate leads to an increase in economic growth by 0.0205%. Regarding economic openness, the results reveal that a percentage change in economic openness is associated with a 0.031% increase in economic growth. The employment-to-population ratio and saving rate positively impacted growth, but the values were not statistically significant. Also, inflation has an inverse relationship with growth but is not statistically significant. Hence, the main conclusion that can be drawn is that entrepreneurship does not aid economic growth and development positively in the short run for the cluster of low-income countries.

Table 5

System GMM results for Low-income countries

Variables	Coefficient	P value
L.1 lnGDPPCG	**0.8013*** **	0.000
lnSELF	**-0.1565*** **	0.009
lnEPR	0.0545	0.931
lnDCPS	**0.0206*** **	0.006
lnINF	-0.0025	0.760
lnSAV	0.0053	0.886
lnLFPR	**0.0205** **	0.018
lnECONOPEN	**0.0309** **	0.045
No. of observations		210
No. of groups		18
No. of instruments		14
Wald chi2(7)		652.42
AR (1)		0.008
AR (2)		0.741
Hansen test		0.631
Sargen test		0.110
Group variable		Country
Time variable		Year

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

Source: Author's own calculation

DISCUSSION AND CONCLUSION

This study's findings show that entrepreneurship generally has a positive and significant impact on growth in high-income countries, but in low-income countries, entrepreneurship does not aid growth. It is interesting to know that the above results conform with some findings in the literature. For instance, O'Connor et al. (2018) found similar results in this work, "The Role of Entrepreneurship in Stimulating

Economic Growth in Developing and Developed Economies". He concludes that entrepreneurship is an essential tool for economic growth. However, the different types of entrepreneurship (entrepreneurial attitude, entrepreneurial activity, and entrepreneurial aspirations) have a negative relationship with growth across middle/low-income countries but a strong positive relation across high-income countries. Stam and Van-Stel (2009) share a similar viewpoint on this argument. According to these authors, entrepreneurship does not affect economic growth in low-income countries; however, entrepreneurship contributes strongly to macroeconomic growth in the transition and high-income countries. In the same vein, Salgado (2005) discovered that the measure of entrepreneurship also plays an important role. According to Salgado (2005), productive entrepreneurship has a positive impact on economic growth as compared with mere self-employment.

The results from both high- and low-income countries vividly demonstrate that it is not necessarily the quantity or number of people who venture into entrepreneurship that is important, but rather the type of entrepreneurship that is practised should be the primary focus. Comparing the results on GDP per capita growth and self-employment for the cluster of countries, as well as evidence from the literature, we can notice that, for the high-income group of countries, entrepreneurship aids growth in a positive and significant manner. However, there is an inverse relationship with growth for the low-income group of countries. This could be attributed to the type of entrepreneurship practised, and evidence from the empirical literature has proven this assertion true. For instance, Valliere and Peterson (2009), using data from the Global Entrepreneurship Monitor (GEM) on 44 countries, found that a major share of economic growth rates in developed countries can be attributed to high-expectation entrepreneurs (entrepreneurs who expect to achieve rapid growth in employment size) who leverage government investments in knowledge creation and regulatory

independence. However, this effect does not exist in developing countries. Baumol (1990) also emphasises that productive entrepreneurship, backed by innovation, leads to growth, while unproductive entrepreneurship, like rent-seeking, does not aid growth. Acs (2010) is also of the view that the so-called opportunity-based entrepreneurship aids growth, but the necessity-based entrepreneurship does not aid growth.

Weighing the pros and cons of the matter, the novel conclusion drawn is that qualitative entrepreneurship, or, simply put, the type of entrepreneurship practised, is necessary for growth to occur but not quantitative entrepreneurship.

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Teacher Attire and Student Impressions: A Closer Look

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SUMMARY

Our choice of clothing has a great impact on how we are perceived by others. The official dress code of the university has changed a lot. From a more formal and exquisite dress code to a range of informal styles, such as business casual and smart casual. This change raises the question of whether dress has an impact on how students develop first impressions and opinions in our campus community. This study, which took place in November and December 2022, involved 414 individuals from a heterogeneous sample who responded to an online questionnaire provided on campus. The basis of this study is the sample, which was carefully selected to represent the age and gender distribution of the university. The main objective of this study is to investigate how students' perceptions and opinions are influenced by lecturers' dress. The results show a complex relationship between what people wear and the perceptions they create. Specifically, a preference for athletic or informal clothing is associated with qualities such as flexibility and directness, while a preference for more elegant and formal clothing conveys qualities such as care and attention to detail. These findings highlight the complexity associated with our assessment and interpretation of teachers' classroom dress codes and shed light on the different facets of first impressions in a university setting.

Keywords: dress code, perception
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INTRODUCTION

In recent years, it has become increasingly difficult for university teachers to motivate students and keep their attention. New teaching strategies that empower Generation Z students to actively participate in the classroom and foster a sense of engagement and responsibility for their own learning are being implemented. Knowledge that can be applied is valuable to Generation Z (Vlasenko et al., 2019). According to Garai-Fodor et al. (2021), these young people are most motivated to grow in the workplace, to express themselves, their knowledge and their ideals. Since childhood, members of Generation Z have been exposed to information and communication technologies, which has led to new socio-cultural changes that affect their personality. Certain specificities need to be considered when designing the learning environment at universities, especially when modern learning outcomes such as the development of entrepreneurial intentions (Gubik & Bartha, 2018) are considered. Generation Z, also referred to as “screenagers” (Tanzilo, 2016), needs to find a balance between their personal and professional lives (Rachmadini & Riyanto, 2020). Witcher et al. (2003, in: Lavin, Davies and Carr, 2010) categorised the qualities of successful university teaching from the students' perspective into the following nine qualities, ranked from most to least important: (1) student-centred; (2) knowledgeable about the subject, (3) professional, (4) enthusiastic about teaching, (5) effective in communication, (6) accessible, (7) competent in teaching, (8) fair and respectful, (9) provides appropriate feedback on performance.

We investigated how students' perceptions are influenced by the appearance of university lecturers during their studies. Do clothes make the man? Do students have a different opinion if the lecturer is sporty or, on the contrary, elegant? Since national scholars have not yet studied this question, most of the literature on this topic comes from other countries. We are curious about the common and recognised attire of a university researcher and teacher because there are some professions that, when we hear them, we automatically

associate with a certain attire. According to protocol experts, “smart casual” or “casual” clothing is preferred over jeans because it is more refined (heilemann.hu, 2018). In the workplace, casual wear expresses one's style, respect, and commitment. The key to success is to demonstrate professionalism and reliability with a neat and acceptable appearance. There is a dress code that is expected at work, that represents the image of the company and is compatible with the company culture. In fact, clothing contributes to the overall image of the company and helps to establish the corporate identity. A uniform appearance strengthens team spirit and promotes a sense of belonging. According to Locksmith (2020) creating your own style is a fantastic way to express yourself, while it is actually a very useful communication tool, almost like a language of your own that conveys a lot about you to others, either instead of language or in addition to it.

The aim of our study is to find out what styles of dress students prefer and how the appearance of their lecturers influences their perception of the university. We developed the following research questions:

Q1: Does the way teachers dress play a role in the first impression they make on students? Does the instructor's clothing influence the student's perception? Does the student care about the instructor's dress?

Q2: What impression do the different styles of dress of the trainers make on the students?

Q3: What types of clothing do students consider appropriate for female and male teachers?

LITERATURE REVIEW

First impressions are formed quickly and influence people's attitudes, expectations, and behaviour (Baranski et al., 2021). During the first encounter, people form an opinion about others in a short time, which often determines their further interactions in the long term. Clothing plays a fundamental role in how a person is perceived (Hester & Hehman, 2023). There is a long history of research in the fields of psychology and sociology on how clothing choices express personality. People's choice of clothing and style of dress conveys a great deal of information about personality traits, emotional states, and interests. Clothing is an important means of expressing personality and identity. From a sociological perspective, clothing is an expression of social norms, roles, and group membership. Certain social groups and cultures have specific styles of dress that contribute to their identity and sense of belonging to a community.

Clothing is an important aspect of communication that can influence perceptions of the wearer's credibility and attractiveness (Dunbar & Segrin, 2012). Perceptions of competence and professionalism are influenced by the style of clothing (Furnham et al., 2013). Clothing reflects a person's personality, lifestyle, and social status. Clothing often contains symbols that represent economic status. Clothing has a significant impact on cognition and influences the processing process that changes the way we interpret objects, people, and events (Slepian et al., 2015). Certain professions, such as healthcare, construction, agriculture or even business, are traditionally associated with certain dress codes. Of course, individual preferences, style, taste, current fashion, and other factors also play a role in the choice of daily clothing. Children in Western countries infer social status from the status of the items worn by the person - for example, blue jeans, backpack - and associate higher status with higher competence and better health (Shutts et al., 2016).

Lecturers' style of dress influences students' perceptions of the quality of teaching in the academic work environment (Slabbert, 2019). An experiment with university students found that when they were shown pictures of people who happened to wear cheap or expensive outerwear, they rated those who wore more expensive clothes as more competent, even though they were asked to ignore the clothes (Oh et al., 2020). A well-dressed lecturer was perceived as knowledgeable, organised, and well-prepared, while an informally dressed lecturer was perceived as friendly, flexible, personable, fair, and enthusiastic (Rollman, 1980 in Kashem, 2019). Regarding the appearance of university lecturers, formal dress was much more frequently used by men as a sign of high status than by women (Mast & Hall, 2004). Formal dress increases perceptions of competence but decreases feelings of friendliness, which lowers interest in attending a course (Oliver et al., 2021). Research by Shepherd and Yeon (2022) shows that students prefer to see their lecturers in what is mentioned as business casual dress, and this is true for both men and women. Furthermore, the findings confirmed that business casual is best for student learning and perceptions of lecturer competence and availability (Shepherd & Yeon, 2022). Mosca and Buzza's (2013) research findings are consistent with this. They show that 72% of students prefer lecturers to wear a casual style and that many feel intimidated by lecturers who wear overly formal clothing. Interestingly, shoes provide more information about certain dimensions of identity than other items of clothing (Gillath et al., 2012).

METHODOLOGY

To answer the research questions, a questionnaire survey (quantitative research) was conducted. The questionnaire was structured in such a way that the specific questions related to the research questions presented earlier were weighted approximately equally. A five-point scale was generally used for the Likert-type questions, except for the rating of impressions of different styles of dress, for which a seven-point scale was used, allowing for a wider range of responses. After

the ten “professional” questions, we concluded the questionnaire with demographic questions. 81.6% had a bachelor’s degree and 6.3% had a master’s degree. In terms of faculties, the largest proportion of students came from the Faculty of Mechanical Engineering and Informatics (29.5%), followed by the Faculty of Economics (24.4%), the Faculty of Law (14.3%), the Faculty of Humanities and Social Sciences (13.3%) and the Faculty of Health Care Sciences (10.1%). The smallest proportions of students in the sample came from the Faculty of Earth and Environmental Sciences and Engineering (5.1%), the Faculty of Materials and Chemical Engineering (2.2%) and the Béla Bartók Faculty of Music (1.2%). The majority of respondents live in a city (37.4%), one third in a county seat (34.1%), one quarter in a municipality (24.2%) and a very small proportion of students come from the capital (4.3%). Data was collected between 1 November and 3 December 2022 using an online questionnaire. Data analysis was mainly carried out with the programmes Excel and SPSS.

ANALYSIS

In the introductory part of the questionnaire, we asked three general questions to find out how important the students found dressing. On a five-point Likert scale, they rated the importance of dressing for first impressions at an average of 4.00 (SD=0.99), the extent to which they are influenced in their opinion by their lecturer's dress (SD=1.15) at 3.39, and the extent to which they care about their lecturer's dress (SD=1.24) at 3.14. This indicates that students consider dressing important, especially for first impressions, but that they care only moderately about their lecturer's dress. To investigate the differences between genders, a t-test for independent samples was conducted, which revealed a significant difference between the opinions of male and female students: the female students are the ones who consider the clothes more important (M_{woman} =4.24; M_{man} =3.76; t(412)=5.085 p < 0.001), they are the ones who are more influenced by their teacher's clothes (M_{woman} =3.62; M_{man} =3.15; t(412)=4.231 p < 0.001) and they are more interested in their teacher's clothes (M_{woman} =3.33; M_{man} =2.94; (t(412)=3.246 p < 0.001).

The next question was about the impression that the more casual/sporty and the more serious/formal dress of the lecturers made on the students. The question was rated on a 7-point Likert scale, where 1 stood for “not at all typical” and 7 for “definitely typical”.

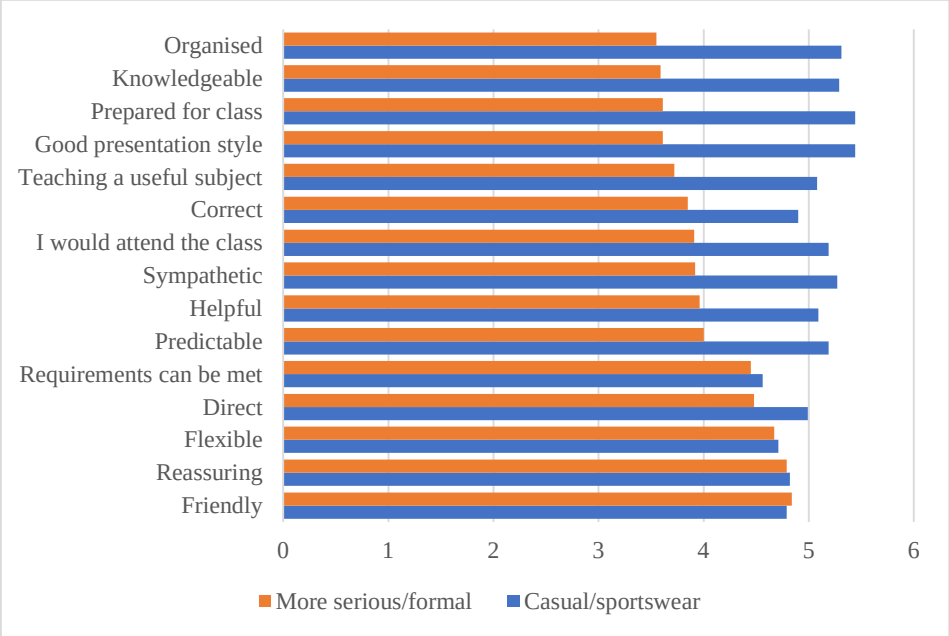

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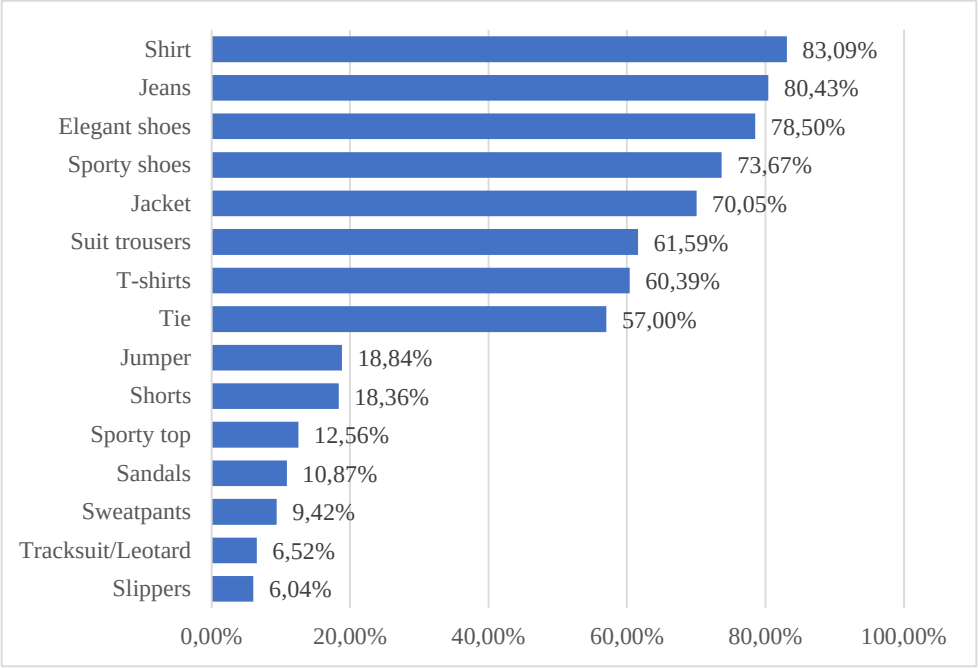
Figure 1. What impression do you get when your teacher wears more casual/sportswear or more serious/formal clothes?

The 5 highest average scores for casual/sporty (informal) dress were for flexible, direct, friendly, reassuring and sympathetic. Conversely, the lowest mean scores were for the qualities of teaching a useful subject, being prepared for class, being organised, knowledgeable and predictable. The opposite of casual/sporty dress was considered serious/formal (formal) dress and we also explored what qualities were and were not associated with this style in students' minds. The results show that serious/formal dress is associated with the following qualities: organised, knowledgeable, prepared for class, a good presentation style, teaching a useful subject. This style of dress is least associated with the following qualities: friendly, reassuring, direct, flexible and requirements can be met. It is also important to note that a sporty looking teacher is perceived as teaching a useful subject, having a good presentation style, being prepared, knowledgeable and organised to about the same extent as a formally dressed teacher. The real difference lies in the other characteristics where casual/sporty dress tends to score better (i.e., a formally dressed teacher is not seen as better organised, informed, or prepared than a casually dressed teacher, but as friendlier, more reassuring or more flexible than the former).

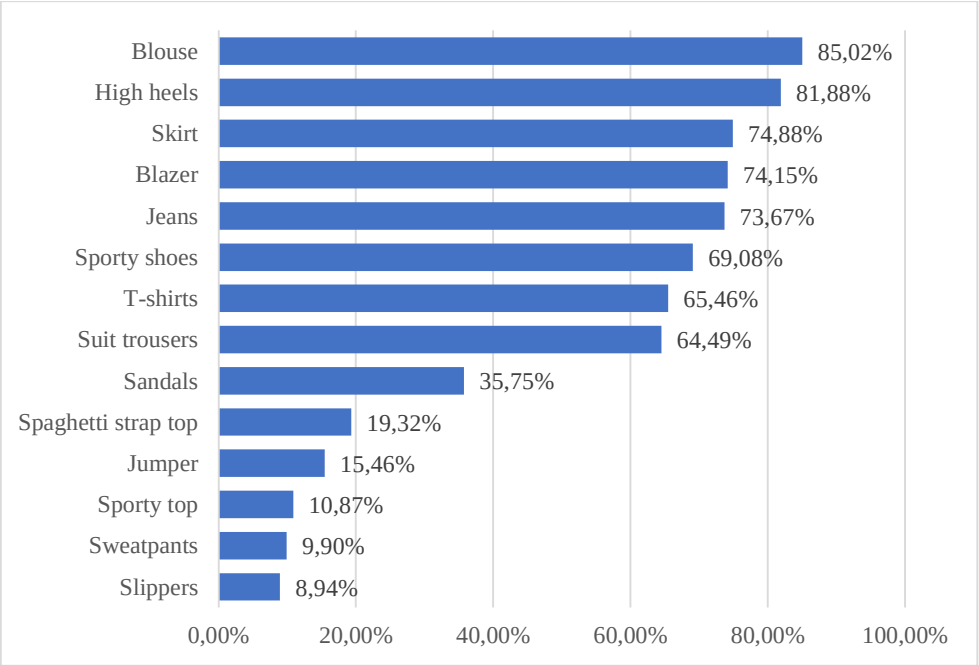
Respondents were then asked to indicate the type of dress they considered appropriate for their teachers. The question was examined separately for male and female teachers where appropriate.



Source: Own editing

Figure 2. What are the types of clothing you would consider appropriate for a male lecturer?

Appropriate dress for male instructors: Shirt with or without tie, possibly T-shirt with suit trousers or jeans, elegant shoes or sporty shoes or jacket. The following items of clothing should be avoided at all costs: jumpers, shorts, sporty tops, sandals, sweatpants, tracksuits, slippers.

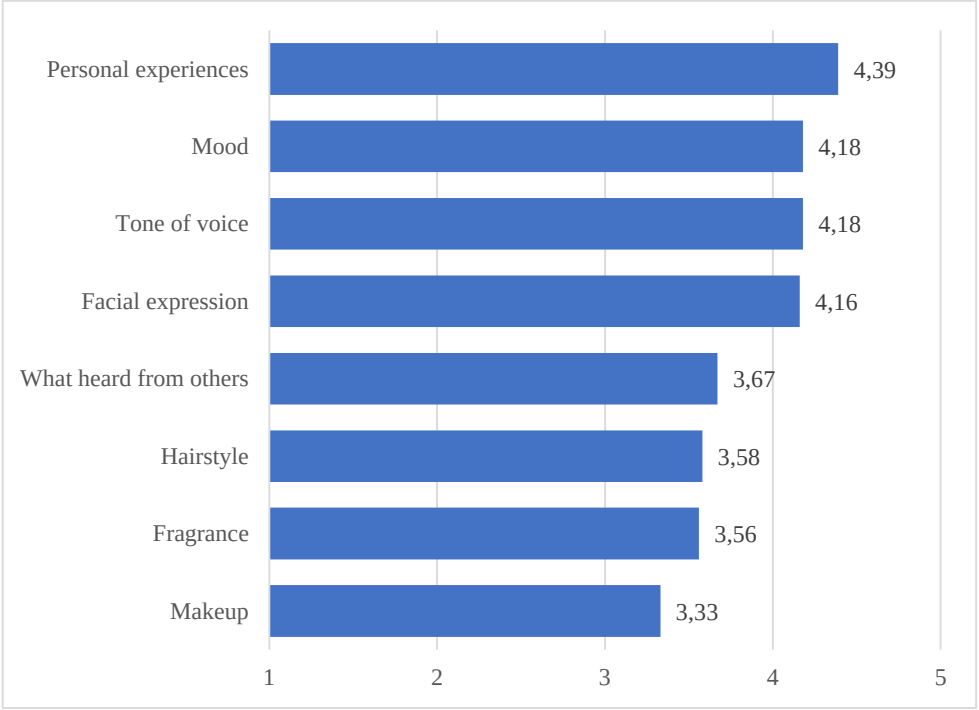


Source: Own editing

Figure 3. What are the types of clothing you would consider appropriate for a female lecturer?

We can also make a recommendation for women: blouse or T-shirt with skirt or jeans or suit trousers, high heels, or sporty shoes with blazer. What to avoid with female lecturers: sandals, spaghetti strap top, jumper, sporty top, sweatpants, slippers.

Obviously, clothing is only one of the factors that influence students in forming their opinions. In our research, we asked ourselves what other factors play a role in this regard.



Source: Own editing

Figure 4. Apart from dress, what are the factors that influence your opinion of your teacher?

The importance of personal experience is undeniable, but so is the tone of voice, and facial expression of the teacher. More important than the medium, but relatively less important, are what we can hear from others, hairstyle, fragrance and make-up (for female lecturer).

RESULTS AND CONCLUSION

In forming students' opinions, teachers' clothing is only one element among many other factors. Personal experience, the opinion of others and other external and internal personality traits of the teacher are also influential factors. Students perceive the teacher's dress differently. Our research confirms that female students are more interested in the appearance of their lecturer. The style and dress of the lecturer has the potential to make the relationship between students and lecturers more informal, but of course this is only a small factor in the learning process, along with the nature and subject of the institution, the teaching environment, and the course. When dressing, lecturers should consider the patterns and expectations of the institution. It is important that lecturers dress appropriately for the context and cultural norms, as this can be an expression of professionalism and appropriate assertiveness.

The results of the survey show that students associate sportier clothes mainly with flexibility, directness, friendliness, reassuring and likeable. With more formal dress, students associate ‘respectability’, meaning that the lecturer is knowledgeable and well prepared, has a good presentation style and teaches a useful topic, but there is no significant difference in these factors compared to casual dress.

For both men and women, students expect both casual and smart casual clothing. Casual dress means casual, comfortable clothing that conveys an assuring, informal appearance. This style does not usually follow a strict dress code and allows for the expression of creativity and personal style, while still carrying informal and comfortable traits.

The smart casual trend, which combines informal and formal elements, is also popular. This is an in-between style that is suitable for events or situations where formal wear is not necessary but informal wear would be too casual. Women should wear suit trousers or skirts with a blouse, while men should wear similarly suit trousers with a shirt. Smart casual style essentially aims to provide an elegant and neat look without sacrificing informal comfort. The business casual style differs from this in that a blazer is additionally recommended for women and a jacket for men.

SUMMARY

Our research shows similar results to those of the authors listed in the literature review:

- Rollman (1980), in terms of orientation, organisation (formal dress) and friendliness, flexibility, sympathy (formal dress),
- Shepherd and Yeon (2022), that a style closer to formalism, which they call business casual, facilitates the perception of the teacher's competence.
- Oliver et al. (2021) who found a decrease in feelings of friendliness associated with formal dress. In our study, students associated friendliness with informal dress.

Overall, there are many factors other than appearance that contribute to a good, inspiring relationship between teachers and students. However, the study by Lavin, Davies, and Carr (2010) confirms that the characteristics associated with the teacher have a significant impact on credibility, regardless of the teacher's dress. From this we can conclude that it is not only the clothes that make a person. As a continuation of our research, we want to investigate the role of brands in influencing the image of teachers.

Author’s contribution

Conceived and designed the study: Noémi Hajdú 60%, László Molnár 40%; collected the data: Noémi Hajdú 100%, performed the analysis: Noémi Hajdú 60%, László Molnár 40%; wrote the paper: Noémi Hajdú 60%, László Molnár 40%

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External Debt and Economic Growth Relationship in Nigeria: A Reconsideration

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SUMMARY

This paper examines the relationship between external debt and economic growth over the period 1981-2021 in Nigeria using the ARDL econometric technique. As economic growth is elusive amid a high and increasing stock of external debt, the country is on the verge of losing access to international financing. Thus, the problem provokes raging discussion on whether, or not, external debt is growth-enhancing in Nigeria. As such, in an attempt to contribute to the discussion and proffer a solution to the problem, this paper builds on an earlier study. Consequent upon preliminary diagnostics, a one-way causality is established to run in a specific pairwise relationship as each of external debt and domestic investment Granger causes economic growth. Moreover, following the affirmation of the long-run relationship among the variables, estimation results reveal an inverse relationship between real interest rate and economic growth in the short-run. The results further establish that external debt impacts negatively, as against openness to trade and domestic investment averagely impacting positively, on economic growth in both the short-run and long-run. In essence, if it becomes pertinent for the country to borrow for growth-enhancing investments, the government is advised to borrow at a zero rate of real interest.

Keywords: ARDL, domestic investment, Economic growth, external debt, real interest rate
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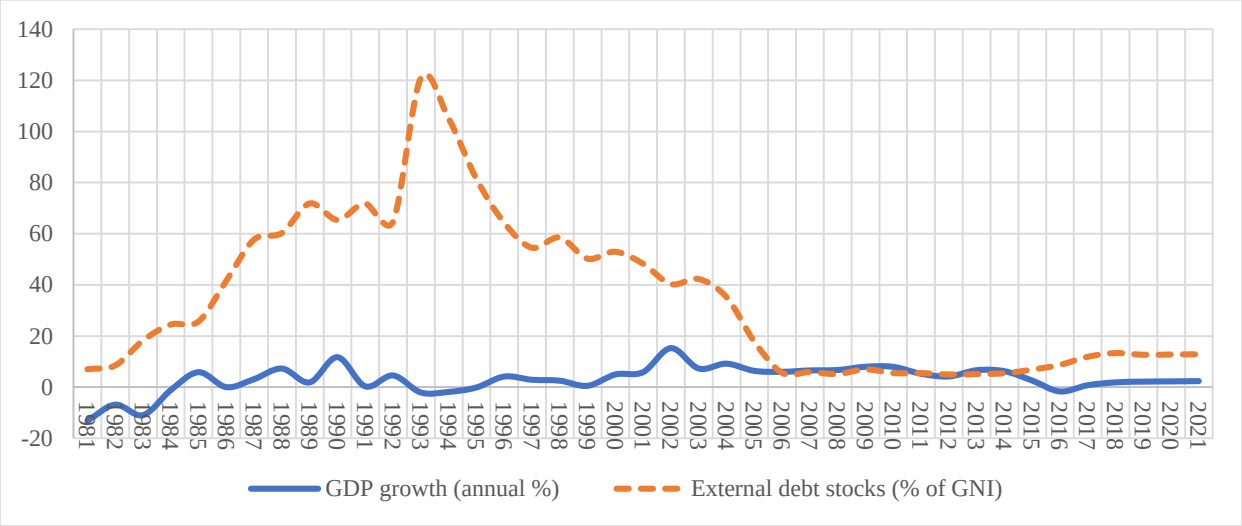
INTRODUCTION

The necessity of external debt for the growth of an economy cannot be overemphasised. This is important given the 2-gap analysis in which, as foreign aid, external debt is sought to fill both the investment-savings and import-export gaps. Imperatively, external borrowing is a potent instrument at the disposal of a government willing to bridge the fiscal gap as well as build economically efficient and growth-enhancing infrastructure. In the Keynesian view, an accelerating debt stands the chance of stimulating aggregate demand and hence, a high rate of economic growth. However, in the neoclassical perspective, declining growth results as external debt rises. In this regard, the debt overhang theory emphasises the detrimental pass-through impact of high indebtedness on economic growth.

In Nigeria, as presented in Figure 1, economic growth fluctuates between -1.58% in 2016 and -1.92% in 2020 as the debt portfolio rises from NGN32.9 billion in 2020 to NGN39.5 billion and NGN46.2 billion respectively in 2021 and 2022 and debt stock is expected to reach NGN77 trillion in 2023.[i] Although the debt-to-GDP ratio is expected to decrease to 45% in 2027 and not surpass the 70% threshold, however, the increasing debt stock might limit the country's access to international financing.[ii] Among the debts owed to foreign sources, Nigeria's indebtedness to the World Bank has risen from USD6.29 billion in 2015 to USD13.93 billion in 2022 as the International Monetary Fund [IMF] expects a significant drop in the country's access to external loans.[iii] Meanwhile, as it stands, real GDP growth reaches 3.98 and 3.52% respectively in the fourth quarters of 2021 and 2022 while 3.75% is targeted for 2023.[iv] Thus, with the spate of indebtedness and increasing costs of borrowing, is external debt growth-enhancing in Nigeria?



Source: Author's representation using data from World Bank (2022).

Figure 1. External debt and economic growth relationship in Nigeria, 1981-2021.

The issue of whether, or not, external debt boosts economic growth in Nigeria has provoked several studies over the years. However, because there is no convergence in findings, the issue has continued to generate more debates and as it stands, discussion still rages on how external debt impacts economic growth in the country. Incidentally, part of the discussion includes Sami and Mbah (2018) and Kolawole (2020) who affirm the negative impact of external debt on economic growth; and Adegboyega (2018), Akanbi et al. (2022) who find external debt impacting positively on economic growth. Nonetheless, Ibi and Aganyi (2015) assert a no-relationship while Adeniyi et al. (2018) conclude that methodology influences the effect of external debt on economic growth. As such, for the fact that the country needs policy sensitization that could proffer a solution to the problem of elusive economic growth amid high and increasing external debt, this paper contributes to the discussion by building on Kolawole (2020). Therefore, by objective, the paper examines whether, or not, external debt is economic growth-enhancing in Nigeria.

Imperatively, Nigeria's recourse to external borrowing predates independence when, among other loans, the country sought USD28 million for the construction of the Nigerian Railways. Although agriculture served as the engine of growth in the period, and economic activities were threatened by political unrest and civil war, yet, by 1969, economic growth climbed to 24.2% while external debt hovered below 7.0% of gross national income (GNI).[v] Moreover, in the 1970s, the country experienced a structural change in the economy which, in effect, led to oil replacing agriculture as the catalyst for growth. As such, an average 6.9% growth recorded in the 1970s resulted from oil-generated income. Nonetheless, in current US dollars, total external debt climbed to 1.77 billion in 1973 from 836 million in 1970. Also, while external debt decreased between 1975 and 1976, the effect of raising syndicated loans from the international capital market in 1977 and 1978 caused an increase in the debt from 3.7% or USD1.33 billion in 1976 to 8.8% or USD3.14 billion in 1977 and upward to about 14% or USD5.09 billion in 1978. In the same period, however, economic growth slowed from 25.0% in 1970 to 9.0% in 1976 and further to -5.7% in 1978 as total external debt averaged USD2.4 billion in the decade.

The stock of Nigeria's external debt assumed an upward trajectory from the early part of the 1980s.[vi] Specifically, due to the activities of the civilian regime in power, the debt stock rose from USD6.24 billion in 1979 to USD17.57 billion in 1983. That is, as a percentage of GNI, external debt increased from 13.2% in 1979 to 18.2% in 1983. Also, following the military incursion to power in the later part of 1983, the country's indebtedness to foreign creditors increased in a geometric version. For example, as an annual percentage change, external debt moved from 1.17% in 1984 to 30.65% in 1987; that is, a monetary rise from USD17.7 billion to USD29.02 billion, respectively. However, consequent on the debt-buy-back agreement with the London Club, the annual percentage change decreased to -13.45% in 1992 from 0.20% in 1991 as debt stock dropped to USD29.01 billion from USD33.52 billion, respectively.[vii] Nonetheless, by the year 2004, while the government was relentlessly campaigning for debt

relief, the stock reached USD44.5 billion and became unsustainable. By the end of the second quarter of 2005, the country agreed on a USD18 billion debt relief package with the Paris Club.[viii] In effect, the country's external debt stock decreased to USD12.9 billion in 2006 with annual percentage change dropping to -55.46 from -34.70% in 2005. It is unfortunate, however, that after 17 years of debt relief, Nigeria's external debt rose to USD41.8 billion in May, 2023.[ix]

After the introductory aspect, the paper is structured into four sections as follows. Section two reviews relevant literature and section three provides the methodology. While empirical results are presented and discussed in section four, section five concludes with recommendations.

REVIEW OF LITERATURE

Using the theoretical postulations of debt overhang along the neo-classical and endogenous views, Akanbi et al. (2022) employ the auto-regressive distributed lag (ARDL) technique to investigate the relationship between external debt service and economic growth for the period 1981-2020 in Nigeria. The study finds insignificant negative and positive effects respectively from external debt service and external debt stock on economic growth in the country. It is, therefore, suggested that to offset the cost of debt service, a methodology should be developed for comparing the return on external debt to the cost. For Indonesia, Suidarma and Yasa (2021) use an error correction mechanism (ECM), among other techniques, to examine the contribution of external debt to economic growth during the period 2011-2020. As preliminary finding reveals that economic growth increases over the period considered, the regression results show that external debt is significant and exerts a positive impact in the long-run.

In the attempt to provide an understanding of how the misapplication of external debt could be short-lived, Ehikioya et al. (2020) use the general method of moments (GMM) technique to examine the dynamic relationship between external debt and economic growth in a panel of 43 African countries from 2001 to 2018. As a long-run relationship is established, the result however shows that beyond a certain capacity, external debt has a deteriorating impact on economic growth in the continent. While buttressing the need for proper application and efficient use of external debt in economic activities, the study suggests putting in place a monitoring mechanism.

By using the linear and polynomial relationship as a basis, and employing the ordinary least squares (OLS) and ARDL techniques, Kolawole (2020) examines the relationship between foreign debt and economic growth in Nigeria. While considering the period from 1970 to 2017, the study in the process confirms the presence of structural breaks using the Bai and Peron (2003) methodology. Preliminary findings show that foreign debt Granger-causes growth. However, the linear analysis reveals that foreign debt is significant and impacts economic growth negatively in the short-run. On the contrary, the polynomial analysis reports insignificant effects in both short- and long-run. The government is, therefore, advised to take caution in securing additional foreign loans for the country.

Considering the origin and metamorphosis of external debt unsustainability in Nigeria, Adegboyega (2018) examines the impact of external debt on economic growth between 1981 and 2016. The study finds external debt impacts positively on gross national income in the country. As a recommendation, the study suggests the use of self-liquidating investment as a panacea to long-term external debt problems. However, in review, it is observed that the recommendation is at variance with the results. Based on the consensus in the literature, Adeniyi et al. (2018) investigate the relationship between external debt and economic growth during the period 1981-2015 in Nigeria. The threshold analysis shows that the effect of external debt is sensitive to the measure adopted. However, the existence of the association of debt Laffer curve with debt overhang is confirmed thereby pointing to an excessive accumulation of external debt. Thus, for the reason to enjoy the growth benefits, the study suggests a maximum ceiling of 6.81% as a share of external debt stock in gross national income (GNI).

Being concerned by the rising external debt required to finance the annual budget of Oman, Sami and Mbah (2018) adopts the ARDL technique to investigate the relationship between external borrowing and economic growth over the period 1990-2015 in the country. The result reveals, via the ECM, that external debt impacts economic growth significantly but negatively in the period considered. To affect growth positively, the study recommends the productive use of external debt in the country. While considering emerging economies, Shkolnyk and Koilo (2018) use various econometric techniques to examine the relationship between external debt and economic growth over the period 2006-2016. Findings reveal that a high stock of external debt impedes growth as the marginal impact of debt is negative in the economies considered. Specifically, the results show how ineffective is the implementation of debt management strategy in Ukraine. Thus, the study suggests an improved debt management model for the country.

Moreover, Ewubare et al. (2017) examine the effect of public borrowing on the growth of the Nigerian economy over the period 1980-2015. The ARDL result reveals that external debt is significant and positively stimulates economic growth. As such, the study suggests prudent utilization of borrowed funds. In review, it is

observed that a 'no structural break' outcome is reported in the analyses. However, the study fails to account for the non-stationarity of GDPR. In addition, the short- and long-run output could not show the estimates of the immediate past value of GDPR which, undoubtedly, is fundamental to the use of ARDL as a dynamic technique. Similarly, by employing OLS and the Johansen cointegration approach, Ndubuisi (2017) analyses how external debt impacts economic growth during the period 1985-2015 in Nigeria. While a unidirectional causality is established, a long-run relationship is also found as external debt propels the growth index positively and significantly in the country. The study recommends that external debt should be used for infrastructural development along with a proper debt management initiative, among others.

In a panel of WAMZ countries, Jarju et al. (2016) analyse and investigate the relationship between external debt and economic growth over the period 1980-2014. The results reveal a non-linear Laffer curve shape relationship between external debt and economic growth thereby confirming the accumulation of external debt beyond a specific threshold. Also, the results confirm the effect of rising external debt stock such that debt service limits the use of scarce revenue from being channelled to growth-propelling productive public investments. However, in Nigeria, Mbah et al. (2016) use the Granger-causality and ARDL approaches to investigate the impact of external debt on economic growth over the period 1970-2013. Following the affirmation of a long-run relationship, the result establishes a unidirectional causality running from external debt to growth while the former impacts negatively on the latter. Thus, it is recommended that government should embark on prudent borrowing and encourage export-oriented growth. In review, it is observed that all the series, except GDPGR, are non-stationary. As such, a structural break test, if conducted, would have revealed the cause of non-stationarity in the series. Nonetheless, Ugwuegbe et al. (2016) use the OLS and Johansen cointegration methodology to examine the effect of external borrowing on the growth of the Nigerian economy over the period 1980-2013. The findings reveal that external debt is positively significant in driving economic growth in the country.

METHODOLOGY

Analysis of the relationship between external debt and economic growth in Nigeria follows a multivariate structure. It utilises the econometric technique of regression analysis. The dependent variable is the growth rate of real GDP measured as an annual percentage. The independent variables comprise the external debt of the federal government, openness to foreign trade, real interest rate, real exchange rate, and domestic investment. To achieve uniform units of measurement and ease the interpretation of estimates, data for real exchange rates are transformed to natural logarithms to be at par with other variables in percentage of GDP. Moreover, all data are collated from the CBN (2022) and World Bank (2022). In essence, the analysis commences with summary statistics and preliminary tests using the approaches of Dickey and Fuller (1979), Phillips and Perron (1988), Kwiatkowski et al. (1992), and Granger (1988). Nonetheless, due to the increasing spate of external borrowing coupled with humongous size of the country's debt since 2020, and to ascertain the extent to which the rate of economic growth has been affected, the study covers the period 1981-2021.

Meanwhile, following the neo-classical framework, the debt overhang hypothesis underpins the study, theoretically. Thus, in line with Krugman (1988) as well as the empirical works of Afonso and Alves (2014) and Kolawole (2020), amongst others, the basic functional relationship is modified and expressed as,

$$grt_t = f(Xd_t, Opn_t, Rir_t, LRer_t, Inv_t) \quad (1)$$

where, at time *t*, grt is economic growth, *Xd* is external debt, *Opn* is openness measured as the average of the sum of imports and exports, *Rir* is real interest rate, *Rer* is real exchange rate, and *Inv* is domestic investment measured in terms of gross fixed capital formation in the country.

The linear transformation of equation (1) becomes,

$$grt_t = \beta_0 + \beta_1 Xd_t + \beta_2 Opn_t + \beta_3 Rir_t + \beta_4 LRer_t + \beta_5 Inv_t + \varepsilon_t \quad (2)$$

where, β_0 is the intercept, or slope, of the regression line, $\beta_{1\ldots\ldots5}$ are the coefficients of estimation, as ε is the error term. Invariably, equation (2) expresses specifically that the rate of economic growth is averagely affected by external debt and each of the other independent variables. As such, by a priori expectation, domestic investment will impact positively on growth as against negative effects from external debt and other variables.

Table 1

Summary Statistics

	GRT	XD	OPN	RIR	RER	INV
Mean	3.111320	34.58932	16.19863	0.520538	4.785806	35.43719
Median	3.200125	24.46118	17.09131	4.342493	4.610741	30.03794
Maximum	15.32916	120.8353	26.63898	18.18000	6.285635	89.38613
Minimum	-13.12788	4.950816	4.567923	-65.85715	3.906734	14.16873
Std. Dev.	5.331757	30.33651	6.048878	14.26849	0.596201	19.03453
Skewness	-0.865217	0.892963	-0.401256	-2.726142	1.029560	1.103356
Kurtosis	4.837053	3.101889	2.372736	12.92906	3.169791	3.917927
Jarque-Bera	10.88066	5.466517	1.772372	219.2024	7.292535	9.758289
Probability	0.004338	0.065007	0.412225	0.000000	0.026088	0.007604
Sum	127.5641	1418.162	664.1439	21.34207	196.2180	1452.925
Sum Sq. Dev.	1137.105	36812.16	1463.557	8143.591	14.21822	14492.53
Observations	41	41	41	41	41	41

Source: Author's computation.

The summary statistics, as presented in Table 1, indicate that, in the period considered, the country's rate of economic growth and stock of external debt averaged 3.1 and 34.5%, respectively. Similarly, the level of domestic investment is an average of 35.4% while openness to trade, real interest rate, and real exchange rate respectively averaged 16.1, 0.5, and 4.7%. Furthermore, economic growth slows to the minimum rate of -13.1%, real interest rate slides deeply to -65.8, as external debt is minimum at 4.9%. Also, the country achieved a minimum of 14.1% in domestic investment with openness being at 4.5% and the real exchange rate fluctuating to 3.9% minimum. Imperatively, given the statistics, it is apparent that domestic investment is potent enough to cushion the effect of external debt on economic growth in the country. This follows from the fact that even as the real interest rate and real exchange rate climb to 18.1 and 6.2%, respectively, and external debt reaches a maximum at 120.8%, domestic investment is at its highest at 89.3% thereby making the country achieve maximum economic growth of 15.3%.

Table 2

Results of unit-root tests

	ADF			PP			KPSS		
Variable	Level	1st Diff	Dec	Level	1st Diff	Dec	Level	1st Diff	Dec
Grt	-3.18	-	I(0)	-4.27	-	I(0)	0.33	-	I(0)
Xd	-1.34	-5.99	I(1)	-1.34	-5.92	I(1)	0.36	0.25	I(1)
Opn	-2.37	-7.75	I(1)	-2.28	-8.28	I(1)	0.33	0.13	I(1)
Rir	-7.32	-	I(0)	-7.23	-	I(0)	0.63	-	I(0)
LRer	-2.96	-	I(0)	-2.46	-4.65	I(1)	0.24	-	I(0)
Inv	-3.76	-	I(0)	-3.67	-	I(0)	0.73	-	I(0)

Source: Author's computation.

The results of the unit-root tests in Table 2 show that the variables integrate in mixed orders, that is, I(0) and I(1). Thus, given this type of result, the most appropriate technique available for analysing the cointegrating relationship among the variables is the ARDL.[x] Imperatively, among other techniques which include that of Engle and Granger (1987), Johansen (1988) and Johansen and Joselius (1990), the ARDL technique is important as it estimates both the short- and long-run estimates simultaneously. In addition, as it produces unbiased estimates, ARDL assumes that all the variables in the model are endogenous. In essence, the process commences with a general vector auto-regressive (VAR) model of order *p*, in which equation (2) is transformed into a long-run specification as follows,

$$grt_t = \beta_0 + \beta_1 grt_{t-i} + \beta_2 Xd_{t-1} + \beta_3 Opn_{t-1} + \beta_4 Rir_{t-1} + \beta_5 lnRer_{t-1} + \beta_6 Inv_{t-1} + \sum_{i=0}^{p} \beta_{1i} \Delta(grt_{t-i}) + \sum_{i=0}^{p} \beta_{2i} \Delta(Xd_{t-i}) + \sum_{i=0}^{p} \beta_{3i} \Delta(Opn_{t-i}) + \sum_{i=0}^{p} \beta_{4i} \Delta(Rir_{t-i}) + \sum_{i=0}^{p} \beta_{5i} \Delta(lnRer_{t-i}) + \sum_{i=0}^{p} \beta_{6i} \Delta(Inv_{t-i}) + u_t \quad (3)$$

where, in equation (3), Δ is the first difference operator, *i* ranges from 1 to 6, β_0 is the drift component, and u is white noise error term.

Moreover, as the procedure follows the bound testing approach, it is based on the joint Wald-test (F-statistic) with null hypothesis of no cointegration among the variables. It states that,

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$$

$$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$$

Furthermore, the short-run parameters can be estimated through the following error correction version of equation (3),

$$\Delta(grt_t) = \sum_{i=0}^{p} \beta_{1i} \Delta(grt_{t-i}) + \sum_{i=0}^{p} \beta_{2i} \Delta(Xd_{t-i}) + \sum_{i=0}^{p} \beta_{3i} \Delta(Opn_{t-i}) + \sum_{i=0}^{p} \beta_{4i} \Delta(Rir_{t-i}) + \sum_{i=0}^{p} \beta_{5i} \Delta(lnRer_{t-i}) + \sum_{i=0}^{p} \beta_{6i} \Delta(Inv_{t-i}) + \gamma ECT_{t-1} + u_t \quad (4)$$

where, γ is the speed of adjustment parameter and *ECT* is the residual from the estimation of equation (3).

Meanwhile, very imperative in the estimation of cointegrating relationship is the lag length. In this regard, and following the Akaike Information criterion (AIC), a lag length of 3 is preferably selected as presented in Table 3.

Table 3

Lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-688.156	NA	2.96e+08	36.53455	36.79312	36.62654
1	-558.72	211.1864	2224595.	31.61682	33.42679*	32.26079*
2	-523.193	46.74606	2641586.	31.64172	35.00308	32.83766
3	-470.177	53.01521*	1640629.*	30.74618*	35.65894	32.49410

Source: Author's computation

Consequent on the lag selection, the causal relation between economic growth and each of the independent variables is conducted and the result is as presented in Table 4. Interestingly, a one-way causality is reported to run between certain variables. Specifically, each of external debt and openness Granger-causes economic growth as economic growth Granger-causes each of openness and real exchange rate.

Table 4

Extract of pairwise Granger-causality between growth and external debt

Null Hypothesis:	F-Statistic	Prob	Decision
XD does not Granger Cause GRT	8.92194	0.0002	Reject
GRT does not Granger Cause XD	0.83237	0.4863	Cannot reject
OPN does not Granger Cause GRT	1.33992	0.2794	Cannot reject
GRT does not Granger Cause OPN	9.14665	0.0007	Reject
RIR does not Granger Cause GRT	0.02731	0.9938	Cannot reject
GRT does not Granger Cause RIR	0.85505	0.4747	Cannot reject
LRER does not Granger Cause GRT	0.19604	0.8983	Cannot reject
GRT does not Granger Cause LRER	4.88865	0.0067	Reject
INV does not Granger Cause GRT	3.45602	0.0282	Reject
GRT does not Granger Cause INV	2.30588	0.0961	Cannot reject

Note: Statistical decision is based on 5% level of significance
Source: Author's computation.

The Wald-test result in Table 5 shows that the F-statistic is significant given a probability figure of 0.0000. By implication, it means that there is cointegration, or a long-run relationship, among the variables in the model.

Table 5

Result of Wald test

Null Hypothesis: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$			
Test Statistic	Value	Degree of freedom	Probability
F-statistic	8.893377	(5, 35)	0.0000
Chi-square	44.46688	5	0.0000

Note: Statistical decisions are based on 5% level of significance.
Source: Author's computation

RESULTS AND DISCUSSION

Following the confirmation of cointegrating relationship among the variable, a long-run estimation is conducted and the result is as presented in Table 6. Essentially, as required, the immediate past value of economic growth is positively significant. By this, it means that economic growth in a year past is positively influencing economic growth in the current year. Numerically, it implies that a 10-percentage point increase in growth in the preceding

year leads to 2.9% increase in economic growth in the current year. Technically, the dynamism of the ARDL technique is confirmed by the significance of the lagged value of the dependent variable.

Moreover, as expected, external debt is significant and negatively impactful on economic growth in the long-run. However, as reported in Table 6, it is the stock of external debt in the past three years that affects economic growth in the current year. In numbers, it implies that a 10-percentage point increase in the stock of accumulated external debt of three years ago causes economic growth to slow by about 0.5% in the current year. A very instructive implication of the result is that despite the debt forgiveness by the London and Paris Clubs in 2005, the country's stock of external debt has, once again, become more humongous and unbearable. While external debt is left and not serviced for three years, and given the rate of interest at which the debt is issued, the stock is compounded thereby causing a negative effect on the current spate of economic growth. As the result supports Pattillo et al. (2004) and Ehikioya et al. (2020), it speaks to the fact that the country's external debt needs to be kept sustainable given the fact that external financing delays economic reform and countries with high level of external debt grow slowly with low productivity (Moss, 2006; Vamvakidis, 2007; Kolawole, 2021). Even then, IMF asserts that when additional debt slows economic growth and contributes negatively to growth, it makes the country worse-off.

Still on the long-run estimation, openness to trade is also significant, but positively impacting on economic growth in the country. In effect, a 10-percentage point depth in openness of trade brings about an approximately 4.5% improvement in the rate of economic growth. Regarding the positive effect of openness, there is no doubt that the export component overwhelms the import. In addition, Table 6 shows that domestic investment exerts positive and significant impact on economic growth in the period considered. Specifically, domestic investment in the past three years propels current year's economic growth. That is, numerically, a 10-percentage point addition to domestic investment in the last three years leads to 0.6% increase in economic growth this year. This speaks to the importance of investment in domestic fixed capital stock for improved economic growth. Intuitively, it implies that in the long-run, the evolution of output is determined by the amount of capital and capital accumulation which basically depends on the level of output which also determines saving and investment. The interactions between capital and output imply that the economy converges in the long-run to a steady-state level of capital which, in turn, associates with a steady-state level of output or economic growth

Table 6

Long-run relationship between economic growth and external debt.

riable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.14946	7.3338	-0.29309	0.771
GRT(-1)	0.29635	0.0271	32.67627	0.000
XD(-3)	-0.04722	0.0777	-5.32704	0.000
OPN(-1)	0.44785	0.1693	2.64944	0.013
OPN(-2)	-0.25195	0.1861	-1.35442	0.186
OPN(-3)	0.17357	0.1601	1.08392	0.287
RIR(-2)	-0.06082	0.0835	-0.72834	0.472
LRER(-1)	-1.98797	1.9446	-1.02227	0.315
LRER(-2)	1.66543	1.9155	0.86944	0.392
INV(-3)	0.06592	0.1052	2.46811	0.039

Note: Statistical decisions are based on 5% level of significance.

Source: Author's computation.

Regarding the short-run estimation, Table 7 presents the results. As a dynamic analysis, the immediate past value of economic growth is significant and positive. Such that, a 2% improved economic growth is achieved in the current year from a 10-percentage point increase in the preceding year's figure. Moreover, as in the long-run analysis, external debt is significant and negatively impactful on economic growth. As the result corroborates Mbah et al. (2016), Sami and Mbah (2018), Shkolnyk and Koilo (2018), and Kolawole (2020), it implies that a 10-percentage point addition to the stock of Nigeria's external debt causes economic growth to fall by 0.1% in the current year. In the same vein, real interest rate also significantly impacts negatively on economic growth in the short-run. It shows that as the preceding year's real interest rate rises by 10-percentage

point, economic growth slows by 0.5% in the current year. Intuitively, the effect of real interest rate in the short-run stems from the decrease in nominal money growth which leads to a decrease in the real money stock. Thus, the decrease in real money leads to a decrease in output and to an increase in both the nominal and the real interest rates (Blanchard, 2006). On the contrary, however, openness to trade is, as in the long-run, significantly positive in its effect on economic growth. Numerically, an approximately 3.5% improvement in economic growth is obtained from 10-percentage point openness to trade in the current year. This implies that the increased amount of foreign income generated in the country also leads to increased volume of exports. Similarly, domestic investment is significant and positively impact economic growth in the short-run. That is, as the immediate past year's domestic investment level rises by 10-percentage point, the current year's economic growth rises by 2%.

Table 7

Short-run relationship between economic growth and external debt.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.0916	0.6282	-0.14582	0.885
Δ*(GRT(-1))*	0.2071	0.2042	4.77355	0.001
Δ*(XDBT(-1))*	-0.0125	0.1621	-5.99246	0.000
Δ*(OPN(-1))*	0.3491	0.1478	2.36105	0.025
Δ*(RIR(-1))*	-0.0512	0.7452	-2.49755	0.017
Δ*(LRER(-1))*	-1.4143	1.8174	-0.77823	0.442
Δ*(INV(-1))*	0.2023	0.0877	2.96294	0.005
ECM(-1)	-0.5993	0.2032	-2.94787	0.006

Note: Statistical decisions are based on 5% level of significance.

Source: Author's computation.

CONCLUSION AND RECOMMENDATIONS

Analysis of the relationship between macroeconomic aggregates regarding economic growth and external debt speaks to the imperative of public finance management. Apparently, external debt gives the borrowing country command over more goods than it is currently producing. This makes it possible for the debtor country to finance itself without displacing household and firms' spending. Also, it avails the country the opportunity of industrialization which is necessary for accelerating the pace of economic growth, and development. However, the payment of interest on the amount borrowed and the repayment of the principal requires the transfer of resources abroad. Such a transfer, no doubt, is not a reallocation of purchasing power among the residents of the country as is the case with domestic debt. It is pertinent to note that Nigeria is currently using about 96% of its revenue to services its debt. And as part of the debt owed to external sources, the country's indebted to the World Bank Group has climbed to USD7.64 billion over the past seven years as economic growth remains elusive.

Also, it is imperative that openness in goods market allows people and firms to choose between domestic goods and foreign goods. This choice depends primarily on the real exchange rate which is the relative price of domestic goods in terms of foreign goods. As such, imports are the part of domestic demand that falls on foreign goods. Thus, the more expensive domestic goods are relative to foreign goods, the higher is the domestic demand for foreign goods. By extension, an increase in real exchange rate leads to an increase in imports. Equivalently, however, exports are the part of foreign demand that falls on domestic goods. The higher the price of domestic goods in terms of foreign goods, the lower the foreign demand for domestic goods. Therefore, exports rise when real exchange rate falls. Although the exchange rate of the CBN hovers around NGN460 per United States dollar recently, however, the rate is currently close to NGN1,000 even as openness to trade appears beneficial to economic growth in Nigeria.

Thus, while domestic investment is growth-enhancing and openness is necessary for output expansion, the role of real interest rate is paramount for borrowing and debt servicing. As such, following the findings so far, it is instructive that external debt is not economic growth-enhancing in Nigeria.

Nonetheless, the above findings bear some implications for policies in the country. For example, as external debt impacts negatively on economic growth in both short-run and long-run, it implies that the bulk of the country's debt sourced externally has not been helpful in propelling economic growth. The situation is instructive given the fact that it is actually external debt

owed since the past one and three years that slows the growth of the country's economy. A basic explanation to this is that the country defaults in meeting its external debt obligation due partly to high and increasing rate of real interest coupled with rising value of the United States dollar. It is an obvious fact that debt repayment depends on the real interest rate. As such, as debt service includes interest rate and principal, the amount to be repaid becomes humongous to the extent that it currently eats up about 96% of the country's fiscal revenue. Thus, in order to nib the external debt problem in the bud, the country should borrow at zero rate of real interest in the future. A zero real interest rate on external debt would necessitate less financial burden and ease re-payment plan as financial resources would be available for allocation to growth-enhancing investments in the country.

Moreover, for the fact that openness to trade impacts positively on economic growth, it implies that the government should focus more on opening the economy and engage in trades that would guarantee positive net-exports for the country. If net-exports is positive, it means that trade is favourable and it can lead to the creation of more jobs and eventual improvement in the growth of the economy. Similarly, domestic investment in the form of addition to stock of capital formation should be encouraged and boosted. If more domestic investment is initiated and achieved, it would drive economic growth both in the short-run and long-run in the country.

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[i] [i]See National Bureau of Statistics [NBS] (2021) which reports that growth rate rises to 2.27% in 2019 before becoming negative in 2020; and Debt Management Office [DMO] (2023) which shows that NGN77 trillion is projected as outstanding debt stock following a proposed borrowing of NGN10.57 trillion in the budget.

[ii] See The World Bank (2022), as Nigeria's debt servicing could surge and exert fiscal and liquidity pressures.

[iii] IMF's warning is also predicated on the global economic environment where interest rates and other costs of borrowing are increasing (DMO, 2023; The Punch, 2023)

[iv] According to the Federal Ministry of Finance, Budget and National Planning [FMFBP] (2021) the rate is expected to be lower than 27.19 and 24.32% projected for 2021 and 2022, respectively.

[v] See Ajayi (2000) and World Bank (2021). According to Ajayi (2000), agriculture was the mainstay of the Nigerian economy at independence; and that agriculture contributed about 64% of GDP shortly after independence.

[vi] The major factors that caused the increase in the size of the country's external debt include decline in the earnings from oil, rapid growth in public expenditure on capital projects, inappropriate monetary policy, dependence on imports, debt servicing (addition of interest and principal), among others (Fajana, 1993).

[vii] Nigeria was one of the 17 most indebted countries globally and the largest debtor in sub-Saharan Africa (Fajana, 1993). As Nigeria embraced debt rescheduling, Chevillard (2001) affirms that the London Club took a cue from the Paris Club by granting a consolidation of 21 months on outstanding debt stock.

[viii] According to the DMO (2005), the debt was to be reduced to USD24.84 billion from a total of USD30.84 billion owed to the Paris Club; under the Naples Terms, an amount up to USD16.64 billion was allowed to be written off from the outstanding; the estimated balance of USD8.2 billion was to qualify for a buyback while the country was expected to save USD2.0 billion and pay USD6.2 billion to exit the Paris Club debts completely. The deal was, however, completed in April 2006.

[ix] See Olayinka (2023) who reports that between 2015 and 2023, the figure increased by 1,890%.

[x] As implied in Pesaran and Shin (1999), Pesaran, Shin and Smith (2001), and Harris and Sollis (2003), ARDL also performs relatively more efficient in handling small and long time-series data set, among other advantages.

Inflation in Hungary: How Does It Affect the Financial Situation of the Population?

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SUMMARY

Recent events have affected the economies of nations that began with an extraordinary epidemic that led to the lifting of closures and the emergence of oversupply (overdemand?) in the market. The result is price increases, new supply problems and deficit economies, all of which contribute to rising inflation. The conflict and the oil crisis made the situation worse. We wondered whether the recent price increases have made people in Hungary more conscious with their budgets. The current report is based on a nationwide representative survey of almost 25,000 people conducted by NET Media PLC in September 2022. The study focused primarily on the development of living standards and the state of the economy, changes in spending patterns, savings, and family household management. Overall, it can be said that more than 75 percent of Hungarians over 25 are dissatisfied with how their standard of living has changed in the last year and that their financial situation has deteriorated.

Keywords: fiscal consciousness, spending patterns, inflationary tendencies
Journal of Economic Literature (JEL) code: G51
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INTRODUCTION

According to Eurostat (2022), the annual inflation rate in the European Union in November 2022 was 11.1%, in the Eurozone it was 10.1%, and Hungary had the highest rate of 23.1%. Not only in our country, but also worldwide, the cost of living has increased significantly. According to the KSH (Hungarian Central Statistical Office) data (2023), in December 2022 the prices of food increased by 44.8%, household energy by 55.5%, durable goods by 13.6%, petrol by 27% and services by 9.5% compared to the previous year.

The following explanations are given in the literature:

1. Vague (2022) blames the pandemic, the war in Ukraine and oil prices.
2. Markovitz and Marchant (2022), in a summary of the World Economic Forum in Davos, describe that after the pandemic-related factory closures, demand for goods skyrocketed and outstripped supply. The forced savings accumulated during the pandemic-related factory closures turned out in many sectors to be demand that could not be met by the supply side, or only with a delay, partly due to capacity constraints and partly due to interruptions in production/supply chains (Pleschinger, 2022). When demand is greater than supply, this leads to price increases. This caused problems in the supply chain.
3. Deloitte's Spring 2022 study with finance director's notes that the pandemic was already impacting the European economy with high inflation and supply chain problems, exacerbated by the war in Ukraine and its aftermath (Muschamp et al., 2022).
4. Daly and Chankova (2021) also mention inflation as a consequence of the war and the pandemic, while the European Parliament has also published several articles on this topic (Cesluk-Grajewski, 2022).
5. Regmi and Stiglitz (2022) attribute inflation primarily to sectoral supply-side disruptions caused by the pandemic and to war-related problems in the energy and food markets.
6. In addition, the rise in commodity and oil prices has pushed up inflation (Caldara et al., 2022). Rising energy prices hit the Hungarian economy especially hard because of the energy intensity of the economy and the country's

reliance on energy imports (Bartha & Tóthné Szita, 2015a, 2015b).

Recent interest rate increases have been implemented in all countries as part of the tightening of the global monetary system (Storm, 2022; UNCTAD, 2022). The war has at least partially challenged the global tightening of economic policy that was planned earlier this year to combat inflation (Karsai, 2022). In the long run, there could be a severe economic downturn, so many people are sceptical that this will solve the problem (Regmi & Stiglitz, 2022).

Our study aims to analyse the financial status of the household population in this difficult economic situation, paying particular attention to spending behaviour, savings opportunities, family budgeting and growing financial awareness.

THE ANALYSIS OF THE FINANCIAL SITUATION

According to Demeter et al. (2011), the lack of funds and the amount of credit, the amount of assets and investments, and liquidity are crucial factors to consider when interpreting the financial situation. The study of how households use financial economics and instruments to achieve their goals falls under the category of household financial situation in the context of finance (Swedish House of Finance, 2014). According to our definition, financial situation refers to the subjective value judgement that captures the balance between a person's (or household's) regular (e.g., monthly) income and expenditure, as well as the amount of liquid savings.

In defining financial literacy, we start from the Organisation for Economic Cooperation and Development (OECD) formulation: financial literacy is a combination of awareness, knowledge, skills, and behaviours required to make informed financial decisions and ultimately achieve individual financial well-being (Atkinson & Messy, 2012 in: Szóka, 2021). According to the later OECD (2018) definition, financial literacy is the combination of the necessary knowledge, awareness, attitudes and behaviours that enable individuals to make appropriate financial decisions to secure their financial well-being (OECD, 2018 in: Csorba, 2020). Szóka (2021) describes that according to Csorba (2020) financial culture and financial literacy have a similar meaning and the use of the word culture is widespread in the Hungarian language.

The OECD (2020) assesses three elements, including financial knowledge, financial behaviour (decisions) and financial attitudes, to determine the level of financial awareness. Hungary's score, 12.3, is just below the OECD average (13). In the case of our country, the three factors are:

1. the financial knowledge score is 4.6 (the OECD average is 4.6);
2. the financial behaviour score is 4.5 (the OECD average is 5.3); and
3. the financial attitude score is 3.3 (the OECD average is 3.1).

From the deviation of financial behaviour from the average, it can be deduced that the adult Hungarian population finds it difficult to apply their existing financial knowledge in practise (MNB, 2020). After the financial crisis, developing the financial awareness of the population was defined as a national economic priority in many countries (Jakovac & Németh, 2017). Németh-Lékó (2020) describes that raising awareness is a time-consuming process, but it is worthwhile as it leads to an increase in the economy and competitiveness in the long run.

According to Hergár and Bernáth (2020), we are implementing more conscious financial behaviour during the crisis and the coronavirus epidemic has once again highlighted the importance of families' financial culture. Cetelem Körkép (2022) also confirms that the population's consumption behaviour is also changing in the unpredictable economic environment of recent years. In Hungary, 46% of respondents perceive a decrease in purchasing power, which leads to financial caution, as 61% of respondents buy less, while 83% strive to reduce their spending (Cetelem Körkép, 2022). The structure of consumer spending by families is strongly influenced by price trends. In the KSH Situation Picture 2021, the structure of consumption in the two extreme income quintiles was examined. According to this, members of the top quintile spent 51.5% on their basic needs, while the poorest quintile spent 62.1%. In terms of expenditure per person, the highest expenditure in 2021 will be on food and non-alcoholic beverages (1st quintile 32.4%; 5th quintile 23%), home maintenance and household energy (1st quintile 21.8%; 5th quintile 15.6%) and transport (1st quintile 7.9%; 5th quintile 12.9%). It is expected that the increase in food and energy prices will lead to a decrease in consumption. In Hungary, the application of price caps may also have increased inflation, as a study by the MNB (2022) found that price caps generated an inflationary effect of about 3-4 percentage points through indirect channels, the effect of which becomes stronger when price caps are removed. The government lifted the price ceiling for fuel in December 2022 as a shortage had developed but extended it for food until 30 April 2023.

RESEARCH METHODOLOGY

The online data collection on which our analysis is based was conducted by NET Media PLC between 7 and 13 September 2022. The results presented in this study come from a second analysis of the original database (Pénzcentrum, 2022) after its cleaning and weighting. The population of our study is the Hungarian population aged over 25 years (N=7,274,006 persons). We weighted the sample (n=24,856 persons) based on three criteria: gender, age categories and regions. On this basis, we can conclude that the sample we analysed is representative of the Hungarian population over 25 years of age from these points of view and that our results are generally valid with a confidence level of 95 per cent and a maximum sampling error of +/- 0.62 percentage points. The following table contains the composition and internal proportions of the population and the unweighted and weighted sample.

Table 1

The demographic structure of the population and the sample

		Population (N=7 274 006)	**Unweighted sample (n=24 856)**	**Weighted sample (n=24 856)**
Gender	Male	3 403 577 (46.8%)	12 565 (50.6%)	11 630 (46.8%)
	Female	3 870 429 (53.2%)	12 291 (49.4%)	13 226 (53.2%)
Age	25–40 years	2 007 664 (27.6%)	4 238 (17.1%)	6 860 (27.6%)
	41–55 years	2 242 141 (30.8%)	7 057 (28.4%)	7 662 (30.8%)
	56–64 years	1 033 859 (14.2%)	4 792 (19.3%)	3 533 (14.2%)
	64+ years	1 990 342 (27.4%)	8 769 (35.3%)	6 801 (27.4%)
Region	Central Hungary	2 283 869 (31.4%)	9 193 (37.0%)	7 804 (31.4%)
	Southern Great Plain	921 574 (12.7%)	3 039 (12.2%)	3 149 (12.7%)
	South Transdanubia	657 091 (9.0%)	2 180 (8.8%)	2 245 (9.0%)
	Northern Great Plain	1 041 775 (14.3%)	2 381 (9.6%)	3 560 (14.3%)
	Northern Hungary	811 552 (11.2%)	3 147 (12.7%)	2 773 (11.2%)
	Central Transdanubia	797 593 (11.0%)	2 560 (10.3%)	2 725 (11.0%)
	Western Transdanubia	760 552 (10.5%)	2 356 (9.5%)	2 599 (10.5%)

Source: Own editing

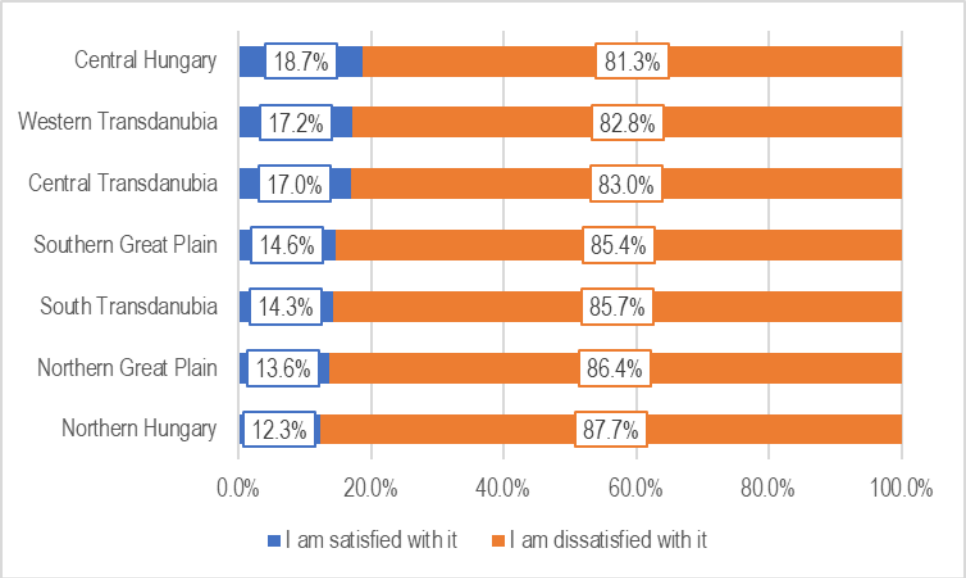
The data collection took place in the form of an online survey and the data were analysed with the programmes Excel and SPSS.

RESULTS OF THE RESEARCH

Standard of living and financial situation

First, we analysed that how satisfied the population was with the development of their standard of living in the last year. In the options, you had the choice between "I am satisfied with it" and "I am dissatisfied with it". Figure 1 illustrates the distribution of responds by region.

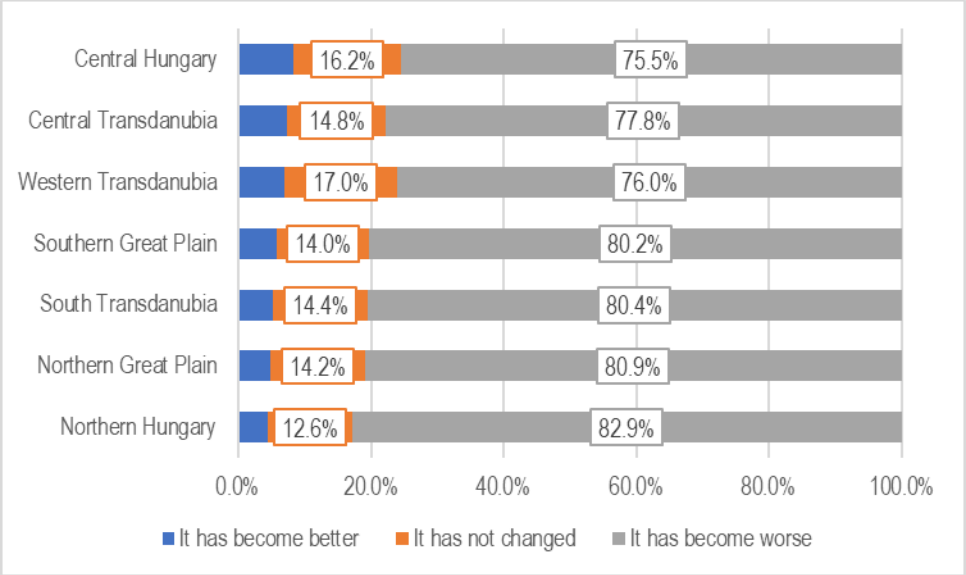
The data show that more than four-fifths of the population (84.0%) were dissatisfied with the development of their standard of living in the past year, and only 16% answered that they were satisfied. Evaluating by region, the inhabitants of Central Hungary were the least dissatisfied (81.3%), while dissatisfaction was highest in the region of Northern Hungary (87.7%). The analysis of the association relationship between the studied question and the regions was carried out using a cross-tabulation analysis and it was found that there is a significant weak relationship between them $\chi 2(6, N=24073) = 97.934$ $p < 0.001$ (two-sided) $V=0.064$. As for the content of the relationship, those who were satisfied with the development of their standard of living were overrepresented in Central Hungary (18.7%), while they were underrepresented in four regions (Southern Great Plain, Southern Transdanubia, Northern Great Plain, Northern Hungary).



Source: Own editing

Figure 1. Regional Satisfaction Levels Regarding Standard of Living

In addition to the development of living standards, we also examined the financial situation: How was it changed in the last year? For this question there were three options: "It has become better", "It has not changed", "It has become worse". Figure 2 illustrates the distribution of responds by region.



Source: Own editing

Figure 2. Regional differences in personal financial situation

Overall, the financial situation of the vast majority (78.5%) has deteriorated in the past year. For a smaller proportion of them (15.0%) it has not changed, and only 6.6% said that their financial situation had improved in the past year. Similar to the previous question, the largest share (8.3%) of respondents answered that their

financial situation has improved in Central Hungary, and the smallest share (4.5%) in Northern Hungary. The cross-tabulation analysis performed to examine the relationship between this question and the region revealed a significant weak relationship: $\chi 2(12, N=24693) = 134.338$ $p < 0.001$ (2-sided) $V=0.052$. From the examination of the adjusted standardised residuals, it can be concluded that those whose financial situation had improved (8.3%) or not changed (16.2%) were overrepresented in Central Hungary. In the other four regions (Southern Great Plain, Southern Transdanubia, Northern Great Plain, Northern Hungary), on the other hand, the proportion of those whose financial situation had worsened was significantly higher compared to the entire sample - at least they said so.

Money spending habits and their changes

In the following part it was examined whether the spending habits of the population have changed in the current inflation situation. The corresponding question could be answered with "Yes" or "No". In relation to the entire sample, 91.0% answered "yes" and only 9.0% answered "no". When examining regional differences, the following can be concluded. In the Northern Great Plains, 92.5% of respondents changed their spending habits. The other "extreme" is in Central Hungary, where this ratio is 89.9%. Although the difference cannot be called significant, on the basis of the available sample there is a significant weak relationship between the question studied and the regions: $\chi 2(6, N=24685) = 30.043$ $p < 0.001$ (two-sided) $V=0.035$. As far as the content of the correlation is concerned, there is a significantly higher proportion of inhabitants whose spending habits have not changed in Central Hungary compared to the whole sample. The exact opposite is observed in the Northern Great Plain and Northern Hungary. A change in spending habits can "take shape" in many ways, for example by postponing expenses that are not necessary. The relevant question was: "Have you postponed any non-essential expenditure in the last 3 months?" Three options were given as answers: "Yes", "No", "I have not planned such an investment at all". In the whole sample, 74.3% of those who postponed a non-essential purchase, 14.0% of those who did not, and another 11.7% did not plan such an expenditure at all, i.e., there was nothing to postpone. Among the regional results, we highlight Central Hungary, where the share of those who did not postpone this type of investment was 16.1% (the highest among all regions), and the Northern Great Plain and Northern Hungary, where, on the other hand, the share was the lowest (11, this share was 9%). When comparing the regional data, we were also able to demonstrate a significant weak relationship: $\chi 2(12, N=24755) = 72.119$ $p < 0.001$ (two-sided) $V=0.038$.

Every inhabitant living in Hungary has experienced the largest price increase in the last decades. The next two questions were: how much we spend on living expenses for ourselves and our family and how much we spend on food. Let us first look at what inhabitants in each region answered when asked how much money they estimate they spend in total per month to support themselves and their family. (This expenditure had to include the cost of housing, utilities, food, and other expenses)

Table 2

Monthly expenditure for personal and family household expenses

	Central Hungary	**Southern Great Plain**	**South Transdanubia**	**Northern Great Plain**	**Northern Hungary**	**Central Transdanubia**	**Western Transdanubia**
<100 000 HUF	6.0%	12.3%	11.4%	9.7%	11.6%	7.2%	8.3%
100,000-200,000 HUF	24.3%	36.3%	35.9%	32.5%	35.1%	29.8%	32.0%
200,000-300,000 HUF	29.1%	27.7%	28.5%	30.9%	28.2%	29.8%	29.8%
300,000-400,000 HUF	19.3%	14.4%	13.8%	16.3%	15.0%	18.1%	15.2%
400,000-500,000 HUF	11.2%	5.6%	6.3%	6.5%	6.3%	8.9%	8.5%
>500,000 HUF	10.0%	3.7%	4.2%	4.1%	3.8%	6.3%	6.2%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Own editing

The difference between Central Hungary and the other regions, especially the Southern Great Plain, Southern Transdanubia, the Northern Great Plain and Northern Hungary, is striking. There is a statistically significant relationship between regions and monthly expenditure: $\chi 2(30, N=24856) = 831.120$ $p < 0.001$

(two-sided) V=0.082. In Central Hungary they spend between 300,000-400,000 HUF, 400,000-500,000 HUF and over 500,000 HUF more than in the whole sample. In contrast, in Eastern Hungary (Southern Great Plain, Northern Great Plain, Northern Hungary) and Southern Transdanubia, those who spend less than 100,000 HUF and those who spend between 100,000 and 200,000 HUF are overrepresented.

The other question was related to expenditure on food (including beverages, excluding alcoholic beverages). The results are summarised in Table 3.

Table 3

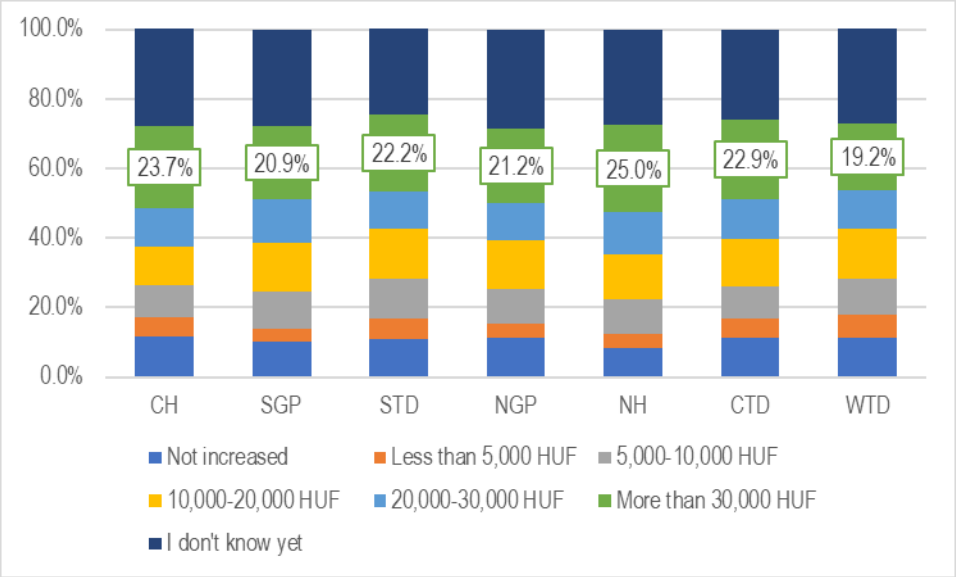
Monthly expenditure on food

	Central Hungary	Southern Great Plain	South Transdanubia	Northern Great Plain	Northern Hungary	Central Transdanubia	Western Transdanubia
<50,000 HUF	8.40%	16.70%	15.00%	14.10%	14.60%	11.00%	11.40%
50,000-100,000 HUF	36.90%	45.70%	45.40%	43.90%	43.20%	40.20%	43.30%
100,000-200,000 HUF	40.10%	30.40%	31.50%	33.50%	33.70%	39.10%	35.20%
>200,000 HUF	14.60%	7.10%	8.10%	8.60%	8.50%	9.60%	10.20%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Own editing

Not surprisingly, the results are similar to the previous question. There is a statistically significant weak correlation between the level of reverse food expenditure and regions: $\chi 2(18, N=24855) = 546.395$ $p < 0.001$ (two-sided) V=0.086. The inhabitants of Central Hungary have higher expenditure (40.1% between 100,000 and 200,000 HUF; 14.6% above 200,000 HUF) and the regions of Eastern Hungary and Southern Transdanubia have lower expenditures (below 50,000 HUF: 14.1-16.7%; between 50,000-100,000 HUF: 43.9-45.7%).

This also includes the question of how much household expenditure has increased in the last year. For this question it was also possible to choose from value ranges: “Less than 5,000 HUF, 5,000-10,000 HUF, 10,000-20,000 HUF, 20,000-30,000 HUF, more than 30,000 HUF”. The value ranges were supplemented by the options “Not increased” and “I don't know yet” (Figure 3).



Source: Own editing

Figure 3. Shifts in household overheads over the previous year

Northern Hungary (25.0%) and Central Hungary (23.7%) had the highest percentage of price increases of more than HUF 30,000 among the seven regions of Hungary. According to a cross-tabulation analysis of the data, the relationship between the two variables (percentage of overhead increase vs. areas) is significant but weak: 2(36, N=24858) = 174.943 p0.001 (two-sided) V=0.034. The responses from Central Hungary are interesting because there is an imbalance between those whose overhead increased by more than 30,000 HUF (23.7%) and those whose overhead increased by less than 5,000 HUF (5.5%) or not at all (11.8%).

Job loss vs. salary increase

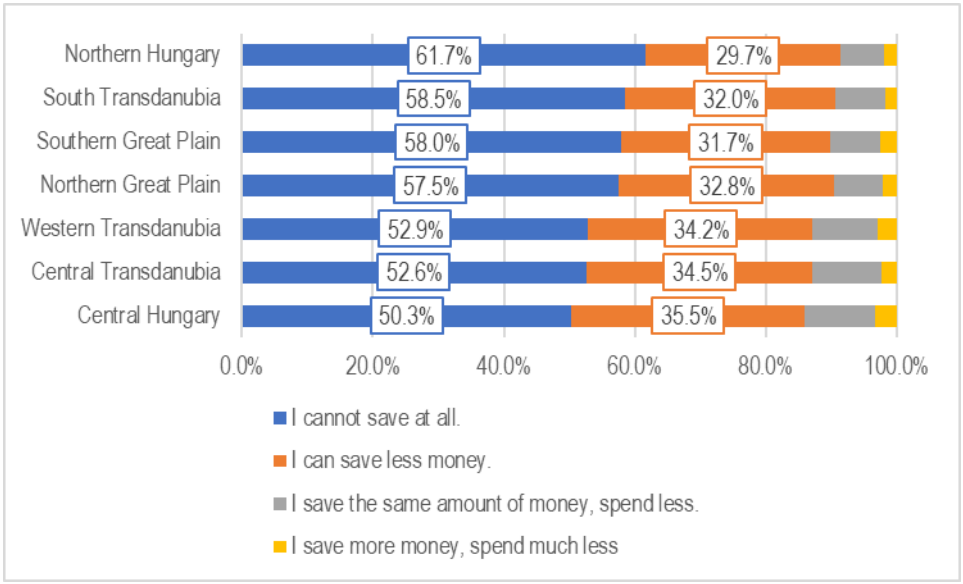
In the current economic situation, characterised by inflation, we cannot ignore two work-related issues. The first question asked if people are worried about losing their jobs, while the second question asked if they have experienced a salary increase due to inflation. Of the total sample, 51.4% are worried about losing their jobs while the rest 48.6% feel safe. Compared to the other regions, the level of concern is highest in Northern Hungary (57.8%) and lowest in Central Hungary (45.8%). The cross-tabulation study revealed a weak but significant relationship between the regions and the question studied: p = 0.001 (2-sided) for 2(6, N=16070) = 139.945 and V=0.093. A further analysis of the ratio shows that those who feel safe are overrepresented in Central Hungary (54.2%), and in Eastern Hungary (Southern Great Plain, Northern Great Plain, Northern Hungary) and Southern Transdanubia those who are afraid of losing their jobs.

To another question on this topic (salary increase), almost one fifth (17.4%) of the respondents answered positively, while four fifths (82.6%) gave a negative answer. Comparing the regions, Western Transdanubia was the happiest, with 21.7% of respondents in this region having already received an inflation-related salary increase. At the other extreme is the Northern Great Plain, where only 14.4% of respondents could say the same. Again, there is a significantly weak relationship: $\chi 2(6, N=19158) = 91.877$ p < 0.001 (two-sided) V=0.069. Based on the corrected standardised residuals, the country was “divided” into two parts: workers in Central Hungary, Central Transdanubia and Western Transdanubia received a significantly higher proportion of salary increases (19.2-21.7%), while the other regions (Southern Great Plain, Southern Transdanubia, Northern Great Plain, Northern Hungary) had a significantly lower proportion.

Loan, savings, family budget

The moratorium on loan repayments ended on 31 December 2022, and those who have been in this moratorium in recent months will have to resume instalments from 1 January 2023, meaning that their cost of living will continue to rise. Except for one question, we looked at whether the population has credit and whether they are using the credit moratorium option. Nationally, 35.2% of respondents do not have credit - by their own admission - but two-thirds do. 58.7% of the total sample do not use the credit moratorium, but 6.1% do. The largest share of loans still falls under the credit moratorium in South Transdanubia (7.0%), the smallest share in Central Transdanubia (5.5%). Overall, there is a weak but significant relationship between the question studied and the regions: $\chi 2(18, N=21870) = 70.558$ p < 0.001 (two-sided) V=0.033. As for the details, those who have no credit are overrepresented in Central Hungary (38.7%), and in Northern Hungary, Central Transdanubia and Western Transdanubia those who have credit but are not included in the credit moratorium (60.7-61.1%).

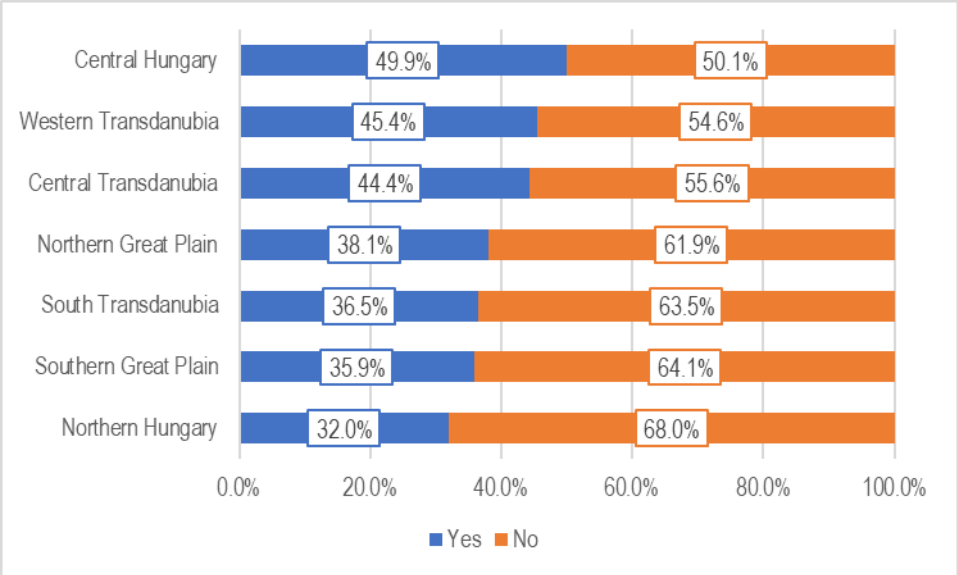
In addition to credit, the issue of savings is at least as important. In this context, we were interested in whether savings habits have changed due to the current inflation. (Respondents could choose from four options: “I cannot save at all”, “I can save less money”, “I save the same amount of money, spend less”, “I save more money, spend much less”.) The relative frequencies calculated from the answers are summarised in Figure 4.



Source: Own editing

Figure 4. Shifts in saving patterns during the previous year

As far as savings are concerned, the population in Northern Hungary is in the "worst" situation, with 61.7% of those who cannot save at all. In central Hungary, on the other hand, this ratio is 50.3%. Examination of the relationship by cross-tabulation analysis shows a significant weak relationship: $\chi 2(18, N=24098) = 199.919$ $p < 0.001$ (two-sided) $V=0.053$. In Central Hungary, those who can retire are overrepresented (less: 35.5%, more: 3.4%, equal: 10.7%), but in four regions (Southern Great Plain, Southern Transdanubia, Northern Great Plain, Northern Hungary) the proportion of those who cannot retire at all is significantly higher (57.5-61.7%). In connection with savings, it was also examined whether the population has savings of more than 500,000 HUF. There were two options to choose from: "Yes" or "No". The results obtained are illustrated with the help of the following figure.



Source: Own editing

Figure 5. Is your savings balance over HUF 500,000?

As for the whole sample, the majority (57.8%) have no savings of more than HUF 500,000, while 42.2% have savings. Among the regions, families in Central Hungary are the best off, where 49.9% have savings. Northern Hungary brings up the rear, where this proportion is only 32.0%. A significant weak relationship was revealed by a cross-tabulation analysis: $\chi 2(6, N=23407) = 407.995$ $p < 0.001$ (two-sided) $V=0.132$. Among the other features of the relationship, the favourable situation in Central Hungary, Central Transdanubia and Western Transdanubia, where savers are overrepresented (44.4-49.9%), should be highlighted. -In Hungary, the proportion of people without savings is significantly higher compared to the whole sample (61.9-68.0%). As we have seen, most of the population has no more than HUF 500,000 in savings. The question arises for how many months the population has sufficient emergency reserves (Table 4).

Table 4

How many months of emergency reserves do you have?

	Central Hungary	Southern Great Plain	South Transdanubia	Northern Great Plain	Northern Hungary	Central Transdanubia	Western Transdanubia
< 1 month	31.0%	39.0%	38.4%	37.8%	42.1%	33.6%	32.6%
1 month	13.4%	17.6%	15.8%	16.8%	16.6%	14.1%	16.1%
2 months	10.9%	9.8%	10.2%	11.0%	11.5%	14.0%	10.0%
3 months	10.2%	9.6%	9.4%	9.7%	8.5%	10.0%	11.1%
4-6 months	11.9%	9.2%	9.5%	9.3%	8.6%	9.7%	10.0%
7-12 months	8.1%	5.3%	7.0%	5.5%	4.7%	6.9%	7.4%
>12 months	14.4%	9.5%	9.8%	10.0%	7.9%	11.7%	12.8%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: Own editing

Among the results, Central Hungary stands out, where 14.4% of respondents have sufficient reserves for more than 12 months. At the other extreme are the Southern Great Plain, Southern Transdanubia, Northern Great Plain and Northern Hungary, where the proportion of people whose emergency reserves are sufficient for less than 1 month is exceptionally high. We examined the relationship between the two variables (emergency reserve vs. regions) using a cross-tabulation analysis and found a significant weak relationship: $\chi 2(42, N=23397) = 379.287$ $p < 0.001$ (2-sided) $V=0.052$.

One possible source of savings is the personal income tax refund received in early 2022 - assuming it was received. In the next question, the use of this option was examined. There were four options to choose from: “I put everything aside”, “I put some aside”, “I spent it” or “I did not receive a refund”. The majority of respondents chose this option, 61.3% of them did not receive any personal income tax refund at the beginning of 2022. A quarter of them (26.6%) received a refund but spent it. 6.8% of them set aside part of it, 5.3% were able to set it aside completely. In a regional comparison, Central Hungary was able to save the total amount the most (6.3%) and South Transdanubia the least (4.1%). Looking more closely at the relationship, we found a weak but significant relationship: $\chi 2(18, N=19941) = 52.549$ $p < 0.001$ (two-sided) $V=0.03$. Compared to the whole sample, the proportion of those who were able to set aside the total personal income tax refund is significantly higher in Central Hungary (6.3%), Southern Great Plain (28.7%) and Southern Transdanubia than the proportion of those who did not receive any refund (63.9%).

One of the first steps in creating financial security is to prepare a family budget, i.e., to plan the expenses in each month. According to our research, 59.3% of the Hungarian population prepare such a budget, while 40.7% do not. Looking at the regional results, it is surprising that the percentage of those who do not prepare a family budget is highest in Central Hungary (43.8%). In contrast, it is lowest in the Northern Great Plain (38.1%). Again, the correlation is weak but significant - thanks to the large sample at our disposal: $\chi 2(6, N=23677) = 57.620$ $p < 0.001$ (two-sided) $V=0.049$. In addition to the correlations mentioned above, the responses from Southern Transdanubia also deviate significantly from the values of the entire sample. The proportion of those who do not prepare a family budget is also significantly lower in this old region.

SUMMARY

Based on the research results, we can summarise that the vast majority of the Hungarian population over 25 years of age, i.e., more than three quarters, were in a worse financial situation in 2022 and were dissatisfied with their standard of living in the past year. As a result, changes in financial habits were also observed. This has challenged family budgets, e.g., by paying higher electricity bills, which sometimes leads to postponing non-essential expenses.

More than four-fifths of people had little or no savings, and more than a third did not even have savings for a month. As for savings, more than fifty percent of them have no more than HUF 500,000. Very few respondents, less than one-eighth, were able to keep all or part of the personal income tax refund received at the beginning of 2022.

In addition, a significant proportion of the population is seriously concerned about losing their jobs. Less than one-fifth of respondents said that their employer would try to compensate for the drastic price increases by raising their salaries. The issues surveyed, including standard of living, financial situation, spending habits, savings and family budget, show that inhabitants in Central Hungary, especially Budapest, are wealthier and less affected by inflation and price increases than people in the poorer east. live in the regions.

Author's contribution

Conceived and designed the study: László Molnár 60%, Noémi Hajdú 40%; collected the data: László Molnár 100%, performed the analysis: László Molnár 60%, Noémi Hajdú 40%; wrote the paper: László Molnár 60%, Noémi Hajdú 40%

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R&D Tax Incentive Implementation Rate: A Novel Approach to Analysing Attractiveness of Tax Incentives

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SUMMARY

The article discusses the current methodology used to evaluate the relative attractiveness of R&D tax incentives, namely the B-index. It describes the evolution of the methodology, as well as its main limitations and drawbacks. It further suggests a novel complementary approach to analysing the attractiveness of tax incentives taking into consideration the practical implementation of tax incentives. The developed indicator – the tax incentive implementation (utilisation) rate – accounts for national features of tax incentive systems and reporting on R&D tax expenditures and allows the generosity of tax incentives to be linked with the actual amount of tax support received by firms. Furthermore, the article demonstrates the applicability of the tax incentive implementation rate in policy analysis. The specific tax incentive implementation rates were computed for 20 European countries and compared to draw conclusions about the relative efficacy of policy implementation.

Key words: R&D tax incentive, tax subsidy, implementation of tax incentives, generosity of tax incentives.
Journal of Economic Literature (JEL) code: H25
DOI: https://doi.org/10.18096/TMP.2024.01.05

INTRODUCTION

Parameters of tax incentive schemes rarely stay constant over time. Governments may wish to give an additional boost to R&D or increase the stimulus for a particular target group. A proper evaluation of improved or alternative R&D tax incentives requires tax indicators which show the generosity of tax schemes and the significance of anticipated changes from firms' perspective.

The main tax indicator applied in the literature (Bloom et al., 2002; Dagenais et al., 2004; Hall, 1993; Mairesse & Mulkay, 2004) to assess tax assistance to investment in R&D is the B-index. This indicator is widely used today for the analysis of policy attractiveness (OECD 2019a, 2019b); however, it describes only potential tax support that can be provided by the tax system and does not reflect the perceived attractiveness of tax incentives by firms, which may affect tax incentive take-up. Meanwhile, successful implementation of R&D tax incentive policy may play a crucial role in the policy's effectiveness. Thus, an effective application procedure is desirable for the pool of beneficiary firms. They might be discouraged from applying for a tax incentive when they face uncertainty about the compliance cost. The complexity of R&D tax incentives due to potential interactions with other tax breaks or direct financing, as well as non-transparent mechanisms of their calculation, causes biases that can be a reason for taxpayers' failure to apply for and use R&D tax incentives. To the best of my knowledge, no studies are available that define and evaluate the relative efficacy of policy implementation, as well as the main drivers of its heterogeneity among countries. Therefore, this article focuses on the discussion of the current assessment practice of tax assistance to R&D, its drawbacks and limitations, and then suggests a novel approach to evaluating the attractiveness of tax incentives and efficacy of their implementation that can support policy analysis.

THE B-INDEX MODEL – METHODOLOGICAL ASPECTS AND LIMITATIONS

The B-index model was first introduced by McFetridge and Warda (1983) in their research "Canadian R&D Incentives: Their Adequacy and Impact" as a measure of generosity of R&D tax incentives and their relative adequacy.[i] Under the adequacy of tax incentives in relative terms they supposed that tax incentives 'are as generous as those of other countries facing similar circumstances' (McFetridge & Warda, 1983, p. 4). In their research, the B-index was used to demonstrate how the incentive to do R&D varies across firm sizes, regions, and types of activities within Canada, and to estimate the extent to which R&D in Canada would decline if it were treated the same for tax purposes as other types of investment. Later, in the reports prepared by the Conference Board of Canada in 1997 and 1999, the B-index was used as a measure of the relative attractiveness of tax systems of different Canadian provinces and as a comparison tool of favourable tax treatment of R&D in Canada and other major industrial countries (Warda, 1997, 1999). In 2000 the B-index was adopted by OECD as an R&D tax policy indicator (for example, in STI Outlook and STI Scoreboard) and was suggested for use as a tool for international benchmarking of the attractiveness of R&D tax systems (Warda, 2001).

Algebraically, the B-index represents a ratio of the net cost of one marginal monetary unit spent on R&D, after all quantifiable tax incentives have been accounted for, to one monetary unit of the income net of corporate income tax. It can be represented with the following formula:

$$B\text{–}index = \frac{(1-A)}{(1-\tau)}, \tag{1}$$

where A is the present value of depreciation allowances, tax credits, and other R&D tax incentives available, and τ is a corporate income tax rate.

Therefore, the B-index specifies the pre-tax income needed for a "representative" company to break even on a marginal, monetary unit of R&D outlay, taking into account provisions in the tax system that allow for an enhanced treatment of R&D expenditures (Warda, 2005; OECD, 2013, 2019c).

Formula (1) is general and can be adjusted to different types of R&D tax incentive schemes. Below are examples of the B-index calculation in cases of taxable and non-taxable tax credit (Formulas (2) and (3), respectively) and investment allowance (Formula (4)):

$$B\text{–}index_{TC} = \frac{1-x\tau-yz\tau-c(1-\tau)}{1-\tau}, \tag{2}$$

$$B\text{–}index_{NTC} = \frac{1-x\tau-yz\tau-c}{1-\tau}, \tag{3}$$

$$B\text{–}index_{d} = \frac{1-yz\tau-xw\tau}{1-\tau}, \tag{4}$$

where $B\text{–}index_{TC}$ – B-index for taxable tax credit; $B\text{–}index_{NTC}$ – B-index for non-taxable tax credit; $B\text{–}index_{d}$ – B-index for investment allowance (deduction); x – proportion of current R&D expenditure; y – proportion of capital R&D expenditure; z – present value of tax depreciation allowances (z = 1 is equivalent to current expensing); c – tax credit rate; and w – investment allowance (super deduction) rate (Warda, 2006, 2007).

The amount of tax subsidies to R&D is then calculated as follows:

$$Rate\ of\ tax\ subsidy = 1 - B\text{–}index. \tag{5}$$

According to the B-index concept, the more favourable the tax treatment of R&D, the lower a country's B-index and, other things being equal, the greater the amount of R&D that will be conducted by its corporate residents (McFetridge & Warda, 1983).

The B-index model can include many components of the R&D cost structure and applicable tax provisions (Warda, 2005):

- current R&D expenditure, including wages and salaries of R&D personnel and the cost of materials used in the R&D process;
- capital expenditures incurred in R&D that can be immediately expensed;
- capital expenditures (e.g. the cost of machinery and equipment, facilities and buildings) that have to be depreciated, usually over the useful life of the capital input

(according to declining balance or straight line methods);
- additional tax allowances on R&D expenditure;
- tax credits that are applied against income tax payable (taxable or non-taxable).

The model does not capture the considerations related to depreciation of the output of the R&D and does not account for deductions allowed for interest payment on loans.

For consistent comparisons, the model measures country B-indexes under constant and uniform technical assumptions:
- proportion of current and capital R&D expenditures is 90 per cent and 10 per cent, respectively, for all countries;
- wages and salaries (a component of current costs) are assumed to represent 60 per cent of total R&D expenditures;
- capital expenditures are divided equally between machinery and equipment (5 per cent), and buildings (5 per cent);
- the model is expressed in present value terms (net return over time) – it is assumed that for all the countries compared, the discount rate is constant and holds at 10 per cent.

In case the cost of investment is fully deductible and there are no additional R&D tax incentives, the value of "A" will be equal to the corporate income tax rate "τ", implying a value of the B-index equal to 1; therefore, the value of tax subsidy will equal 0. At first sight, this seems to signify that the tax system does not provide generous R&D tax incentives. However, this is not the case, as the benchmark of the B-index refers to immediate expensing, which implies a favourable tax treatment compared to the tax treatment of other investments that have to be depreciated over time (Palazzi, 2011). Indeed, studies on the effect of corporate income taxation on capital accumulation show that immediate expensing of investment expenditures is optimal since the fiscal neutrality is achieved by harmonising investment incentives on a common basis (King, 1987). The B-index will vary from 1 when R&D expenditures are not fully deductible ($A < \tau$) or are more than fully deductible ($A > \tau$).

The B-index model has some shortcomings:
- initially, only corporate income taxes and related incentives were incorporated (the model excluded incentives related to personal income, value added, property taxes, as well as taxes on wealth and capital); however, later the model was extended to include tax incentives applied through employer social security contributions (SSCs) and withholding taxes for R&D personnel;
- the model does not consider the treatment of the cost of financing (tax deductions of the cost of debt constitute an overall tax incentive for R&D);
- the B-index considers investment at the margin and does not reflect the tax treatment of infra-marginal investment and profits;
- the B-index is sensitive to the degree of symmetry between the tax treatment of R&D expenditures and the tax treatment of income derived from R&D (thus, for example, reduction in the B-index attributable to a tax credit, provided at a given rate, is larger the higher is the corporate income tax rate);
- the model refers to "representative" firms in their class for which caps or ceilings that limit the amount of eligible expenditures or tax support are not applicable (OECD, 2018; Warda, 2006; Palazzi, 2011; Clark, n.d.).

Originally the model assumed the existence of no tax exhaustion: it made no distinction between non-refundability and refundability provisions of tax incentives, and carry-forward and carry-back provisions did not alter B-index values, either. The challenging macroeconomic environment, particularly in the initial phase of the global economic crisis, has dented the profitability of many companies, making operating surplus negative in many countries' corporate sector. This called into question the relevance of the headline B-index as a representative indicator for all R&D-performing companies. Acknowledging the fact that there are differences in the provisions made by countries for scenarios in which companies cannot immediately realise the entire value of the tax benefit for R&D expenditures, the B-index formula was further developed by the OECD for loss-making companies or companies which do not have sufficient profit to utilise R&D tax incentives (OECD, 2013).

The B-index formula has been generalised as follows:

$$B\text{–}index = \frac{1 - \tau(x + (1 - x)\psi)\theta}{1 - \tau(x + (1 - x)\psi)}, \quad (6)$$

where $x = 1$ if the firm has a sufficiently large profit to claim tax incentives, $x = 0$ otherwise; and ψ is the present value adjustment factor for the allowance (or equivalent incentive) in the scenario with an insufficiently large profit base: $\psi = 1$ if the tax incentive is fully and immediately refundable in the "loss" case, and $0 < \psi < 1$ if the tax incentive can be carried forward.

The present value of an allowance or a tax credit which can be carried forward is calculated based on the assumption of a constant probability of returning to profit (arbitrarily set to 50 per cent) according to Formula (7):

$$\psi(T,\lambda,i) = [1-(\frac{\lambda}{1+i})^T](\frac{\lambda}{1+i})/(1-\left(\frac{\lambda}{1+i}\right), \quad (7)$$

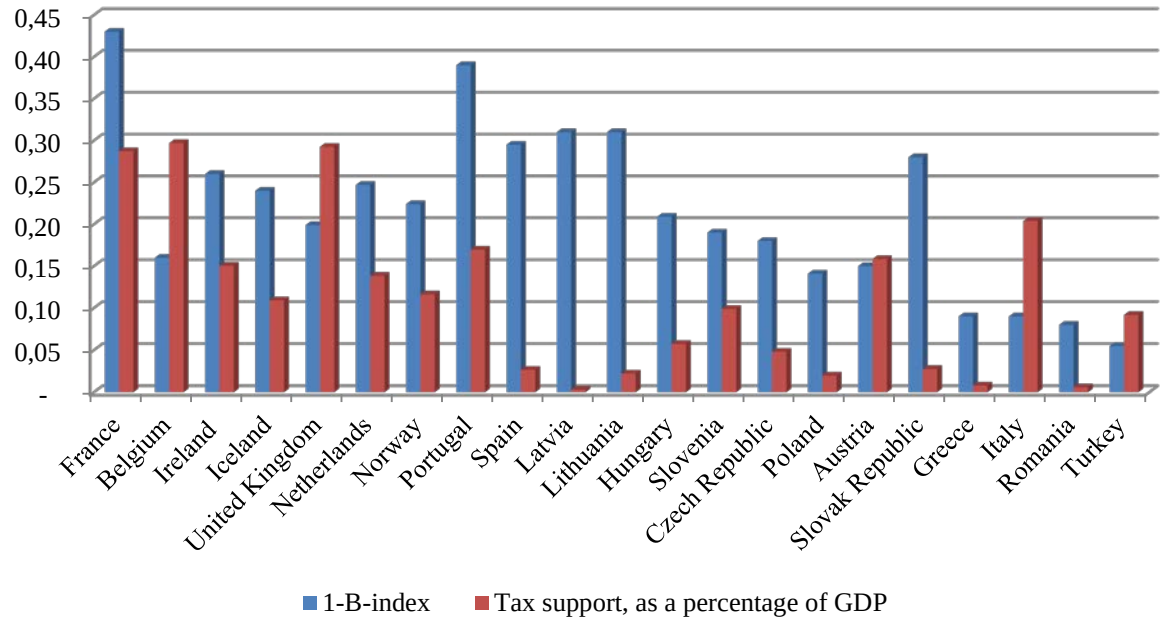
where λ is a probability of returning to profit; T is a time limit for carrying forward special credits and allowances; and i is an interest rate (assumed to be 10 per cent).[ii]

The computation of the B-index for loss-making firms has broadened the application of the B-index model allowing comparison of countries' tax rules for firms with no profits (albeit under some generalised assumptions).

Therefore, the B-index is a summary measure which assesses the generosity (maximum full value of benefit) of the tax system to encourage R&D of firms in different profit scenarios. However, potential generosity of tax incentives is only one dimension of their attractiveness, and other features of tax schemes may be important from firms' perspective (such as their simplicity, availability, or ease of use). Consequently, the B-index cannot be a complete measure of the relative attractiveness of tax schemes and should be complemented by other indicators. This question will be a focus of the next section.

A Novel Approach to Evaluating the Attractiveness and Efficacy of Implementation of R&D Tax Incentives: Baseline Methodology

Since the B-index assesses only potential generosity of tax system and does not reflect the behavioural responses of taxpayers to tax incentives, it should be analysed along with the actual amount of government tax support provided to business R&D (Figure 1).



Note: figures for Austria, Belgium, Latvia and Ireland are for 2017, for Romania for 2016. For countries that have different tax treatment of R&D for large firms and SMEs (namely, the United Kingdom, Norway and the Netherlands) tax subsidy rates are calculated by the author based on the share of SMEs in the total amount of tax support for BERD.

Source: own construction based on OECD statistics – R&D Tax Incentive Indicators (OECD, 2022a).

Figure 1 – Tax subsidy rate for R&D expenditures and the actual level of tax incentive support of BERD, 2018

As seen in Figure 1, some of the countries which provide generous tax incentives as measured by the tax subsidy rate have a lower share of actual tax incentive support to GDP (for example, Spain, Lithuania, Latvia and the Slovak Republic). On the opposite side, Belgium and Italy, providing less generous tax incentives, have a higher level of tax support for R&D than the Netherlands, Norway, Ireland, Hungary and some other countries. These differences may arise due to different levels of business-financed R&D in GDP, as well as due to the availability of tax support

administered by government officials and behavioural responses of taxpayers to the tax treatment.

To link the generosity of tax incentives with practical implementation of tax incentive policy a new indicator is suggested that can be meaningful for international comparisons of attractiveness of R&D tax incentives. It can be described with the following formula:

$$R\&D\ tax\ incentive\ implementation\ rate = \frac{Tax\ support, as\ a\ \%\ of GDP}{\frac{Business-financed\ R\&D, as\ a\ \%\ of GDP}{1-B-index}}. \quad (8)$$

[iii]

The proposed indicator may be named in two ways: the tax incentive implementation rate (TIIR) to emphasise how government succeeds in implementation of R&D tax incentive policy (such as creating a clear mechanism for the usage of tax incentives, transparent application procedure, delivering information about new tax incentives to taxpayers, etc.), or the tax incentive utilisation rate (TIUR), indicating whether businesses find it reasonable to claim and use tax incentives for R&D.

The numerator in Formula (8) shows how much tax support as a percentage of GDP is received by one per cent of business-financed R&D in GDP, or the share of business-financed R&D supported by R&D tax incentives if multiplied by 100.[iv] The total ratio shows the amount of normalised tax support[v] as a percentage of GDP generated by one unit of tax subsidy, or the share of business-financed R&D supported by tax incentives attributable to 1 unit of tax subsidy. Therefore, the indicator illuminates the effect of different levels of business-financed R&D expenditure in GDP among countries on the amount of tax support provided.

TIIR is meaningful primarily for cross-country comparisons of the successful implementation of R&D tax incentive policy. In a single-country analysis it can be used when changes to tax incentive schemes are introduced, reflecting the responsiveness of firms to them, otherwise other methods can be sufficient. For example, if the generosity of R&D tax incentives remains constant over time, the change in the magnitude of R&D tax expenditures or the number of taxpayers using the scheme can be analysed.

The formula of TIIR (8) is general and should be adapted to each country's specific circumstances.

The following features of national R&D tax incentive systems and the reporting practices on R&D tax expenditures should be taken into account:

- differentiation of tax support based on the firms' size;
- existence of refundable and carry-over provisions, and their modelling in the B-index;
- the method of measurement of government tax relief for R&D;
- tax treatment of subcontracting costs;
- existence of limitations in R&D tax relief.

These features along with their accountability in the formula will be discussed below.

Differentiation of tax support based on the firms' size

Countries which target their R&D tax incentives by firm size have different estimates of tax subsidy rates for SMEs and large firms. In this case, a weighted average estimate for all types of firms should be computed. In case of limited data on the amount of tax support distributed among different types of firms (large and SMEs), the weighted average B-index may be computed based on the share of their R&D expenditures in total business expenditure on R&D. According to the OECD (2019b), SMEs' share in tax support tends to be closely aligned with SMEs' share in BERD. Where countries perform evaluations of the R&D tax support provided to the business sector, the more precise amounts from such reports can be drawn upon. For example, HM Revenue and Customs in the United Kingdom provides annual reports on the amount of tax support by type of scheme, the Netherlands publishes "Focus on research & development", where uptake of the current R&D tax incentive scheme ("WBSO") is reflected, and some statistics can be found in the OECD Summary reports on indicators of tax expenditures (for example, OECD, 2019b).

Accounting for refundable and carry-over provisions in the B-index and the method of measurement of government tax relief for R&D

For consistent estimates of countries' specific tax incentive implementation rates, the B-indexes in different scenarios (profit- and loss-making firms) should be opposed to the amount of tax support, which can be estimated on an accrual or cash basis. Accrual reporting means that the recording of the provision of tax relief occurs when R&D generating the basis for claiming tax relief has taken place. Therefore, a measure of tax relief on an accrual basis is based not only on relief earned and claimed in the current year, but also on relief which may be carried over. For countries which provide accrual-based estimates, B-indexes for profit scenario should be used in the computation of TIIR. At the same time, some countries provide cash-based estimates of government tax relief for R&D, that is, the claim is recognised by the

government when it is paid in cash or used to decrease the tax liability of the firm. If these countries offer refundable provisions the B-indexes for profit- and loss-making scenarios will coincide. Some biases may arise in the computation of TIIR when only carry-over provisions are adopted (no cash refunds) or modelled in the B-index. To connect cash-based estimates with B-indexes in both scenarios the share of firms that could not fully benefit from available R&D tax incentives due to an insufficient amount of income in the total amount of tax support should be estimated. Considering that not all countries collect such information, the assumed share of 50 per cent can be used in the computations. Since the B-indexes for loss-making firms, generally differ only slightly from those for profit-making due to the possibility to carry-forward tax benefits, this assumption will not distort the estimates.

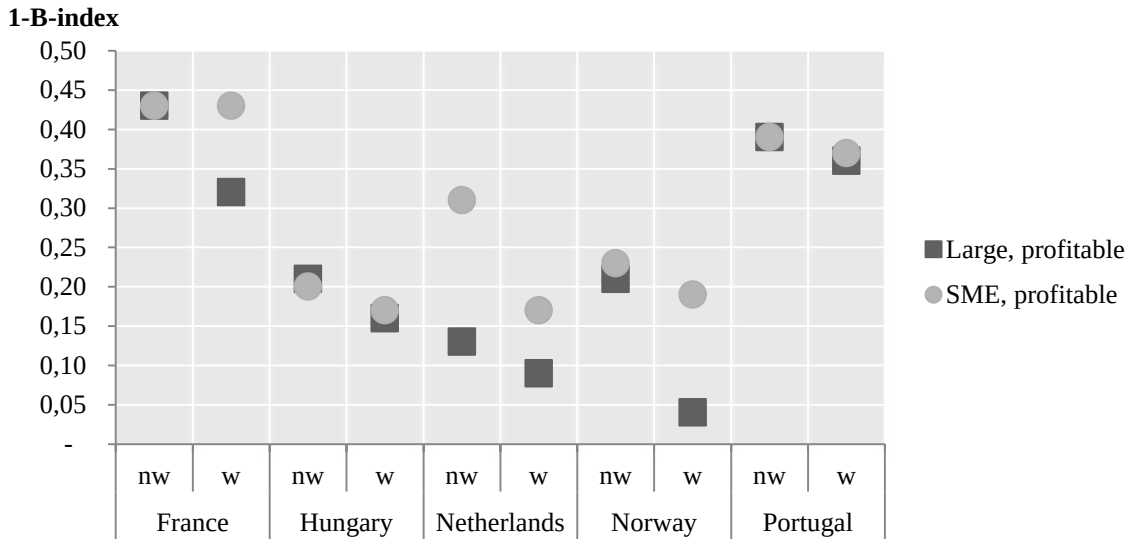
Tax treatment of subcontracting costs

The treatment of subcontracting costs should be taken into account in order to estimate the amount of R&D expenditure used for normalisation of tax support of R&D. In some countries (for example, Belgium, the Netherlands and Hungary) only the performer of R&D activity may apply for tax incentives, while most European countries provide tax incentives for the funder of R&D activity, which means that subcontracted R&D expenditure may also qualify for tax support. Italy and the United Kingdom, when supporting a funder of R&D activity, allow tax benefits to be claimed for R&D contracted to firms by the business sector from abroad (in the United Kingdom under the large company scheme only). Some countries (for example, Austria, Ireland, the Slovak Republic and Romania) allow either the performer or the funder to make a claim for tax benefits; however, there is no double tax relief (OECD, 2022b). In Turkey the tax benefit can be received by both parties in equal proportion. Eligibility criteria may also relate to the nature of the contractual relation between the contractor and contracted party. For example, Austria and Ireland exclude R&D contracted to related parties from R&D expenditure eligible for tax benefits. Therefore, county specificities regarding eligibility of subcontracting costs should be considered and the adjustment should be made to the amount of business-financed R&D used for normalization of tax support in the formula.

The existence of limitations in R&D tax relief

In general, the B-index model assumes that ceilings and floors are not binding. In countries which offer tax benefits redeemable against social security contributions and payroll withholding taxes, tax offsets by construction are limited to tax liability (for example, in Belgium, France, Hungary, the Netherlands, Spain and Turkey). However, some of these countries impose additional limitations on the amount of tax relief that can be claimed. For example, in Turkey the number of support personnel who benefit from social security contributions cannot exceed 10 per cent of the number of total full-time R&D personnel. In Hungary, tax relief can be validated up to the gross wages of 500,000 Hungarian forint (HUF) per month (HUF 200,000 in case of PhD students or doctoral candidates). In Spain, 60 per cent of the annual wage bill for qualified research staff may benefit from a tax incentive. France adopted a ceiling for SSC reduction at the employee and company level, while the Netherlands and Belgium did not use additional limitations for the amount of tax relief (Belgium imposes a limitation only from 2018, which was caused by the extension of the scheme to researchers with bachelor degrees). Some countries do not limit the amount of tax benefits from R&D tax credit and R&D tax allowance (for example, Poland, Greece, Latvia, Lithuania (for profit-making firms)[vi], Romania, Slovenia, Belgium and the United Kingdom (for RDEC scheme)), while others impose various types of limitations on the amount of R&D expenditure. For example, Norway limits the amount of qualifying R&D expenditure for the ScatteFUNN scheme per project, per firm, and per year (for intramural R&D including that procured from entities other than approved R&D institutions, subcontracted R&D to approved R&D institutions, and the sum of the two). Such limitations affect mainly large firms, making the scheme less generous.

To account for the effect of ceilings OECD has recently developed an experimental indicator “weighted” tax subsidy rate. It is computed for countries whenever data or proxy measures for the distribution of eligible R&D spending are available. The comparison of the two subsidy rates is presented in Figure 2.



1-B-Index, by firm size (profit scenario)

Note: nw = non-weighted, w = weighted. Figures do not reflect preferential provisions for start-ups, young firms or a specific subset of SMEs (for example, innovative SMEs).

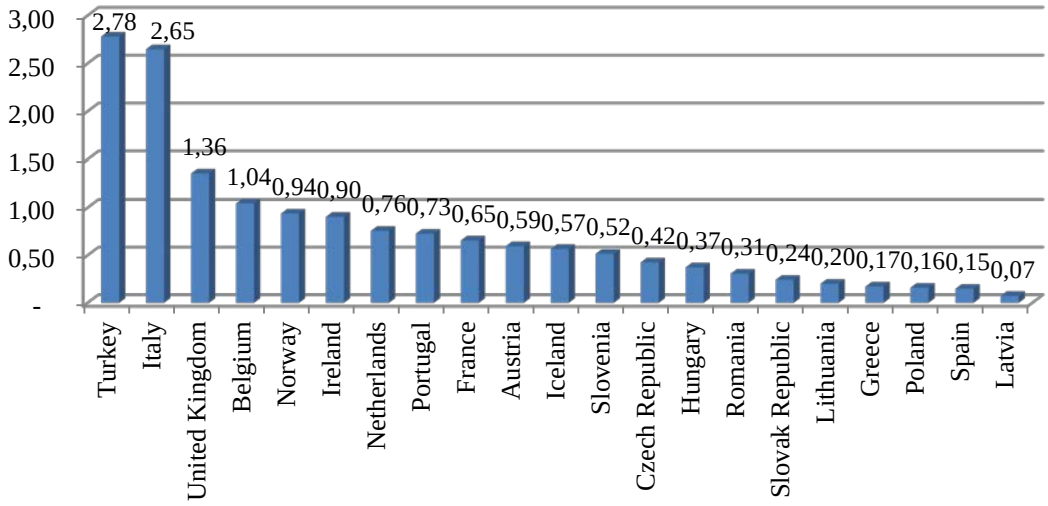
Source: own construction based on OECD, 2019a, 2022c.

Figure 2 – Weighted vs. non-weighted implied tax subsidy rates on R&D expenditures, 2018

Therefore, for these countries (namely, France, Hungary, the Netherlands, Norway and Portugal) the weighted tax subsidy rates can be used in the computation of TIIRs, which allows estimates to be more precise. Since in France and Portugal weighted tax subsidy rates differ for large firms and SMEs (while non-weighted tax subsidy rates coincide), the proportion of tax support for SMEs should be also accounted for in these countries to arrive at the average weighted tax subsidy rate estimates.

APPLICATION OF TIIR IN POLICY ANALYSIS

According to the approach developed, TIIRs were computed for 20 European countries[vii] with R&D tax incentives in place for the year 2018, for which comprehensive and reliable data on tax support are publicly available. The results are presented in Figure 3.



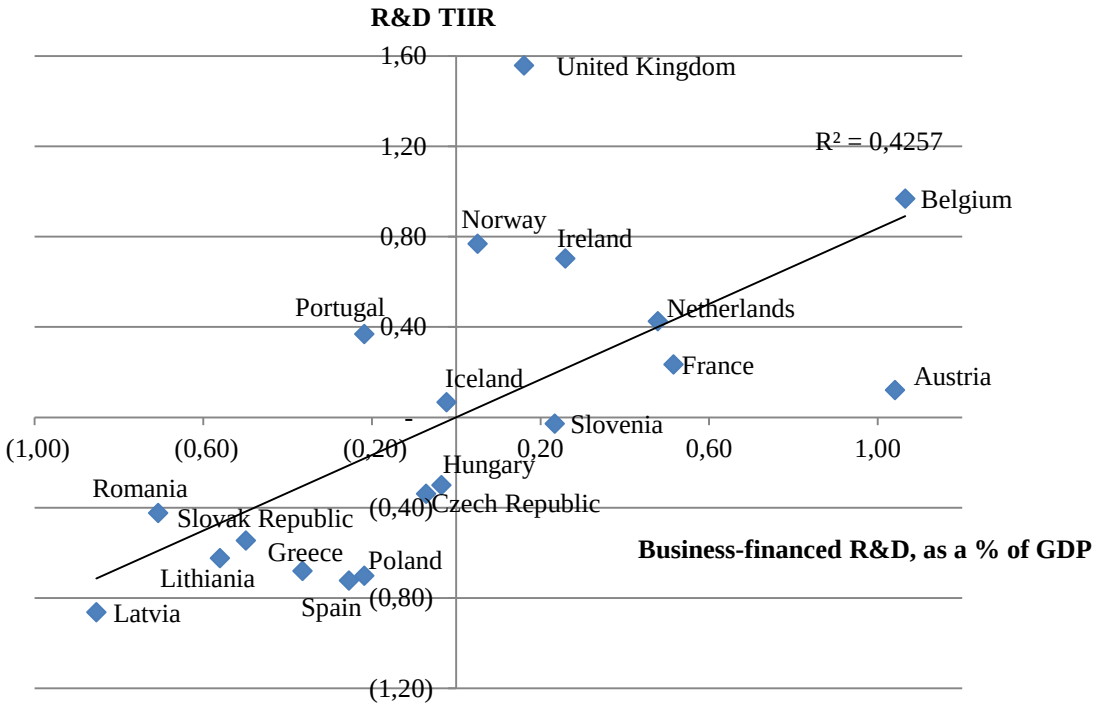
Note: figures for Austria, Belgium, Latvia, and Ireland are for 2017, for Romania for 2016.

Source: own construction

Figure 3 – R&D tax incentive implementation (utilisation) rate, 2018

As can be seen from the figure, the highest TIIRs are in Turkey and Italy, which can largely be explained by the low generosity of tax incentives in these countries – the tax subsidy rates are 0.09 for Italy and 0.06 for Turkey[viii] for profit-making firms in 2018, while the average tax subsidy rate in the analysed set of countries is 0.22 for SMEs and 0.20 for large profit-making firms, taking into account weighted tax subsidy rates for some countries. Therefore, the ease of availability of tax incentives in these countries can be related to low tax expenditures on R&D in the national budgets. The highest use of R&D tax incentives, at a given level of generosity, is observed in the United Kingdom, Belgium, Norway, Ireland and the Netherlands, while the lowest tax incentive utilisation rates are in Romania, the Slovak Republic, Lithuania, Greece, Poland, Spain and Latvia. Since the latter group of countries, except Spain[ix], do not have limitations in the use of tax incentives in form of ceilings, low TIUR can signal low interest in tax incentives in these countries due to lack of awareness, existence of administrative barriers to the usage of tax incentives, or high compliance costs to firms. Therefore, tax incentives in these countries may be less attractive to firms due to less efficient implementation of the R&D tax incentive policy.

To test if TIIRs are positively associated with business-financed R&D the relative positions of countries based on these two indicators were identified[x] and the correlation coefficient was computed to assess the strength of such association (Figure 4).



Notes: figures for Austria, Belgium, Latvia and Ireland are for 2017, for Romania for 2016. For Ireland business-financed GERD as a percentage of modified GNI is estimated. Turkey and Italy are excluded from the correlation analysis due to their extraordinarily high TIIRs.

Source: own construction

Figure 4 – The strength of association between business-financed GERD and R&D tax incentive implementation rate, 2018

As can be seen from Figure 4, the R&D tax incentive implementation rate is positively correlated with business-financed GERD. The correlation coefficient is at 0.652, which indicates a strong positive association among variables. Therefore, if a causal relationship presents it can be that it is not the generosity of tax incentives itself but their successful implementation that drives the policy effectiveness.

CONCLUSION

The developed approach to analysing the attractiveness of tax incentives points out the necessity of accounting for the additional features of R&D tax incentives which can affect tax incentive take-up (such as their availability, simplicity, or ease of use, etc.). By linking the generosity of tax incentives and the amount of actual tax support provided to firms, TIIR provides information about practical implementation of tax benefits. The computation of countries' specific TIIRs will allow policy makers to judge the relative attractiveness of R&D tax incentives from firms' perspective, as well as to identify a country's relative position in the efficacy of policy implementation. These conclusions may guide policy decisions on better shaping the policy based on the benchmark TIIRs. The heterogeneity in the policy implementation may be further explored to draw conclusions on the premises of efficient policy delivery.

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[i] The underlying theoretical framework is based on the approach to measurement of the user price of capital developed by Hall & Jorgenson (1967). Later, King & Fullerton (1984) expanded the model with the aim of deriving marginal effective tax rates (METR) on various types of investment. The B-index represents the tax component of METR; however, qualitatively the B-index gives the same results as the METR (Warda, 2001; Jung, 1989).

[ii] It can be noted that the adjustment factor will be higher for tax credits which can be carried forward indefinitely than for those which can be carried forward for a limited number of years ($\psi(T, \lambda, i) < \psi(\infty, \lambda, i)$).

[iii] In the formula the business-financed GERD (or BERD) by domestic and foreign business-enterprise sectors (where applicable) should be considered depending on the eligibility of certain R&D expenditures.

[iv] For ease of calculation relative measures to GDP are used rather than absolute figures. However, this depends on the user of the methodology.

[v] Tax support normalised by the level of business-financed R&D.

[vi] In Lithuania the limitation of the tax benefits is for loss-making firms only – the amount of carry-forward losses may not exceed 70 per cent of taxable profit of a particular accounting year.

[vii] Including Turkey.

[viii] Italy and Turkey do not differentiate tax support by firm size

[ix] The weighted tax subsidy rate is not reported for Spain.

[x] Specifically, based on the deviations of these indicators from the sample mean.

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Fast Changes in Food Retailing Due to the Impact of COVID-19

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SUMMARY

In this article, the impact of the COVID-19 pandemic on the Fast-Moving Consumer Goods (FMCG) sector is examined. We consider it important to analyze the directions in which the retail sector has shifted and to determine whether it has been able to react to the sudden and increased online market challenge. How do offline and online food retailing relate to each other? What new challenges will shopping face in the future, how is retailing adapting to them and how can artificial intelligence support these retail processes? What new innovations are expected in future retailing and how can domestic market players adapt to them?

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INTRODUCTION

The COVID-19 pandemic has drastically set back the economies of countries around the world. The process of recovery in some sectors may last for years. The situation is further aggravated by the fact that the coronavirus epidemic is not fully over, but is still reigniting, though with less intensity. The coronavirus epidemic has affected the targeted retail sector in different ways. The winning markets in retailing have been food and hygiene products, with e-commerce gaining particularly strongly over traditional business networks in the first three waves. E-commerce will continue to play an increasingly important role in the future, but even traditional stores will find their place in the changing retail structure. In the food retailing sector, a particular situation is likely to emerge where multinational companies that have been strong in the online space will ally with offline retailers to consolidate their market position. Examples include Alibaba and Auchan, Google and Walmart, and Uber Eats and Albertsons. The online companies need this because it gives them access to logistics warehouses and points of sale without having to invest heavily.

Previous market systems are being transformed and new commercial models are emerging. For commercial companies, data and information related to the product being sold is playing an increasingly important role in value creation, and the role of transparency and increased options in customer decisions is becoming more important, alongside rapidity.

The procedures and policies defining the framework in which companies operate must adapt to these changes. Process controls and procedures for maintaining or improving efficiency are designed to enable businesses to change and adapt. Another aspect of organizational process management is the accumulation of knowledge and the continuous development of the company's learning capacity. The historical knowledge base of each business development project is maintained, updated and made available to the other parts of the organization; this knowledge base can be used to plan and manage future projects. All these examples illustrate how the strategic resources of companies (e.g. retailers) have changed, not only transforming traditional business models, but also requiring a different management approach to reach customers and understand their needs. For a commercial company, even 5-10 years ago, a more or less geographically defined catchment area was an important dimension of customer segmentation. The omnichannel sales channel model requires a different kind of stakeholder management. The internet has created the category of trait-based community (Ismail et al., 2014).

Regardless of geographical proximity, customers are “in the cloud” and communicate, creating a virtual community. Different methods and algorithms are needed to reach potential customers, understand their needs and serve them. In our study, we explore the paradigm shifts that are fundamentally influencing the spatial thinking and operations of corporate management as a result of the rise of disruptive technologies.

New Models and Innovation

Big Data plays a key role in the new models. This data makes it possible to build a new understanding of consumer needs and to formulate new marketing approaches. Increasingly sophisticated methods of machine learning (ML) and artificial intelligence (AI) are playing a major role in this process. Natural language processing (NLP) represents an important area of development, with one example being Telekom Vanda's digital business assistant. These and similar systems are an effective way of keeping in touch with customers and serving their needs even better. Pepper, a humanoid robot with face recognition, face tracking and voice recognition technology, was presented at the ARKÁDROBOTIKA exhibition held 19–24 February 2019. The presented robot can make our everyday life more convenient due to its versatile usability, for example it can guide us, help us in booking a hotel, serve us in a restaurant, assist us in administration or even in reporting a lost credit card, and it can be a great help in a shopping mall, as visitors prefer to ask the robot for guidance on where to buy certain products, where to find a shop, etc. Pepper also gives you a sense of personality by looking straight into your eyes, playing with your voice, making small gestures with its hands and responding to your questions (Debreceni, 2019).

Another area of application of robots increased significantly during the COVID-19 epidemic. In particular, disinfection robots received significant attention; such robots were used by the Dutch company Ahold Delhaize in two US commercial centers. The machines, manufactured by AVA Robotics, were the first in the world to be used by Ahold Delhaize in the fruit and vegetable trade to disinfect their warehouses. According to the manufacturer, the robots were capable of disinfecting more than 800 square meters of surface and air space per hour and were 99% effective against the SARS-COV-2 virus (Horváth, 2021).

We have to conclude that traditional trading systems are also increasingly being permeated by the models offered by modern technology. Machine Learning and Artificial Intelligence are increasingly present in the offline space, which, combined with the benefits of the online space, opens up new opportunities for shoppers. As a fact, the period of the coronavirus epidemic accelerated the use of the online space, and customers forced into home office became accustomed to the convenience offered by e-commerce, so in addition to convenience, low prices, wide choice and quality of delivery have become important factors for them. Research shows that the growth of the online FMCG market is accelerating strongly and could be up to four to five times larger than current sales. This is why it is in the interest of offline sellers to build and forge alliances with online retailers and create their own online world (Zhang & Wedel, 2009). To be successful, companies need to be able to manage Big Data data sets successfully. To do this, they need to employ experts with expertise in IT and mathematical methodologies to gain access to more sophisticated data sets that will help them develop and operate a new type of omnichannel marketing strategy. Omnichannel solutions allow companies to manage their sales palettes in the same structure, so their customers can get the information they need by voice, email, live chat, chatbot, SMS, social media or video chat. The key component of this new approach is interoperability between channels to ensure the right flow of information between buyers and sellers. Omnichannel marketing will only be truly effective if we are aware of the points at which we can help customers to choose our product without any significant effort. Thus, we use customer data to highlight the points that make the shopping experience easy and effortless (Bajor, 2018). In addition to this, it is also important that the messages sent through the communication channel include higher level brand knowledge and connections, i.e. a consistent brand image. Another important aspect is that the messages sent through the communication channels are tailored to the customer, as this greatly increases the effectiveness of the communication strategy. It is only through effective data mining that we can achieve the effective marketing strategy mentioned above. Through network research, Big Data datasets can be used to extract a wealth of data that can provide new information about the properties of social networks, the evolution of the networks of connections and the points of densification of networks. This clustered information can then be used to better identify marketing target groups and to predict information diffusion and behavioral patterns (Barabási et al, 2015; Barabási et al., 2020).

What New Developments Can Be Expected in the Future of Retailing?

Nielsen's research has shown that comfort, practicality, environmental and health protection are the key consumer priorities for innovations, and this has become particularly important in the context of the COVID-19 pandemic (Szűcs-Villányi, 2019). And in the longer term, sustainability, personalization and online

penetration play a key role. However, there are also significant differences within online trade. Growth in the FMCG sector remains the most dynamic (Trade Magazin, 2022). Understanding customers and shopping opportunities are crucial for success online. In terms of shopping occasions, we distinguish between top-up and routine purchases, with the most common being weekly bulk purchases. The COVID-19 pandemic forced companies to come up with solutions providing convenience and practicality for shoppers. The pandemic period has accelerated this way of thinking among both offline and especially online sellers. From a business point of view, food home delivery has been a headache for retail chains for years, but with the exception of discount supermarkets (Aldi, Lidl, Penny Market), almost no one can afford not to be present in this market, including Tesco, Auchan, Spar and Prima. However, new companies have also emerged in the COVID-19 pandemic and are gaining ground over larger competitors. One such company in the food retail market is Kifli.hu, which was launched from the Czech Republic. If you "don't have time or motivation to go to that particular bakery where that particular croissant you love is made, you can order it from Kifli.hu and once you've ordered it, you can add a few other basic groceries you need anyway. You'll get the latter for about the same price here as anywhere else," promised Kifli's CEO (Torontáli, 2019). Kifli does not primarily aim to serve young people, but rather those who are willing to pay for good quality products and good quality service. About 50% of their product range consists of high-end or premium products: wines, bakery products, meat products and chocolates, for which people are willing to pay a higher price. However, they also try to ensure that the majority of their prices do not differ too much from those of the biggest chains, Tesco or Spar, as this is the only way to keep their competitive edge (Egy év alatt piacot robbantana Magyaországon a Kifli.hu, 2019).

Online retailers offer convenience and practicality by placing your order on your doorstep. Reducing food waste is an important aspect for both offline and online companies, so products approaching expiry are offered for sale at significantly reduced prices, and efforts are made to collect packaging. Kifli is a pioneer in this regard, collecting and recycling carrier paper bags at the time of the next purchase. In the long term, therefore, flexibility, responsiveness and a proactive approach, alongside multi-channel operations, will be the keys for success (Konuş et al., 2008; Verhoef, 2012). The year 2020 brought major changes. There was a massive increase in online demand for everyday consumer goods and it was not easy for retailers to keep up: "during the first months of the pandemic, online supply was severely understocked and retailers were not prepared for the increased delivery demands during the 'home office' and 'stay at home' campaigns - capacity could not be increased several-fold from one day to another" and this has reorganized the market (Sikos T., 2024, p. 387). The situation has given a big boost to the expansion plans of online FMCG players and the competitive situation created by new entrants has also been beneficial for service quality. Chefmarket stands out as an interesting example, which typically specializes in catering, but as a result of the pandemic was forced to open a retail business, which has been successfully launched and is expected to be maintained as an additional area of business. In 2020, the value of online shopping baskets increased by more than 40% as a result of the pandemic (Sikos T., 2024, p. 387).

Competition between online retailers has become fierce. The top five in the market included two hypermarkets (Tesco and Auchan), two drugstore chains (Rossmann and DM), and one purely online player, Kifli.hu.

Table 1

Ranking of the top online FMCG retailers in 2023

Ranking	**FMCG company**
1.	Kifli
2.	Tesco
3.	Auchan
4.	Rossman
5.	DM

Source: Hazai e-toplista: ők a menő kereskedők Magyarországon, 2023; TOP 15: ezekben a webshopokban vásárol legtöbbet a Magyar, 2021

The top five retailers' combined online turnover in 2023 exceeded HUF 50 billion (gross). Since these retailers sell not only FMCG products, the gross turnover of the sector was approximately EUR 76.6 billion (Sikos T., 2024, p. 388). Convenience and practicality have been important factors for the continued growth of online businesses, with personalization in the future.

ENVIRONMENTAL AWARENESS

Consumers are increasingly expecting companies to take care of the environment and minimize their environmental impact. However, we must also recognize that different generations live in different ways, with different dynamics, and react differently to certain issues in the world surrounding them. This was also the case regarding the epidemiological situation, but their thinking is also different on environmental issues. In many respects, are the elderly unpersuadable? Are teenagers careless? Are young people overreacting to protests and conscious living? Individual differences are always present, obviously, and it is not possible to determine what is right and wrong for the environment on the basis of age. Not everyone is equally concerned about this issue within any age group, and generational differences within families may well be due not to attitudes towards the environment but to the dysfunctional family dynamic (Kertész, 2020). The population over 55 is not only more environmentally conscious but also much more thrifty than younger people and much more generous. This is understandable, naturally, given the greater amount of consumer goods accumulated over their lifetime (Lewis, 2021). Thus, compared to those aged 16-34, they donate around 25% more of their household assets to charity. Habit and tradition lie behind the environmental awareness of the older generation. This is the generation that places more importance on car use in everyday life than other generations and is much less able to accept and switch to new transport alternatives (such as car sharing, BlaBlaCar etc.). Younger generations are often less aware, and often environmental awareness is not necessarily an intrinsic motivation, instead driven by peer pressure, following fashion. For the older generation, environmental awareness is based on respect for nature and natural values. And for the youngest age groups, the development of an environmentally aware attitude is strongly linked to what older people see and do to protect the environment (Sikos T., 2024).

Not only consumers, but also companies should strive to reduce overconsumption on the planet. To this end, on 29 July 2021, World Overeating Day, WWF and Tesco launched a unique initiative to promote affordable and sustainable food consumption in the Czech Republic, Hungary and Slovakia in the long term. Through this initiative, Tesco aims at raising awareness among shoppers to make an effort to consume food sustainably on a daily basis.

PERSONALIZATION

Achieving ever larger shopping baskets and, at the same time, developing personalized commerce are the key drivers of the future of online commerce. Large companies will focus on expanding their product range, while small companies will only survive in the market if they specialize. Obviously, the large range of products offered by shops also poses a number of risks, such as an increase in stock, which will become much more difficult to manage, and more complex IT and logistical tasks and a higher level of systems are required. In addition, a more effective marketing policy will be needed to inform customers. Large database (Big Data) systems and the management of data clouds require new types and skills of management and, of course, the development of new communication interfaces both for logistics and customers.

For small shops, one very important endeavor is to understand the needs of their customers as well as possible. Retailers need to be aware of the structure of a customer's shopping basket pattern and its frequency pattern. This will be one of the most important conditions for success in face-to-face sales. During the pandemic, retailers launched a significant number of small and large online schemes. The secret to the success of the online units established lies in their speed, accuracy and maximum adaptability to customers' needs. It can be stated as a fact that today it is becoming increasingly difficult to navigate across a wide range of products and therefore consumers are reinterpreting their preferences and expectations of products and services. "Traditional factors such as price, choice and convenience remain important, but given how many good choices consumers are offered, personalized experience may now be the differentiating factor. This is especially true for the digital natives of Generation Z, who now make up one-fifth of the European and US population, the Nielsen survey points out. Personalization will become easier for digitally enabled businesses, with e-commerce being able to track purchase history, ad views, demographics and preferences. All of this facilitates optimization for the retailer, who can then maximize revenue." (Dechant, 2016). New algorithms must be used to manage the data generated by purchases. New methods developed can track customer behavior, and with the help of marketing geography tools, we can gain even deeper insights into customers and tailor our business strategy accordingly.

We can then plan our advertising, promotions and advertising campaigns on this basis.

WILL TRADING TAKE PLACE OFFLINE OR ONLINE IN THE FUTURE?

The retail of the future will be a mixture of offline and online, which means that shopping will always take place through whichever channel suits the shopper best. So, shopping will take place at the edge of traditional geographic space and cyberspace. Surveys conducted by market research company Nielsen in sixty countries, including Hungary, show that consumers are embracing new digital technologies and expectedly these new technology solutions will become an important part of the future retail. Modern technologies help "retailers and manufacturers to take advantage of flexible sales opportunities. This will enable them to provide a better shopping experience and increase footfall in each channel." (Dechant, 2016). And all this will influence tomorrow's trading in a positive direction. The blending of online and offline also means that in many cases shoppers will choose the most convenient pick-up points for them. These may be the office, home, holiday home for home delivery, but also, naturally, certain points in the offline space, such as the various pick-up points or collection points designated by shops. The latter also has the huge advantage that in this case the shop acts as a warehouse, as the customer's shopping basket is assembled here. Some products are missing from the offline system or are only available in limited quantities, such as vegan foods, which are very popular among Generation Z. In a short time, the digital world can create a multitude of new tools to make ordering easier and faster, thus significantly accelerating the development of online commerce, which has already been accelerated by the recent epidemic. An innovative distribution system is emerging, using modern retail technologies, in which market players are constantly innovating and learning to adopt and use newer and newer technologies. This new system is now fully embraced by the world of robotics. In this new framework, firms are able to react very quickly to market challenges and to cooperation with smart partners in order to remain competitive in the market (Gauri et al., 2021). All of this makes it possible for customers to participate in a world of convenience and experience.

CONCLUSION

In the future, retail will be dominated by hybrid sales, where retailers will sell both offline and online. More and more companies are expected to merge in order to have both offline and online sales channels, as this will be the basis for their commercial success. The EBIT (Earnings Before Interest and Taxes) profits of offline companies are still higher for now, but no one can afford to ignore such a significant market segment as online sales (only discounters like Aldi, Lidl, and Penny Market can afford this nowadays, but it is not the way forward for them either). Online companies will become more successful as shopping baskets grow, and late entrants will easily find themselves at a competitive disadvantage. Companies with an offline network will need to build fewer logistics centers as they can use their own stores as logistics bases. It is also a fact that the COVID-19 pandemic in particular has had a significant impact on the development of online commerce. If we would like to extrapolate this in time, there has certainly been at least a 5–6-year jump in the growth process. Many other areas have also developed dynamically, as stricter hygiene conditions have become necessary in order to overcome the epidemic. To this end, several companies have adopted technologies that were previously less used, resulting in a dynamic development of robot technology, especially in the field of manufacturing disinfection robots, which were the most needed tools in logistics, alongside picking and transport robots. Of course, there were similar types of robots and applications before, but the pandemic has accelerated the use of these tools even more.

Humanity must face the issue of depleting resources and in particular the rational use of food resources, as many products end up as waste after purchase, while more than two billion people do not have regular access to adequate food and 11% of humanity is starving (WHO, 2023). However, the ecological footprint of the minority of the population exceeds the current carrying capacity of the planet if current trends continue. The COVID-19 epidemic has had a positive impact on the growth of the FMCG sector in the retail sector, including online retailing, which will continue to be a dominant trend in the future. The key to its continued growth will be a focus on environmental issues, sustainability and personalization in online commerce - particularly important among digital natives, who are the most receptive to digital culture.

Author's contribution

The authors, Tamás Sikos T. and Dóra Molnár, carried out the work in a 50% - 50% ratio.

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A Nationwide Assessment of Kuwaitis' Compliance with Preventative Measures During the COVID-19 Epidemic

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SUMMARY

This study examined how well people in Kuwait followed guidelines to prevent the spread of COVID-19. To prevent the virus's spread, precautionary measures such as social distancing, wearing masks, and hygiene practices have employed. The purpose of this study was to analyze the Kuwaiti population's adherence to precautionary measures during the epidemic. A cross-sectional study was carried out between March and August of 2022 with the use of a self-administered online questionnaire distributed to Kuwaitis aged 20 or above. The questionnaire included demographic questions as well as questions on preventative behaviors. Descriptive statistics, chi-square analysis, and multivariate regression analysis were used to examine the data. The findings revealed that 54.8% of individuals had good behaviors, with hand cleanliness being the most prevalent and eating a healthy diet being the least common. Chronic illnesses, a history of COVID-19 infection, and the COVID-19 vaccine were all linked to levels of practice. Regression analysis demonstrated that COVID-19 infection considerably enhanced the likelihood of adherence to preventative measures. The data indicate that, while a sizable majority of the Kuwaiti population engaged in beneficial activities, there is still room for improvement, particularly in terms of adopting a better diet. Future efforts should concentrate on marketing and educating the public about the relevance of COVID-19 prevention measures.

Keywords: COVID-19, Precautions, Preventive practices, Pandemics, Outbreak Kuwait
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STUDY BACKGROUND AND LITERATURE REVIEW

The global impact of COVID-19

Since its emergence in late 2019, the COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, has rapidly spread worldwide. The initial absence of readily available antiviral treatments or established vaccines presented significant challenges in curbing the virus's transmission (He et al., 2020; Yang et al., 2020; Zhou et al., 2020). To mitigate the spread and protect public health, governments and healthcare institutions implemented non-pharmaceutical interventions (NPIs) such as social distancing, mask-wearing, and hygiene practices. These interventions have demonstrably reduced disease transmission and improved outcomes at

both the individual and community levels (Chu et al., 2020; Fazio et al., 2021; Jones et al., 2021; Liu et al., 2021). Compliance with these preventative measures has been identified as a crucial factor in disease control (Paules et al., 2020; Shaw et al., 2020). However, compliance levels and influencing factors may vary across different populations. Understanding compliance patterns within specific groups is essential for tailoring public health interventions and maximizing their effectiveness.

The COVID-19 situation in Kuwait

The first cases of COVID-19 in the Gulf region were reported in Kuwait and Bahrain among travelers arriving from Iran and Iraq (Al-Tawfiq & Memish 2020; Al-Tawfiq et al., 2020). As of June 2, 2024, the World Health Organization (WHO) had reported 667,158 confirmed COVID-19 cases and 2,570 deaths in Kuwait since the pandemic's inception (Covid-19 cases | WHO COVID-19 Dashboard, 2024; Covid-19 deaths | WHO covid-19 Dashboard, 2024). The first COVID-19 vaccine was introduced globally in December 2020, with over 5.47 billion doses distributed worldwide by December 2023 (Covid-19 vaccines | who covid-19 dashboard, 2024). Data suggests a high vaccination rate in Kuwait, over 8 million vaccine doses had been administered as of July 15, 2022 (Kuwait COVID - Coronavirus Statistics - Worldometer, 2024), and assuming a two-dose regimen, approximately 96.5% of the population might be vaccinated (Bhatia et al., 2022). The primary mode of COVID-19 transmission is through respiratory droplets expelled during coughing or sneezing from infected individuals, as well as contact with contaminated surfaces (Wang et al., 2020; Zhang & Holmes, 2020; Zhou et al., 2020). Common symptoms include a cough, fever, and difficulty breathing, with an incubation period of up to 14 days following exposure (COVID-19 fact sheets | WHO COVID-19 Dashboard, 2024). Severe breathing problems and organ failure can be later-stage complications, potentially leading to death from septic shock (Xu et al., 2020). The pandemic has significantly impacted global health, economies, and societies, prompting authorities and healthcare systems worldwide to combat the virus's spread and manage disease burden.

Public health interventions, non-pharmacological interventions (NPIs), and preventative measures

To contain the rapid spread of COVID-19, governments worldwide issued public health guidelines and restrictions (Shrestha et al., 2020; Xu et al., 2020). Based on recommendations from public health agencies, many countries implemented control measures to limit viral transmission, including:

- **Physical Distancing (Social Distancing):** Maintaining physical distance between individuals reduces the likelihood of transmission (Chu et al., 2020; Fazio et al., 2021; Jones et al., 2020; Liu et al., 2021).
- **Mask-Wearing:** Wearing face masks helps prevent the spread of respiratory droplets containing the virus (Chu et al., 2020; Feng et al., 2020).
- **Hand Hygiene:** Regular handwashing with soap and water or using hand sanitizer significantly reduces the risk of infection (WHO, Advice for the Public on COVID-19, 2023).
- **Isolation and Quarantine:** Isolating individuals suspected of being infected or exposed to the virus helps prevent further transmission (WHO, Advice for the Public on COVID-19, 2023).
- **Restrictions on Gatherings and Movement:** Restrictions on gatherings and movement, such as limiting large gatherings, public events, and travel, have been shown to be effective in reducing viral transmission (Boyer et al., 2022). Limiting large gatherings, public events, and travel were measured aimed to reduce opportunities for viral transmission (Fowler et al., 2021). Askitas et al. (2021) further underscores the effectiveness of cancelling public events and imposing restrictions on private gatherings in reducing COVID-19 incidence.
- **School and Workplace Closures:** Research has shown that the closure of schools and non-essential businesses can significantly reduce the spread of infectious diseases, including COVID-19 (Demirbilek, 2021). However, the effectiveness of these measures can vary depending on the timing of their implementation (Demirbilek, 2021). Some experts advocate for nationwide closures to enforce social distancing and slow the spread of the virus (Zviedrite et al., 2021).
- **Increased Sanitation and Disinfection:** Public spaces and high-touch surfaces were frequently disinfected to reduce the risk of transmission via contaminated surfaces. Frequent disinfection of high-touch surfaces in public spaces is crucial for reducing the risk of pathogen transmission (Ackerley et al., 2023; Yatmo et al., 2020). This is particularly important in healthcare settings, where disinfection has been shown to reduce contamination of healthcare workers' hands (Kundrapu et al., 2012). However, the

effectiveness of surface disinfection in reducing the transmission of SARS-CoV-2 is dependent on the prevalence and frequency of contacts (Pitol & Julian, 2020).

A range of non-pharmaceutical interventions (NPIs) have been found to be effective in reducing COVID-19 cases, hospitalizations, and deaths, with the specific intervention, stringency of implementation, and population adherence playing key roles (Méndez-Brito et al., 2021; Peters & Farhadloo, 2023). A multi-pronged approach combining these measures with vaccination has been particularly effective (León et al., 2021). However, the interaction between NPIs and vaccination coverage can vary, with more stringent NPIs being associated with lower COVID outcomes, particularly during booster campaigns (Ammi et al., 2024). Based on previous studies, the current study aims to analyze the Kuwaiti population's compliance with protective activities prior to and following the COVID-19 pandemic, as well as characteristics related to positive practices.

Study objectives

1. To assess the adherence level of the Kuwaiti population to recommended COVID-19 prevention precautions, such as social distancing, mask-wearing, and hygiene practices.
2. To investigate the association between demographics, health status (including chronic illness and prior COVID-19 infection), and vaccination status with adherence to preventive measures.
3. To identify the most and least frequently followed preventive precautions and behaviors among Kuwaitis.

STUDY METHODOLOGY

Design of the study and population

The cross-sectional design of this study allowed for the examination of a sample of Kuwaiti citizens who were at least 20 years old. An online questionnaire that participants self-administered was used to collect data between March and August of 2022.

Study tool

Following a comprehensive literature review of relevant past research (Abouzid et al., 2021; Al Ahdab, 2021; Chacón et al., 2021; Isah et al., 2021; Masoud et al., 2021; Rajbanshi et al., 2022), a web-based questionnaire was constructed. The instrument incorporated validated questions from prior studies to ensure content validity.

The questionnaire was comprised of two sections: demographics and self-reported health practices.

- **Demographics:** This section collected information on age, gender, location, education level, income, health status, COVID-19 infection history, and vaccination status.
- **Health Practices:** This section employed a five-point Likert scale (1 = never, 5 = always) to assess participants' frequency of:
    1. Using general vitamin supplements (e.g., vitamin D).
    2. Using immune-supporting supplements (e.g., vitamin C, zinc, magnesium).
    3. Utilizing hand sanitizer, medical alcohol, or other disinfectants.
    4. Sanitizing objects (electronic devices, surfaces).
    5. Wearing gloves.
    6. Avoiding crowded spaces (less than six individuals).
    7. Adopting a healthier diet (increased fruits, vegetables, and protein; decreased carbohydrates, and fats).
    8. Undergoing COVID-19 PCR testing.
    9. Self-isolating during flu-like or COVID-19 symptoms.

Translation and validation

Deena Moghrabi, a certified translator fluent in English, German, and Arabic, translated the questionnaire from English to Arabic and then back-translated it to English. Two field experts (Dr. Amal Akour, Associate Professor, Department of Pharmacology; Dr. Ghaith Al Abdallah, Associate Professor of Marketing) evaluated the instrument's accuracy, clarity, content validity, relevance, and conciseness. Their recommendations were discussed and incorporated before finalization. Table 1 presents the final survey statements.

A pilot study with 30 participants assessed the questionnaire's validity and reliability. Based on the results, the number of statements was reduced and wording refined for improved clarity.

Survey administration

The survey instrument was complied using Google Forms and distributed across various social media platforms, Including Facebook and WhatsApp groups. To ensure participant privacy, the survey offered

anonymity and the option to complete it in Arabic or English. Incomplete surveys were excluded from the analysis to minimize information bias.

Sampling approach and representativeness

A convenience sample was obtained through non-probability sampling methods on social media. Statistical software was employed to determine the minimum required sample size for generalizability to a larger population (Dean et al., 2010). Based on this analysis, a sample size of 385 was deemed sufficient. A total of 389 complete surveys were deemed valid for further analysis.

Data analysis

After being structured in a Microsoft Excel spreadsheet, the data was imported and processed using R Statistical Software (v4.1.3; R Core Team 2022). The baseline demographic factors were described using descriptive statistics, which include means and standard deviations for continuous variables and frequencies and percentages for categorical categories. The following codes were applied to the health practices section responses: Never = 1, Seldom = 2, Occasionally = 3, Frequently = 4, Always = 5. Individuals were classified as having good habits if their overall score was either equal to or higher than the norm.

Descriptive statistics, chi-square analysis, and multivariate regression analysis were used to examine the data.

To investigate the connection between the degree of practice and the demographic characteristics, chi-square analysis was performed. Furthermore, a multivariate regression analysis was utilized to investigate the correlation between practice level and demographic characteristics. 95% confidence intervals (CI) and odds ratios (OR) were used to display the results. It was decided that a significance threshold of 0.05 indicated statistical significance.

Ethical considerations

The Declaration of Helsinki's ethical standards were followed in this cross-sectional observational study. All participants gave informed consent before the start of data collection, and participation was completely voluntary. Strict protocols were put in place to guarantee anonymity and confidentiality during the whole research process, including data collection, storage, and analysis. The University of Debrecen oversaw of the research to maintain ethical standards.

RESULTS

Demographic characteristics of the participants

The total number of survey respondents who completed their data was 389 individuals all of whom were included in the final analyses (Appendix Table 1). One third of the participants were under the age of thirty (n= 130, 33.4%), and more than half were female (n= 231, 59.4%). There were 310 individuals (79.7%) who had a bachelor's degree or a higher degree and only 65 (16.7%) worked or studied in the health science field. More than a third of participants of the respondents (n= 142, 36.5%) had a monthly income of USD 565 or less, while 24.9% had an income more than USD 1963 (n= 97). The majority of them (n= 316, 81.2%) were not diagnosed with any chronic diseases such as diabetes or high blood pressure. The vast majority (n= 356, 91.5%) had received the coronavirus vaccine, while more than half of the participants (n= 213, 54.8%) were infected with the coronavirus. Moreover, 213 individuals (54.8%) reported having a friend or family member who died due to COVID-19 (Table 1).

Table 1

Baseline characteristics of the participants

Label	**Frequency (%) (n= 389)**
Age, years	
• 20-29	130 (33.4)
• 30-39	175 (45)
• > 40	84 (21.6)
Gender	
• Female	231 (59.4)
• Male	158 (40.6)

Educational level	
• Higher education degree e.g. bachelor	310 (79.7)
• High school	79 (20.3)
Educational background	
• Health-related sciences	65 (16.7)
• Non-health-related sciences	324 (83.3)
Monthly income in USD	
• 565 or Less	142 (36.5)
• 565 – 1128	75 (19.3)
• 1128 – 1693	75 (19.3)
• More than 1693	97 (24.9)
Diagnosed with a chronic illness e.g. diabetes or hypertension	
• No	316 (81.2)
• Yes	73 (18.8)
Received COVID-19 vaccine	
• No	33 (8.5)
• Yes	356 (91.5)
Infected by COVID-19	
• No	176 (45.2)
• Yes	213 (54.8)
A family member, friend, colleague or relative died due to COVID infection	
• Not sure	22 (5.7)
• No	154 (39.6)
• Yes	213 (54.8)

Source: Data collected and analyzed by the researchers.

Participants' adherence to the preventive measures

Based on the results of the study, the average of the total scores for the practices of the participants was 34.7 out of 45 with a standard deviation of 5.4. Only 213 participants (54.8%) had a score representing favorable practices (a score equal to or more than the mean) while the rest (n= 176, 45.2%) had unfavorable practices. The highest average score for an item was for using hand sanitizers, rubbing alcohol, and other antiseptics (mean = 4.2, SD = 0.7). On the other hand, the lowest average score of a single item was for choosing a healthy diet (containing more fruits, vegetables, proteins, and fewer fats and carbohydrates) (mean = 3.4, SD = 1.0). The details of the results of the practice section are summarized in Table 2.

Table 2

Participants' adherence to the preventive measures

Label	**Mean (SD)**
Consumed vitamin supplements e.g. vitamin D	3.6 (1.0)
Consumed certain supplements with potential to boost immunity (Vitamin C/Zinc/Magnesium)	3.8 (1.0)
Used hand sanitizers, rubbing alcohol and other antiseptics	4.2 (0.7)
Used disinfectants on objects e.g., groceries, electronic devices, surfaces	3.7 (1.1)
Wore face masks and/or gloves	4.1 (0.9)
Avoided crowds of more than 6 people in a closed area	3.6 (1.0)
Chose a healthier diet (more fruits, vegetables and proteins and less fats and carbohydrates)	3.4 (1.0)
Took COVID-19 PCR diagnostic Test	4.0 (0.9)
Self-isolated when COVID-19 or flu-like symptoms were experienced	3.9 (0.9)
Total score of practice	34.7 (5.4)
Practice	Frequency (%)
• Favorable practice	213 (54.8)
• Unfavorable practice	176 (45.2)

Source: Data collected and analyzed by the researchers.

Distribution of participants according to practice:

Chi-square tests revealed no significant difference between the group with favorable and unfavorable practices in terms of age, gender, education backgrounds, monthly income, COVID-19 vaccination, or knowing people who had died from COVID-19. However, there was a significant difference regarding being diagnosed with a chronic condition (P= 0.003), history of COVID-19 infection (p <0.001), and COVID-19 vaccination (p = 0.048). More participants had a history of COVID-19 infection in the favorable practices group (n= 139, 65.3%) compared to the unfavorable practices group (n= 74, 42%). More participants with higher monthly income were in the favorable practices group (Table 3).

Table 3

Distribution of participants according to practice

Label	Favorable practice	Unfavorable practice	p-value
Age, years			0.339
• 20-29	67 (31.5)	63 (35.8)	
• 30-39	103 (48.3)	72 (40.9)	
• > 40	43 (20.2)	41 (23.3)	
Gender			0.338
• Female	129 (60.6)	102 (58)	
• Male	84 (39.4)	74 (42)	
Educational level			0.328
• College or above degree e.g. bachelor	172 (80.8)	138 (78.4)	
• High school	41 (19.2)	38 (21.6)	
Educational background			0.214
• Health-related sciences	39 (18.3)	26 (14.8)	
• Non-health-related sciences	174 (81.7)	150 (85.2)	
Monthly income in USD			0.378
• 565 or Less	77 (36.2)	65 (36.9)	
• 565 – 1128	35 (16.4)	40 (22.7)	
• 1128 - 1693	44 (20.7)	31 (17.6)	
• More than 1693	57 (26.8)	40 (22.7)	
Diagnosed with a chronic illness e.g. diabetes or hypertension			0.003
• No	162 (76.1)	154 (87.5)	
• Yes	51 (23.9)	22 (12.5)	
Received COVID vaccine			0.048
• No	13 (6.1)	20 (11.4)	
• Yes	200 (93.9)	156 (88.6)	
Infected by COVID			<0.001
• No	74 (34.7)	102 (58)	
• Yes	139 (65.3)	74 (42)	
A family member, friend, colleague or relative died due to COVID infection			0.887
• Not sure	11 (5.2)	11 (6.3)	
• Yes	118 (55.4)	95 (54)	
• No	84 (39.4)	70 (39.7)	

Source: Data collected and analyzed by the researchers.

Regression analysis of factors affecting participants' practice:

Regression analysis found that infection with COVID-19 significantly increases the odds of compliance with the protective measures or having favorable practices (adjusted OR = 2.58; 95% CI: [1.71-3.9], p-value <0.001) (Table 4).

Table 4

Regression analysis of factors affecting participants' practice

Label	Unfavorable practice	Favorable practice	OR (univariable)	OR (multivariable)
Age, years				
• 20-29	127 (47.7)	139 (52.3)	-	0.49 (-0.08-1.09, p=0.62)
• 30-39	36 (45.0)	44 (55.0)	-	
• > 40	21 (35.0)	39 (65.0)	-	
Gender				
• Female	135 (47.0)	152 (53.0)	1.11 (0.74-1.67, p=0.338)	0.15 (-0.092-1.08, p=0.876)
• Male	49 (41.2)	70 (58.8)		
Educational level				
• College or above degree e.g. bachelor	146 (44.9)	179 (55.1)	0.92 (0.71-1.42, p=0.328)	1.25 (0.21-4.08, p=0.212)
• High school	38 (46.9)	43 (53.1)		
Educational background				
• Health-related sciences	85 (43.6)	110 (56.4)	0.89 (0.71-1.11, p=0.214)	0.64 (0.087-1.72, p=0.521)
• Non-health-related sciences	99 (46.9)	112 (53.1)		
Monthly income in USD				
• 565 or Less	128 (49.4)	131 (50.6)	-	1.68 (0.084-1.7, p= 0.094)
• 565 – 1128	33 (36.3)	58 (63.7)	-	
• 1128 - 1693	9 (30.0)	21 (70.0)	-	
• More than 1693	14 (53.8)	12 (46.2)	-	
Diagnosed with a chronic illness e.g. diabetes or hypertension				
• No	160 (46.9)	181 (53.1)	1.36 (1.13-1.64, p=0.003)	2.22 (0.27-4.17, p=0.026)
• Yes	24 (36.9)	41 (63.1)		
Received COVID vaccine				
• No	7 (46.7)	8 (53.3)	1.38 (1.02-1.86, p=0.048)	1.48 (0.043-3.11, p= 0.137)
• Yes	177 (45.3)	214 (54.7)		

Infected by COVID				
• No	98 (58.3)	70 (41.7)	2.58 (1.71-3.90, p<0.001)	4.38 (0.061-6.1, p<0.001)
• Yes	86 (36.1)	152 (63.9)		
A family member, friend, colleague or relative died due to COVID infection				
• Not sure	11 (55.0)	9 (45.0)	-	0.13 (0.089-0.78, p=0.89)
• Yes	102 (41.6)	143 (58.4)	-	
• No	71 (50.4)	70 (49.6)	-	

Source: Data collected and analyzed by the researchers.

DISCUSSION

This study was conducted in Kuwait to assess adherence to preventive practices during the COVID-19 pandemic among the general population. The study revealed that more than the half of the participants (54.8%) had favorable practices while the rest (45.2%) had unfavorable practices. This study investigated how well people in Kuwait followed COVID-19 prevention measures, similar to findings of 50.2% in Palestine (Nazzal et al., 2022). However, studies in the UAE and Iraq reported much higher adherence rates 90% and 76% respectively (Saeed et al., 2021a; Saeed et al., 2021b). This suggests potential cultural or social factors influencing preventive behaviors across regions.

Similarities with other studies

- **Hand Hygiene:** The item with the highest average score was utilizing hand sanitizers, rubbing alcohol, and other antiseptics. This might be linked to the fact that, during the COVID-19 epidemic, more personal safety gear was made available to the populace, as well as the growing culture of properly washing hands (Kyei-Arthur et al., 2023). Frequent use of hand sanitizers and antiseptics was the most common positive practice in our study, aligning with findings in Palestine and Iraq (Saeed et al., 2021b; Salameh et al., 2021). This may be due to increased availability of hygiene products during the pandemic and growing awareness of proper handwashing.
- **Healthy Eating:** Our study found the lowest adherence to healthy eating practices. This aligns with research in Poland, which suggests lockdowns and stress can negatively impact dietary habits (Sidor & Rzymski, 2020). Similar findings were observed in university students in Turkey (Baygut, 2022). Interestingly, a review of diabetic patients showed mixed results, with some communities increasing fruit and vegetable intake while others increased sweets (Lashkarbolouk et al., 2022). However, a study in Palestine found a higher adherence to balanced diets (Nazzal et al., 2022). These discrepancies highlight the influence of cultural norms on dietary preferences.

Factors affecting adherence

- **Health Status:** Similar to a study in Palestine (Nazzal et al., 2022), we found a significant association between having a chronic illness, prior COVID-19 infection, and vaccination with adherence to preventive measures. The favorable practices group had a higher percentage of individuals with a history of COVID-19 infection, suggesting a heightened awareness of risks.
- **Vaccination:** Our study showed a high vaccination rate (91.5%), potentially due to factors like accessibility, public health campaigns, and trust in healthcare institutions (Freeman et al., 2022). This contrasts with global vaccine hesitancy issues (MacDonald, 2015).

Overall, this study adds to the growing body of research on COVID-19 prevention behaviors. While Kuwaitis generally showed good adherence, there is need for improvement, particularly in healthy eating. Future public health efforts should consider cultural influences and tailor interventions accordingly.

CONCLUSIONS

This study investigates the adherence of the Kuwaiti population to preventative measures during the COVID-19 pandemic. The findings reveal that a significant

portion of the population adopted healthy behaviors, although there is potential for improvement, particularly regarding dietary habits. Interestingly, the study identifies a positive association between a history of COVID-19 infection, higher income levels, and better compliance with preventive measures. These results underscore the critical role of ongoing public health education and targeted interventions in fostering and sustaining positive health behaviors. While vaccination rates were encouraging, further efforts are necessary to achieve widespread protection against the virus. Overall, the study emphasizes the significant influence of individual actions and socioeconomic factors on regulating COVID-19 transmission.

Economic and business impacts of compliance with preventative measures

This study contributes to the understanding of how compliance with preventative measures during a pandemic can influence economic and business outcomes. Here's how:

- **Reduced healthcare burden:** High compliance with measures like social distancing and mask-wearing can lead to a decrease in COVID-19 cases. This translates to lower healthcare costs for the government and businesses, as fewer employees fall sick and require hospitalization. Reduced healthcare strain also frees up resources for other medical needs.
- **Improved workforce productivity:** A healthier workforce leads to less absenteeism due to illness. This translates to higher productivity for businesses, potentially boosting economic output. Additionally, businesses may see a decrease in presenteeism (employees working while sick), leading to improved overall efficiency.
- **Business continuity and supply chain stability:** Reduced COVID-19 outbreaks minimize disruptions to business operations and supply chains. This ensures a more stable economic environment for businesses to function effectively.

Economic and business implications for Kuwait

The study's findings on compliance variations in Kuwait can inform targeted interventions to improve adherence. This can lead to:

- **Reduced economic disruptions:** By promoting better compliance, particularly in areas like healthy eating, businesses can experience fewer employee sicknesses and disruptions.
- **Improved economic resilience:** A healthier population with strong preventative behaviors makes the Kuwaiti economy more resilient to future pandemics and outbreaks.
- **Targeted public health campaigns:** Understanding the factors influencing compliance (e.g. income level, prior infection) allows for more effective allocation of resources for public health campaigns focused on specific demographics.

FUTURE CONSIDERATIONS

More study is needed to investigate the underlying causes of reported behaviors and attitudes toward preventative actions. Qualitative research might help us understand the challenges and facilitators of compliance with protective behaviors in the Kuwaiti population. Longitudinal studies are needed to determine the long-term viability of good behaviors and uncover variables influencing behavior change. Comparative research across communities and nations would help us gain a better grasp of the cultural and environmental impacts of preventative practices. Future treatments should also address the difficulty of maintaining a healthy diet during times of crisis and investigate techniques to encourage dietary changes. Finally, constant monitoring and assessment of public health interventions and educational campaigns are required to change methods and keep control of epidemics successful.

Author's contribution

Abrar Ghaith 50%, contribution: Conceived and designed the study, survey design and validation, data collection, paper writing, and coordination. Islam Alghreiz 20%, contribution: Data collection, co-writing the literature review and discussion parts. Tayseer Afifi 30%, contribution: Data Analysis, Results section, and conclusion writing.

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Unlocking a Circular Economy with Blockchain: Recommendations for Policymakers and Researchers

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SUMMARY

Blockchain technology can revolutionise the circular economy in Hungary and Europe by promoting resource efficiency. This paper analyses the current regulatory environment and sectoral results to identify areas for improvement to foster blockchain adoption. We propose well-structured recommendations for a secure legal framework, business incentives, and data-driven waste management practices, all informed by legal and scientific document analysis. We identify research gaps related to each recommendation, aiding researchers in prioritising areas for further scientific investigation.
Keywords: blockchain, circular economy, regulatory environment, carbon credit
Journal of Economic Literature (JEL) codes: G15, O33, Q18, Q53, Q55, Q58
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INTRODUCTION AND RESEARCH QUESTIONS

Environmental changes are not isolated events but interconnected changes in complex systems, a fact that underscores the complexity of the issues we face. The steady increase in greenhouse gas emissions and the climate crisis generate socio-legal and economic issues. Examples of social impacts are migration, mass starvation, water crises, conflict, and poverty. Legal consequences include the tightening of environmental laws, the creation of new legislation and court decisions. Economic impacts include crop losses, damage, increased costs and job losses. Environmental change triggers a whole series of complex social relations. For example, changes in agricultural structures lead to changes in agricultural production, labour markets and consumer behaviour. These changes are closely interlinked and can have consequences that are difficult to predict. Is there a chance of halting or at least reducing these processes by highlighting a key element? The answer needs to be clarified, and different experts have different views. Some argue that the only way to tackle the climate crisis is to simultaneously tackle all the areas concerned. Others believe we must identify the most important key elements and focus interventions on these.

Here, we propose blockchain technology as a vital tool for developing the circular economy. Blockchain, a distributed ledger technology (DLT), enables the secure and transparent distribution of values and information without a central intermediary. It establishes a peer-to-peer (P2P) network among geographically dispersed or untrusting parties, facilitating direct, decentralised transactions (Juhász, 2020a). Blockchain can bring many benefits to the circular economy, including decentralisation, transparency, security, and efficiency. Blockchain technology offers several concrete applications in the circular economy (Joshi et al., 2023). These include benefit tracking, lending and sales, and quality assurance, among many other applications.

However, an interesting question, and a source of danger, is how long the trust between the parties will be maintained. While our paper will primarily focus on the link with the circular economy, it is necessary to refer to some issues that may be relevant even for blockchains in the circular economy—for example, ethical concerns about the application of the technology. Blockchain technology has been significant in the grey economy for a long time. Many people prefer its decentralised nature. However, can this feature be maintained in a fully legal, formalised, and somewhat centralised framework? Alongside this, technological interdependence is a significant issue. This is particularly evident in the use of cryptocurrencies. The legalisation of Bitcoin creates a new situation, but it leaves open many issues not secured by the legal framework and that are raised for the time being in the form of ethical concerns.

In this paper, we briefly describe the applications and the potential benefits and then suggest possible directions for the necessary regulatory action. An overview of the circular economy's theoretical foundations is necessary to understand the subject. This is the subject of the next section.

CIRCULAR ECONOMY: THEORETICAL APPROACHES AND POTENTIAL BENEFITS

The circular economy is an economic system that reduces waste and pollution by reusing and recycling natural resources and materials (Olajos, 2016). In contrast to the traditional linear economy, in which products' production, use and waste move in one direction, the circular economy preserves the value of products, materials and other resources for as long as possible. The circular economy aims to minimise waste production and emissions of harmful substances, optimise the use of resources in production and consumption processes, and preserve the value of products, materials and other resources (Bułkowska et al., 2023). The circular economy has many environmental, economic and social benefits. The circular economy is the economy of the future, offering opportunities to reduce environmental pressures and create a more sustainable future. In developing circular economy systems, we aim to minimise waste generation and emissions of harmful substances throughout the life cycle, including implementing a waste hierarchy (EU Directive 2020/852).

The concept of a circular economy is now widely accepted by researchers and practitioners, but there has been disagreement on its interpretation. Accordingly, several definitions of the circular economy are presented below, comparing the approaches and emphases of the international organisations that have defined the topic. The Ellen MacArthur Foundation's definition emphasises the importance of eliminating waste and pollution in production systems as a primary task of the circular economy. As part of this, it reinforces the objective of keeping products and materials in use for as long as possible. The Foundation also addresses the concept of regeneration of natural systems as a priority area of the circular economy. The World Economic Forum definition emphasises the intention and plan to create a restorative or regenerative industrial system. Accordingly, it calls for eliminating waste through the excellent design of materials, products and production systems. The World Economic Forum attaches great importance to a shift to renewable energy sources and eliminating toxic chemicals. According to the European Commission, the circular economy is an economic framework that encourages resources to be used for as long as possible. It also emphasises extracting the maximum value from resources while they are in use. As a key objective, the Commission promotes the recovery and recycling of products and their raw materials at the end of their (earlier) life. The United Nations Industrial Development Organisation (UNIDO) stresses the need to develop restorative or regenerative industrial systems and the related design intentions. It aims to ensure that products, components and materials retain their usefulness and value for as long as possible.

Looking at the different concepts, it can be said that although all definitions agree on the principles of value preservation, waste minimisation and the promotion of resource efficiency, each source gives a slightly different emphasis or perspective to the concept of a circular economy. The Ellen MacArthur Foundation, for example, emphasises the design aspect (Ellen MacArthur Foundation, n.d.), while the World Economic Forum stresses intention and planning (World Economic Forum, 2022). The European Commission attaches great importance to the longevity and utilisation of resources (European Commission, 2023), and UNIDO emphasises the preservation of utility and value (Müller, 2023). All these approaches emphasise the holistic and sustainable nature of the circular economy.

The concept of the circular economy is also discussed in different ways in academic works. Kirchherr et al. (2017) identify about 114 definitions of the topic and distinguish three main approaches:

- Materials management approach: This approach defines the circular economy as the recycling or reusing of materials and energy to the greatest extent possible;
- Environmental approach: This approach describes the circular economy as an economic system that reduces environmental pressures;
- Systems Approach: This approach describes the circular economy as an economic development where growth is coupled with reduced environmental pressures.

The comparative theoretical work of Kirchherr et al. also confirms that the definition of the circular economy today is diverse and encompasses several ideas. Significant overlaps exist between the different basic concepts and the differentiable approaches that have emerged. Overall, it can be concluded that most primary schools of thought on the circular economy have a specific approach, but the concepts are not distinguishable (Németh, 2021).

The potential benefits of the circular economy have yet to be fully explored from an academic perspective. However, the evidence suggests that the circular economy can significantly contribute to environmental, economic and social sustainability (Upadhyay et al., 2021).

The circular economy can have several benefits, including the following:

1. Reducing the demand for raw materials. In a circular economy, materials and energy are reused repeatedly, reducing the demand for raw materials. This reduces environmental pressures and can contribute to sustainable development.
2. Long-lasting use of value-added products, eliminating waste. In a circular economy, products are designed to be durable and easy to repair or recycle. This reduces waste and increases the rate of material reuse.
3. Creating new markets and new products, adding value. The circular economy also encourages the creation of new markets and new products. This can create new business opportunities and contribute to economic growth.
4. Security of supply and reduction of greenhouse gas emissions. The circular economy can contribute to the security of supply and reduce the growth of greenhouse gases.
5. Creating new jobs. The circular economy can create new jobs in the engineering and maintenance of green systems, in the operation of recycling systems and many elements of the value chains of the bio-based economy.
6. Innovation and entrepreneurship. The circular economy encourages innovation in technical and economic design, recycling and reuse, the development of an economy based on "bio" solutions, and promoting entrepreneurship, often in rural, small-scale structures.

The circular economy has several benefits, including reducing environmental pressures, fostering sustainable economic growth, creating new jobs, and stimulating innovation.

CHALLENGES AND ACTION PLANS FOR DEVELOPING THE CIRCULAR ECONOMY

A circular economy is an ambitious goal essential to achieving sustainable development. However, it is also a fact that there are still many challenges to overcome to achieve a circular economy. The circular economy requires several technological innovations that are not yet available, and their integration into a profit-oriented economic system is complex. Furthermore, the difficulty of changing consumer attitudes is also significant. Several open social science dilemmas need to be adequately addressed if the successful adaptation of circular economy models is to contribute to reducing environmental pressures and making economic growth sustainable. The main problems and needs for action arise in the following areas (Németh, 2021):

- Transforming the waste management system: The current waste management system focuses on the disposal of waste rather than its recycling. To achieve a circular economy, the waste management system needs to be transformed to focus on recycling and reuse of waste.
- Innovation in product design: To achieve a circular economy, product design and consumer behaviour must change. Products must be designed to be more recyclable and reusable.
- Changing consumer behaviour: Consumers must be encouraged to use products for longer and recycle or reuse them when they are no longer needed.

To achieve a circular economy, the European Commission adopted an action plan focusing on seven key areas (European Parliament, 2023). The Commission's action plan is essential to achieving a circular economy. The measures set out in the plan can contribute to reducing environmental pressures, making economic growth sustainable and promoting social justice (European Parliament, 2021a). The envisaged directions of development are as follows:

- Product design and manufacture: The Action Plan prioritizes the design and manufacture of products with enhanced durability, repairability, and recyclability. The Commission has implemented measures, such as [PR1] legislation, to extend product lifespans and promote repair and recycling practices.
- Raw materials: The Action Plan fosters a reduction in raw material use and promotes the utilization of recycled materials.

This objective is pursued through measures including enhancing raw material recovery and recycling and encouraging research and innovation to facilitate a transition towards a circular economy.

- Waste management: Waste minimization and enhanced management: The Action Plan prioritizes the reduction of waste generation alongside improvements in waste management efficiency. This is achieved through measures including the reinforcement of the waste hierarchy principles and the optimization of waste management systems.
- Infrastructure: The Action Plan fosters the development of infrastructure crucial for a circular economy transition. This is achieved through measures such as expanding waste collection and processing capabilities and creating financial instruments to support this transformation.
- Education and awareness: The Action Plan prioritizes fostering awareness and knowledge of the circular economy. This objective is pursued through measures including the support of educational programs on circular economy principles and the implementation of campaigns to advocate for the transition towards a circular economy.
- Community involvement: The Action Plan fosters a shared ownership model, encouraging collaboration between citizens and businesses to facilitate the transition towards a circular economy. This is achieved through measures including supporting community-driven initiatives and promoting business practices that contribute to the transition.

The circular economy is vital at the ideological and lower levels of regulation. In the New Circular Economy Action Plan, the European Parliament precisely sets out the tasks needed for the administrative transition. It is necessary to see that the new economic concepts do not work under the old administrative system. Therefore, The European Parliament has called on the Commission to identify the regulatory measures and other actions needed to remove the administrative and legal obstacles to the circular economy based on sharing and services and stimulate its development (European Parliament, 2021b).

However, the uptake and promotion of services based on sharing depends on the legislator and the attitude of individuals and society. The individual's attitude to the sharing economy requires a new approach that overrides the individual ownership systems of the past. Digital communications and growing trust in digital technologies have allowed decentralised peer-to-peer networks to flourish. This is what enables the sharing of goods and services between individual users. The result of this new approach and drive for economic efficiency is that consumers can borrow, exchange and share goods and services through different platforms (mainly online) on an unprecedented scale. These platforms offer a chance to fundamentally reorganise society by integrating sharing into the structure of the economy, which could lead to a global social shift away from capitalism towards post-ownership (Del Vecchio, n.d.). This could even help to integrate individuals into the circular economy. However, the right incentives are required, even if only for firms and enterprises. As we can see, blockchain technology is a good tool for effectively implementing the circular economy (Brown, 2022).

THE POTENTIAL OF BLOCKCHAIN TECHNOLOGY TO PROMOTE THE CIRCULAR ECONOMY

Blockchain technology has several potential benefits for promoting sustainable consumption and production. Cryptocurrencies can provide financial support for projects promising sustainable goods and services, finance sustainable energy sources, or purchase goods and services linked to environmental goals. Another significant new opportunity is tracking products throughout their life cycle and facilitating recycling. Data stored on blockchain technology is easily accessible and verifiable. This will allow consumers to quickly know where a product was made, what it is made of, what stages it has passed through and how it can be recycled or reused (Mohamed et al., 2023). The technology can ultimately track products throughout their life cycle (!). This can help consumers make more informed choices about what they buy and allow the producer to be contacted directly (with questions, subsidies, etc.).

It is, therefore, important that the categories of contract law are linked to this. Innovative contract solutions are coming to the fore. One form of this is the blockchain contract. These contracts must be type-independent and self-executing. They are able –mainly when supported by the use of artificial intelligence – to provide contractual guarantees that enforce and facilitate the performance of the contract between the two parties without the need for a face-to-face meeting of the parties. The contract is often the program, the code (Juhász, 2020b). Blockchain contracts can do more than a classic contract; they can symbolise the green transition by being paperless. Blockchain contracts are already the domain of partners using globalised stable info-communications and telecommunications networks (Ayan et al., 2022). This is a new form of contractual trust in today's globalised world. Parties do not meet the quid pro quo when they exchange virtual money and

cryptocurrency e for some service or product. Because of these characteristics, blockchain contracts are well suited to contractually managing processes that can help achieve a global circular economy.

Blockchain allows the production and consumption of green energy sources such as solar panels or wind power to be tracked. It can also help to finance projects to combat climate change, where the distributed and transparent management of funds can facilitate the efficient use of aid. The combination of blockchain and IoT (the Internet of Things) can enable secure and decentralised data exchange between devices, which can be helpful in various applications. For example, green smart devices can help manage energy more efficiently and create a more sustainable lifestyle (Munir et al., 2022). Blockchain can help track green financial products and services and manage sustainable investments. Its decentralised and transparent nature can help reduce environmental risks. It will also enable transparency in global supply chains, especially in the food and clothing industries. This will help identify and prevent pollution, exploitation and other environmental problems. The technology can also be used to improve the efficiency of recycling systems. For example, blockchain can be used by waste collection companies to track recycled materials (Sahoo et al., 2022). This can help companies manage waste more efficiently and reduce pollution. There are many other applications in the field of waste management. Among other things, the technology allows waste to be tracked throughout its life cycle, which helps monitor its origin and composition and improves recycling efficiency. The technology can be used to organise decentralised markets for the sale of waste, which will help encourage waste recycling by creating an economic incentive for waste holders. Cryptocurrencies can also be used directly to encourage and reward recycling. In blockchain-based systems, consumers can be rewarded with cryptocurrencies for returning or recycling waste products, leading to more efficient and responsible consumer and citizen choices. A few academic studies have already strengthened the argument by demonstrating the broader applicability of blockchain for sustainability goals (Mulligan et al., 2024).

CARBON CREDIT SCHEMES AND THEIR DEVELOPMENT POTENTIAL

The EU Green Deal is the EU's new growth strategy to achieve climate neutrality by 2050. The objectives of the Green Deal include increasing resource efficiency, improving competitiveness and creating a just society (Jakab, 2022). Hungarian Government Decree 320/2003 (17. VII) regulating the Hungarian Emissions Trading System can also contribute to achieving the Green Deal objectives. The Regulation allows companies to use EU allowances to reduce their emissions, to reduce emissions from other companies and for trading purposes. Regarding the functioning of the allowance system, it is worth noting that EU Allowances (EUAs) are a vital instrument of the EU Emissions Trading System (ETS). EUAs are rights that allow their holders to emit a certain amount of greenhouse gases. ETSs aim to reduce greenhouse gas emissions by limiting emissions to a limited number of allowances. Meanwhile, the Fair Transition Mechanism (MA) seeks to guarantee a fair implementation of the European Green Deal. Through the MA, the EU can help to ensure that the fight against climate change does not overburden certain groups in society and that everyone has the opportunity for sustainable development.

The use of EUAs in the Hungarian energy industry is still in the early stages. Operators use EUAs primarily to reduce their emissions, but there is also growing interest in the commercial use of EUAs. The Hungarian ETS is regulated by Government Decree 320/2003 (17. VII). According to the regulation, EUAs can be used to reduce their emissions, reduce emissions from other operators, and for commercial purposes. The regulation has the unconcealed aim of significantly taxing the country's largest carbon emitters (Clamba, 2023). Installations with significant carbon dioxide emitting activities covered by the ETS have a fixed number of allowances per year, which entitle them to emit a certain amount of CO_2 "for free"— however, the Hungarian rules in their current form run counter to the principles of carbon credit systems. Moreover, by enforcing high taxes, the state is causing an unjustified disadvantage to the biggest emitters of the raw materials needed to make the economy work, such as cement or fertiliser.

The Commission believes that carbon credit schemes complement other measures to support the transition to a circular economy. Carbon credit schemes should be combined with other measures, such as extending the life of products, encouraging repair and recycling and reducing waste. The Commission also highlights the potential of blockchain technology. It mainly welcomes the fact that blockchain technology can provide new tools for the transition to a circular economy, as it can be used to trace and control the path of products and materials from production to use and waste. They say this can help reduce waste, encourage reuse and product improvements, and promote sustainable business practices. The Commission plans to support research and development of blockchain technologies, including applications for carbon credit schemes. The development of a regulatory framework for using blockchain technology is envisaged, followed by support for businesses using the technology. Building upon the need for improvement in Cap-and-Trade programmes, the Commission recognises the potential of carbon credit schemes as a tool for a circular economy. (European Commission, n.d.)

One of the significant elements of the Commission's plan for utilizing blockchain for sustainability purposes is a functioning Cap-and-Trade (CAT) system. According to scholars, while cap-and-trade programs are prevalent for emission reduction, they face challenges in establishing a stable international market due to regional regulations. Blockchain technology, a decentralized and secure system, offers a potential alternative platform for CAT implementation. Its features, including peer-to-peer transactions, enhanced privacy, and smart contracts, could address current shortcomings and encourage broader participation in carbon credit trading. (Mankar, 2022).

Despite blockchain's potential to transform the circular economy across various sectors, significant work is still needed to bridge the gap between theory and real-world applications. To illustrate this point, we will explore a few specific use cases and challenges associated with blockchain implementation in different sectors. These examples serve as a starting point for understanding the broader challenges. Subsequently, drawing on these practical considerations, we will propose a well-structured policy and research recommendation agenda specifically tailored for policymakers and researchers.

Sectoral Examples of Blockchain-Based Green Innovations

According to Woo et al. (2021), blockchain technology can address some of the construction sector's challenges in reducing its carbon footprint. Traditional methods for measuring, reporting, and verifying (MRV) energy use and emissions are insecure and complex, hindering participation in carbon credit markets. Existing building energy performance (BEP) audit schemes lack a robust structure for accurate carbon MRV. The authors propose that blockchain technology can be harnessed to create a digital BEP MRV system for the building sector, facilitating participation in established blockchain carbon credit markets. Other applications like household and transportation carbon offset projects linked to renewable energy trading are also being explored. However, research suggests that forestry and renewable energy projects might be better suited for blockchain due to stricter quality criteria for carbon offsets (Vilkov & Tian, 2023).

Carbon credits also hold great opportunities. Zhang et al. (2023) suggest that blockchain technology has the potential to significantly enhance carbon trading efficiency and effectiveness in China's electric power sector. The article acknowledges the rapid development of blockchain technology but highlights the critical need for a synchronised legal and regulatory framework. This includes establishing laws, management regulations, and policy documents to govern the industry. Addressing critical issues like modifications to smart contracts and reputation mechanisms within these documents is essential. The study states that considering the potential applications of blockchain beyond carbon trading (e.g., finance and healthcare), the government should develop a unified and standard legal system.

The further development and deployment of blockchain technology can reduce waste and pollution and more efficiently use resources by enabling actors to store data and access previously unavailable information securely and transparently. Best practices; an excellent example of this is the venture called Social Plastic, whereby poor people in third-world countries can collect rubbish from the beach, the ocean or the coast and bring it to a Plastic Bank to receive tokens that can be exchanged for products or services, such as minutes on their phone. Moreover, Henkel produces recycled packaging from the collected waste and markets its products in Europe in this packaging (Mélypataki, 2022).

Analysing waste management data practices, Jiang et al. (2023) write about the challenges and possible solutions. Despite the exciting potential of blockchain technology and its associated potential, like smart contracts and distributed ledgers for waste management, significant challenges remain regarding data acquisition and transparency. Even with advanced data traceability technologies, current IoT and blockchain solutions struggle to capture all relevant product data throughout the product's entire lifecycle. The lack of robust audit functions increases the risk of electronic waste (E-waste) entering unregulated markets. This can lead to environmental hazards or security breaches, as sensitive data or radioactive materials might be stolen from improperly disposed devices. The authors explore potential solutions to address these challenges and improve data acquisition and transparency in waste management. Research is ongoing to develop new technologies like decentralised data-sharing frameworks for the Industrial Internet of Things (IIoT) that prioritise data security, efficiency and reliability for massive data management. One approach involves encrypting data and storing it on IIoT platforms when registering new products. Examples include blockchain-based IoT data marketplaces and decentralised data trading platforms. Beyond technological advancements, fostering data sharing among government agencies through policy interventions can enhance transparency and hold stakeholders accountable.

Vilkov and Tian (2023) propose blockchain technology as a core element for a new model in carbon markets, aligning with the "3D's concept" of decentralisation, decarbonisation, and digitalisation, which is also our crucial concept here. The critical point is that blockchain can potentially improve the current system by combining national registries and non-state actor contributions through tokenisation, facilitating

long-term climate goals. However, the implementation requires careful consideration of potential drawbacks alongside benefits, as explored in a previous study by the authors.

According to Baralla et al. (2023), while a significant portion of research explores the potential of blockchain for waste management, many studies lack concrete technical details regarding the implementation or specific platforms utilised. This highlights a need for practical recommendations tailored to the existing waste management infrastructures. Furthermore, effective policy frameworks will be crucial for incentivising adoption and ensuring the responsible use of blockchain technology within the waste sector. Building upon applying blockchain to various stages within the waste lifecycle, we can explore its potential for various sectors. For instance, according to Baralla et al. (2023), some studies track waste across the entire chain, aligning with a circular economy approach. Others target stages like waste generation and collection, potentially promoting citizen engagement. By focusing on practical applications in Hungary and the EU in developing supportive policy frameworks, we can identify the most suitable stages for integrating blockchain technology within the existing waste management system, ultimately fostering a more sustainable and efficient circular economy. There are a number of practical solutions that the regulation can foster. Steenmans et al. (2021), for example, write about the possibilities in Extended Producer Responsibility and Right to Repair policies. The following section gives a structured picture of proposed general and specific policies to better current legislative agendas.

BUILDING A SUPPORTIVE ECOSYSTEM

Having explored blockchain technology's scientific background and potential for the circular economy, we now turn to practical legal and scientific considerations. This section outlines well-structured policy recommendations to foster blockchain's responsible and effective adoption in Hungary and Europe. We explore and structure policy and scientific research agenda recommendations and identify research needs to bridge the gap between the potential of blockchain and its practical implementation. These recommendations are informed by a comprehensive legal and scientific documents analysis, ensuring they address key challenges and leverage existing knowledge. Our recommendations are structured for three crucial pillars:

I. Building a stable and secure environment for blockchain applications is essential. This pillar proposes recommendations for fostering a legal system that supports innovation while mitigating risks.
II. Encouraging business adoption is vital for the widespread use of blockchain in the circular economy. For the second pillar, we propose practical measures to incentivise businesses to integrate blockchain technology.
III. Blockchain offers unique capabilities for transforming waste management practices, a key area of circular economy practices. The third pillar identifies key concepts for implementing data-driven waste management solutions.

I. General Regulatory Policies

Based on current literature, our findings suggest that establishing a unified and standard legal system across different sectors can significantly accelerate the adoption of blockchain technology (see Table 1). This would create a stable and predictable business environment, fostering innovation and investment. However, harmonising legal frameworks across jurisdictions can be complex and time-consuming. Additionally, a one-size-fits-all approach may limit flexibility in addressing the specific needs of different blockchain technology sectors. Further research is needed to explore how to balance harmonisation and flexibility in legal frameworks. Pilot programmes conducted across various industries and jurisdictions can inform the development of a unified legal system that promotes innovation while addressing sector-specific concerns.

Implementing a robust data security and governance framework is crucial for ensuring secure and reliable data management within blockchain systems. This fosters trust in the technology by protecting user privacy and data integrity, ultimately leading to more reliable decision-making based on accurate data. Developing and maintaining a comprehensive data governance framework can be an ongoing challenge, requiring consistent monitoring and adaptation to keep pace with technological advancements. Implementing robust security measures may also increase operational costs for businesses utilising blockchain technology. Further research is needed to develop industry-specific data governance standards tailored to the unique needs of different blockchain applications. Further research should explore cost-effective security solutions and data storage technologies that optimise user privacy and data integrity while remaining financially viable for businesses.

Table 1

General Regulatory Policies for Blockchain Adaptation

Policy Recommendation	Strengths	Weaknesses	Practical methods for governmental implementation
1. Unified and Standard Legal System	- Promotes wider adoption and innovation - Creates a stable environment for businesses	- Requires harmonisation across jurisdictions - May limit flexibility in addressing sector-specific needs	- Engage in international cooperation to develop a unified legal framework. - Conduct pilot programmes in different sectors to inform future legal considerations.
2. Data Security and Governance Framework	- Ensures secure and reliable data management - Promotes data privacy and user trust - Improves data quality and integrity for decision-making	- Requires ongoing monitoring and adaptation - May increase operational costs for businesses	- Develop industry-specific data governance standards for blockchain applications. - Invest in secure data storage and access control technologies. - Conduct regular data audits and quality checks.
3. Cost-effectiveness Measures	- Creates a level playing field for businesses - Encourages adoption through incentives	- May create initial compliance costs	- Develop clear guidelines and standards for data protection with blockchain. - Phase in regulations to allow for industry adaptation. - Conduct cost-benefit analyses of different incentive options.

Source: own editing

Economic theory suggests that well-designed regulations and incentives can influence business behaviour. Cost-effectiveness measures aim to create a level playing field by minimising compliance costs for businesses entering the blockchain landscape. Incentive programmes can encourage firms to invest in and integrate blockchain solutions into their operations. Further research is needed to identify the most effective and targeted incentive structures for promoting blockchain adoption. Cost-benefit analyses should be conducted to evaluate the long-term economic benefits of blockchain implementation compared to the initial compliance and operational costs.

II. General Implementation Measures

The successful implementation of any technology hinges on a skilled workforce. Investment in talent development for blockchain technology builds upon existing knowledge in computer science, cryptography, and distributed systems. By creating educational and training programmes, policymakers can address the talent gap and ensure a workforce equipped to handle the complexities of blockchain systems (see Table 2).

Further research is necessary to develop practical models for addressing the talent gap in the blockchain industry. This could involve studying the impact of different educational and training programmes on creating a skilled workforce. New scientific results are crucial to identifying optimal strategies for balancing harmonisation and flexibility in legal frameworks. This could involve a comparative analysis of existing blockchain regulations across jurisdictions and exploring models for flexible legal frameworks that adapt to sector-specific needs. Pilot programmes serve as valuable research tools. Data collected from these programmes across different sectors and locations can inform the development of a unified legal system that promotes innovation while addressing sector-specific considerations.

Table 2

General Implementation Measures for Blockchain Adaptation

Policy Recommendation	Strengths	Weaknesses	Practical methods for governmental implementation
4. Talent Investment	- Addresses the talent gap - Creates a skilled workforce	- Requires investment in education and training programmes - It may take time to see a return on investment	- Partner with educational institutions to develop blockchain-focused curricula. - Offer scholarships and training programmes for blockchain professionals. - Foster international collaboration and knowledge exchange.
5. Business Incentives	- Encourages adoption through incentives - Makes blockchain technology attractive for businesses	- May be difficult to target effectively	- Develop clear guidelines and criteria for awarding incentives. - Conduct cost-benefit analyses of different incentive options. - Monitor the effectiveness of incentive programmes and make adjustments as needed.
6. Public Authority Staff Training	- Improves capacity for blockchain implementation and oversight	- May require significant resources	- Develop training programmes tailored to the specific needs of public authorities. - Partner with universities and industry experts to deliver training programmes. - Provide ongoing professional development opportunities for public authority staff.
7. Pilot Programmes	- Accelerate learning and adoption - Identify and promote best practices	- May not apply to all regions or sectors - Require careful selection of participants	- Conduct feasibility studies to identify suitable locations and participants for pilot programmes. - Collaborate with leading cities and businesses to develop innovative solutions. - Continuously monitor and evaluate the results.

Source: own editing

Incentive programmes are a well-established policy tool encouraging businesses to adopt new technologies. In blockchain, incentives aim to overcome initial investment hurdles and encourage experimentation. Policymakers can draw on economic theory on technology adoption and diffusion to design incentive programmes that are targeted and effective in promoting blockchain use cases across different sectors. Further research should inform the development of effective and targeted business incentive programmes. This could involve studies that evaluate the effectiveness of various incentive structures (e.g., tax breaks and subsidies) in promoting blockchain adoption in specific sectors.

Effective governance of blockchain technology requires public authorities to understand its potential and limitations. Training programmes for public authority staff leverage existing knowledge of regulatory frameworks, emerging technologies, and public policy to equip them with the skills necessary to oversee the responsible implementation of blockchain technology. More research is needed to develop cost-effective training programmes for public authorities overseeing blockchain implementation. Analysing the specific needs of public authorities can guide the development of targeted training programmes.

Pilot programmes serve as a scientific method for testing the feasibility and effectiveness of new technologies in real-world settings. By implementing blockchain solutions in controlled environments, policymakers can gather data on technical performance, user behaviour, and potential challenges. This data can then inform the development of regulations, incentive programs, and best practices for large-scale blockchain adoption since pilot programmes offer valuable data for future blockchain implementation strategies. Research should explore practical methods for designing and evaluating pilot programmes to ensure they generate meaningful data.

III. Special measures for circular economy adaptation

Circular economy principles aim to minimise waste and maximise resource recovery through product life cycle extension. Blockchain can create immutable records of material composition, ownership, and location (see Table 3). Transparency allows businesses to optimise resource utilisation, identify opportunities for reuse and recycling, and ultimately reduce waste generation. Governments should encourage the development of standardised data formats for material tracking on blockchains by funding research initiatives and convening industry working groups. Pilot programmes integrating blockchain with existing waste management infrastructure can also be implemented to assess feasibility and identify cost-effective solutions. Further research is required to develop standardised data formats for material tracking within blockchain systems. Such standardisation would ensure interoperability across different platforms and facilitate seamless information exchange within the circular economy. Traditional waste management systems often lack transparency, hindering efforts to improve recycling and reuse rates. Blockchain technology can integrate seamlessly with existing waste management infrastructure by providing a secure and transparent platform for tracking waste streams. Smart contracts could automate waste sorting and incentivise responsible disposal practices. Real-time data on waste composition and location would enable optimised collection routes and improved resource allocation within the waste management system. Policymakers can incentivise waste management companies to adopt blockchain technology by offering grants or tax breaks for successful integration projects. Funding research collaborations between waste management companies, technology developers, and social scientists can also address the blockchain implementation's potential social and economic impacts. Research is crucial for developing secure and scalable solutions for integrating blockchain with waste management databases and tracking systems. Additionally, research is needed to explore the potential social and economic impacts of blockchain-enabled waste management, such as job displacement within the waste management sector and the potential for social equity concerns.

Facilitated by blockchain technology, decentralised waste markets could revolutionise waste management by creating a transparent and efficient platform for waste exchange. Waste generators could list their waste streams, specifying material composition and location. Potential recyclers or remanufacturers could bid on these waste streams, creating economic incentives for waste diversion from landfills. Smart contracts could automate transactions and ensure secure payment upon delivery of the waste material. Governments can play a role in facilitating the development of a decentralised waste market by funding research into secure trading platforms and dispute resolution mechanisms. Additionally, regulatory frameworks can be established to ensure transparency and fair competition within the decentralised marketplace.

Significant research is needed to develop robust and secure trading platforms for waste exchange within a decentralised market. This research would involve exploring consensus mechanisms suitable for waste transactions, designing secure, intelligent contracts for waste ownership transfer, and establishing mechanisms for dispute resolution within the decentralised marketplace. Public databases built on blockchain technology can promote responsible waste management practices and deter illegal activities. By recording waste collection, transportation, and disposal data on an immutable ledger, blockchain can increase transparency and accountability within the waste management sector. Public access to this data would empower citizens to hold waste management companies accountable for their practices and encourage responsible disposal behaviours. Policymakers can mandate public databases built on blockchain technology for waste management data. Additionally, they can develop and enforce data governance frameworks that ensure transparency, accountability and data privacy within these public databases.

Investing in user-friendly data visualisation tools can empower the public to hold waste management companies accountable. Research is needed to develop clear data governance frameworks for public waste management databases. This includes establishing data ownership rights, access control mechanisms, and data privacy protocols to ensure the responsible management of sensitive information within the public database. Additionally, research is needed to explore effective data visualisation and dissemination methods to ensure accessibility and user-friendliness for the public.

Table 3

Special measures for circular economy adaptation

Policy Recommendation	Strengths	Weaknesses	Practical methods for governmental implementation
8. Encouraging Circular Economy Applications	- Promotes waste reduction, reuse, and recycling	- Requires infrastructure development for tracking materials	- Invest in research and development of blockchain solutions for the circular economy. - Partner with waste management companies for pilot programmes. - Develop clear ownership and responsibility models for material data.
9. Waste Management Integration	- Increases transparency in waste management - Improves recycling and reuse	- May disrupt existing waste management practices	- Partner with waste management companies for pilot programmes. - Develop training programmes for waste management personnel on blockchain technology. - Provide financial and technical assistance to waste management companies adopting blockchain technology.
10. Decentralised Waste Market	- Creates economic incentives for sustainable practices	- Requires development of a robust and secure trading platform	- Conduct feasibility studies to assess the potential of a decentralised waste market. - Develop clear rules and regulations for operating a decentralised waste market. - Pilot-test the decentralised waste market concept in a controlled environment.
11. Public Database for Waste Management Transparency	- Promotes responsible waste management practices - Reduces illegal activities	- Requires investment in data collection and management infrastructure	- Develop clear guidelines and standards for data collection and reporting. - Partner with waste management companies and local authorities to collect data. - Implement strong data security measures to protect sensitive information.

Source: own editing

CONCLUSION

This analysis explored policy recommendations for fostering the responsible and secure adoption of blockchain technology, focusing on three categories: general regulatory policies, general implementation measures, and special measures for circular economy adaptation. Unified legal systems and robust data governance frameworks are crucial for creating a stable and secure environment for blockchain applications. Cost-effectiveness measures like targeted incentives can encourage business adoption. Investing in talent development, training public authorities and conducting pilot programmes equip stakeholders with the necessary skills and knowledge. The focus then shifted to integrating blockchain with the circular economy. Standardised data formats and cost-effective infrastructure are essential for tracking materials within the supply chain. Integrating blockchain with existing waste management systems can improve transparency and resource allocation. Decentralised waste markets facilitated by blockchain offer economic incentives for waste diversion. Finally, public databases built on blockchain can promote responsible waste management practices and deter illegal activities. By addressing these considerations and supporting further research, policymakers can unlock the potential of blockchain technology for a more efficient, transparent and sustainable future.

The most effective approach might be a combination of baseline regulations and industry-specific guidelines. The former is a core set of rules that apply to all blockchain applications, regardless of industry. These would address fundamental issues like data security, consumer protection and anti-money laundering. The latter specifies additional guidelines or best practices to address different industries' risks and needs. These guidelines could be developed through collaboration between governments, industry experts and researchers.

Given the technology's scope and novelty, researchers are critical in guiding its responsible implementation. Their work on developing standardised

data formats, secure trading platforms for waste exchange, and effective data governance frameworks is essential for overcoming technical challenges and ensuring transparency within the system. Additionally, research into blockchain's social and economic impacts on waste management practices is crucial for mitigating potential disruptions and promoting equitable outcomes.

Our findings suggest that a successful blockchain future hinges on a three-pronged approach. First, establishing a unified legal system and robust data governance frameworks creates a secure and stable environment. Second, cost-effectiveness measures like incentives and talent development encourage business adoption and equip the workforce with the necessary skills. Finally, blockchain can revolutionise waste management for the circular economy through data tracking, transparent markets, and public databases. Further research is required to unlock its full potential.

Author's contribution

Ádám Bereczk: 34%, conceived and designed the study, collected the data, performed the analysis. Bettina Hódiné Hernádi: 33%, collected the data, edited and formatted the text, proofread the text. Gábor Mélypataki: 33%, worked on conceptualisation, the environmental and legal aspects.

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The State of Content Marketing in Hungary and Its Possible Effects on a Specific Brand – Hungarian Experts' Opinions

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SUMMARY

The aim of this paper is to give an overview of the state of content marketing (CM) in Hungary, its application and whether it is worth examining the effect of CM on the Brand Asset Valuator (BAV) and brand experience (BX). To investigate these issues, the author conducted individual interviews with twelve online marketing and content marketing experts in 2022. Based on the research results, it can be stated that the Hungarian practice of content marketing is typically at an initial stage, the attitude of the management of the companies is inappropriate and there are often resource limitations. According to the experts, examining the effect of CM on BAV and BX is generally relevant and reasonable. The results confirm the connection between content marketing and branding and its controlling is an important academic research area and a business issue that requires further study.

Keywords: content marketing, online marketing, branding, BAV brand value, brand experience
JEL codes: M31, M37
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INTRODUCTION

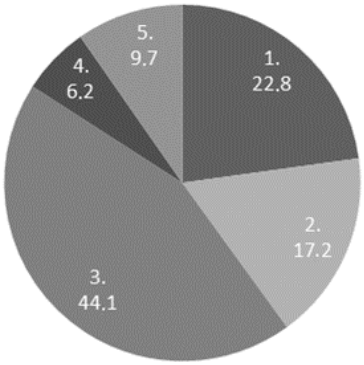
Profit-oriented companies are under constant pressure to maximise their efficiency in unpredictable economic times (Hajdú, 2013) and under these circumstances content marketing can be an effective tool. The application of content marketing (CM) has become a significant tendency (Mathew & Soliman, 2020 in Nguyen et al., 2023), which affects the majority of sectors (Nguyen et al., 2023). One of the reasons for this is that companies have switched from their sales-centred approach to a customer-centred one (Hollebeek & Macky, 2019; Terho et al., 2022 in Fan et al., 2024). Content marketing can support the strengthening of the relationship between the brands and the customers to increase business performance (Fan et al., 2024).

Zhang and Zhang (2024) refer to several other authors to support their view that content marketing is a significant and efficient tool in ensuring and supporting the brand experience and consumer value. The relevance of the current research topic is also confirmed by the results of Hajdu (2022a). The processing of the literature reveals that CM is a natural component of the brand experience (BX). Apart from summarising the relevant literature, this article presents the results of two interviews conducted in small groups. These results show that the content of brands influences the brand experience as defined by Brakus et al. (2009) and its dimensions.

Hajdu (2022b) processes and compares the literature of the Brand Asset Valuator (BAV) model - developed by Young and Rubicam (Szőcs, 2012) - and that of content marketing and reveals a principle-based connection regarding how CM affects BAV and its dimensions.

In 2017, contentplus.hu conducted a survey among Hungarian companies with regard to their content marketing activities (Pécsi, 2017). The results also confirm the importance of research in this area. From the findings of the contentplus.hu survey, the following descriptive statistics results are the most relevant (Pécsi, 2017). The rate of companies where CM is a "stable program" was barely 16% (Figure 1). The research also states that 26% of the companies replied that they did not even have a dedicated person in charge of CM. 24.1% said that they created some kind of content "ad hoc", while 26.9% of the companies used content only to emphasise the advantages of their products. The survey also reveals that 38.6% of the companies do not

have a separate budget for content marketing, so they spend money on CM on an individual authorisation basis. 35.2% of the respondents handle CM as part of the expenses allocated for all digital channels in their budgets, but not separately.



1. do not use it or use it only "ad hoc": 22.8%

2. testing its potential: 17.2%

3. using it but would like to develop it further: 44.1%

4. have a stable program, there are inputs from every department: 6.2%

5. have a stable program and measure the results, supported by the top management: 9.7%

Source: Pécsi, 2017. Retrieved November 11, 2019, from https://contentplus.hu/blog/2017/07/04/magyar-vallalatok-tartalommarketing-erettsege/

Figure 1: Percentage rates of the responses given to the question of "How would you characterize the content marketing activities of your company?"

The data given in the previous example show that content marketing in Hungary was at a very initial stage. However, a more recent survey shows much more positive results. The trendfm.hu website published (on January 6, 2020) the data of a survey conducted by Marketing112 Ltd. in the first half of 2019. These data revealed that the company websites and Facebook profiles were the most commonly used marketing tools, since 51.2% and 42.7% of the respondents chose these, respectively, out of the 51 options. There was a question in the survey for the company managers or other decision makers which asked the areas that they would like to improve in 2020. From the options, 43.9% chose copywriting and content marketing, while 40.3% chose brand management.

This article is a more recent addition to and an important element of a research series. The primary research area and focus of this research series is content marketing and its effect on a specific brand, especially on the BAV and BX. The theoretical basis and the immediate precedent of this article are based on the works of Hajdu (2022a, 2022b).

Based on the above, the aim of this paper is to create a basis for scientific and quantitative research which will attempt to answer the following questions:

1. How can we evaluate the activities of those dealing with content marketing, what are the state and circumstances of and tendencies for using CM in Hungary?

2. Is the examination of the connection between content marketing and the Young and Rubicam consumer brand value (BAV) relevant for marketers?

3. Is the examination of the connection between content marketing and the Brakus et al. brand experience (BX) relevant for marketers?

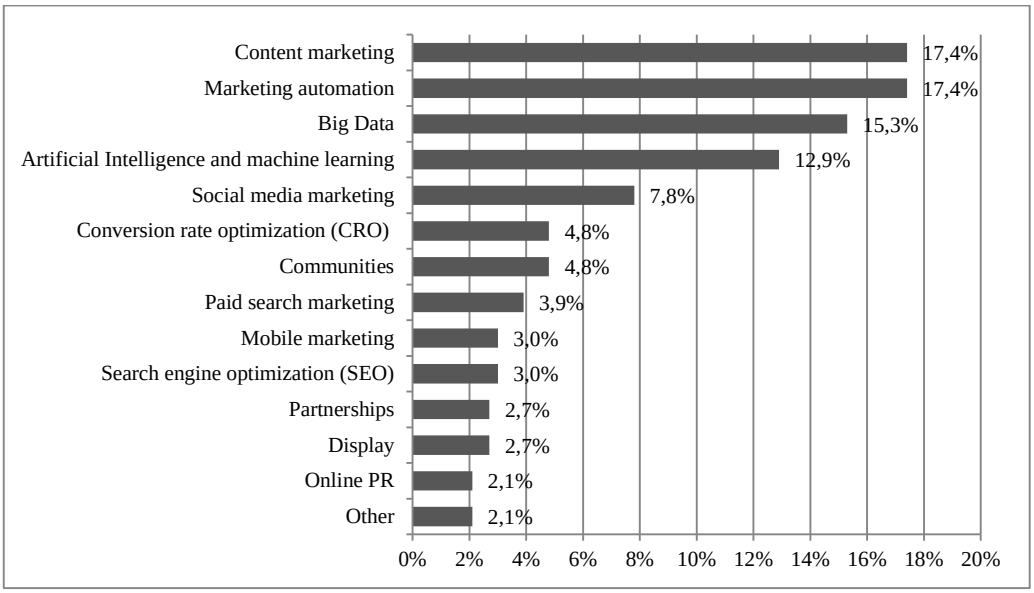
Major Findings of the Literature, Theoretical Basics

Regarding the fact that this paper is one element of a research series, the author seeks to present the most relevant and most basic findings of the literature in relation to the research topic. Also, the author does not wish to give a detailed presentation of the BAV and BX scales since these do not concern the results of the interviews.

Content marketing

As is shown in Figure 2, from Statista.com, marketing experts evaluate content marketing (CM) to be one of the most efficient digital marketing tools. The graph gives a rather narrow interpretation of CM, since according to certain sources, several alternative categories are actually parts of CM, rather than its alternatives. These include social media marketing (Kotler et al., 2017), marketing automation (Järvinen &

Taiminen, 2016) and search engine optimisation (Hajdú, 2018). At the same time, if the percentage values of the tools belonging to the broad interpretation of CM are added to the values of the narrow interpretation (17.4%), it is obvious that, based on the data of the graph, the significance of content marketing is even greater.



Source: Statista.com, 2020.

Figure 2: The most effective digital marketing techniques according to marketers worldwide in 2020
Survey time period: January 2020

Content marketing is "creating, distributing and sharing relevant, compelling and timely content to engage customers at the appropriate point in their buying consideration processes, such that it encourages them to convert to a business building outcome" (Holliman & Rowley, 2014, p. 285).

Instead of encouraging customers directly to buy, content marketing affects sales indirectly with the help of valuable content (Gregoriades et al., 2021; Hollebeek & Macky, 2019 in Fan et al., 2024). This indirect effect on sales is achieved by generating consumer acknowledgment toward the brand or the company (Gregoriades et al., 2021; Hollebeek & Macky, 2019, in Fan et al., 2024). Kotler et al. (2017) presume that content might support sales, not only directly. They think that according to its purpose, content can be either brand-building or sales supporting. Such a content can gain a broader interpretation and definition: content can induce action from the customers (Izogo & Mpinganjira, 2020), or it can influence their attitudes (Yuceer et al., 2024). According to Eigenraam et al. (2021), CM activity can be typically carried out in the following channels: social media platforms, forums, blogs and vlogs, corporate websites and mobile applications (Nguyen et al., 2023). Fan et al. (2024) also confirmed this by referring to Hollebeek and Macky (2019), who state that valuable brand content can reach the potential consumers via social media and corporate websites. From the content marketing point of view, Instagram, YouTube and TikTok are the most relevant social media platforms (Gümüş, 2017; Breves et al., 2019; Törhönen et al., 2021; Mallipeddi et al., 2021 in Zhang and Zhang, 2024).

Brand experience (BX)

Brand experience is defined by Brakus et al. as follows: "subjective internal consumer responses (sensations, feelings, and cognitions) and behavioral responses evoked by brand-related stimuli that are part of a brand's design and identity, packaging, communications, and environments." (Brakus et al., 2009, p. 53). Brand experience has four dimensions: sensory, affective, intellectual and behavioural (Brakus et al., 2009). The four dimensions are presented in Table 1.

Table 1

The definitions of the BX dimensions

Brand Experience dimension	**Definition**
Sensory Dimension	Sensory dimension examines the effect of a given brand on the visual and other senses.
Affective Dimension	The affective dimension examines emotional judgements or the consumer's emotional responses evoked by the brand, such as emotions, feelings and sentiments.
Behavioral Dimension	The behavioral dimension examines whether contacting with a given brand results in active action or behaviour.
Intellectual Dimension	The intellectual dimension examines whether a given brand induces mental activity or creativity.

Source: the author's own compilation based on Brakus et al., 2009.

The brand asset valuator (BAV)

According to Kotler and Keller, "brand equity is the added value endowed on products and services" (Kotler & Keller, 2012, p. 284). From the brand equity models presented by the authors, the first one is the Brand Asset Valuator (BAV), developed by Young & Rubicam agency, which is "a method suitable for measuring consumer brand value" (Szőcs, 2012, p. 53) and it is based on evaluations by target audience (Piskóti et al., 2015). BAV has four dimensions: differentiation, relevance, esteem and knowledge (Szőcs, 2012; Piskóti et al., 2015). The definitions of these dimensions are presented in Table 2.

Table 2

The definitions of the BAV dimensions

BAV dimension	**BAV dimension definition**	**Source**
Differentiation	"It measures the perceived distinctiveness of the brand, which Aaker (1996) stated is the most important synthesizing measure of associations. Thanks to this, the brand is able to stand out from its competitors."	Aaker, 1996, in Szőcs, 2012, p. 52
Relevance	"Relevance measures the extent to which the given brand appeals to the consumer, and in fact BAV estimates with this level the probability that the consumer is willing to buy the given brand."	Szőcs, 2012, p. 53
Esteem	1. "Respect is the result of consumer perception of quality and popularity." 2. "Esteem measures associations related to perceived quality, reliability, and ideas about the brand's leading position."	1. Agres & Dubitsky, 1996 in de Mortanges & van Riel, 2003, p. 522 2. Szőcs, 2012. p. 53
Knowledge	1. "measures brand awareness", 2. "consumers (…) understand what the brand means"	1. Szőcs, 2012, p. 53 2. de Mortanges & van Riel, 2003, p. 522

Source: the author's own compilation based on Hajdu, 2022b, pp. 196-197.

RESEARCH METHODOLOGY

In order to confirm the conclusions of the previous publications based on the processing of the literature and to establish the quantitative research, a series of individual interviews were conducted with 12 experts who are either "general" online marketers, experts specialised in certain areas (like video marketing, copywriting, search engine optimisation or web shops) or content marketing experts who mostly work for small and medium-sized enterprises (SMEs) as consultants or contractors. However, some of these experts had gained a significant amount of experience in the large enterprise sector. The interviews were conducted between April

and August 2022 (Table 3). A specific goal of these interviews was to confirm that it is worth examining the connection between CM, BAV and BX (especially from a business and practical viewpoint). Also, the interviews were intended to give an insight into the attitude of the Hungarian businesses toward content marketing and the circumstances influencing it.

Table 3

The codes of respondents used in this paper and the dates of interviews made in 2022

Code	**Date of interview**	**Code**	**Date of interview**	**Code**	**Date of interview**	**Code**	**Date of interview**
Expert 1	3 August	Expert 4	20 April	Expert 7	12 April	Expert 10	29 April
Expert 2	10 August	Expert 5	29 April	Expert 8	3 May	Expert 11	27 June
Expert 3	11 August	Expert 6	28 July	Expert 9	5 August	Expert 12	22 April

Source: the author's own compilation

During the summary and evaluation of the interviews, the experts' opinions were contrasted but it is important to note that these experts did not have any real chance to come to an agreement, to confirm or contradict one another directly. As a moderator, I expressly asked these experts to answer, where it was necessary, as if they were talking to a layperson (some questions were put in a more unprofessional way, so that the questions would influence the respondents as little as possible). Consequently, among the experts' responses we can find statements that are obvious or seem obvious. When it was necessary, the definitions or the point of the questions (accounting or consumer brand equity) were cleared up for the respondents right after the questions. The 103-page long transcript of the interviews is not presented in this paper due to obvious length limitations (the shortest interview lasted about 45 minutes and the longest one was about 1 hour 40 minutes). The outline of the interviews and the questions are all in accordance with the research questions. Beside these questions, there were other topics and questions which were discussed during these interviews, but they were irrelevant to the topic of this paper and thus they will not be detailed here. At the beginning of each interview and during the small talk, I briefly laid out the most necessary information about the subject and the aim of the research (I tried not to influence the respondents). At the end of the interviews, I requested and was granted permission to use the exact same words and the content of the responses as references in a PhD dissertation and other scientific articles.

An audio recording was made of each interview which contains the respondent's permission that their responses can be used. At the beginning of the interviews, I requested and was granted permission to make audio (and sometimes video) recordings. All of the interviews were conducted online, with the help of a web camera and a microphone, typically via Skype.

THE RESULTS OF THE QUALITATIVE RESEARCH

Table 4 gives an overview of the questions belonging to the interview topics. The interview questions are also listed before the summary of the interviews (in italics and between quotation marks).

Table 4

The topics of the qualitative research

Relevance of the topic as a research topic	**Interview questions**
The state of content marketing in Hungary	*"How do you evaluate the state of content marketing in Hungary?"*
CM and brand experience (BX)	*"Do you think it is worth researching the relationship between CM and BX? Does it have any practical benefit? Can CM contribute to brand experience?"*
CM and brand value (BAV)	*"Do you consider the examination of the relationship of brand value (BAV) and CM relevant? Is it or is it not worth researching this? Can it have any practical benefit?"*

Source: the author's own compilation

Summary of the interviews: the state of content marketing in Hungary – a few thoughts from the experts

”How do you evaluate the state of content marketing in Hungary?”

The professional discourse about content marketing started around 2012 and 2013, mainly because of Google’s 2012 algorithm update which gave more preference to text content. As Expert 9 stated, this caught the attention of Hungarian companies, too. The expert also added that the experts in Hungary began to understand and become more interested in this topic around 2015 and 2016. Expert 9 also states that today there is general agreement on the importance of content marketing. Another expert, Expert 7, thinks that CM is already part of the mainstream, and it is developing continuously. Expert 7 thinks that the companies and brands that make the best use of CM started using it 3 to 5 years earlier, but emerging brands can also succeed by applying CM. Expert 12 confirms that professional communication (and within that, content marketing and its tools) may be an advantage in the competition. Several experts (Expert 11, Expert 6, Expert 10) agree that there are both good and bad examples of CM in Hungary. Expert 10 says that basically all age groups in Hungary are now on the internet, which - according to Expert 5 - is dominated by Facebook and Google in Hungary. Expert 2 says that the interest in CM grew further due to the 2020 COVID pandemic. According to Expert 9, CM is now easier to access than it was a few years ago, partly because of lower costs and partly because of the expansion of the services and service providers. This idea is somewhat degraded by the change of the taxation laws regarding "KATA" (itemised tax liability for small taxpayers which is a flat-rate taxation). The number of service providers in CM, and especially that of content creators, is decreasing in Hungary. Expert 2 says the market of content creators is being concentrated and this leads to a cleansing process. Since only the more solid companies and experts will remain after the change in the “KATA” tax status, the rate of high-quality service providers and the barrier to entry may increase in the market. (We must not forget that content creation and content marketing can be outsourced [Kotler et al., 2017]). According to Expert 3, CM is often “influencer-centred” in Hungary, and this is often an unjustified approach.

The experts also talked about the deficiencies and the challenges, which can be classified as follows:

-Immatureness: according to Expert 1 and Expert 8, content marketing is still “at an initial stage”, “it is lagging behind”. Expert 1 says that few people work in this area, and many misunderstand it. Expert 4 also thinks that few people understand content marketing appropriately and how important content creation and brand building are, and feels that the awareness level of the market actors in Hungary is still insufficient. Expert 2 says that the amount of Hungarian-language literature on CM is insufficient. Expert 6 also agrees with this and adds that content marketing does not have traditions in Hungary. For those who want to get more information, mostly only English-language sources are available.

-Inappropriate attitude and application: Expert 12 also confirms that CM in Hungary is still at an initial stage but adds that this communication solution is not handled properly within online marketing. Expert 9 says that those who work in content marketing in Hungary are usually not committed to their own content. One consequence of this is that only the bad campaigns are thoroughly evaluated. The good campaigns, which might follow a working model, are either poorly evaluated or not evaluated at all. Expert 1 thinks more research is necessary on how CM could help the SME sector and how CM applied by large companies could be adapted to the SME sector. Furthermore, the expert emphasises that there is a need for research that would present the usefulness of content creation. The experts think that problems usually occur at the beginning and at the end of content marketing campaigns. In Hungary, content marketing activities are not at all or not properly target-oriented and the controlling is not appropriate, either. The latter mentioned problem was emphasised mainly by Expert 1, while the other problems were mentioned by several experts (Expert 1, 9 and 12). Expert 12 calls this “hope marketing”: the companies do something and then they hope that it will yield results; that is, these companies do not have a concept or strategy and they do not act in line with concepts or strategies. Expert 12 says the following about the topic: “we cannot develop what we do not measure”. Expert 12 also mentions another problem: Hungarian web shops are typically sales-oriented and they present little content. However, as was previously mentioned, content marketing can be a competitive advantage as Unique Selling Proposition (USP). This practice is not in accordance with the consumer trends either, since so-called single-stage sales approach does not work anymore, and consumers get information from 5 to 7 places (“touchpoints”) before shopping. This increases the value of CM within communication. Regarding the sales orientation, Expert 3 says that it is often a problem that Hungarian companies expect short-term results from CM.

-The applicability of foreign trends and solutions: CM in Hungary is underdeveloped (Expert 4), and it is also different from the western markets, especially the North American markets (Expert 10, Expert 3). The underdevelopment is marked by the fact that CM

solutions are less widespread, while the difference comes from the size and homogeneity of the market and the language characteristics. According to Expert 2, it is a mistake to implement foreign trends and solutions in Hungary without any criticism, filtering or adaptation. However, Expert 2 says that it is worth paying attention to the work of good foreign and Hungarian experts.

-Resource limitations: Expert 8 has a strong opinion and thinks that it is very difficult to fully implement "real" CM in the Hungarian SME sector, rather its tools can be utilised. The reason for this is that professional and comprehensive CM requires personnel and financial resources. According to Expert 8, the so-called "entry level" in case of resources is about HUF 250,000 to 300,000 per month, but the effectiveness is questionable. A small firm, company or an entrepreneur with a low turnover does not have resources for CM. This idea was confirmed by Expert 11 as well. According to Expert 9, Hungarian CM cannot match the results produced in the western markets, but it still remains an important communication tool (Expert 9, Expert 2) and efforts are being made to catch up with international practice (Expert 6). Expert 3 thinks that "something has begun and started to develop but there is a serious lag". During the interviews, there were also promising, straightforward and brief statements about the present and the future of "Hungarian content marketing". As Expert 4 says: "Thank God, we have a lot to do in the next 100 years." Expert 11 says: "I think it is promising or at least encouraging".

A Summary of the interviews: CM and brand experience (BX)

"Do you think it is worth researching the relationship between CM and BX? Does it have any practical benefit? Can CM contribute to brand experience?"

Most of the experts (except for one) consider the examination of content marketing and brand experience to be relevant. The main differences between the responses were the arguments to support the relevance of the topic or what the framework is regarding the validity of the topic. Expert 6's response confirms the conclusions drawn from the literature, that is, "content is also part of brand experience" and that is why this topic is relevant. Expert 11 also says that the topic is relevant, and should and can be researched along with BAV. During the interview, this expert could not mention anyone who was dealing with this topic. Expert 12 thinks that the topic is interesting because the relationship between CM and BX "may have a direct effect on the success of the particular brand" which can be measured with financial indicators. This expert also adds that "most people make their buying decisions on an emotional basis; that is, if content marketing can give them brand experience, a user who interacts with the content of the brand can probably be encouraged to buy in the next step". Expert 12 and Expert 1 think that brand experience has a positive effect on brand loyalty. Expert 9 thinks that the examination of the relationship between BX and CM is exciting because some content should be created for each stage of the so-called customer journey and get the customers to the repurchase stage. The goal is to turn the customer into an "evangelist" and a recommendation from the customer is an organic part of this. The expert does not know an "easy-to-handle" model and the research of the topic would be interesting from a professional viewpoint. The examination of BX has a framework or limits: according to Expert 1 satisfaction with the product and the service and their match with the content can seriously limit the effect of CM on BX. If there is not a close match, it can cause serious damage (Expert 1). Expert 1 thinks that CM can get the customers to the point of purchasing the product. Expert 10 and Expert 2 think that the measurement of brand experience and its effect on customer loyalty is more relevant and easier to measure in the large company sector than in the SME sector.

Several experts mention that the effect of CM on brand experience may be a goal and its measurement may be an important indicator of efficiency, a controlling tool (Experts 11, 1, and 4).

Summary of interviews: CM and brand value (BAV)

"Do you consider the examination of the relationship of brand value (BAV) and CM relevant? Is it or is it not worth researching? Can it have any practical benefit?"

Regarding the relevance of the effect of CM on brand experience, several experts were uncertain, and they would primarily examine it in the large company sector. Experts 8, 4, and 10 think that in the SME sector there is often a compulsion that all activities must focus on the short-term income. Long-term activities like brand building are often pushed into the background. These experts think that the methods which measure and increase the brand value also belong to this category. They think that the measurement and the use of this topic are not well-founded or realistic in the SME sector. Expert 4 says that measurement is possible, but this information is not very useful for small businesses.

Expert 6 says that this topic may arise in case of large companies, but the topic is relevant in general. Expert 7 and Expert 3 do not mention any conditions; they consider the topic relevant. Expert 1 and Expert 2 tie this topic to the goal setting of the management: if it is defined as an objective (similarly to BX), the effect of CM on brand value should be measured.

Expert 12 confirms that there is practical benefit if the business and academic experts deal with the

relationship between the consumer brand value and content marketing, and therefore they should measure it. The expert added a basic principle: "we cannot develop what we do not measure".

Expert 5 and her colleagues deal with the likeability of a brand when they perform the controlling of a brand. Expert 5 firmly argues that the effect of CM on brand value should be examined both in the business and the academic sector, since this area is rather neglected in Hungary and this kind of research might answer several questions and several phenomena seen in business practice might be confirmed or explained.

Expert 11 thinks that nowadays the Hungarian market actors and the Hungarian brands within BAV often "forget about" differentiation; thus, this area is neglected. According to the expert, CM is a good tool to build the differentness and differentiation of a specific brand. Consequently, the expert considers the analysis of the relationship between the consumer brand value (like the Young and Rubicam brand value model) and content marketing very relevant. The relevance of BAV is also an essential research area from the viewpoint of CM. The brands pay more attention to this area. What is usually ignored (but concerns the relevance and differentiation) in several cases is the fact that not only the brands themselves compete but the contents, too. What is more, in this case, not only the immediate rival of a brand is important, but the content of the traditional media brands as well.

Expert 9 also confirmed that the examination of the relationship between CM and brand value may have a practical benefit and it would be good to get as precise results as possible. The expert thinks it is important to describe and understand good and effective practices and everyone in the sector could make use of these. Expert 9 thinks that confirmation of the relationship between CM and the consumer brand value would be very significant and "exciting".

The summary of the expert interviews, the responses and key ideas given to the research questions is presented in Table 5.

Table 5

A brief summary of the expert interviews

Research topic	Research results
The state of content marketing in Hungary	Immatureness Inappropriate attitude and application The application and applicability of foreign trends and solutions Resource limitations
The relationship between CM and brand experience (BX)	Most experts (except one) think the examination of content marketing and brand experience relevant. Content is also part of BX. The framework and limitations of the examination of BX in relation to CM (e. g. satisfaction with the product and serving and its accordance with CM) People make most of their buying decisions on an emotional basis. The measurement of BX and its effect is more relevant in the large company sector than in the SME sector. The effect of CM on BX can be a goal and an important controlling tool.
The relationship between CM and brand value (BAV)	The experts would rather examine this in the large company sector, but the topic is relevant in general. The examination of the relationship between CM and brand value can have practical benefits. CM may be a good tool to differentiate a brand (which is an element of BAV). The confirmation of the relationship between CM and the consumer brand value would be very significant and "exciting". It is important to describe and understand the good and working practices and the whole sector should make use of these.

Source: the author's own research

The main findings of the research

The interviewed experts confirmed the chief findings of the research conducted by contentplus.hu and provided more information about the content marketing practices in Hungary. CM in Hungary needs further development, and it is developing in spite of the resource limitations and the inappropriate attitude of the management.

The results of the expert interviews do not only confirm the relevance of the examination of the relationship between CM and BX, but they also confirm that CM is part of brand experience. This confirms a result of Hajdu (2022a). BX contains an emotional

dimension as well, which should be emphasised because most buying decisions are based on emotions.

The relationship between CM and BAV is considered to be an important research topic since CM can affect the whole BAV or a part of it. This is especially true in case of the differentiation dimension of BAV.

Based on the expert interviews, it can be stated that it is worth examining the effect of CM on BAV and BX and this examination may also act as a controlling tool.

CONCLUSION

A series of interviews was conducted with 12 experts in the spring and summer of 2022 to prepare for a quantitative research project which would examine the relationship between content marketing and branding, more specifically brand experience and brand value. During the interviews, it was found that experts see content marketing as still being at an initial stage in Hungary, based on foreign solutions, but showing promising signs. The experts consider the examination of the relationship between content marketing and brand experience and, in general, the examination of the Young and Rubicam BAV model to be relevant. However, some of the experts noted that the examination of both areas should be conducted in the large company sector. The experts put forth several arguments which confirm the relevance of this topic.

Based on the research results, if a brand has CM activity, it might be necessary to examine the effect of content marketing on BAV and BX. The information and opinions revealed during the research might need further confirmation, but they provide an excellent basis and reason to continue the research by using both qualitative and quantitative methods. The recommended implementation methods of the measurement should also be the subject of further research.

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