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PREFACE

Dear Readers,

We are delighted to publish this special *Eunomia – Rozwój Zrównoważony – Sustainable Development* journal issue edited by the American Institute of Applied Sciences in Switzerland (AUS) research team. Over the last few years, Giuseppe Catenazzo from AUS and Aleksandra Zając, with AUS and the State University of Applied Sciences in Racibórz, built a diverse and dynamic scientific community through innovative scientific events that take place periodically, resulting in scientific publications, the expansion of scientific knowledge, and new research cooperation. Thanks to these great efforts, FMOS 2023, or Finance, Marketing and Operations for Sustainable Business, an annual scientific conference and workshop for junior researchers, was created. The first edition of the scientific conference and the workshops for young scientists took place on 8-9 June 2023.

Eunomia – Rozwój Zrównoważony – Sustainable Development joined as a partner journal for the event. This scientific event was organised online, gathering over 100 participants worldwide from several countries and continents. After the conference and its second edition on 7-8 June 2024, several authors expressed their interest in publishing extended versions of their conference presentations. The authors published in this issue of the journal joined the conference or belong to the extended research community administered by the American Institute of Applied Sciences in Switzerland. Another publication related to AUS research endeavours and the FMOS conference is titled *Research at the Crossroad of Finance, Marketing and Operations for Sustainable Business*, to be published in autumn 2024 by Ethics International Press in the United Kingdom.

The current issue of the *Eunomia* journal Sustainable Development comprises eight research articles directly or indirectly connected to sustainable development. The initial three articles concern the economic, environmental, and social dimensions of sustainable development. Next up is an article on digitalization and computerization, followed by four articles in finance.

In the first article, Abdulkadir Keskin, Abdulkadir Atalan, Abdurrahman Keskin and Erdal Beşoluk in "The Impact of Social Expenditures on Poverty: a Study on Türkiye" examine how government social spending in Turkey helped reduce poverty in the country in 2021-2026. Not all spending categories helped reduce poverty in the country; this study's results can help policy-makers in their fight against poverty. Emmanuel Salim, Jeanne Fournier, Ephraïm Gerber, Emmanuel Fragnière, and Leïla Kebir present to the

readers of *Eunomia* the article "Summer Glacier Skiing amid Climate Change: What does Production Transformation Mean for Sustainability?" These scholars analyse the impact of climate change on summer glacier ski tourism sustainability in Saas-Fee, Switzerland. The transition to more sustainable practices may become a remedy to the challenges climate change poses for this niche tourism activity.

Professor of the New Vision University in Georgia, Sureyya Yigit, in the article "Sustainable Development: A Global Worry", looks at the difficulties in reaching a consensus in the international community on specific courses of action that would most fully contribute to the realization of sustainable development. Although the idea does not raise any objections regarding the global stage, the directions of its implementation remain controversial despite the pressing and urgent problems humanity is facing, such as climate change and global warming.

The second group of selected articles starts with "Digital Transformation's Impact on Society: Unraveling Trends, Challenges, and Opportunities," by Farhana Yeasmin from the University of Agder in Norway and American Institute of Applied Sciences in Switzerland. She examines digitisation and its multifaceted impact on contemporary society concerns, among others, such as communication, trade, management, and culture.

Joining us from Kosovo are Fisnik Morina, Besfort Ahmeti and Leonita Gashi who worked on "Determinants of Financial Failure Risk: an Econometric Study using the Z-altman and Springate Models". Their calculation of the risk of bankruptcy unravels the variables that positively and negatively affect the financial success of a company. Cristiane Benetti, Renato Guimaraes, Joshua Onome Imoniana, in their article "The Weekend Effect on the Index Returns of 15 Stock Exchanges around the World" explain the relationship between stock market index returns and market location. As such, this article is not only interesting for researchers but also important for policy-makers. Ruban Christopher .A. Ruban is the author of the article "Investigating the Correlation between Financial Literacy and the Adoption of Digital Platforms for the Women Teachers 'Sustainable Savings", which concerns the correlation between financial literacy and the use of digital platforms by female teachers in the field of savings. Finally, Soumya Pandey, from Bhutan, is the author of the article "Bridging the Fintech Divide: Understanding Financial Literacy in India's Tech Boom". The researcher examines a problematic contrast in India: next to the dynamically developing fintech sector, there are also environments that lack basic financial knowledge.

We would like to sincerely thank the Editor-in-Chief, Piotr Mucha, and the entire Editorial Board for offering us such a fantastic opportunity to publish an entire issue of *Eunomia – Rozwój Zrównoważony – Sustainable Development*. We are also indebted to the editorial team of *Eunomia – Rozwój Zrównoważony – Sustainable Development* for their incredible editing work. Interested readers can join the AUS free scholar community by writing to the editors of this issue at **research@aus.swiss** or contacting us on LinkedIn. We hope readers will find this issue interesting and inspiring for further research endeavours.

Aleksandra Zając and Giuseppe Catenazzo

PRZEDMOWA

Drodzy Czytelnicy,

Z przyjemnością publikujemy specjalny numer czasopisma *Eunomia – Rozwój Zrównoważony – Sustainable Development*, redagowany przez zespół badawczy American Institute of Applied Sciences in Swizterland (AUS). W ciągu ostatnich kilku lat Giuseppe Catenazzo z AUS i Aleksandra Zając z AUS i Akademii Nauk Stosowanych w Raciborzu zbudowali zróżnicowaną i dynamiczną społeczność naukową poprzez odbywające się cyklicznie innowacyjne wydarzenia naukowe, których efektem są publikacje naukowe, rozwój wiedzy naukowej i nowe współprace badawcze. Dzięki tym wielkim wysiłkom powstała FMOS 2023, czyli Finance, Marketing and Operations for Sustainable Business, coroczna konferencja naukowa i warsztaty dla młodych badaczy. W dniach 8-9 czerwca 2023 r. odbyła się pierwsza edycja konferencji naukowej i warsztatów dla młodych naukowców.

Eunomia – Rozwój Zrównoważony – Sustainable Development dołączyła do wydarzenia jako czasopismo partnerskie. To wydarzenie naukowe zostało zorganizowane online i zgromadziło ponad 100 uczestników z całego świata, z kilku krajów i kontynentów. Po konferencji i jej drugiej edycji w dniach 7-8 czerwca 2024 r. kilku autorów wyraziło zainteresowanie publikacją rozszerzonych wersji swoich wystąpień konferencyjnych. Autorzy publikujący w tym numerze czasopisma dołączyli do konferencji lub należą do rozszerzonej społeczności badawczej administrowanej przez American Institute of Applied Sciences in Switzerland. Kolejna publikacja związana z przedsięwzięciami badawczymi AUS i konferencją FMOS to *Research at the Crossroad of Finance, Marketing and Operations for Sustainable Business*, która ukaże się jesienią 2024 roku nakładem Ethics International Press w Wielkiej Brytanii.

Prezentowany numer czasopisma *Eunomia – Rozwój Zrównoważony – Sustainable Development* zawiera osiem artykułów naukowych związanych bezpośrednio lub pośrednio ze zrównoważonym rozwojem. Pierwsze trzy artykuły dotyczą ekonomicznego, środowiskowego i społecznego wymiaru zrównoważonego rozwoju. Następny jest artykuł na temat cyfryzacji i komputeryzacji, a dalej cztery artykuły na temat finansów.

W pierwszym artykule pt. „Wpływ wydatków socjalnych na ubóstwo: badanie na temat Turcji" Abdulkadir Keskin, Abdulkadir Atalan, Abdurrahman Keskin i Erdal Beşoluk badają w jaki sposób rządowe wydatki socjalne w Turcji pomogły zmniejszyć ubóstwo

w kraju w latach 2021-2026. Nie wszystkie kategorie wydatków pomogły w ograniczeniu ubóstwa w kraju; wyniki tego badania mogą pomóc decydentom w walce z ubóstwem. Emmanuel Salim, Jeanne Fournier, Ephraïm Gerber, Emmanuel Fragnière i Leïla Kebir przedstawiają czytelnikom *Eunomii* artykuł „Letnie narciarstwo na lodowcu w obliczu zmian klimatycznych: co oznacza transformacja produkcji dla zrównoważonego rozwoju?" Naukowcy ci analizują wpływ zmian klimatycznych na zrównoważony rozwój turystyki narciarskiej na lodowcu w Saas-Fee w Szwajcarii. Przejście na bardziej zrównoważone praktyki może stać się lekarstwem na wyzwania, jakie zmiany klimatyczne stwarzają dla tej niszowej działalności turystycznej.

Profesor Uniwersytetu New Vision w Gruzji, Sureyya Yigit, w artykule „Zrównoważony rozwój: globalne zmartwienie" przygląda się trudnościom w osiągnięciu konsensusu w społeczności międzynarodowej w sprawie konkretnych kierunków działań, które w najpełniejszy sposób przyczyniłyby się do realizacji celów zrównoważony rozwój. Choć koncept nie budzi żadnych zastrzeżeń na arenie globalnej, kierunki jego realizacji pozostają kontrowersyjne pomimo palących i pilnych problemów stojących przed ludzkością, takich jak zmiany klimatyczne i globalne ocieplenie.

Drugą grupę artykułów rozpoczyna „Wpływ transformacji cyfrowej na społeczeństwo: odkrywanie trendów, wyzwań i możliwości" autorstwa Farhany Yeasmin z Uniwersytetu w Agder w Norwegii i American Institute of Applied Sciences in Switzerland. Autorka bada wieloaspektowy wpływ cyfryzacji na problemy współczesnego społeczeństwa, m.in. takie jak komunikacja, handel, zarządzanie i kultura.

Dołączający do nas z Kosowa Fisnik Morina, Besfort Ahmeti i Leonita Gashi pracowali nad „Determinantami ryzyka niepowodzenia finansowego: badanie ekonometryczne z wykorzystaniem modeli Z-altmana i Springate'a". Ich kalkulacja ryzyka upadłości pozwala odkryć zmienne, które pozytywnie i negatywnie wpływają na sukces finansowy firm. Cristiane Benetti, Renato Guimaraes, Joshua Onome Imoniana w swoim artykule „Wpływ efektu weekendu na zwroty indeksów 15 giełd na całym świecie" wyjaśniają związek pomiędzy zwrotami z indeksów giełdowych a lokalizacją rynku. Ten artykuł ten jest nie tylko interesujący dla badaczy, ale także ważny dla decydentów. Ruban Christopher .A. jest autorem artykułu „Badanie korelacji między znajomością finansów a przyjęciem platform cyfrowych w celu zapewnienia trwałych oszczędności nauczycielek", który dotyczy korelacji pomiędzy znajomością finansów a wykorzystaniem platform cyfrowych przez nauczycielki szkolne na polu oszczędności. Wreszcie Soumya Pandey z Bhutanu jest autorką artykułu Zniwelowanie luki fintech: Zrozumienie wiedzy finansowej w technologicznej eksplozji Indii". Badaczka pochyla się nad problematycznym kontrastem, tropiącym Indie: obok dynamicznie rozwijającego się sektora fintech są tam środowiska pozbawione podstawowej wiedzy finansowej.

Chcielibyśmy serdecznie podziękować Redaktorowi Naczelnemu Piotrowi Mucha oraz Radzie Naukowej czasopisma za danie nam tak fantastycznej możliwości wydania całego numeru *Eunomii – Rozwój Zrównoważony – Sustainable Development*. Jesteśmy wdzięczni także zespołowi redakcyjnemu *Eunomii – Rozwój Zrównoważony – Sustainable Development* za niesamowitą pracę redakcyjną. Zainteresowani czytelnicy mogą dołączyć

bezpłatnie do społeczności naukowców AUS, pisząc do redaktorów tego numeru na adres research@aus.swiss lub kontaktując się z nami na LinkedIn. Mamy nadzieję, że Czytelnicy uznają ten numer czasopisma za interesujący i inspirujący do dalszych działań badawczych.

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THE IMPACT OF SOCIAL EXPENDITURES ON POVERTY: A STUDY ON TÜRKİYE

Streszczenie (abstrakt): Nowadays, the problem of poverty is one of the most important challenges to address, and various strategies are employed to combat it. Social expenditures are among the most significant approaches to reducing poverty and increasing welfare. While some literature discusses the effects of specific types of social expenditures on poverty, the majority suggests that social expenditures play a vital role in poverty reduction. Although many institutions and organizations contribute to social expenditures, the state is responsible for a significant portion of social spending in Türkiye and the world. Since 2002, public social expenditures have significantly increased during a more stable period in Türkiye compared to previous years. Therefore, it is essential to investigate the impact of social expenditures on poverty and their effectiveness. This study aims to analyze the effect of public sector social expenditures on poverty in Türkiye from 2006-2021. The study examines the relationship between social expenditures for social security/social assistance, education, and health services and the poverty rate of 50% and 60% of households using panel data analysis. According to the findings, an inverse relationship was found between education services expenditures, social security/social assistance services expenditures, and both the 50% and 60% poverty rates. However, no statistically significant relationship between health services and poverty rates was observed.

Słowa kluczowe: poverty, poverty reduction, social expenditures, Türkiye

WPŁYW WYDATKÓW SPOŁECZNYCH NA BIEDĘ: BADANIE W TURCJI

Abstract: W dzisiejszych czasach problem ubóstwa stanowi jedno z najważniejszych wyzwań do rozwiązania, i stosuje się różne strategie, aby mu przeciwdziałać. Wydatki społeczne są jednymi z najważniejszych zmniejszania ubóstwa i zwiększania dobrobytu. Podczas gdy część literatury omawia wpływ konkretnych rodzajów wydatków społecznych na ubóstwo, większość sugeruje, że wydatki społeczne odgrywają kluczową rolę w redukcji ubóstwa. Chociaż wiele instytucji i organizacji społecznych, to państwo odpowiada za znaczną część wydatków społecznych w Turcji i na świecie. Od 2002 roku publiczne wydatki społeczne znacząco wzrosły w bardziej stabilnym okresie w Turcji w porównaniu z poprzednimi latami. Dlatego ważne jest zbadanie wpływu wydatków społecznych na ubóstwo i ich skuteczności. Niniejsze badanie ma na celu analizę wpływu wydatków społecznych sektora publicznego na ubóstwo w Turcji w latach 2006-2021. Badanie analizuje związek między wydatkami społecznymi na zabezpieczenie społeczne/pomoc społeczną, edukację i usługi zdrowotne a wskaźnikiem ubóstwa w 50% i 60% gospodarstw domowych, korzystając z analizy danych panelowych. Zgodnie z wynikami, odnotowano odwrotny związek między wydatkami na usługi edukacyjne, wydatkami na zabezpieczenie społeczne/pomoc społeczną a wskaźnikami ubóstwa 50% i 60%. Jednakże, nie zaobserwowano statystycznie istotnego związku między usługami zdrowotnymi a wskaźnikami ubóstwa.

Keywords: bieda, redukcja ubóstwa, wydatki społeczne, Turcja

1. Introduction

Poverty is one of the most important problems that must be addressed from the past to the present. While social assistance and solidarity were established to combat poverty before the Industrial Revolution, the significant increase in impoverished individuals and the weakening of social bonds after the Industrial Revolution have undermined the mechanisms of assistance and solidarity. Due to the threat that poverty poses to social order and peace, governments have been compelled to intervene in the free market and implement certain measures, albeit limited, to reduce poverty (Şenkal, 2017). Over time, as these measures became institutionalized and due to changes in the economic understanding, the responsibility of combating poverty has been placed on the government, and the state has emerged as the most critical institution in the fight against poverty (Şenses, 2017; Koray, 2018). Despite the existence of numerous policies and practices in the fight against poverty, they can examine under two categories. The approach to tackling indirect poverty is based on supporting economic growth and the premise that the wealth generated by this growth will either increase or improve the conditions of people experiencing poverty. On the other hand, the approach to direct poverty alleviation involves reforms, subsidies, and expenditures aimed at reducing or eliminating poverty, utilizing resources directly in favor of the poor (Gündoğan, 2019; Şenses, 2017). Among these expenditures, social spending is considered one of the most crucial tools in directly combating poverty.

While the definition and scope of social spending remain a subject of debate, there is a common understanding regarding its purpose: the resolution of societal issues and the

improvement of social welfare. Social spending plays a significant role in addressing social problems such as the equitable distribution of income, raising the level of social welfare, and combating poverty (Çelikay and Gümüş, 2017). Social spending can be undertaken by both the private sector and the government. However, as the responsibility for increasing welfare and resolving social problems is primarily attributed to the state, public social spending outweighs private social spending. Furthermore, social spending, to varying degrees, is implemented by all governments. This study primarily focuses on public social spending and conducts evaluations within this context. The OECD (2016) defines public social spending as "social expenditure comprises cash benefits, direct in-kind provision of goods and services, and tax breaks with social purposes. Benefits may be targeted at low-income households, the elderly, disabled, sick, unemployed, or young persons. To be considered "social", programmes have to involve either redistribution of resources across households or compulsory participation. Social benefits are classified as public when general government (that is central, state, and local governments, including social security funds) controls the relevant financial flows. All social benefits not provided by general government are considered private."

Although there is an ongoing debate about the scope of social expenditure, the classification and scope provided by the OECD (SOCX) and Eurostat (ESSPROS) are widely used. Despite some differences between the two methods, the components of social spending are generally similar. The significant differences between the two methods are as follows: (i) In the ESSPROS method, administrative costs are included in social expenditure, whereas they are not included in the SOCX method. (ii) The ESSPROS method presents private and public social spending together, while the SOCX method provides them separately. (iii) The SOCX method includes active labor market programs in social expenditure calculations, whereas the ESSPROS method does not include them (OECD, 2019; Eurostat, 2022). In Türkiye, the ESSPROS method is used for calculating social expenditure. Both the ESSPROS and SOCX methods include expenditures that demonstrate a certain level of development and have a short-term impact. Therefore, the suitability of both the ESSPROS and SOCX methods for Türkiye is a subject of debate. The main reason for this debate is that education and development expenditures are not included in the calculations of both methodologies. Education and development expenditures are highly significant in developing or less developed countries and countries with high regional development disparities. In this context, it is necessary to include these expenditures within the scope of social spending (Keskin, 2023; Erdoğdu, 2013). In this study, education, health, and social security expenditures are considered social spending.

Numerous studies have indicated that countries with high social expenditures tend to have higher levels of social welfare. Examples often cited include Western European and Northern European countries with high social spending, which is associated with higher levels of human development, fairer income distribution, and lower poverty rates. In Türkiye, social expenditures have also increased following a period of more stable economic structure and significant economic growth since 2002. Table 1 presents the share of social spending in Türkiye's GDP.

Table 1. Share of Social Expenditures in GDP in Türkiye

| Year | Presidency of Strategy and Budget | | | | SOCX | ESSPROS |
	Education	Health	Social Protection	Total	Public Total	
2004	3.1	3.8	6.7	13.6	10.0	10.5
2005	3.1	3.6	7.0	13.6	9.9	10.5
2006	2.9	3.8	7.1	13.8	10.2	10.7
2007	3.0	3.9	7.1	14.0	10.8	11
2008	3.2	4.1	6.9	14.2	11.0	11.3
2009	3.7	4.8	7.9	16.4	12.9	13.4
2010	3.8	4.3	8.0	16.1	12.2	12.7
2011	3.7	4.0	7.8	15.5	11.7	12.2
2012	3.8	3.9	8.1	15.8	11.9	12.4
2013	3.8	3.8	8.0	15.6	11.7	12.1
2014	3.9	3.8	8.0	15.6	11.6	12
2015	3.9	3.7	8.2	15.7	11.5	11.9
2016	4.1	3.8	9.0	16.9	12.5	12.8
2017	3.8	3.7	8.4	15.9	12.0	12.2
2018	3.8	3.6	9.0	16.3	11.8	11.9
2019	3.8	3.8	9.5	17.1	12.4	12.6
2020	3.4	4.1	10.1	17.6	*	13
2021	3.3	4.0	8.6	15.9	*	*
2022	3.3	3.9	8.3	15.4	*	*

Source: (Presidency of Strategy and Budget, 2023; OECD, 2023; Eurostat, 2023)

In Table 1, it can be observed that the share of social spending in GDP has been increasing from 2004 to 2020. There is a significant proportional increase, particularly in social protection expenditures. It is evident that there was an increasing trend in social protection spending until 2020, followed by a proportional decline. This pattern also applies to the overall share of social spending in GDP. There have been no significant changes in the share of education and healthcare expenditures in GDP. However, this does

not imply that there has been no increase in social spending. Considering that Türkiye's GDP has been consistently increasing every year after 2004 (except for 2009), it can be said that there has been an increase in the amount of social spending, even though there have been no changes in the proportion of social spending to GDP. In this context, it is possible to say that the social orientation of the state has developed in Türkiye after 2004. The general outline of poverty in Türkiye is presented below.

Figure 1. Outlook of Poverty in Türkiye (2006-2021)
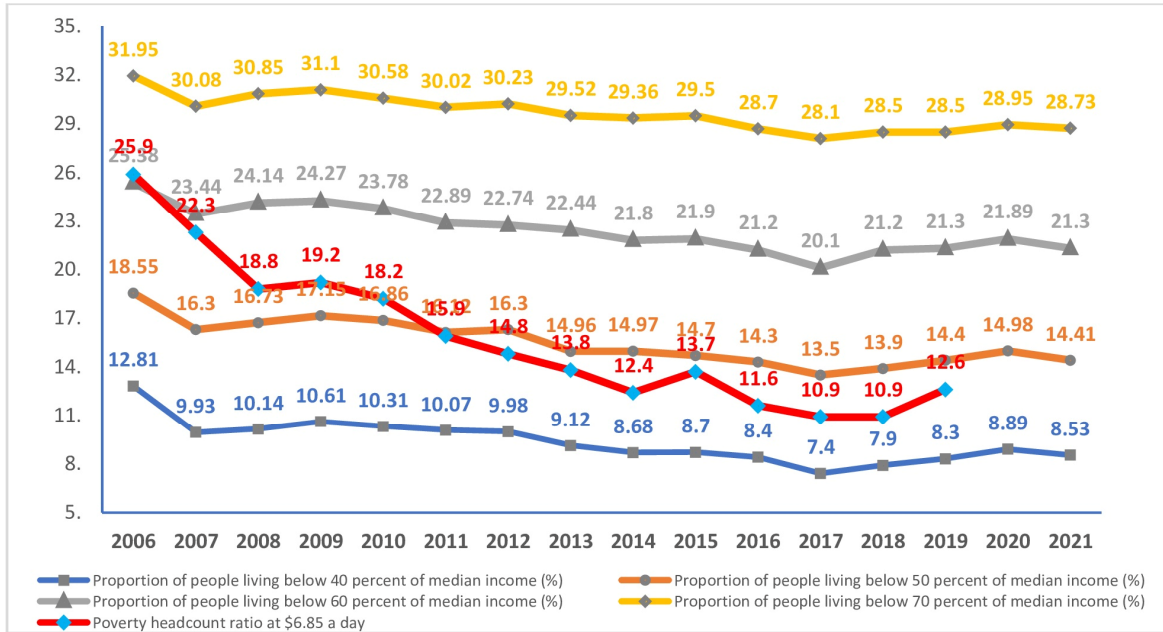
Source: (Turkstat, 2023; World Bank, 2023)

In Figure 1, poverty indicators in Türkiye are presented after 2006. It can be observed that there have been significant reductions in both relative poverty rates and absolute poverty since 2006. Particularly, there has been a high level of change in the poverty rate of $6.85 per day, and the absolute poverty rate has decreased by approximately 13.3%. In the period from 2006 to 2021, there has been a 4% decrease in the relative poverty rates of 40%, 50%, and 60%. Overall, it is possible to say that significant reductions in both absolute and relative poverty rates occurred in Türkiye after 2006.

Social spending is one of the most effective tools in combating poverty, which is a significant societal problem arising from the lack of welfare (Kalkavan and Ersin, 2020). Particularly, education, health, and social security expenditures play an important role in reducing or eliminating absolute poverty and reducing disparities in the society's welfare levels. There exists a direct and indirect relationship and a vicious cycle between education, health, social security, and poverty. In other words, inadequate or nonexistent access to education, health, and social security services leads to poverty, while poverty hinders access to education, health, and social security services. In this context, social spending provided by the state plays a crucial role in breaking the cycle of poverty and combating poverty. Additionally, through the positive externalities of social spending,

poverty can be indirectly reduced (Keskin, 2023). Therefore, it is necessary to examine the impact of changes in public social spending on poverty in Türkiye. The aim of this study is to investigate the effect of education, health, and social security expenditures on poverty in Türkiye. Following a literature review, information about the data set and methodology is provided. Subsequently, an empirical analysis was conducted, findings was presented, and finally, the conclusions section evaluates the findings.

2. Literature Review

There are numerous studies examining the impact of social expenditures on poverty. The majority of these studies have found a negative relationship between social spending and poverty. Kenworthy (1999) conducted a study using data from 15 developed countries between 1960 and 1990 and concluded that poverty decreases as social spending increases. Uza (2021) examined the relationship between the share of social assistance in GDP and the lowest 20% income group in 36 OECD countries using the panel cointegration method for the years 2000-2018. It was found that an increase in social assistance expenditures as a share of GDP reduces poverty. In his study, Atkinson (2000) found that an increase in the share of social spending in GDP leads to reduced poverty. In other words, the research indicates a negative relationship between social spending and poverty.

Akbulut, Altundemir and Güven (2022) investigated the impact of social protection benefits on poverty using the Driscoll-Kraay estimator for 28 EU countries, including Türkiye. The study utilized data from 2007 to 2018, with the dependent variables being the 50% and 70% median income thresholds and the independent variables being the ratios of family assistance, healthcare assistance, retirement benefits, and unemployment benefits to GDP. The results showed a negative effect of family and healthcare assistance on the 50% and 70% poverty rates, a positive effect of retirement benefits on the 50% and 70% poverty rates, and finally, a positive effect of unemployment benefits on the 70% poverty rate. Ertekin and Hayat (2022) examined the impact of social spending on poverty using panel data analysis for 23 EU countries, including Türkiye. The study used the poverty risk indicator as the poverty measure and found that increasing public social spending as a share of GDP reduces poverty. Olopade et al. (2019) examined the relationship between human capital and poverty in 12 OPEC countries. The study found that education and health expenditures have a negative impact on poverty. Miežienė and Krutulienė (2019) found in their research on 28 EU countries, Caminada et al. (2021), Caminada, Goudswaard and Koster (2012) for 22 OECD countries, Cammeraat (2020) for 22 EU countries, Longford and Nicodemo (2010) for 26 EU countries, Lustig, Pessino and Scott (2014) for 6 South American countries, and Caminada and Goudswaard (2009) for 15 EU countries that social spending reduces poverty.

Çelikay and Gümüş (2017) examined the relationship between education, health, and social security expenditures as a share of Gross Domestic Product (GDP) and poverty rates (at 50% and 60% of median income) for 26 regions in Türkiye from 2004 to 2011. The study found that an increase in the share of social expenditures in GDP reduced poverty

rates (at 50% and 60%). Additionally, it concluded that social spending had a short-term reducing effect on poverty but an increasing effect in the long run.

Keskin (2023) investigated the relationship between education, health, and social security/social assistance expenditures and poverty rates (at 50% and 60% of median income) for 12 regions in Türkiye from 2006 to 2021. The study employed four models and utilized the Seemingly Unrelated Regression (SUR) method. The findings varied across regions and models, but it found that education was more effective in reducing poverty compared to health and social security/social assistance expenditures. In other words, it concluded that education had a stronger impact on poverty reduction. Furthermore, the study identified that social spending increased poverty in some regions.

Dal and Temiz (2023) examined the relationship between social assistance expenditures and poverty rates in Türkiye from 2002 to 2021. They employed the Johansen-Juselius cointegration, Granger causality, and Toda-Yamamoto causality tests. The research identified a long-term unidirectional relationship between social assistance expenditures as a share of GDP and poverty rates.

Beyaz Sipahi (2021) investigated the relationship between education expenditure, health expenditure, income distribution, and poverty in Türkiye from 2002 to 2019. The study employed the Johansen cointegration method. It found a significant and negative long-term relationship between health expenditure, education expenditure, and poverty rates. Çetin (2020) examined the relationship between education and poverty in Türkiye from 2008 to 2018 using regional data and the Ordinary Least Squares (OLS) and Dynamic OLS methods. The study concluded that education contributed to poverty reduction. Sağdıç (2021) examined the relationship between social expenditures and the risk of poverty (at 60%) in 12 regions of Türkiye from 2006 to 2019. The study utilized the Durbin-Hausman panel cointegration and Panel Autoregressive Distributed Lag (ARDL) methods. The findings indicated that social spending had a long-term reducing effect on poverty.

These studies provide valuable insights into the relationship between social expenditures and poverty in Türkiye, highlighting the significance of education, health, and social security/social assistance expenditures in poverty reduction efforts.

3. Data and Methodology

The aim of the study is to analyze the relationship between social expenditures such as education, social security and social assistance and health expenditures and poverty in Turkey. From 2006 to 2021, panel data at the regional level in 12 regions were utilized to achieve this aim. The independent variables in the study are per capita education, social security/social assistance, and health expenditure, while the dependent variable is the poverty rate at 50% and 60% of the median income. The dataset and data sources for the research are presented in the table below

Table 2. Dependent and Independent Variables

Variables	Abbreviations	Source
50% Poverty Rate (Dependent 1)	PR%50	Turkstat
60% Poverty Rate (Dependent 2)	PR%60	Turkstat
Educational services expenditures per capita	ESE	Ministry of Treasury and Finance
Healthcare expenditures per capita	HSE	Ministry of Treasury and Finance
Social security/social assistance sevices expenditures per capita	SSSE	Ministry of Treasury and Finance

The data in the study is presented on an annual basis. The poverty rates (at 50% and 60%) represent the proportion of the population below the median income. The social security/social assistance, health, and service expenditures reflect only the expenditures made by the central government. In this context, the annual nature of the data, the absence of other regional poverty data, and the inclusion of only central government expenditures are the most significant limitations of this study.

3.1. Panel Data Analysis

Panel data analysis allows researchers to obtain more valid and comprehensive results in scientific studies compared to statistical techniques that utilize cross-sectional data, as it employs a more complex research design incorporating both cross-sectional and time-series analyses. Due to its advantages, panel data analysis has become increasingly popular among researchers in various scientific studies in the social sciences. It has become an essential component of quantitative methods and is widely used in disciplines such as economics, business, public administration, political science, finance, and many other social science fields.

A panel data set is a collection of data involving multiple observations of a set number of variables across various entities, such as individuals, households, firms, or cities. Unlike cross-sectional data, which captures observations at a single point in time, and time series data, which tracks variables over a series of periods, panel data combines both dimensions by providing repeated measurements over time for the same set of variables (Hsiao, 2003).

$$Y_{it} = a_{it} + \beta_k X_{it} + u_{it} \qquad i=1,\ldots\ldots,N; \quad t=1,\ldots T \qquad (1)$$

In panel data, the number of cross-sectional units (N) is typically greater than the number of time periods (T) (N > T). Panel data consists of observations on cross-sectional

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units over a specific period of time. In this context, the panel data regression equation can be expressed as follows:

In other words, in the equation mentioned above, Y represents the dependent variable or the variable to be explained, while X represents the explanatory variable(s) in the model. The α in the equation denotes the intercept or the constant term of the model, β represents the slope parameter(s), and u represents the error term. The subscript i in the equation refers to the cross-sectional units (such as countries, cities, or sectors), and the subscript t represents time periods (such as days, months, or years) (Baltagi, 2021).

Classical Pooled Ordinary Least Squares (OLS) Method: The classical panel data regression model assumes that both the intercept and slope parameters do not vary across units and time. In other words, all observed units are homogeneous. If the error terms in the panel data regression model do not incorporate unit and time effects, the classical OLS estimator is a good predictor, and the obtained coefficients are consistent. In the pooled least squares method, the error terms should have constant variance and a mean of zero. The units should be uncorrelated, meaning there should be no correlation among units, and there should be no issue of autocorrelation in the model. If the error terms of the panel data regression include unit and time effects, and these effects are only correlated with the independent variables, the coefficients estimated by the pooled least squares (PLS) are consistent (Yaffee, 2003).

$$Y_{it} = \beta_0 + \sum_{k=1}^{k} X_{kit} + \upsilon_{it} \tag{2}$$

$$Y_{it} = X_{it}\beta + \upsilon_{it} \qquad i = 1,\ldots\ldots\ldots N \qquad t = 1,\ldots\ldots\ldots T \tag{3}$$

Fixed Effects Model: The fixed effects model assumes that the slope coefficients are constant and that the intercept varies across cross-sectional units. This approach implies that the slope parameters are the same for all horizontal units, while the fixed parameters vary from unit to unit. In the fixed effects regression model, the dummy variable approach is used to account for the variation across units, known as the Least Squares Dummy Variable (LSDV) model (Gujarati and Porter, 2014).

In the fixed effects regression model, there are n fixed coefficients, one for each unit. The obtained intercept coefficients can be represented by the indicator variable. The resulting binary variables include all excluded variables that are constant over time while varying from unit to unit (Stock and Watson, 2011).

$$Y_{it} = \beta_1 X_{1,it} \ldots\ldots\ldots \beta_k X_{1,it} + \alpha_i + \ldots\upsilon_{it} \tag{4}$$

The fixed effects regression model can be represented as follows:

$$i = 1,............N \quad t = 1,..............T \tag{5}$$

Random Effects Model: The fixed effects model allows for the inclusion of unobserved individual effects correlated with the included variables. This model can be seen as applied only to the cross-sectional units in the study rather than to additional units outside the sample. A cross-country comparison may include all countries for which the assumption of fixed effects is reasonable. If individual effects are unrelated to the explanatory variables, then it may be appropriate to model individual-specific fixed terms as randomly distributed among the cross-sectional units. In the random effects model, the unit effects are not fixed but random and are included in the error term. If we define the composite error term, the random effects model can be expressed as follows (Wooldridge, 2018: 469; Gujarati, 2016):

$$Y_{it} = \beta_0 + \beta_1 X_{it1} + ...\beta_k X_{itk} + \alpha_i + ...\upsilon_{it} \tag{6}$$

$$\beta_0 = \overline{\beta} + a_i \tag{7}$$

This model is the error terms model and β_0 is the population mean constant parameter a_i is the unit effect error term component.

4. Results

The relationship between per capita education, health, and social security/social assistance expenditure and poverty has been examined. The descriptive statistics of the variables are presented in Table 3.

Table 3. Descriptive statistics

	ESE	HSE	SSSE	PR50	PR60
Mean	0.402378	0.143059	0.521259	11.75349	18.93104
Median	0.392913	0.138808	0.497866	11.60000	18.86000
Maximum	0.891796	0.302028	0.780254	18.90000	26.39000
Minimum	0.150062	0.058507	0.286039	6.930000	13.90000
Std. Dev.	0.132948	0.041387	0.132002	2.058406	2.247924
Skewness	0.820579	0.850680	0.147397	0.331568	0.235581

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Kurtosis	4.207241	4.327811	2.164556	3.458167	3.402029
Jarque-Bera	33.20666	37.26165	6.278967	5.197330	3.068970
Probability	0.000000	0.000000	0.043305	0.074373	0.215567

According to the calculated Jarque-Bera tail probabilities, considering the skewness and kurtosis statistics, it is found that the variables ESE, SSE, and SSSE do not exhibit a normal distribution. On the other hand, the tail probabilities of the PR50 and PR60 variables are greater than 0.05, meaning that they have a normal distribution.

Table 4 presents the model selection hypotheses for the panel data regression models conducted for poverty at 50% and poverty at 60%.

Table 4. Panel Data Model Selection Hypotheses

PR %50			
	Hypotheses	**Statistics**	**P value**
F test	H_0: pooled model is suitable H_1: fixed effects model is suitable	F	0.0000
Hausman Test	H_0: random effects model is suitable H_1: fixed effects model is suitable	chi2	0.0804
Lagrange Multiplier test (LM)	H_0: pooled model is suitable H_1: random effects model is suitable	chibar2	0.0000
PR %60			
	Hypotheses	**Statistics**	**P value**
F test	H_0: pooled model is suitable H_1: fixed effects model is suitable	F	0.0000
Hausman Test	H_0: random effects model is suitable H_1: fixed effects model is suitable	chi2	0.1661
Lagrange Multiplier test (LM)	H_0: pooled model is suitable H_1: random effects model is suitable	chibar2	0.0000

In the analysis, fixed effects, random effects, and Pooled regression methods were applied. F-test, Hausman test, and LM test were used to determine the most suitable model among the three calculated models. The F-test was used to compare the Pooled regression model with the fixed effects model, the Hausman test was used to compare the random effects model with the fixed effects model, and the LM test was used to compare the Pooled and random effects models. The test statistics are presented in Table 4. According

to the results, the random effects model was determined as the most suitable model for both the 50% poverty rate and the 60% poverty rate estimation models. The results of the random effects model are presented in Table 5 and Table 6.

Table 5. Random Effects Model Coefficient Results for %50 PR

PR %50	Coef.	Std. Err.	z	P>|z|
HSE	6.959367	4.311062	1.61	0.106
ESE	-3.911268	1.784605	-2.19	0.028
SSSE	-4.386005	1.567125	-2.80	0.005
C	14.63357	.6824194	21.44	0.000
R^2 0,2355	Prob > chi2=0.0000			

In Table 5, an increase in healthcare expenditures positively affects the 50% poverty rate. In comparison, increased education and social security/social assistance costs negatively impact the 50% poverty rate. A one-unit increase in healthcare expenditures leads to a 6.95% increase in poverty. Additionally, a one-unit increase in education expenditures decreases poverty by -3.9%, while a one-unit increase in social security/social assistance expenditures reduces poverty by -4.38%. The coefficient of healthcare expenditures (P= 0.106) is statistically insignificant, whereas the coefficient of education expenditures (P= 0.028) and social security/social assistance expenditures (P= 0.005) are statistically significant. In other words, the findings suggest that while healthcare expenditures have a positive but statistically insignificant impact, the results for education and social security/social assistance expenditures are negative and statistically significant. The independent variables explain 23.55% of the dependent variable.

Table 6. Random Effects Model Coefficient Results for %60 PR

PR %60	Coef.	Std. Err.	z	P>|z
HSE	7.291788	4.654887	1.57	0.117
ESE	-2.90094	1.946346	-1.49	0.036
SSSE	-5.691779	1.702069	-3.34	0.001
C	22.03768	.7507947	29.35	0.000
R^2 0,2381	Prob > chi2=0.0000			

The result in Table 6 show that an increase in healthcare expenditure positively affects the 60% poverty rate. In comparison, an increase in education expenditure and social

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security/social assistance expenditure negatively affects the 60% poverty rate. A unit increase in healthcare expenditure leads to a 7.29% increase in poverty. On the other hand, a unit increase in education expenditure decreases poverty by -2.9%, and a unit increase in social security/social assistance expenditure decreases poverty by -5.69%. The coefficient for healthcare expenditure (P=0.117) is statistically insignificant, while the coefficients for education expenditure (P=0.036) and social security/social assistance expenditure (P=0.001) are statistically significant. In other words, the findings indicate that while healthcare expenditure has a positive but statistically insignificant impact on poverty, education, and social security/social assistance, expenditures have significant adverse effects on poverty. The independent variables explain 23.81% of the dependent variable.

5. Discussion and Conclusion

Poverty remains one of the most crucial issues that need to be addressed today, and governments, along with numerous voluntary organizations, are combating poverty through various means. Social expenditures are considered to be one of the most effective tools in the fight against poverty. While the government and the private sector carry out social spending, a significant portion of social expenditures is undertaken by the public sector. The most important reason for this is that the responsibilities and opportunities of the state are broader in solving social problems and increasing social welfare.

Poverty, stemming from a lack of welfare, is one of the most significant social problems that must be resolved. Ensuring a more equitable income distribution and reducing or eliminating poverty are crucial reasons why the public sector engages in social spending. Moreover, due to the positive externalities and essential nature of subcomponents of social expenditure, such as healthcare, education, and social security, governments intervene in the market. Certain goods and services the market provides may not be accessible to all consumers, or some goods and services may not be produced in sufficient amounts due to their lack of profitability. Inadequate consumption of these goods or services, such as vaccinations, primary education and healthcare services, social assistance, food, and shelter, can result in problems that impose costs exceeding the production costs of the goods or services. Therefore, the public sector engages in social spending to address potential economic and social issues that may arise from insufficient consumption of specific goods and services. Public production and provision of education, health, and social security services, among the fundamental human rights in national and international conventions, are of great importance in the fight against poverty.

Since the establishment of the Republic of Türkiye, societal welfare has not sufficiently developed due to the unique economic, social, political, and cultural problems of each period. Particularly, the economic, political, and social issues between 1990 and 2002 have significantly contributed to the decline in societal welfare. However, after 2002, the formation of a more stable political and economic structure has led to a substantial increase in the amount of social expenditures. Therefore, it is necessary to investigate the direction of the impact of social expenditures on poverty. This study aims to examine the effect of social expenditures on poverty in Türkiye during the period of 2006-2021. To

achieve this objective, empirical tests have been conducted to explore the relationship between per capita education, healthcare, social security/social assistance expenditures, and poverty rates (%50 and %60) at the regional level.

According to the findings obtained from the empirical part of the study, education and social security/social assistance services expenditures per capita reduce the 50% and 60% poverty rates. Besides, no statistically significant relationship was found between health services expenditures per capita and poverty rates (50% and 60%). The coefficients of the relationship between education and social security/social assistance services expenditures and poverty rates show that social security/social assistance services reduce poverty rates more than education services expenditures. However, the fact that social security/social assistance services expenditures reduce the 60% poverty rate more than the 50% poverty rate can be contributed to the fact that these expenditures do not reach the poorer segments. In this context, increasing social expenditures seems to be a good method for reducing poverty. In societies with high levels of welfare and low levels of poverty, the share of public social expenditures in GDP is above 25%. In Türkiye, this ratio has been between 15-18% in the last ten years. Although the increase in the amount of social expenditures seems to be a good method for combating poverty in Türkiye, it is necessary to determine the target groups for social expenditures correctly and to spend efficiently.

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SUMMER GLACIER SKIING AMID CLIMATE CHANGE: WHAT DOES PRODUCTION TRANSFORMATION MEAN FOR SUSTAINABILITY?

Abstract: This paper examines the impact of climate change on the sustainability of summer glacier skiing (SGS) in Saas-Fee, Switzerland. Summer glacier skiing (SGS) is a niche tourism activity that is particularly vulnerable to climate change. This is evidenced by the notable reductions in snowpack and glacier retreat, which are affecting the viability of SGS. By applying the valuation system framework, the study examines the relationship between the production and consumption systems of SGS and how climate-induced transformations influence sustainability. Methodologically, the research employs a qualitative approach, integrating fieldwork, direct observations, and semi-structured interviews with key stakeholders, including tourism operators, local authorities, and ski athletes. The findings demonstrate that climate change intensifies the scarcity of resources, necessitating augmented investments in infrastructure and modifying consumer behaviour, which in turn affects the economic and environmental sustainability of the activity. Notwithstanding these challenges, the existence of institutional cooperation within Saas-Fee offers the region the opportunity to transition towards more sustainable practices. The paper emphasises the necessity for a comprehensive approach to comprehend and oversee the sustainability of SGS in the context of ongoing climate change.

Keywords: climate change, qualitative research, summer glacier skiing, sustainability, tourism adaptation

LETNIA JAZDA NA NARTACH NA LODOWCU W OBLICZU ZMIAN KLIMATYCZNYCH: CO OZNACZA TRANSFORMACJA PRODUKCJI DLA ZRÓWNOWAŻONEGO ROZWOJU?

Streszczenie (abstrakt): Niniejszy artykuł analizuje wpływ zmian klimatu na zrównoważony rozwój letniej turystyki narciarskiej na lodowcu (SGS) w Saas-Fee w Szwajcarii. Letnia jazda na nartach na lodowcu (SGS) to niszowa działalność turystyczna, która jest szczególnie podatna na zmiany klimatu. Dowodem na to jest znaczne zmniejszenie pokrywy śnieżnej i cofanie się lodowca, które wpływają na rentowność SGS. Stosując ramy systemu wyceny, badanie analizuje związek między systemami produkcji i konsumpcji SGS oraz wpływ transformacji spowodowanych zmianami klimatu na zrównoważony rozwój. Metodologicznie, badanie wykorzystuje podejście jakościowe, integrując badania terenowe, bezpośrednie obserwacje i częściowo ustrukturyzowane wywiady z kluczowymi interesariuszami, w tym operatorami turystycznymi, władzami lokalnymi i sportowcami narciarskimi. Wyniki pokazują, że zmiany klimatyczne nasilają niedobór zasobów, wymagając zwiększonych inwestycji w infrastrukturę i modyfikując zachowania konsumentów, co z kolei wpływa na zrównoważony rozwój gospodarczy i środowiskowy tej działalności. Niezależnie od tych wyzwań, istnienie współpracy instytucjonalnej w Saas-Fee oferuje regionowi możliwość przejścia na bardziej zrównoważone praktyki. Dokument podkreśla konieczność kompleksowego podejścia do zrozumienia i nadzorowania zrównoważonego rozwoju SGS w kontekście zachodzących zmian klimatycznych.

Słowa kluczowe: zmiany klimatyczne, badania jakościowe, letnie narciarstwo na lodowcu, zrównoważony rozwój, adaptacja turystyki

Introduction

Climate change is causing profound transformations in the environment that directly or indirectly affect the tourism sector (Mora et al., 2018). In Europe, impacts include an increase in the intensity and frequency of extreme events, heat waves, sea level rise, and the general retreat of the cryosphere, including permafrost, snow and ice (Steiger et al., 2023). This last element is particularly important for the tourism industry in the Alps, including glacier tourism activities and businesses (Salim, Gauchon, et al., 2021), and the ski industry (Steiger et al., 2019).

In the European Alps, the ski industry is a highly developed, multi-million euros, industry that is clearly important to the local economy, employment and culture. The ski industry relies on the availability of snow and it is now generally accepted that to be economically viable, most of the ski resorts must be able to operate seven seasons out of ten, for at least 100 days, between 1 December and 15 April (Abegg et al., 2020). However, due to the retreat of the cryosphere, the reliability of snow is decreasing, resulting in a reduction of the season length and the quantity of snow accumulated during the winter (Gilaberte-Búrdalo et al., 2014; Spandre et al., 2019). Accordingly, cryosphere depletion is a very serious threat to the European ski industry, as it reduces the substrate for its activities (François et al., 2023).

The ski tourism industry is developing adaptation strategies to face climate risks. These adaptations are mainly based on and aimed at reducing the vulnerability of ski lift

operators to inter-annual variability of snow cover, in particular by rationalising the snow grooming system and, above all, by developing artificial snowmaking (Steiger & Scott, 2020). Although snowmaking as an adaptation strategy can effectively reduce the vulnerability of operators, it can also lead to path-dependency due to the large investment required (Berard-Chenu et al., 2022). Snowmaking also relies on water and energy resources, which can be difficult to access in some areas (Scott et al., 2022). As a result, snowmaking as an adaptation strategy can be considered a maladaptation because of the increased vulnerability it can lead to (Schipper, 2020).

Questions have been raised about the sustainability of the ski industry. Firstly, even with snowmaking, skiing is still vulnerable to climate risks and at the same time increases water and energy demands that can harm the environment (François et al., 2023; Gerbaux et al., 2020). Second, as a development model, ski tourism is based on high-income tourist visits, which means it relies on travel that is often highly carbon-intensive (Salim et al., 2024). The question of how ski tourism-based areas can transform themselves in a sustainable way, for example by diversifying, is therefore an ongoing one. Answering this question requires a holistic approach to the territory and given the economic nature of the activity, an understanding of the production system on which it is based. The effects of climate change being numerous and multifactorial, special attention is required. As a result, it may be necessary to study specific cases of high vulnerability to climate change in order to inform stakeholders about sustainability.

In this context, summer glacier skiing (SGS) is a niche activity of glacier and ski tourism that is highly vulnerable to climate change. SGS consists of skiing on glaciers outside the winter season, from May to November (Mayer & Abegg, 2022). The activity developed around the 1970s, but many SGS areas (three-quarters in Switzerland) had to close before 2000 because of snow conditions (Koenig & Abegg, 1997). In 2023, only seven summer glacier ski areas are still operating in July and August in the Alps. In Switzerland, Saas-Fee and Zermatt are the two remaining SGS resort that are still operating in July and August.

In comparison to traditional winter skiing, SGS is notably vulnerable to climate change elements, such as reduced snowpack and glacier retreat (Graf, 1995; Huss et al., 2021). This can even lead to the closure of the resort during the summer, as happened in 2022 in the Alps (Abegg & Mayer, 2023). But climate change is not the only threat to SGS, as Mayer & Abegg (2022) has shown. Demand is very volatile, related to meteorological factors like thermal comfort (Mayer et al., 2018). As a result, understanding the functioning of SGS's production system is critical to assessing its sustainability, especially as it is threatened and transformed by climate change.

Rooted in regional economics, the production system is an element of a valuation system that allows to understand the relational process between an object, the production and consumption system, and how the process creates value (Jeannerat & Kebir, 2016). As shown in Figure 1, the object (which can be an artefact, knowledge or, in the present case, a glacier) is identified by a set of actors and their means of production. Through this identification process, the actors change their representation of the object set into

a production system in order to create value based on it (Kebir & Crevoisier, 2007). For example, in the context of SGS, the actors create cable cars and ski lifts, and prepare the snow on the glacier in order to create value from it. Conceptually, this means that a production intention is required for an object to become a resource (Kebir, 2016). The third circle in Figure 1 represents the market and how it interacts with the production system to create value. It incorporates the consumer's perspective and logic as it influences the valuation process. The model has been applied mainly in the industrial context (Jeannerat, 2021), but has recently been extended to tourism and the impact of climate change on it (Salim & Kebir, 2024). As it allows to follow the valuation chain from object to consumer from a territorial perspective, the model is relevant to understand the impact of climate change on SGS and its implications for sustainability.
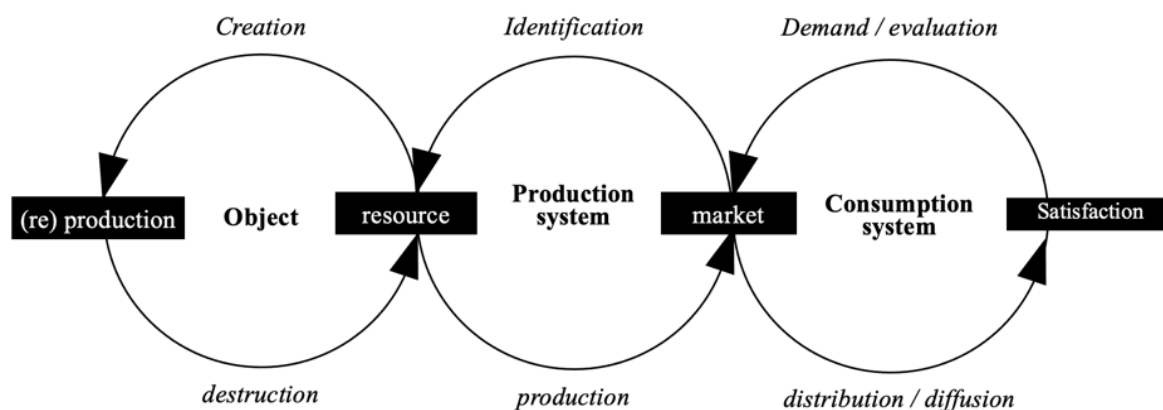
Figure 1. Conceptualisation of the valuation system (modified from Jeannerat & Kebir, 2016)

The aim of this paper is to assess the role of climate change in the transformation of the SGS production system, the way it interacts with the object and consumer system, and the implications it has for sustainability. Accordingly, the research question guiding this work is: how is climate change transforming the SGS production system, and what are the implications for sustainability? Because of the importance of summer glacier skiing for Saas-Fee and its clear vulnerability to climate change, the research was carried out in this destination.

The following sections of the paper present the methodology used to conceptualise summer glacier skiing within the framework of the valuation system (Jeannerat & Kebir, 2016). The paper then describes the production and consumption system of glacier skiing and the impact of climate change on it. It then discusses the implications of the impact of climate change on the sustainability of it using the economic, socio-cultural, institutional and environmental dimensions of sustainability proposed by Asmelash & Kumar (2019).

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Methodology

Selection of the study site

In 2023, Saas-Fee and Zermatt were the only remaining glacier summer ski resorts operating in July and August in Switzerland. Saas-Fee is located in the canton of Valais in Switzerland. The resort operates in winter and summer, with approximately 60% of tourist arrivals during the winter season (November to April; data from the Swiss Federal Office of Statistic). Part of the Saas-Fee ski area is located on the Fee glacier. The activities of the SGS require the use of the cable car and the Alpine metro to reach the Mittelallalin. At this point, ski lifts are operated to allow skiing on the glacier during the summer season (Figure 1). The Fee Glacier, like the other glaciers in Switzerland, is receding rapidly. From 1883 to 2019, Fee glacier lost about 1100 meters in length (GLAMOS-Glacier Monitoring Switzerland, 2019; Figure 1).
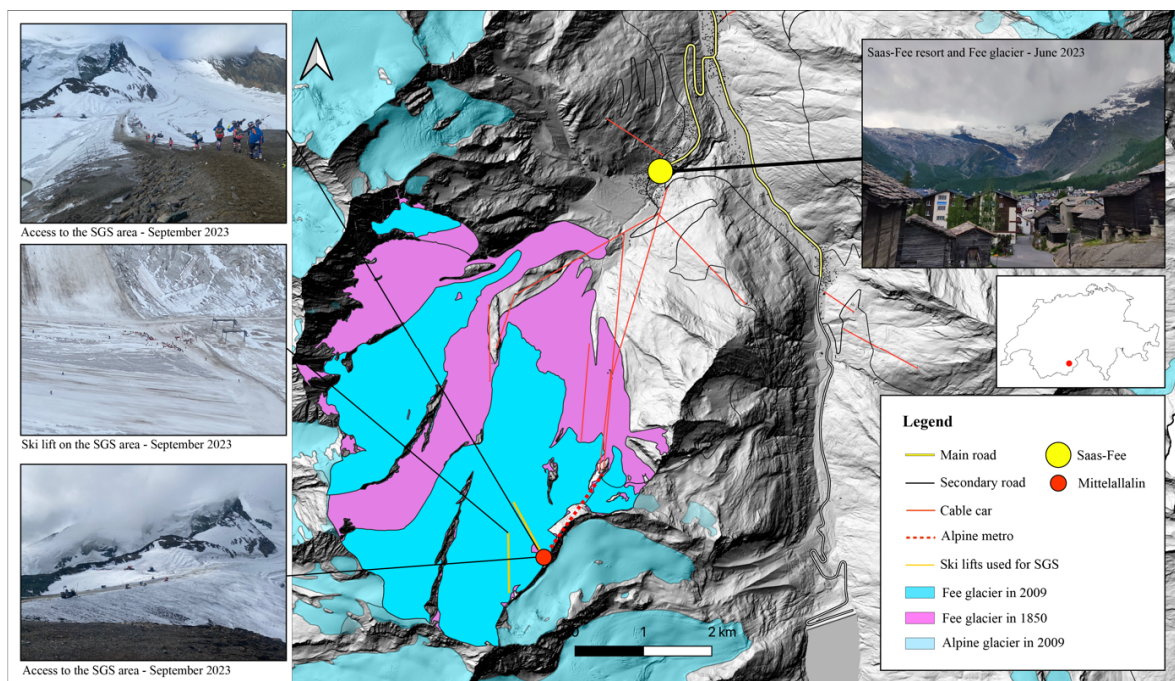
Figure 2. Situation map of Saas-Fee and the SGS area. Glacier extentions are from GLAMOS (2019). Taken photography are from the authors.

Saas-Fee stands out as one of the top SGS destinations in the Alpine region. It is particularly esteemed among various categories of ski athletes, the main customer base. These athletes can be skicross, downhill skiing, and freestyle skiing practitioners. Saas-Fee has become a singular location for ski training activities during the summer months for a number of reasons. Primarily, its glacier is oriented in a northerly direction and situated at a relatively high altitude (the summit elevation of the ski area is approximately 3,500 m a.s.l.). Furthermore, Saas-Fee is able to draw on a diverse range of expertise and infrastructure to cater to the needs of skiers. This is partly due to the destination's dual identity, which primarily positions it as a winter ski resort, and allows for the development of the necessary infrastructure to serve as a summer training base for ski athletes. In

comparison to regular winter skiing, SGS clientele is mostly composed of ski athletes (more than 90%, according to the destination manager). The presence of the later for the training purposes, the potential vulnerability of SGS activities to warming climatic conditions carries significant ramifications for the destination's summer-related viability. The local hospitality and tourism infrastructure have been meticulously tailored to accommodate the needs of SGS athletes, featuring dedicated off-snow training facilities and ski workshops. Moreover, the incorporation of SGS into a four-season strategy offers local stakeholders a reliable source of income. However, alternative tourist and recreational activities during the summer months are relatively scarce, which highlights the reliance of the destination's economic vitality on the continuity of SGS activities. In this context, Saas-Fee has been selected as a case study to examine the vulnerability and adaptation of SGS to climate change.

Methodological approach

This research adopted a qualitative approach. The qualitative data acquisition process included three modes of collection: (1) exploratory phase, characterised by direct observations and informal interviews with stakeholders, (2) semi-structured interviews (N=20), conducted with stakeholders from the tourism sector and embedded in the valuation of the SGS activity (N=6), ski athletes representing the main customers of the SGS in Saas-Fee (N=14), and (3) a workshop bringing together researchers and stakeholders (N=7) to present and validate the first results. The local stakeholders comprised two representatives of the cable car company, two hoteliers hosting SGS athletes, a former president of the community, and a representative of the tourism office. On the consumption side, our focus was directed towards ski athletes, which encompassed both snowboarders and skiers, while recreational skiers were excluded from the interview pool due to their limited presence within the study context. The interviews were conducted during summer and autumn 2023. All interviews with the local stakeholders took place within the destination; and the interviews comprising ski athletes were conducted in Valais, Haute-Savoie and through video conferencing. All these interviews were recorded with the participants' agreement and were transcribed for analysis using NVivo. The interviews lasted between 1 and 2 hours.

Once these semi-structured interviews were conducted and analysed, a first draft with results was presented and discussed with local stakeholders from Saas-Fee in December 2023. A hotelier along with both a former and a current representative of the cable car company were invited to discuss the results with the research team during the workshop. This workshop functioned as a crucial step in the validation process of the accrued data. Through active engagement with these stakeholders, potential ambiguities were mitigated, and findings underwent further elucidation and refinement.

Results

Summer glacier ski valuation system

Compared to other tourist destinations in the Alps, Saas-Fee was relatively late in developing tourism structures, especially summer-related recreational activities. The first ski-lift company was founded in 1948, and this can be viewed as an inaugural phase of an ongoing ski-tourism oriented development. Hotels were built, services developed (ski rental, accommodation, restaurants and snacks in the resort and on the ski slopes, ski schools, etc.) constituting the production system that gave value to the snow as an object. Nowadays in Saas-Fee, there are strong interconnections between the main stakeholders in local tourism. For example, Saastal Bergbahnen AG, which operates the ski lifts, holds shares in Saastal Tourismus, the tourist office in Saas-Fee. The public authorities of Saas-Fee also hold shares in both entities. Cooperation between these actors is guided by a destination strategy (Destinations Strategy 2020-2025), which outlines strategic directions, key areas of activity and the overall strategy. Seven stakeholders are driving the development of this strategy: Saastal Bergbahnen AG, Bergbahnen Hohsaas AG, the four Saas Valley municipalities (Saas-Fee, Saas-Grund, Saas-Almagell and Saas-Balen) and Saas Valley Tourism, which also represents the hotel and accommodation sector.

The glacier as an object was considered valuable by the cableway company in the eighties. In 1984, in order to allow access to the glacier, the cableway company built the "Alpine Metro", which allowed the glacier to be used for summer skiing. The analysis of the production system shows that two objects are valued by it: the glacier and the snow.

The valuation of glaciers has changed from the 1980 to the present day. In the first place, the glacier and summer glacier skiing as an activity was promoted as a leisure and touristic activity. Its promotion has gradually transformed from leisure-oriented public to sport- and training-oriented public. Nowadays, the consumption system is mainly composed of Swiss and international sports teams that come to the glacier during the summer to train for competitions. As a result, the Fee Glacier has become a training ground for many Worlds Cup, European Cup, and junior teams. Different facilities have been built to accommodate different disciplines, including alpine skiing, ski cross and freestyle. For freestyle, a company specialising in snowpark construction came to Saas-Fee to set up, in 2006, the first ever "pre-season" training facility for freestyle athletes.

Climate change impact on the valuation system

The dynamics of glacier and snowpack are profoundly impacted by the consequences of climate change, and these two cryospheric components are the basic object put into resource for SGS. According to the interviews, the retreat of glaciers causes both a reduction in height and an increase in the number of crevasses. The reduction in height provokes instability in the infrastructures, which undermines the production system. As an illustration, some ski lift pylons are built directly into the ice. Changes in the glacier morphology lead to the destabilisation of these pylons, which requires more maintenance, increased operating costs. Sometimes this destabilisation can lead to the closure of the ski

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facilities. The reduction in height also makes access to the slopes more difficult, meaning that skiers have to walk further to reach the slopes. At the same time, the proliferation of crevasses rises safety concerns and escalates maintenance costs for ski lift operators. In a broader context, glacier retreat reduces the space allocated for skiing. Furthermore, climate change is also increasing snow anomalies, with two main consequences: a diminution in snow reliability and a drop in snow quality. Reduced snowfall and more frequent rainy days during the summer mean that less space is available for skiing due to insufficient snow conditions. Changes in snowfall patterns also lower the quality of snow for skiing, leading to poor conditions for competition, training or, more generally, an increased risk of injury during practice.

These changes in the object (the glacier) which affect directly ski lift operators, have not only cascading effects on the entire production system, but influence the consumption system too. These direct effects of climate change on the glacier increase the risk of closure, as happened in the summer of 2022. Hence customers, predominantly ski athletes interested in on-snow training, are confronted with increased uncertainty. According to interviews with professional skiers and coaches who used to train in Saas-Fee, this uncertainty about skiing conditions and the access to skiing facilities has led them to plan their training more flexible or to change their training venue altogether; sometimes opting for more remote ski resorts in the southern hemisphere or indoor skiing facilities.

Consequently, the hospitality sector has to deal with the increased flexibility of ski teams who plan their trip closer to the date of arrival and sometimes cancel at the last minute due to poor skiing conditions. On the other hand, the uncertainty of snow and glacier conditions affect the destination image as well, whereby the destination management adopts and promotes more diverse touristic activities.

As a result, changes in the glacier and snow conditions due to climate change have a direct impact on the infrastructure on the glacier, mainly affecting one stakeholder in the production system, namely the cable car company. Changes felt by this stakeholder directly determine the consumption system, thereby changing the demand of SGS. At one level, changes in the production system transform the consumption system. At another level, changes in the consumption system affect the other stakeholders within the production system, as shown by shifted demand behaviour related to hospitality.

Discussion

With reference to the aforementioned valuation system, the primary finding of our research reveals that environmental changes cause profound transformations in one part of the production system (the local cable car company); these changes, then, directly alter the consumption system (skiers); thereby exerting effects on the rest of the production system (the local hospitality industry). These dynamics prompt inquiries into sustainability of the activity and the way it is managed by destination stakeholders.

The impact of changes of the valuation system on the sustainability of the destination in terms of economic, social and environmental dimensions needs to be examined (WTO, 2024). In their paper, Asmelash & Kumar (2019) set out indicators to measure progress on

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sustainability. Rather than the three traditional dimensions of sustainability, Asmelash & Kumar's (2019) assessment is divided into four dimensions: economic sustainability, socio-cultural sustainability, institutional sustainability and environmental sustainability.

Economic sustainability

The effects of climate change on mountain areas are challenging the economic sustainability of SGS in Saas-Fee. Even if summer skiing represent 40 to 50 per cent of the incomes of the cable car company during summer[1], the economic viability of the system is challenged by several aspects: firstly, the increased maintenance requirements for the cable car operators increase their costs, leading them to increase the price of the ski ticket and, during the high season, to restrict access to the ski facilities for sports club and professional skiers, increasing prices and restrictions. Coupled with the uncertainty of the availability of the glacier for training, this has an impact on the decision of sports teams to choose Saas-Fee for training. Nowadays and according to the interview, top athletes (national teams) often choose to move to the southern hemisphere in order to find better training conditions than in Saas-Fee. This means that clients with more financial means are going elsewhere, while predominately regional teams with less means are staying in Saas-Fee at a time when prices are rising.

This situation is different from other glacier tourism sites. In the Alps, for example, Salim, Ravanel, et al. (2021) show that environmental changes also lead tourism stakeholders to increase maintenance and labour, thereby increasing their costs. In these cases, however, projects are developed with a logic of upgrading in order to attract more international tourists (Salim, Girault, et al., 2023). In terms of value production, the glacier as an object leads the production system in a dynamic of scarcity (Kebir, 2006) that is not yet compensated by the operators.

Socio-cultural sustainability

Socio-cultural sustainability can be seen at the visitor satisfaction levels (Asmelash & Kumar, 2019). According to our results, the customers of the SGS activity in Saas-Fee are mainly professional or sport team members. On the one hand, due to glacier retreat and reduced snowfall, the spring and summer activity does not meet their requirements in terms of slope quality, availability and safety. The main challenge is related to the uncertainty of the opening of the slopes in summer. As professional skiers have to train before the first competition in October, this situation leads them to substitute Saas-Fee as a training facility for indoor slopes or destinations in the southern hemisphere.

In this sense, the socio-cultural sustainability of SGS in Saas-Fee is questionable, as it does not fully meet visitor expectations in terms of slope conditions and availability for training. However, the glacier landscape is also a vehicle for cultural and environmental learning (Weber et al., 2019). In other words, based on our findings, training on a glacier that is clearly affected by climate change is also a way for skiers to reflect on the

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[1] Data provide by Saastal Bergbahnen, 2023.

consequences of climate change. A reflection that is discussed in order to promote pro-environmental, low-carbon, as well as sustainable behaviours (Lv et al., 2023; Salim, Ravanel, et al., 2023).

Institutional sustainability

Analysing institutional sustainability, that is local oriented control policy, political participation, local planning policy and political support (Asmelash & Kumar, 2019), for Saas-Fee, it is essential to differentiate between two different community systems: the municipality and the *Bourgeoisie* (citizen's community). The former administers municipal affairs such as education and infrastructure maintenance, while the latter refers to individuals with deep-seated ties to the community, often inherited through birthright as *Bourgeoisie* citizens[2]. The cable car companies involve stakeholders from the *Bourgeoisie*, who possess shares historically allocated to long-established locals. The same goes for the local tourism office that coordinates the communication and marketing of the operators. Relations with the hotel and catering industry have made it possible to define a joint strategy, which has proven to be more resilient in times of crisis. These dynamics underscore the agency afforded to locally rotted individuals, enabling them to manage rural resources reflecting local oriented control policy.

Nevertheless, such a system is vulnerable to changes in competitive economic dynamics and has let the cable car company to a precarious financial state. Over the past decade, the primary shareholder has undergone multiple changes in ownership. Consequently, the direction of the production system is largely dictated by the agenda of these main shareholders, today a foreign entity. Secondly, the representation of the *Bourgeoisie* only encapsulates a segment of the local population, neglecting individuals in the decision process who have relocated to Saas-Fee. Such a dynamic is incongruent with locally oriented political control.

Environmental sustainability

Even with measures to mitigate glacier retreat (e.g., Clouse, 2022), it is now clear that glaciers will continue to shrink, even years after we reach net-zero targets (Rounce et al., 2023). In this sense, and considering the Fee Glacier, it seems improbable to continue summer glacier skiing in the future. This fact is already acknowledged by the various stakeholders encountered during the interviews, who thought that this specific activity will continue for a maximum of ten years. From a regional economic angle, this situation acknowledges the fact that the production system of summer glacier skiing is facing a situation of scarcity, which should lead to a change in the valuation system.

Environmental sustainability can also be seen within the context of the overall operations carried out by the cableway company on the slopes during the summer and winter seasons. In this case, snowmaking and the maintenance of the ice cave for tourist

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[2] The term "*bourgeoisie*" is used to describe a local authority in which the original inhabitants of the commune participate, as opposed to new inhabitants.

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visits require the covering of snow with a blanket, which can have adverse effects on the dispersal of microplastics (Ambrosini et al., 2019). The degradation of the permafrost also has an impact on the stability of certain slopes and structures, which will become more important in the future (Schrott et al., 2024).

Conclusion

Summer glacier skiing is an activity that is particularly affected by climate change and cryosphere depletion. From a regional economic perspective, the glacier and the snow can be considered as two objects that are processed into a resource by a production system consisting of the ski lift operator and the other actors of the destination, namely the hospitality sector, the tourist office, etc. This production system allows sports teams and ski professionals, conceptualised as the consumption system, to practice summer skiing in Saas-Fee. In this context, this paper shows that climate change induces a resource scarcity dynamic, which leads the production system to increase the means needed to guarantee the activity. On the one hand, changes in the object affect the production system. On the other hand, changes in the object and in the production system influence the consumption system, which increases substitution behaviour and creates a feedback loop in influencing the production system.

The changes in the valuation system caused by climate change raised concerns about the sustainability of the activity. On the one hand, in terms of environmental sustainability, the projection of glacier retreat in the future led to the hypothesis that summer glacier skiing would not be able to continue in the future. Meanwhile, the current retreat requires investment from the cable car company to increase maintenance, and this investment, together with changes in customer behaviour due to dissatisfaction, reduces economic sustainability. On the other hand, the cultural and ecological value of the glacial landscape increases socio-cultural sustainability. In Saas-Fee, the cooperation between the actors that make up the production system is an aspect that increases institutional sustainability.

Overall, climate change impacts on the production and consumption systems of summer skiing in Saas-Fee reducing the sustainability of the valuation system. However, the institutional organisation of the destination gives the opportunity to the system to transition away from this activity and to develop new resources based on the territory and complying with sustainability.

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SUSTAINABLE DEVELOPMENT: A GLOBAL WORRY

Abstract: Sustainable development is a critically important and complex issue being addressed on a global scale. While the international community recognizes its significance, reaching a consensus on the necessary course of action remains a challenge. Extensive consultations have taken place, yet concrete measures to address pressing environmental concerns, such as the impact of global warming and climate change, still need to be included. Notably, global institutions, including the United Nations, have prioritized sustainable development on the international agenda, but conclusive strides toward mitigating these challenges still need to be made.

Keywords: sustainable development, progress, order, United Nations, States, ecology, environment, engagement

ZRÓWNOWAŻONY ROZWÓJ: GLOBALNY PROBLEM

Streszczenie (abstrakt): Zrównoważony rozwój to niezwykle ważny i złożony problem, którym zajmuje się społeczność międzynarodowa. Podczas gdy społeczność międzynarodowa uznaje jego znaczenie, osiągnięcie konsensusu w sprawie niezbędnego kierunku działań pozostaje wyzwaniem. Odbyły się szerokie konsultacje, ale nadal należy uwzględnić konkretne środki mające na celu rozwiązanie pilnych problemów środowiskowych, takich jak wpływ globalnego ocieplenia i zmiany klimatu. Co ciekawe, instytucje globalne, w tym Organizacja Narodów Zjednoczonych, nadały priorytet zrównoważonemu rozwojowi na arenie międzynarodowej, ale nadal należy poczynić zdecydowane kroki w celu złagodzenia tych wyzwań.

Słowa kluczowe: zrównoważony rozwój, postęp, porządek, Organizacja Narodów Zjednoczonych, państwa, ekologia, środowisko, zaangażowanie

The global interconnectedness of human activities necessitates an examination of the far-reaching impact of current trends. Simultaneously, it is imperative to recognise how these trends are influenced by the behaviours of the world's eight billion or so inhabitants. These behaviours are shaped by the political, economic, and social institutions individuals operate within. Sustainable development is a social endeavour that envisions the future, necessitating changes in our actions to chart new courses. It is reasonable to assert that addressing our challenges requires collective efforts from all societal stakeholders at every decision-making level (Yigit, 2024a). While cultural diversity and the autonomy of human communities are fundamental to sustainable development, fostering a unified vision capable of orchestrating collective efforts for tangible outcomes is imperative.

Nevertheless, complexities arise in navigating the multitude of initiatives purporting to promote sustainable development, often from disparate actors and guided by divergent, sometimes conflicting, motivations (Yigit, 2023a). How do people effectively steer toward their intended course when an overarching consensus on the vision is lacking? While no one claims to have definitive answers to these intricate questions, one proposal can be to engage in a reflective process responsive to the complex and pressing challenges that must be addressed. The need for a shared vision in this context cannot be overstated.

In order to facilitate the successful implementation of sustainable development, several key facets must be considered: Firstly, a comprehensive understanding of the system's functionality is essential. This necessitates integrating scientific insights into collective knowledge and proficient comprehension of the operational dynamics of political, social, and economic institutions.

The second imperative is articulating a shared vision, underscoring the significance of democratic deliberation. Nevertheless, the realisation of this vision is liable to remain uncertain, particularly within a context where control is elusive, and influence is the best-case scenario. Engaging in reflective discourse concerning the foundational principles and values that steer society's envisaged future is crucial. This obligation must be unrestricted within the discourse of sustainable development.

A third vital step involves formulating precise guidelines encompassing targeted objectives and indicators. Subsequently, action must be taken at varied hierarchical strata, with numerous initiatives underway at multiple levels.

Finally, the indispensable culminating point is the provision and optimisation of the resources necessary for action-taking, amending established methodologies, monitoring the outcomes of these adjustments, and modifying approaches accordingly.

The objective is to outline the options for facilitating the transition towards sustainable development. This involves engaging diverse stakeholders and implementing interventions at various levels (Beck et al., 2023).

Sustainability issues, such as climate change, resource depletion, and social inequality, are extremely complex. They impact all aspects of human societies. The science of complexity can significantly contribute to our understanding of these intricate issues, emphasising the need for cautious application of methods and principles derived from the natural sciences in addressing social matters (Sigahi et al., 2023).

Complex systems are defined by non-linear interactions among multiple actors or autonomous entities within a network structure, and they exist as open systems. These systems give rise to new emergent properties that transcend the mere summation of individual components' properties, exhibiting behaviours and properties not inherent in their constituent parts (Yiğit, 2023b). Consequently, they defy reductionism, rendering it impossible to ascribe their explanation to limited, defined causes (Ruggerio, 2021). Furthermore, the evolution of complex systems eludes precise anticipation, precluding control and definitive knowledge of intervention outcomes within these systems.

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Amidst this complexity, the principles of adaptation and self-organisation guide the evolution of complex systems, offering a beacon of hope. These principles can serve as a compass, illuminating effective action strategies in this intricate landscape. Striving for adaptability, fostering mechanisms to address unforeseen circumstances, and upholding the autonomy of actors are touted as the most promising strategies in navigating this complex terrain.

Sustainable development is not a static endpoint but a dynamic process of continuous progress. It is a response to the complexity of our world, requiring flexibility for adaptation and self-organisation. The idea of progress, now widely accepted in modern society, was not present in pre-modern societies, such as medieval Western societies (Japee, & Oza, 2021). This concept now guides our approach to sustainable development. The interplay between cooperation and competition and the integration of science into decision-making are clear examples of the complexity we face in pursuing sustainable development.

Assuming that each society may define this advancement as deemed appropriate based on their specificities, questions remain regarding the means at the disposal of each society to attain it. Whether it pertains to fertile land, energy sources, access to maritime or land transport routes, technology, or knowledge, these resources are not uniformly distributed across societies and nations, nor within individual national units. In our increasingly globalised world, typified by deepening interdependencies among global economies and societies, financial transfers alone are inadequate to rectify such disparities; addressing their origins becomes imperative (Hoang, Nguyen & Le, 2022). Resolving certain quandaries inevitably relies on the actions of others, necessitating consideration of each party's objectives, actions, and limitations, thus underscoring the need for cooperation. The realisation that cooperation is fundamental to societal progress underpins establishing international organisations, functioning as platforms for crafting a vision of progress and as mechanisms for fostering it.

Nevertheless, member countries of international organisations underscore that their foremost responsibility lies in improving conditions for their citizens (Yigit, 2024b). Secondarily, this enhancement rests on maximising available opportunities, encompassing resources within their territorial boundaries and those obtainable through trade, production, and investment mechanisms elsewhere.

Options

The concept of transcendent order is typically found in myths or religious beliefs rather than in a vision of an attainable future. Globally, progress often hinges on competition among nations for resource access. The coexisting notions of cooperation to improve the quality of life for all humanity and competition to enhance the quality of life for specific national populations present a multifaceted challenge. While the underlying principles and values often conflict, most development strategies seek to strike a middle ground without acknowledging this inherent conflict. This paradox is a significant feature of the contemporary world, where the pursuit of cooperation must grapple with the imperative of competition.

Two options are available when selecting a path forward, each with distinct advantages and limitations. One approach involves crafting a unified future vision that aligns with consistent principles to galvanise collective action. However, realising this objective today is challenging, and desirable and feasible actions may be postponed. Nevertheless, it offers the advantage of establishing criteria and guidelines for assessing the many unforeseen consequences of actions.

The second option involves seeking a compromise on specific actions and the means to execute them before a consensus on the overarching vision and values to be embraced. This alternative, characterised by pragmatism, facilitates the attainment of results provided that agreement on precise objectives is reached. It allows for the transcendence of overly vague perspectives, such as the concept of a universally improved world, without becoming entangled in pursuing a theoretical equilibrium between conflicting principles of action. While this approach favours the adoption of "win-win" means, assessing their potential consequences proves to be a challenge in the absence of a broader reference framework to gauge the benefits, risks, and long-term ramifications compared to other potential means. Consequently, the only relevant yardsticks in such instances become the negotiating capacity and power dynamics among the involved parties.

When considering the intricacy of the current landscape in anticipation of shaping a favourable future, the role of our relationship with scientific knowledge must be duly acknowledged (Stein et al., 2023). As previously indicated, the challenges we face often transcend individual perceptual limitations, necessitating a reliance on scientific knowledge to comprehend their nature and associated risks. The abundance of information must consistently translate into actionable knowledge suitable for decision-making. Presently, one can argue that "cognitive overload" is taking place – an excess of information devoid of the necessary abstraction mechanisms to translate it into new knowledge (Bergeron-Guyard et al., 2014). Therefore, expanding knowledge only leads to improved understanding if one can decode, interpret, and assimilate this information into individual and collective knowledge and skills.

This presents a significant challenge within our interconnected society, particularly within the context of education. The dual role of science, both as a critical means of assessing problems and as a crucible for individual and collective decision-making, constitutes a pivotal element for analysing current trends and potential opportunities (Allen, Metternicht & Wiedmann, 2021).

Pragmatic Targeting

Sustainable development entails delivering results and elucidating the pragmatic approach embraced in the Millennium Development Goals (MDG) strategy. Unveiled at the Millennium Summit in 2000, these eight objectives were designed to address the fundamental needs of the most marginalised populations. They delineated targets to be attained by 2015: income, employment, education, nutrition, gender equality, infant mortality, maternal health, disease prevention, environmental sustainability, and global cooperation (Stanujkic et al., 2020). By fostering resource mobilisation, notably through

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public-private partnerships, the formulation of specific and measurable targets served as a conduit to concentrate efforts on resolving tangible challenges within a constrained timeframe.

Considering the magnitude of the predicaments, this accord on a minimum achievement threshold may necessitate reassessment. The conclusive evaluation in 2015 evidenced tangible progress in attaining certain objectives, particularly the widespread provision of AIDS treatment, advancements in agricultural productivity, augmented school enrolment rates, and enhanced access to water and sanitation services. Despite enduring significant disparities among nations and at the domestic level, these favourable outcomes, pinpointed during interim appraisals, positioned this strategy as an exemplar to emulate at the Rio+20 Summit in 2012 (Sachs, 2020). This blueprint was embraced to steer collective endeavours toward sustainable development. Subsequently, in 2013, an expert panel was commissioned to identify themes and propose Sustainable Development Goals (SDGs), accompanied by targets and indicators, for submission to the United Nations General Assembly. The objective was to integrate the MDGs and SDGs, guiding global actions beyond 2015.

The working group examined the principles delineated in the Rio Declaration, particularly the principle of common but differentiated responsibilities (Fraisl et al., 2020). The anticipated targets were required to be action-oriented, succinct, easily communicable, limited in number, globally formulated, and universally applicable while considering national realities about capacities, levels of development, and national policies and priorities. Subsequently, the group delineated areas for intervention that are consistent with the MDGs and introduced novel domains, including energy, industrialisation, infrastructure, sustainable cities and human settlements, production and sustainable consumption, climate, ecosystems and biodiversity, marine resources, seas and oceans, and peaceful societies and competent institutions. Furthermore, the group analysed these domains' interrelationships to prioritise actions that concurrently benefit multiple areas. The process engaged additional national representatives, experts from various countries and United Nations programs and agencies, and representatives of the nine major civil society groups.

National and sectoral consultations were conducted during 2013 and 2014, while an online survey solicited input from global citizens to select six themes from 16 options. This comprehensive effort culminated in formulating the 2015-2030 development agenda, encompassing 17 Sustainable Development Goals and 169 targets (Yigit, 2024c). This agenda was collectively endorsed on September 25, 2015, by the 193 member countries of the United Nations and was greeted with a standing ovation from the assembled delegations. UN Secretary-General Ban Ki-moon praised it as a universal, integrated and transformative vision for a better world (Tomuschat, 2021). Notably more participatory than the MDGs in its formulation, this emergent program is also more expansive as it addresses environmental, social, and economic challenges. It embodies the desire of states to uphold multilateral cooperation and pursue collective solutions, a significant aspiration amidst enduring crises and tensions. While laudable, this aspiration must be realised

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through tangible actions. Establishing precise indicators for each target constitutes a critical stride toward executing this ambition.

Implementing the SDGs should pique the interest of all nations, not solely those considered the most financially deprived. The assertion that all countries are in a state of "development", regardless of their economic standing, underscores the universal importance of these objectives (Nussbaum, 2021). Therefore, every nation needs to address the task of ensuring a decent quality of life for all its inhabitants, particularly in a sustainable manner. Notably, the obligation to achieve these goals involves more than just national governments, limited civil servants, and international experts. Rather, it extends to encompass all citizens and civil organisations. These entities should endeavour to exert influence on their respective governments to ensure compliance with their commitments. This encompasses both financial support for international programs and the incorporation of these objectives and their corresponding indicators within the framework of each country or region. Such collective action presents an opportunity to foster improved coherence across different levels of decision-making and among the endeavours of all stakeholders, both individual and collective, which can contribute to forming an all-encompassing vision for the future.

How Happy?

Since its inception, economics has been linked to the concept of societal progress and the pursuit of the well-being of the masses. Adam Smith, recognised as the progenitor of modern economics, was predominantly acknowledged for his scholarly contributions to moral philosophy during his lifetime (Smith, 2010). Societal progress and development are assessed and benchmarked using economic metrics, with most governments shaping their policies around such indicators, often focusing on economic growth as the primary yardstick. Although historical circumstances have necessitated a predominant focus on material sustenance for most of humanity, advancements in management methodologies and technologies have enabled an increasing segment of the populace to transcend mere subsistence. This realisation has prompted the emergence of novel methodologies for analysing societies and steering their advancement.

The SDG strategy builds upon the UNDP's series of human development reports. These reports are designed to collate and compare data from diverse nations to inform discussions on development policies. The indicator model is widely utilised due to its dual functionality. It allows for the collective articulation of the vision for the desired future and quantifies the contribution of specific actions towards its realisation. The Human Development Index (HDI) emerged from the collaboration of a team of economists commissioned by the UNDP in the 1990s, featuring the notable involvement of Nobel Prize laureate Amartya Sen (Sen, 2000). This initiative was a notable response to the mounting critiques of the conventional focus on economic growth as the sole measure of development, typically quantified solely by gross domestic product (GDP).

Since the 1990s, the UNDP has consistently produced reports leveraging the HDI, encompassing per capita income measurements, life expectancy at birth, school enrolment

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rates, individual freedom, and national income. Consequently, the HDI underscores the notion that the quality of life is contingent upon factors beyond the direct implications of economic expansion within a nation. By accentuating the significance of infrastructure and public services like healthcare and education, alongside the role of public institutions in effecting tangible enhancements in the quality of life within a given nation, this index presents a more intricate and multifaceted perspective of development, in contrast to one that merely equates it with GDP growth. Nearly twenty-five years of methodological refinement and adaptations to encompass various contributing elements have underscored the HDI's capacity to showcase that progress and development invariably transcend economic growth.

Sen's work presents alternative solutions to the conventional definition of fundamental and universal needs. Instead, Sen advocates for a diverse range of conditions that he deems essential for the complete realisation of individuals within society. These conditions, termed "capabilities," serve as domains of freedom that enable the development of human potential (Sen, 2013). Integral examples of such capabilities encompass health, education, and political participation. Sen refrains from positing an exhaustive and definitive list, thus allowing each nation the autonomy to establish its priorities.

An elaboration of this approach provides a more comprehensive inventory and a minimal benchmark of conditions requisite for social justice, thereby delineating the essence of global development. This delineation entails endowing all individuals with a gratifying and inventive life, facilitating actualising their potential within an existence imbued with significance, dignity, and impartiality. Should the endeavour of formulating the SDGs constitute a pivotal element in establishing this minimal threshold and rallying collective global endeavours, the prospective monitoring mechanisms of the SDGs are poised to enable individual nations to discern their priorities and tailor indicators to suit their respective social and cultural milieus.

The discipline of national accounting is undergoing significant evolution in response to the limitations of relying solely on GDP as an economic indicator. This evolution is rooted in the System of National Accounts, a statistical framework endorsed by major international organisations such as the United Nations, the Organization for Economic Cooperation and Development, and the World Bank. Its purpose is to monitor and analyse the global economy to inform decision-making. In 2012, the international community adopted a new statistical reference, the System of Environmental and Economic Accounting (SEEA), to complement rather than replace the existing framework system (Mamii & Khomenko, 2009). Its primary objective is to provide clear, concise, and coherent statistics and indicators to elucidate the complex interrelationships between the economy, the environment, and society. Notable SEEA indicators encompass the rate of industry exploitation of natural resources, atmospheric emissions, and water use.

A pioneering feature of the SEEA is its integration of environmental and economic statistics, leveraging readily available data from most nations. This integrated statistical information facilitates comprehensive analyses and equips decision-makers with the tools necessary to develop more effective policies. Collecting data and generating reliable,

comparable analyses to adequately assess progress towards the SDGs presents a considerable challenge, often called the "data revolution." (Allen et al., 2021).

Alternative measures such as Gross National Happiness (GNH) are gaining prominence in assessing societal progress. GNH represents a tool designed to gauge the quality of life and social progress holistically and human-centrically, distinct from the traditional GDP approach (Ugyel, Givel & Chophel, 2024). Bhutan has officially adopted this novel indicator, establishing a GNH commission responsible for evaluating policy decisions and allocating resources accordingly.

Alternative viewpoints offer a fresh perspective on progress, considering individual aspirations beyond consumerism and the market. They articulate principles and values that can be transformed into goals or serve as criteria for evaluating strategies. A potential articulation of these principles includes:

• Reevaluating the role of economic growth in the conception of societal progress;

• Embracing diversity;

• Prioritising the interconnected components of progress while respecting the earth's biogeochemical limits and determining the relationships between the ecosystem, social, cultural, and economic dimensions of progress accordingly.

These principles embody the values of freedom, responsibility, solidarity, and transcendence, recognising a human dimension beyond material needs. They allow us to appreciate the diversity of values that underpin concepts of progress and development objectives. One must understand that more does not necessarily equate to better. Furthermore, focusing on ecological economics one may argue that transitioning to an "economy in society in nature" requires three fundamental changes:

i. Embracing a worldview that acknowledges our existence on a finite planet and that well-being relies on more than material consumption;

ii. Replacing the current pursuit of unlimited growth with objectives focused on material sufficiency, fair distribution, and sustainable human well-being;

iii. Completely redefining the global economy to safeguard natural systems crucial for life and well-being while balancing natural, social, human, and built capital.

Action

Communities and organisations worldwide are increasingly committing to sustainable development. While some are influenced by public pressure or the demands of their customers, others are genuinely dedicated to making a positive environmental impact. From responding to regulations and employee demands to enhancing their public image, various initiatives are driving sustainable development.

The International Council for Local Environmental Initiatives (ICLEI) is a global association of cities and local governments focused on implementing sustainable development (Betsill & Bulkeley, 2021). Established in 1990, the association unites over 1,000 towns and villages from 86 countries. Its objective is to promote local action for global sustainability and aid cities in becoming sustainable, resilient, and resource-efficient

while promoting biodiversity and reducing greenhouse gas emissions. ICLEI is also pivotal in developing smart infrastructure and creating inclusive and green urban economies to foster healthy and happy communities. The organisation provides training and networking opportunities for elected officials and mayors, shares resources and experiences, leads campaigns, and finds solutions to support the implementation of sustainable practices. For instance, ICLEI-Europe has designed an integrated and cyclical sustainability management tool for local governments to help them attain sustainability goals and fulfil their commitments.

Hosting green, sustainable, and responsible events is a powerful way for organisations to demonstrate their environmental and social responsibility commitment. By following comprehensive guides on sustainable development, relating to brands and eco-responsible pharmacy, businesses can make a significant impact (Mufson, 2022). Alongside this, adopting a responsible sourcing policy that considers the environmental and social impact of goods and services is crucial. Implementing this can be challenging but essential for creating a positive influence. Embracing corporate social responsibility (CSR) encompasses these efforts and goes even further. Companies adopting CSR voluntarily take responsibility for the impact of their activities on the community and integrate social and environmental considerations into their culture and operations (Sisaye, 2022). The Sustainable Apparel Coalition is a prime example of how multiple stakeholders can work together to minimise their products' environmental and social impact (Coalition, 2021).

Progressive Path Forward

The cornerstone of humanity is the individual who embodies, influences, and promotes ideas, behaviours, and values. He/she wields a modest yet significant impact on society and the world. For instance, advocating for sustainable practices in our daily lives can propel positive change. This final section delves into the power individuals hold in fostering development.

Committing to sustainability is not just a choice but a moral imperative. It entails embracing an ethic of equality, fairness, and solidarity. It also involves recognising our responsibility to contribute to the well-being of others. Sustainable development is rooted in acknowledging humanity's interconnectedness. Understanding this interconnectedness is crucial in a world where our everyday actions can reverberate globally. Moreover, past behaviours have necessitated a change for the betterment of the community (Waridel, 2002). Current challenges call for similar transformative actions on a larger scale.

Voluntary simplicity, often called "joyous austerity" by Dansereau, represents a conscious choice to reduce material consumption and possessions, enhance life satisfaction, and honour its core values (Howe, 1997). Renowned figures such as Leo Tolstoy, John Ruskin, Henry Thoreau, and Gandhi have embraced this philosophy. The decision to embrace voluntary simplicity can stem from various reasons and can be manifested in diverse ways. This lifestyle offers numerous benefits to individuals, allowing them to work less, thereby creating more time for leisure, family, personal projects, and community engagement. Moreover, decreased consumption lessens the environmental

impact by reducing the associated pollution. Therefore, adopting voluntary simplicity not only benefits individuals but also contributes to responsible consumption and ecological awareness.

Achieving sustainable development demands that we confront personal complexity. While it may be daunting to address uncertain issues and contend with the associated risks and solutions, this is an essential aspect of our development. Venturing into the realm of sustainability involves breaking out of our comfort zone and taking action amid the complexities and uncertainties that arise. Embracing our world's rich complexity demands a deep understanding of its interconnected aspects. This includes delving into the workings of natural, social, and economic systems and recognising the intricate relationships between different entities. It is equally important to comprehend the fundamental ideas that shape our thinking and behaviour and how they relate to different forms of development.

Summary

Engaging in dialogue is a powerful tool for broadening perspectives. Fostering conversations among diverse groups can give us crucial insights into different cultures, generations, and economic sectors. This inclusive approach challenges us to critically assess our worldview and cultural assumptions while endeavouring to understand those of others. "Sustainable happiness" presents a powerful framework for our collective well-being (Alam, 2022). It prompts us to consider how our pursuit of happiness impacts others and the environment. By actively seeking ways to enhance the quality of life for individuals and communities, one can strive for enduring happiness without compromising the well-being of others or future generations.

Embracing sustainability demands time to think, educate ourselves, and take meaningful action. One must rethink our consumption patterns, participate in discussions, engage with our political leaders, and assert our values to the companies we support. Various movements advocating for a more sustainable society advocate for slowing down our lifestyles and production to respect the natural environment better. For instance, the slow food eco-gastronomic movement, founded in Italy in 1986, champions the consumption of nutritious food produced in ecologically sound and ethical conditions (Lee, 2019). This appeal for a new approach to time has also permeated the realm of research, as evidenced by manifestos from European scientists advocating for the freedom to deliberate, collaborate, and foster interdisciplinary connections, particularly between the natural and human sciences.

So far, an extensive overview of ongoing global initiatives from various levels, domains, and regions has been noted, signifying a notable shift; these diverse initiatives have garnered attention from multilateral organisations globally, offering a valuable opportunity to assess their collective impact. Taking an objective and scientific approach to the presented issues highlights that progress assessments may vary based on individual perspectives. However, regardless of differing viewpoints, it is crucial to recognise the collective value of these initiatives and understand that our collaborative efforts will define their success.

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THE IMPACT OF DIGITAL TRANSFORMATION ON SOCIETY: UNRAVELING TRENDS, CHALLENGES, AND OPPORTUNITIES

Abstract:The study presents the multi-faceted impact of digitalization on modern society. The rapid advancement of technology and the widespread integration of digital innovations have brought profound changes in many areas of life, such as communication, commerce, management, and culture. The study aims to explain the impact of digitalization on social structures, individual behavior, and economic systems. Through qualitative inquiry, this study answers the following research questions: what are the key areas influenced by digitalization? How do these changes manifest themselves in social structures and interactions? What challenges do they pose and what new opportunities do they offer? The findings of the study highlight the need to use adaptive strategies and policy frameworks to leverage the positive effects of digitalization while mitigating its potential negative consequences.

Keywords: digitalization, society, technology, commerce, communication, Challenges and opportunities

WPŁYW TRANSFORMACJI CYFROWEJ NA SPOŁECZEŃSTWO: ODKRYWANIE TRENDÓW, WYZWAŃ I MOŻLIWOŚCI

Streszczenie (abstrakt): W badaniu przedstawiono wieloaspektowy wpływ cyfryzacji na współczesne społeczeństwo. Szybki postęp technologii i powszechna integracja innowacji cyfrowych przyniosły głębokie przemiany w wielu dziedzinach życia, takich jak komunikacja, handel, zarządzanie i kultura. Celem badania jest wyjaśnienie wpływu cyfryzacji na struktury społeczne, zachowanie jednostek i systemy gospodarcze. Poprzez badanie jakościowe niniejsze badanie odpowiada na następujące pytania badawcze: Jakie są kluczowe obszary, na które wpływa cyfryzacja? W jaki sposób zmiany te manifestują się w strukturach społecznych i interakcjach? Jakie stawiają wyzwania i stawiają wyzwania i jakie dają nowe możliwości? Wyniki badania wskazują na stosowania adaptacyjnych… Wyniki badania wskazują na potrzebę stosowania adaptacyjnych strategii i ram polityki, aby wykorzystać pozytywne skutki cyfryzacji, jednocześnie łagodząc jej potencjalne negatywne konsekwencje.

Słowa kluczowe: cyfryzacja, społeczeństwo, technologia, handel, komunikacja, wyzwania i możliwości

Introduction

The twenty-first century has witnessed an unprecedented surge in technological transformation driven by the rapid proliferation of digital technologies (Arrow.com, 2022; World Economic Forum, 2020). This pervasive influence of digitalization has fundamentally redefined the way society functions, communicates, and operates globally (Hagel et al., 2016; Harrison, 2020; World Economic Forum, 2020). Digitalization, encapsulating the assimilation and integration of technologies like the Internet, mobile devices, artificial intelligence, and the Internet of Things (IoT), has permeated various facets of human existence (Brynjolfsson & McAfee, 2014). This transformation transcends geographical boundaries and socio-cultural barriers, resulting in an intricate digital landscape that exerts its influence on human interactions, economic dynamics, governance structures, and cultural expressions (Benkler, 2006; Benkler et al., 2015; Harrison, 2020; OECD, 1998; World Economic Forum, 2020).

The rapid advancement of digitalization manifests itself through the widespread adoption of smartphones and the meteoric rise of social media platforms, which have catalyzed transformative shifts in how individuals forge connections and disseminate information (IEEE Digital Reality, 2023). Concurrently, the digitization of industries and the consequential surge of e-commerce have not merely modified but fundamentally reshaped business models and consumer behavior, engendering a redefinition of commerce and trade dynamics (Bughin et al., 2017). Further amplifying this transformation are strides in data analytics and machine learning, inducing revolutionary changes in decision-making processes across the healthcare and finance sectors (Brynjolfsson et al., 2021; Van Gemert, 2023). The cumulative impact of this transformational journey has initiated fervent discussions on the profound repercussions of digitalization on the fundamental structures of societies, individual behaviors, and the very fabric of human existence (Harrison, 2020; IEEE Digital Reality, 2023).

Within this context, the essence of this study lies in unraveling the intricate tapestry woven by the impact of digitalization on society. The core objective of this study is to meticulously analyze and document the sweeping changes catalyzed by digitalization across diverse domains. Leveraging qualitative analysis and accumulated knowledge from prior research, this research aims to provide substantial responses to pivotal research inquiries: What are the key areas of society influenced by digitalization? How do these changes manifest themselves in societal structures and interactions? What challenges do they pose and what new opportunities do they offer?

The study makes theoretical and practical contributions in three areas. Firstly, it enriches the design literature in the digitalization domain by examining social impact from a strategic perspective. Secondly, it contributes to standardization literature by examining how it influences key societal areas: communication, commerce, education, healthcare, governance, and civic engagement. The study focuses on the asymmetric impacts of aesthetic and functional design on these areas. Another contribution to standardization literature is the focus on the reshaping of societies. The study describes the power of digitalization in providing businesses and consumers with extraordinary experiences by

increasing sales and improving logistics and supply chains. The study identifies limitations in research and offers research questions in three critical areas in digitalization: ethics, legal, and validation of uses. These areas require further discussion in future research.

Finally, the ultimate aspiration of the study is to illuminate the nuanced and multifaceted ramifications of digitalization on society, thereby furnishing indispensable guidance for individuals, businesses, and policymakers traversing the uncharted territories of this swiftly evolving landscape.

Digitalization's Influence on Key Areas

The sweeping influence of digitalization on society across the domains of communication, commerce, education, healthcare, and governance has initiated profound discussions and spurred intensive research. This section delves into each domain, exploring the transformative effects of digitalization and its implications.

1. Communication and Social Interaction:

The advent of digitalization has reconfigured the landscape of communication. The ubiquitous embrace of social media platforms and instant messaging applications has revolutionized how individuals connect, engage in conversation, and exchange information (Boyd & Ellison, 2007; Hampton & Wellman, 2003; Miller et al., 2016). Contemporary social interactions rely heavily on online social networks like Facebook, Twitter, and Instagram, empowering individuals to engage with a global audience in real-time (Polonski, 2017). These platforms have blurred the distinctions between interpersonal and mediated communication, shaping a hybrid communicative environment (Miller et al., 2016).

The emergence of new forms of social interactions, such as emoji-based conversations and visual media, reflects the evolving language of digital communication (Bai et al., 2019; Emigh, 2023). The boundary between personal and public aspects of individuals' lives has become increasingly porous, challenging conventional notions of privacy (Veytia-Bucheli et al., 2020). The capacity for instant dissemination of information has facilitated rapid mobilization for social and political causes, as witnessed during various global movements and protests (Emigh, 2023). Thus, the impact of digitalization on communication transcends technological change, shaping socio-cultural norms and behaviors such as emojis and visual media, and has become an integral part of contemporary social interactions, reflecting the evolving language of digital communication.

2. Transformation of Commerce:

Digitalization has instigated a fundamental shift in commerce, disrupting traditional business models and altering consumer behaviors (Fey, 2023). The rise of e-commerce, facilitated by platforms like Amazon and Alibaba, has disrupted traditional retail structures (Bakos, 1997; Chaffey et al., 2019). Consumers can now access vast products and services from the comfort of their homes, revolutionizing the shopping experience and altering the supply chain dynamics (Fey, 2023).

Moreover, digitalization has enabled personalized marketing and tailored recommendations through data analytics, influencing consumer preferences and purchase decisions (Deloitte.com, 2023; Edelman & Abraham, 2022). However, concerns regarding the concentration of power within a few dominant platforms have raised questions about market competition, leading to calls for regulatory interventions (Eisenmann et al., 2011). Consequently, the impact of digitalization on commerce underscores the complex interplay between technological innovation, market dynamics, and consumer behavior.

3. Education in the Digital Age:

Integrating digital technologies into pedagogical practices has transformed education, expanding learning beyond traditional confines (Dede, 2010; Warschauer, 2003). Massive Open Online Courses (MOOCs) offer cost-free online educational programs accessible to all, offering an economical and adaptable means to acquire fresh skills, progress in careers, and provide widespread access to quality learning experiences (MOOC.org, 2023). The most popular MOOC providers are American platforms Coursera, edX, Udacity, and the British FutureLearn (Nurutdinova* et al., 2023). With more than 107 million users worldwide, Coursera is one of the most popular MOOCs, providing thousands of courses (Nguyen, 2022). MOOCs have brought about a profound transformation in the way education is accessed worldwide, democratizing quality learning for a global audience (MOOC.org, 2023). Besides conventional course materials like recorded lectures, readings, and problem sets, numerous MOOCs offer interactive learning experiences featuring user forums and social media discussions. These elements foster community interactions among students, professors, and teaching assistants (TAs) and provide prompt feedback on quizzes and assignments (TechTarget, 2021). These Virtual classrooms and online collaboration tools enable remote learning and bridge geographical gaps (MOOC.org, 2023; TechTarget, 2021).

However, the promise of digital education is accompanied by challenges. The digital divide persists, as unequal access to technology exacerbates educational inequities (Selwyn, 2004). Additionally, concerns about the quality, authenticity, and credibility of online learning experiences in digital assessments require careful consideration. The impact of digitalization on education underscores the need for inclusive approaches that harness its potential while addressing its limitations (Diaz-Infante et al., 2022; Li et al., 2023).

4. Revolutionizing Healthcare:

Digitalization has revolutionized healthcare, fostering innovations in diagnostics, treatment, and patient care. Telemedicine, enabled by digital technologies, allows remote consultations and health monitoring (Topol, 2019). Wearable devices and mobile apps enable individuals to track their health and well-being, leading to a more proactive approach to personal health management (Ventola, 2014).

However, the digitization of healthcare raises ethical concerns. Collecting and storing vast amounts of health data necessitates robust data privacy safeguards (Rigby, 2019).

Integrating artificial intelligence and machine learning in medical diagnoses requires careful validation to ensure accurate and ethical use (Farhud & Zokaei, 2021). To tackle these ethical apprehensions, it is imperative to encompass all four fundamental medical ethics principles – autonomy, beneficence, nonmaleficence, and justice – in every facet of healthcare (Farhud & Zokaei, 2021). Additionally, current policies and ethical guidelines governing AI technology are trailing the advancements AI has achieved within the healthcare sector. A substantial task remains to establish the ethical groundwork for the secure and efficient utilization of AI technology in healthcare (Rigby, 2019).

5. Reshaping Governance and Civic Engagement:

In the realm of governance, digitalization has engendered e-government initiatives and transformed citizen-government interactions (Bannister & Connolly, 2011; Norris, 2001). Digital platforms provide avenues for citizens to participate in decision-making processes and hold governments accountable (C. Wang et al., 2018). Eventually, all the digitalized public services enhance efficiency and transparency, fostering responsive governance.

However, disparities in digital literacy and access can undermine the promise of digital democracy, perpetuating existing social inequalities (Bannister & Connolly, 2011). Moreover, the ease of disseminating misinformation in digital spaces poses challenges to informed civic discourse (Kozyreva et al., 2020). As digitalization shapes governance dynamics, critical considerations of access, equity, and the quality of civic engagement come to the fore.
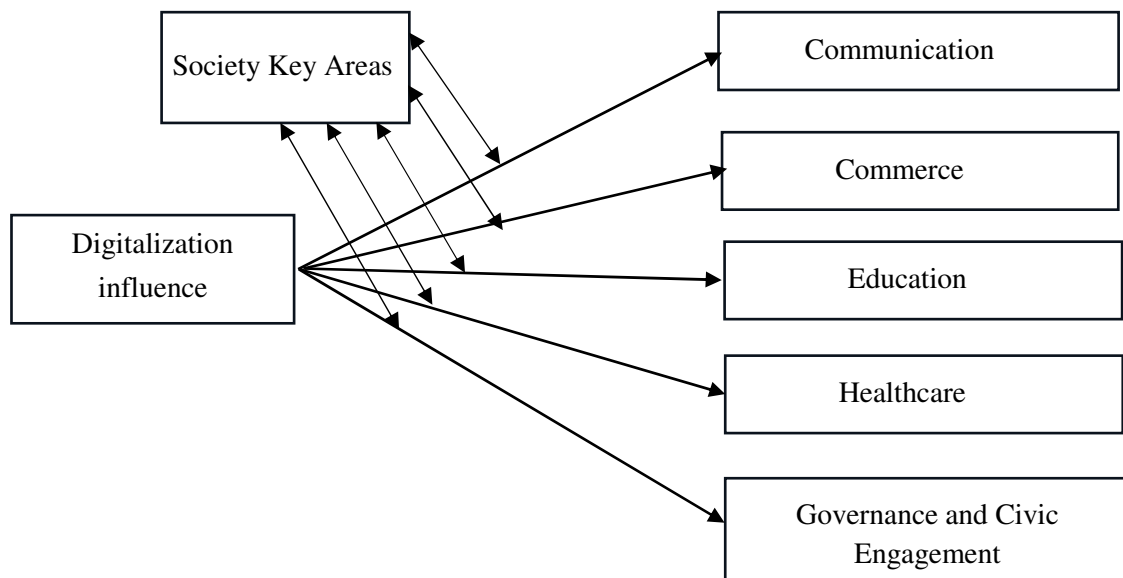

Fig. 1. The areas impacted by digitalization

In sum, the impact of digitalization on communication, commerce, education, healthcare, and governance reverberates across societal domains, transforming interactions, business models, learning paradigms, patient care, and civic engagement. The

ramifications are both transformative and complex, demanding nuanced responses that leverage the potential of digitalization while addressing its inherent challenges.

Manifestations in Societal Structures and Interactions

The far-reaching impact of digitalization extends beyond specific domains to intricately shape societal structures and interactions. This section delves into the nuanced manifestations of this influence on the fundamental dimensions of society.

1. The Networked Society:

One of the hallmark manifestations of digitalization is the emergence of what Manuel Castells (1996) termed the "network society." This concept encapsulates the transformation of societal structures through interconnected networks facilitated by digital technologies. The pervasive expansion of online social networks and digital communication platforms has fundamentally transformed how individuals and communities connect and engage with one another.

The dissolution of traditional spatial and temporal boundaries characterizes the networked society. Geographical limitations are transcended, enabling individuals to connect across distances instantaneously (Jan & Van Dijk, 2012). As individuals navigate this landscape, their identities are amplified and refracted through digital interfaces, contributing to the complex negotiation of self-presentation in online environments (Boyd & Ellison, 2007). The network society heralds a profound reconfiguration of social structures as individuals traverse digital networks to form new affiliations and communities, transcending traditional socio-cultural divisions.

2. Reimagining Social Interactions:

Digitalization has ushered in novel forms of social interactions, challenging established norms and patterns. Adopting emojis, gifs, and memes as modes of expression exemplifies how digital communication transcends linguistic boundaries (Papacharissi & De Fatima Oliveira, 2012). The digital realm has also nurtured the growth of virtual communities united by shared interests rather than geographical proximity (Rheingold, 1993). These online communities are spaces for identity negotiation and affinity formation, showcasing the plasticity of digital interactions.

The fusion of online and offline realms has engendered hybrid social practices. The documentation of everyday experiences on social media blurs distinctions between private and public lives, shaping the construction of self-identity (Ellison et al., 2007). At the same time, digitalization has transformed activism and collective action, enabling coordinated movements across continents in real time (Castells, 1996). Thus, the manifestations of digitalization in social interactions extend beyond mere communication, shaping how individuals perceive themselves and engage with their surroundings.

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3. Reshaping commerce:

Digitalization's impact on commerce also reverberates through societal structures. The surge of e-commerce has fostered new economic models, altering power dynamics between businesses and consumers. The democratization of retailing through digital platforms empowers consumers with choice, driving the demand for personalized experiences (Brynjolfsson et al., 2013). Concurrently, the influence of digitalization on supply chains and logistics has transformed market landscapes, necessitating adaptable business strategies (Mak & Max Shen, 2021).

The networked nature of e-commerce has redefined consumer interactions. Online reviews, recommendations, and social endorsements wield significant influence over purchasing decisions, shaping the reputation of businesses (Bakos, 1997). However, this digital shift is full of challenges. The dominance of a few tech giants and online platforms raises concerns about competition and data ownership, potentially centralizing economic power (Eisenmann et al., 2011). Thus, digitalization's impact on commerce engenders democratization and concentration, necessitating careful navigation of its implications.
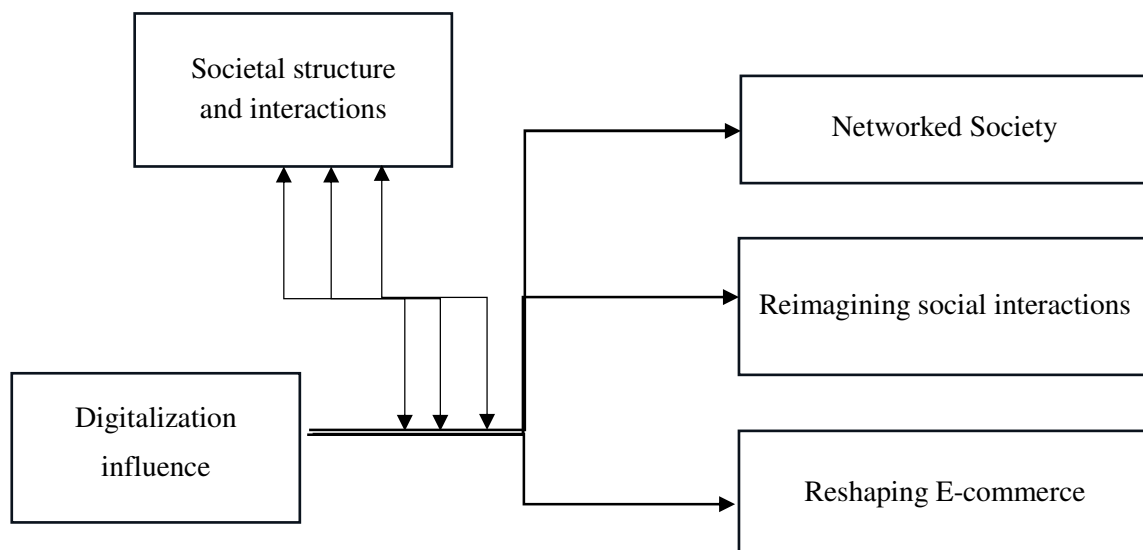
Fig. 2. Digitalization's influence on societal structure and interactions

Overall, the manifestations of digitalization in societal structures and interactions are profound and multifaceted. The emergence of the networked society (in Fig.2), the reimagining of social interactions, and the E-commerce structure represent just a few dimensions of this intricate tapestry. As digitalization continues to reshape how societies function and individuals interact, a deeper understanding of its implications becomes crucial for navigating these evolving landscapes.

Challenges and Opportunities Arising from Digitalization

As digitalization permeates every facet of contemporary society, it ushers in many challenges and transformative opportunities. This section delves into the multifaceted digitalization landscape, shedding light on its persistent challenges while highlighting its promising prospects.

1. The Digital Divide:

Despite the increasing ubiquity of digital technologies, the digital divide remains a stark reality. Unequal access to these technologies perpetuates socioeconomic disparities, hindering inclusive participation in the digital era (Yu et al., 2016). This divide is exacerbated by income, geographical location, and educational attainment (Earl & Kimport, 2016). While digitalization promises connectivity and empowerment, it also underscores the pressing need to address the barriers that hinder equitable access to its benefits.

2. Navigating Privacy Concerns:

Intricate interplays between convenience and data security characterize the digital age. With the surge in data collection and storage, individuals confront a trade-off between reaping the benefits of seamless digital services and safeguarding their personal information (Y. Wang et al., 2022). As data becomes increasingly valuable, surveillance, ownership, and consent concerns emerge (Chung & Grimes, 2006). Striking a balance between the conveniences of digitalization and the imperatives of privacy protection poses a significant challenge for individuals, businesses, and policymakers.

3. Harnessing Transformative Opportunities:

Amidst the challenges, digitalization ushers in transformative opportunities that hold the potential to reshape society and industries. The power of big data and predictive analytics offers the promise of evidence-based decision-making across sectors (Lanier et al., 2020). In healthcare, data-driven insights can lead to more personalized treatments and early disease detection, ushering in an era of precision medicine (Topol, 2019). Similarly, artificial intelligence and machine learning applications in finance and business can enhance risk assessment, customer engagement, and operational efficiency (Pallathadka et al., 2023).

4. Reimagining Economic Landscapes:

Digitalization has catalyzed a shift in economic paradigms, fostering the emergence of digital economies and new forms of work. The gig economy, characterized by short-term contracts and freelance work facilitated by digital platforms, has redefined labor dynamics (Tan et al., 2021). While offering flexibility and autonomy, this shift raises concerns about workers' rights, job security, and income stability. The emergence of blockchain and cryptocurrencies introduces novel possibilities for decentralized financial systems yet

necessitates addressing regulatory, security, and ethical considerations (Shin & Rice, 2022).

5. The Imperative of Digital Literacy:

In the digital era, literacy encompasses traditional reading and writing skills and digital literacy, involving navigating and critically evaluating digital information (Neumann et al., 2017). Promoting digital literacy is essential to bridging the digital divide and equipping individuals with the skills to engage meaningfully in the digital landscape. Furthermore, fostering digital literacy is critical for navigating the complexities of online interactions, media consumption, and data privacy (Livingstone & Helsper, 2007).

Finally, the duality of challenges and opportunities encapsulates the essence of the impact of digitalization on society. Addressing the digital divide, safeguarding privacy, and harnessing the transformative potential of digital technologies are vital imperatives. As societies navigate the uncharted territories of the digital age, a thoughtful approach is required to ensure that digitalization promises are realized while mitigating its pitfalls. Embracing these challenges and opportunities is essential for steering society toward a future that balances innovation, inclusivity, and ethical considerations.

Discussion and Conclusion

The exploration of digitalization's impact on society revolves around three pivotal research questions: What are the key areas influenced by digitalization? How do these changes manifest in societal structures and interactions? What challenges and opportunities emerge as a result? This general discussion delves into these inquiries, synthesizing overarching themes, revealing profound insights, and offering a holistic perspective on the implications of digitalization for contemporary society.

The first research question directs our attention to the domains profoundly altered by digitalization. Communication, commerce, education, healthcare, and governance emerge as key areas of transformation. Social media platforms and instant messaging applications redefine communication patterns and interpersonal interactions (Boyd & Ellison, 2007). E-commerce disrupts traditional retail models, reshaping consumer behavior and business strategies (Brynjolfsson et al., 2013). Digital technologies infiltrate education, democratizing learning opportunities beyond geographical confines (Dede, 2010). Telemedicine and data-driven diagnostics revolutionize patient care and health management (Ventola, 2014). Governance undergoes a paradigm shift with e-government initiatives and digital democracy fostering civic engagement and transparency (Bannister & Connolly, 2011).

The second research question delves into the intricate manifestations of the impact digitalization has on societal structures and interactions. The emergence of the network society underscores the dissolution of geographical boundaries, enabling global connections and fostering hybrid identities (Boyd & Ellison, 2007; Castells, 1996). The reconfiguration of social interactions blurs the lines between personal and public, ushering in novel forms of expression and affiliation (Papacharissi & De Fatima Oliveira, 2012).

The fluidity of online and offline realms reshapes activism and collective action, exemplified by coordinated global movements (Castells, 1996). The digital transformation of commerce influences consumer dynamics, altering purchase behaviors and redefining market landscapes (Chaffey et al., 2019). The multifaceted manifestations of digitalization in societal structures and interactions underscore its pervasive influence on contemporary life.

The third research question probes the dichotomy of challenges and opportunities arising from digitalization. The digital divide persists as unequal access to technologies perpetuates socioeconomic disparities (Selwyn, 2004). Bridging this gap is essential to realizing the inclusive potential of digitalization. Privacy concerns intensify as data collection escalates, necessitating the delicate balancing of convenience and data security (Y. Wang et al., 2022). The promise of big data and artificial intelligence introduces transformative opportunities yet demands ethical considerations and safeguards (Pallathadka et al., 2023; Topol, 2019). Digitalization reshapes economic landscapes, fostering the gig economy and blockchain-powered financial systems while raising concerns about workers' rights and regulatory frameworks (Pallathadka et al., 2023; Shin & Rice, 2022).

A Holistic Perspective:

In synthesizing the responses to these research questions, a holistic perspective emerges. The impact of digitalization is intricate, multifaceted, and transformative. It extends beyond specific domains, shaping societal structures, interactions, economies, and individual experiences. While presenting opportunities for innovation and empowerment, digitalization also magnifies equity, privacy, and ethical dilemmas. Striking a balance between embracing the potential and mitigating the pitfalls requires collaborative efforts from stakeholders across sectors.

Looking Forward:

The journey to unravel the complex tapestry of digitalization's impact on society is ongoing. As technological advancements accelerate, the intersections between digitalization and society will continue to evolve.

The study agrees with Favaretto et al. (2020) that the use of growing personal data and the lack of appropriate guidelines and laws raise critical ethical issues. Stakeholders and governance entities need to discuss how the future world can be developed to address the challenges posed by digitalization (Dwivedi et al., 2022; Quach et al., 2022). In that case, the research question might be, how do we maintain digital ethics in this digital world?

The validation of uses of digitalization is a crucial aspect that needs to be examined further to ensure its responsible implementation. Dwivedi et al. (2023) widely discuss the uses of generative conversational AI in their study. ACCC's (2018) report highlights the importance of validation and responsible use of digital technologies in the media industry. CEPAL (2022) discusses the potential social and environmental value of digital transformation, including its impact on education. It suggests that digitalization should

drive sustainable industrialization and development while considering its validation and impact on various stakeholders. Tracking the challenge of validated focus groups in future research can be a matter of discussion. Further research can identify the answer to the question, "To what extent is digitalization validated to a particular focus group?".

Governments and companies increasing use of digital technologies raises numerous questions regarding regulating these technologies. Companies may improve at ethical design, but how much the public knows whether a digital tool and its designer are ethical or trustworthy remains to be seen (Anderson & Rainie, 2023). An international legal framework with guidelines and regulations that may help them survive in this competitive world is crucial to service providers and consumers. The jurisdiction may differ from country to country, but the possibility of future hassle and insecurity will be minimized. Further research may develop a framework based on the research question, "What could be the common regulations for digitalization among different countries?".

Navigating these uncharted territories requires proactive measures to bridge the digital divide, safeguard privacy, and cultivate digital literacy. Embracing the opportunities while addressing the challenges will define our ability to harness digitalization's potential for a more equitable, connected, and ethically informed future.

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DETERMINANTS OF FINANCIAL FAILURE RISK: AN ECONOMETRIC STUDY USING THE Z-ALTMAN AND SPRINGATE MODELS

Abstract: Objective: The main objective of this study is to identify the determinants of financial failure in production and trading enterprises in Kosovo. Financial failures represent the loss of a business, which can cause significant losses for the business owner, employees, and all those who benefited from the business. Therefore, identifying the determinants of financial failure in a timely manner will help prevent such failures. The secondary objective of this study is to produce adequate results and information that will contribute to the existing literature on financial failures and creditor risk in enterprises in Kosovo.

Research Methodology: To achieve this study's objectives, we will review a wide range of literature from recent years and the scientific works of different authors. In addition, we will use secondary data to produce results. These data are published in the annual financial reports of the Ministry of Finance and the General Auditor's Office in Kosovo. The sample for this scientific work includes 50 enterprises in the production and trading sector, and the study covers a three-year period (2020-2022). The risk of bankruptcy of these enterprises is analyzed through the Z-Altman model and the Springate model, which will show the level of failures in these enterprises.

Research findings: From the results generated by this study, we can conclude that the return on assets and return on equity have a positive effect on reducing the risk of financial failure. Additionally, variables such as capital, firm size, liquidity, and solvency have a positive correlation and impact on exposure to the risk of financial failure. On the other hand, variables such as long-term liabilities and short-term liabilities increase the risk of financial failures in trading and production enterprises in Kosovo.

Practical implications: This study provides detailed empirical evidence on the determinants of financial failure risk in production and trading enterprises in Kosovo. Despite the limitations of this study, it can serve as a good source of information for other researchers who will analyze the risk of financial failure of enterprises in different sectors of the economy.

Originality: The paper contains original and real econometric data and results that accurately and consistently demonstrate the effect of various financial factors on the risk of financial failure in production and trading enterprises in Kosovo.

Keywords: Kosovo, Z Altman, Springate, financial failure, production, trade

DETERMINANTY RYZYKA FINANSOWEGO: BADANIE EKONOMETRYCZNE Z WYKORZYSTANIEM MODELI Z-ALTMANA I SPRINGATE'A

Streszczenie (abstrakt): Cel: Głównym celem niniejszego badania jest identyfikacja czynników warunkujących niepowodzenia finansowe przedsiębiorstw produkcyjnych i handlowych w Kosowie. Niepowodzenia finansowe oznaczają utratę firmy, która może spowodować znaczne straty dla właściciela firmy, pracowników i wszystkich osób, które skorzystały z działalności. Dlatego też wczesne zidentyfikowanie czynników warunkujących niepowodzenie finansowe pomoże zapobiec takim niepowodzeniom. Drugorzędnym celem tego badania jest uzyskanie odpowiednich wyników i informacji, które wniosą wkład do istniejącej literatury na temat niepowodzeń finansowych i ryzyka kredytowego w przedsiębiorstwach w Kosowie.

Metodologia badań: Aby osiągnąć cele niniejszego badania, dokonamy przeglądu szerokiej literatury z ostatnich lat oraz prac naukowych różnych autorów. Ponadto do uzyskania wyników wykorzystamy dane wtórne. Dane te publikowane są w rocznych sprawozdaniach finansowych Ministerstwa Finansów i Urzędu Audytora Generalnego w Kosowie. Próba do niniejszej pracy naukowej obejmuje 50 przedsiębiorstw sektora produkcyjno-handlowego, a badanie obejmuje okres trzech lat (2020-2022). Ryzyko upadłości tych przedsiębiorstw analizowane jest za pomocą modelu Z-Altmana i modelu Springate'a, które pokażą poziom niepowodzeń w tych przedsiębiorstwach.

Wyniki badań: Z wyników niniejszego badania wynika, że zwrot z aktywów oraz zwrot z kapitału własnego pozytywnie wpływają na zmniejszenie ryzyka niepowodzenia finansowego. Dodatkowo zmienne takie jak kapitał, wielkość firmy, płynność i wypłacalność mają dodatnią korelację i wpływ na ekspozycję na ryzyko niepowodzenia finansowego. Z drugiej strony zmienne takie jak zobowiązania długoterminowe i zobowiązania krótkoterminowe zwiększają ryzyko niepowodzeń finansowych w przedsiębiorstwach handlowych i produkcyjnych w Kosowie.

Implikacje praktyczne: Niniejsze badanie dostarcza szczegółowych dowodów empirycznych na temat czynników warunkujących ryzyko niepowodzenia finansowego w przedsiębiorstwach produkcyjnych i handlowych w Kosowie. Pomimo ograniczeń niniejszego badania, może ono stanowić dobre źródło informacji dla innych badaczy, którzy będą analizować ryzyko niepowodzenia finansowego przedsiębiorstw w różnych sektorach gospodarki.

Oryginalność: Artykuł zawiera oryginalne i rzeczywiste dane oraz wyniki ekonometryczne, które trafnie i spójnie obrazują wpływ różnych czynników finansowych na ryzyko niepowodzenia finansowego przedsiębiorstw produkcyjnych i handlowych w Kosowie.

Słowa kluczowe: Kosowo, Z Altman, Springate, niepowodzenie finansowe, produkcja, handel

Introduction

The concept of financial failure or financial losses is a well-known concept; most people may face or have faced this kind of failure. Financial failures do not only affect businesses but can also affect the country or the location where the businesses operate. Financial failures may arise from a variety of reasons, as highlighted by Weir (2018), who stated that failures were caused by factors such as excessive debt, lack of funds, external forces, weak governance, poor skills, failure to pay taxes, and more, all of which can be linked to the

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decisions that people have or have not made. To keep a business away from financial failures, one must take care and carefully manage the entire business, especially manage risk. This has been stated by Bragg (2021) in his book, who emphasized that a well-managed business must factor in risk in its daily operations to avoid unexpected losses. Enterprise risk management describes the concept of risk management, how to identify risks, and how to prioritise responses to these risks.

Financial failures are predictable, and two of the most commonly used models for predicting financial failure are Z-Altman and Springate. The Altman Z Score is used to predict the probability that a business will fail within the next two years. The equation depends on the data found in the income statement and the balance sheet of a business. Thus, it attempts to take readily available data. Given the simplicity with which necessary data can be found, the Z score result is a valid measure for a person approaching the budget reports of an organization. The Springate model is a development of the Altman model in 1968. The Springate model uses 19 financial reports, and after retesting, Springate finally selected four reports used in determining the criteria for companies that included the category of healthy companies or potentially bankrupt companies. Springate is a model that can be used to predict the potential (indication) of bankruptcy.

Literature Review and Meta-Analysis

Financial risk arises through numerous financial transactions, including sales and purchases, investments and loans, and other business activities. It can result from legal transactions, new projects, mergers and acquisitions, debt financing, high costs, or through management activities, interested parties, competitors, foreign governments, or atmospheric conditions. When financial prices change dramatically, it can increase costs, reduce income, or otherwise have a negative impact on an organisation's profit. Financial fluctuations can make planning and budgeting, pricing of goods and services, and capital allocation more difficult (Horcher).

Corporate failure often occurs when a firm experiences serious loss or becomes unable to meet obligations that are disproportionate to its assets. Corporate failure can result from one or a combination of internal and external factors, such as managerial errors due to insufficient or inappropriate experience in the industry, risk-seeking behaviour, lack of commitment and motivation to lead the company effectively, refusal or failure to adapt managerial and operational structures of the firm to new realities, ineffective or inappropriate corporate policies, economic climate, changes in legislation, or industry decline (Ouenniche, 2017).

Predicting or projecting future financial performance is a key element in many business and financial decisions. Projections used in valuation, capital project appraisal, and financing alternatives appraisal will be important inputs in the decision-making process (Alexander, 2007). Predicting the financial distress situation of companies is critical for rating agencies, managers, investors, bankers, and also for the shareholders of the company itself and even more so for the economy of countries in general (Alaka, 2018).

Table 1 presents a meta-analysis that includes empirical findings from various studies by different authors who have analysed the determinants of financial failure risk of companies in different sectors of the economy.

Table 1. *Summary of the existing literature related to the determinants of the risk of financial failure*

Authors	Year	Variables	Methods	Findings
(Zizi, 2020)	2016-2019	Liquidity, Capital, Return on Investment (ROI), Management Reports, Profitability Reports.	Descriptive statistics, Correlation, Logistic Regression, Linear Regression.	The research results conclude that creditors should properly assess the financial condition of borrowing firms. As for investors, decision-makers, and forecasters, they should avoid investing in companies with high default risk. Likewise, managers should act proactively and take corrective measures to avoid financial failure.
(Ikpesu, 2019)	2010-2017	Financial distress, Firm size, Liquidity, Profitability, Leverage, Revenue growth, Stock price.	Panel stationarity test, descriptive statistics, correlation, regression analysis.	The econometric findings of the study showed that leverage, liquidity, profitability, firm size, revenue growth and share price are the specific determinants of financial failure of firms in the manufacturing sector in the country. To ensure the smooth operation and continued survival of firms, corporate managers must design policies that will determine the appropriate level of liquidity, leverage, profitability, and revenue growth..

(Hasanah Azhar, 2021)	2013-2017	Liquidity, Profitability Ratio, Leverage Ratio, Solvency Ratio, Efficiency Ratio.	Descriptive statistics, regression tests.	The results of the study show that liquidity, profitability, leverage, solvency and efficiency ratios are significantly negatively related to corporate failure and bankruptcy. The leverage ratio is also determined to be the strongest indicator of insolvency, followed by profitability, liquidity, solvency and efficiency ratios.
(Ahmed, 2021)	2006-2017	Financial performance, Credit risk, Interest rate, Liquidity risk, Bank size, Leverage.	Dynamic models, GMM model.	The results of the study show that financial risk management significantly reduces the financial performance of commercial banks in Pakistan. The study suggested that managers should adopt risk management and hedging strategies to manage financial risks of commercial banks in Pakistan. They need to carry extra cash while using trade credit.
(Susanti, 2020)	2014-2018	Return on assets, Leverage, Liquidity.	Panel regression analysis, Multiple linear regression.	The findings of the research show that profitability, leverage, and liquidity variables have an effect on financial difficulties.
(Lestari, 2021)	2010-2019	Return on assets, Return on equity, Debt ratio, Debt to equity ratio, Interest.	Purposive sampling techniques, Panel regression analysis.	The results of the research show that the debt ratio has a positive effect on the return on assets and return on equity. The debt-to-equity ratio has a positive effect on return on assets, but it has a negative and significant effect on return on equity. Interest coverage ratio has no effect on return on assets and return on equity, and cash coverage ratio has no effect on return on assets and return on equity.

(Ismajli, 2012)	2011-2021	Work experience, Level of knowledge.	ChiSquare test, and Cramer's V.	The findings of the research show that the unfavorable business environment, the lack of adequate economic policies and the neglect of the compilation of the business plan endanger the increase of the possibility of success in business. Likewise, lack of cash flow, lack of commercial analysis, high interest rates risk the financial failure of the business.
(Günay VAN, 2021)	2017 - 2020	Operating profit margin, asset turnover, acid test ratio, net profit margin, financial leverage.	Altman-Z Score Model, Generalized Logit Model.	According to the results of the research analysis, an increase in operating profit margin, asset turnover, net profit margin and acid test ratios increases the probability that the company is in a safe zone. Meanwhile, increasing the financial leverage ratio reduces this probability.
(Nyamwanza, 2020)	2015-2017	Debt ratio, Return on assets.	Modeli i regresionit linear.	The research findings showed that debt financing has significantly and statistically negatively affected the company's return on assets. The study recommends that companies conduct a detailed cost-benefit analysis as well as debt financing analysis to ensure optimal benefits especially for small and private limited companies in an unstable economy.
(Boyacioglu, 2009)	1997-2004	Capital, asset quality, management quality, earnings, liquidity and sensitivity to market risk.	Multivariate discriminant analysis, group mean analysis and logistic regression analysis.	The results of the study show that the multi-layer perceptron and learning vector quantization can be considered the most successful models in predicting the financial failure of banks.

Source: Data processed by authors (2023)

The above meta-analysis table contains a summary of several works by different authors related to the topic of the determinants of the risk of financial failures. From the analysis of their empirical results, a conclusion is reached that the debt ratio has a positive effect on the return on assets and return on capital. Also, the research confirms that the interest rate and the exchange rate are two of the important determinants of business failure. Likewise, the research finds that managers should act effectively in cash management and take corrective measures to avoid the occurrence of financial failure.

Research methodology and econometric model specification

This study gives a a theoretical and practical look at the factors determining the risk of financial failure for some of the enterprises of the real sector of the Kosovo economy. The purpose of this study is to learn more about the determinants of the risk of financial failures for manufacturing and commercial enterprises in Kosovo. To achieve the objectives of this study, we have applied these two dependent variables and six independent variables. The risk of financial failure is taken as the dependent variable, which will be measured through two Z-Altman and Springate models, while the independent variables are ROA, ROE, liquidity, solvency, firm size and capital.

Many authors such as Amoah (2015), Bunyaminu (2019), Dias (2017), Jaafar (2018), carried out studies that included similar concepts of topics such as the importance of financial risk determinants, but there were also many studies by other authors who have analysed the determinants of the risk of financial failure from which they gave even more support to the findings of the research.

To conduct this research, we have relied on extensive literature and the scientific works of various authors. For the extraction of results, we utilized secondary data, which were published in the annual financial reports of the Ministry of Finance and the Office of the Auditor General. In this scientific research, 40 enterprises of the production and trade sector are included as a sample, and the time period included in this study will be three years (2019-2021). The risk of financial failure of manufacturing and commercial enterprises in Kosovo will be measured through two models, namely: the Z-Altman model and the Springate model, which will show the level of failure of these enterprises.

The research questions of this study are:

1. What impact do liquidity and solvency have on the risk of financial failure?
2. How have financial performance indicators affected the risk of financial failure?
3. What is the effect of capital and firm size on the risk of financial failure?

The main hypotheses of this study are:

H1: Return on assets has a positive effect on reducing the risk of financial failure.

H2: Return on capital has a positive effect on reducing the risk of financial failure.

H3: There is a positive correlation and impact between liquidity and the risk of financial failure.

H4: *There is a positive correlation and impact between solvency and the risk of financial failure.*

H5: *There is a statistically significant relationship between capital and the risk of financial failure.*

H6: *There is a statistically significant relationship between firm size and the risk of financial failure.*

Table 2. Description of the variables included in the econometric model

Variables	Acronyms	Measurement	Evidence	Data source
Z Altman	ZA	X1 = Working capital / Total assets, X2 = Retained earnings / total assets, X3 = Net profit before interest and taxes (NPBIT) / Total assets, X4 = Market value / Total liabilities, X5 = Sales / Total Assets.	(Archer, 2017), (Ari, 2012), (Altman, 2006), (Bayar, 2014)	Annual Reports of commercial and manufacturing enterprises of Kosovo (2019 – 2021)
Springate	SG	X1 = Working capital / Total assets, X2 = Net earnings before interest and taxes (EBIT) / Total assets, X3 = Net Profit Before Taxes (NPAT) / Current Liabilities, X4 = Sales / Total Assets.	(Horcher), (Kapoor, 2010), (Rama, 2020), (Hossein, 2012), (Peter, 2011).	Annual Reports of commercial and manufacturing enterprises of Kosovo (2020 – 2022)
Return on Assets	ROA	Net income/total assets	(Nirajini, 2018) (Ani, 2013) (Jewell, 2012) (Bucevska, 2015) (Ghulam Hussain Khan Zaigham, 2019)	Annual Reports of commercial and manufacturing enterprises of Kosovo (2020 – 2022)
Return on Capital	ROE	Net income/share capital	(Sumarau, 2019) (Alexiou, 2019) (Gui-Diby, 2014) (Klammer, 2017)	Annual Reports of commercial and manufacturing enterprises of Kosovo (2020 – 2022)
Liquidity	LIQ	Current assets - Inventory / Current liabilities	(Crom, 2011) (Eleonora, 2019) (Ghafeer, 2015)	Annual Reports of commercial and manufacturing enterprises of Kosovo (2020 – 2022)

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Solvency	SOL.	Net income + amortization/ all liabilities	(Rama, 2020) **(R.Kajananthan, 2014)**	Annual Reports of commercial and manufacturing enterprises of Kosovo (2020 – 2022)
Capital	CA	Overview of the financial position for commercial and manufacturing enterprises in Kosovo	(Radhika Butalia, 2020)	Annual Reports of commercial and manufacturing enterprises of Kosovo (2020 – 2022)
Firm size	FS	Log (Total assets) from the statement of financial position for commercial and manufacturing enterprises in Kosovo	(Syed Danial Hashmi, 2020) **(Karlsson, 2021)**	Annual Reports of commercial and manufacturing enterprises of Kosovo (2020 – 2022)
Long-term liabilities	LTL	Overview of the financial position for commercial and manufacturing enterprises in Kosovo	(Hajisaaid, 2020)	Annual Reports of commercial and manufacturing enterprises of Kosovo (2020 – 2022)
Short-term liabilities	SHTL	Overview of the financial position for commercial and manufacturing enterprises in Kosovo	(Bonga, 2019) **(Levišauskait, 2010)**	Annual Reports of commercial and manufacturing enterprises of Kosovo (2020 – 2022)

Source: Data calculation by the authors (2023)

The research is reflected with two econometric models which are linear models specified as follows:

$$Z\,Altman_{it} = \beta_0 + \beta_1\,(ROA)_{it} + \beta_2\,(ROE)_{it} + \beta_3\,(Liquidity)_{it} + \beta_4\,(Solvency)_{it} + \beta_5\,(Capital)_{it} + \beta_6\,(Firm\,size)_{it} + \beta_7\,(Long\text{-}term\,liabilities)_{it} + \beta_8\,(Short\text{-}term\,liabilities)_{it} + \gamma_{it}$$

$$Springate_{it} = \beta_0 + \beta_1\,(ROA)_{it} + \beta_2\,(ROE)_{it} + \beta_3\,(Liquidity)_{it} + \beta_4\,(Solvency)_{it} + \beta_5$$

$$(Capital)_{it} + \beta_6\,(Firm\ size)_{it} + \beta_7\,(Long\text{-}term\ liabilities)_{it} + \beta_8\,(Short\text{-}term\ liabilities)_{it} + \gamma_{it}$$

Ku:

ROA – *Return on assets*

ROE – *Return on capital*

LIQ – *Liquidity*

SOL – *Solvency*

CA – *Capital*

FS – *Firm size*

LTL – *Long-term liabilities*

SHTL – *Short-term liabilities*

γ **–** *stochastic variables (other factors not considered in the model)*

i **–** *code and t – time period.*

The term return on assets (ROA) refers to a financial ratio that shows how profitable a company is relative to its total assets. An investment is an asset acquired for the purpose of generating income or appreciation. The longer the maturity, the greater the risk and the greater the investment's returns. Return on equity (ROE) is a measure of financial performance calculated by dividing net income by shareholders' equity. Because shareholders' equity is equal to a company's assets minus its debt, ROE is considered the return on net assets.

Solvency is the ability of a company to meet its long-term debts and financial obligations. Solvency can be an important measure of financial condition, as it is a way of demonstrating a company's ability to manage its operations in the foreseeable future. The quickest way to assess a company's solvency is by checking its shareholders' equity on the balance sheet, which is the sum of a company's assets minus its liabilities. Liquidity refers to the efficiency or ease with which an asset or value can be converted into cash without affecting its market price. The most liquid asset of all is money itself. A current liability is a financial obligation that must be paid within one year. Long-term liabilities are financial obligations of a company that must be paid more than one year into the future.

Econometric analysis and study findings

In this part of this study, the empirical results are presented, which were analysed through econometric panel models ranging from linear regression, random effect, fixed effect, Hausman Taylor regression, GEE model and Nelson E - GARCH analysis results.

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Table 3. Empirical results for the first econometric model

Variables	Linear Regression	Random Effects – GLS Regression	Fixed – Effects Regression	Hausman Taylor Regression	GEE Model
Z Altman	-	-	-	-	-
ROA	.0383049*** (0.001)	.0415106*** (0.000)	.0432494*** (0.002)	.043714*** (0.000)	.416603*** (0.000)
ROE	.0435511** (0.007)	.0048382 (0.183)	.0051403 (0.205)	.0052393 (0.171)	.004863 (0.163)
Liquidity	.0566798** (0.005)	.0622451*** (0.001)	.0699565*** (0.001)	.0649504*** (0.000)	.062573*** (0.000)
Solvency	.2948972** (0.012)	.1822793 (0.107)	.0353473 (0.787)	.1544795 (0.163)	.1754335 (0.106)
Capital	0.479584 (0.004)	0.896774 (0.144)	0.240254 (0.234)	0.119687 (0.077)	0.936541 (0.121)
Firm size	0.475874 (0.013)	0.619854 (0.029)	0.1078574 (0.006)	0.7635854 (0.008)	0.6365874 (0.020)
Long Term Liabilities	- 0.387468 (0.002)	- 0.4078547 (0.158)	- 0.4698574 (0.181)	- 0.458968 (0.104)	- 0.4165874 (0.133)
Short Term Liabilities	0.3874751 (0.000)	0.6284711 (0.146)	0.8712411 (0.202)	0.7554141 (0.091)	0.6445141 (0.124)
Const.	3.232429*** (0.000)	2.307984*** (0.000)	2.40701*** (0.000)	2.808233*** (0.000)	2.314041*** (0.000)
R Square	0.7476	0.7146	0.7589	0.7654	0.7456
Adj. R²	0.7077	0.6994	0.7264	0.7412	0.7365

Source: Authors' data processing in STATA (2023)

*__Clarification:__ p-values shown in brackets: *** indicates statistical significance at the 1% level; ** indicates significance statistical significance at the 5% level, and * indicates statistical significance at the 10% level.*

According to the results of the regression tests, all the variables included in this model econometrically significant at the 1%, 5% and 10 levels, as well as for interpretation purposes to be based on the Linear Regression model. According to the data presented in the table above, we can notice that a part of the variables are statistically significant at the 95% and 90% confidence level. The coefficient of parameter b 0 = 41.51066 is significant

and this coefficient is taken into account if the factors of others are constant, then the value of Z Altman will be of 41.51 units.

If ROA increases by 1 unit keeping other factors constant, then Mr. Altman will grow up to 3.83 units. This statement is correct since the significance value (P-value = 0.000 < 0.05)is in the range of statistical significance. From this, we can conclude that the return on assets has positively influenced the reduction of the risk of financial failure and this shows that companies have no risk of financial failure, therefore from this, we note that the basic hypothesis is rejected, and the first alternative hypothesis is accepted.

ROE is another independent and main variable. If it increases by 1 unit while holding constant other factors, then Z-Altman will increase by 0.043 units. This statement is correct since the value of significance (P-value = 0.007 < 0.05) is below the interval of statistical significance. From this result, we can conclude that with the increase in return on capital, companies are financially good, have sufficient available capital and with the increase of the capital this affects in reducing financial failures for companies. Therefore, this basic hypothesis is rejected and the second alternative hypothesis is accepted.

Another independent variable is liquidity. If liquidity increases by 1 unit by holding other factors constant, then Z-Altman will increase by 0.056 units. This statement is correct since the significance value (P-value = 0.005 < 0.05) is in the range of statistical significance. From here we can show that there is a positive correlation and impact between liquidity and the risk of financial failure, therefore the basic hypothesis is rejected while the third alternative hypothesis is accepted.

Likewise, if solvency as an independent variable increases by 1 unit, keeping other factors constant, then Z-Altman will increase by 0.294 units. This statement is correct since the value of significance (P-value = 0.012 < 0.05) is in the range of statistical significance. From here you can to show that there is a positive correlation and impact between solvency and risk financial failure, therefore the basic hypothesis is rejected, while the fourth alternative hypothesis is accepted.

Another independent variable is capital and if it increases by 1 unit holding constant other factors, then Z-Altman will increase by 0.479 units. This statement is correct since the value of significance (P-value = 0.004 < 0.05) is below the interval of statistical significance. It can be said that there is a statistically significant relationship between capital and the risk of financial failure f. This statement is correct because the significance value was below the reliability level, therefore, the basic hypothesis is rejected, while the fifth alternative hypothesis is accepted.

Moreover, if firm size increases by one unit holding other factors constant, then Z-Altman will increase by 0.475 units. This statement is correct since the significance value (P-value = 0.013 < 0.05) is below the statistical significance range. As a result of this there is a statistically significant relationship between firm size and the risk of financial failure because the size of the firm can affect the aspect of facing the firm with any risk, be it internal risk or external risk.

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Another independent variable is long-term liabilities. If they increase by 1 unit by holding all other factors constant, then Altman's Z will decrease by 0.387 units. This statement is correct since the significance level is below the interval of statistical significance since that (P-value = 0.002 < 0.05). From here we can conclude that with the increase in long-term liabilities, the risk of financial failure will also increase.

If short-term liabilities increase by 1 unit while keeping other factors constant, then Z-Altman values will decrease by 0.387 units. The statement is correct because the level of significance is below the level of statistical significance (P-value = 0.000 < 0.05). From this result, we can conclude that even though long-term liabilities have a maturity longer than one year to cover expenses, this gives the company enough time to ensure an increase in the return on assets. Therefore, in a certain situation, long-term liabilities can also have negative effects that companies fail to secure protection against the risk of financial failure.

Table 4. Empirical results for the second econometric model

Variables	Linear Regression	Random Effects – GLS Regression	Fixed – Effects Regression	Hausman Taylor Regression	GEE Model
Springate	-	-	-	-	-
ROA	.288098** (0.006)	.0284947** (0.006)	.0275838** (0.029)	.0279088** (0.007)	.0284956** (0.004)
ROE	.5407219 (0.001)	.0474491 (0.056)	.0045928 (0.027)	.0037481 (0.008)	.0047454 (0.040)
Liquidity	.0604397*** (0.001)	.0771794*** (0.000)	.09372*** (0.000)	.0806197*** (0.000)	.0771574*** (0.000)
Solvency	.4580112*** (0.000)	.2974612** (0.004)	.1093563 (0.373)	.2786914** (0.007)	.297693** (0.003)
Capital	0.2885467 (0.001)	0.3102541 (0.001)	0.5623541 (0.005)	0.2358474 (0.093)	0.3102547 (0.006)
Firm size	0.728985** (0.004)	0.6895474** (0.009)	0.5956857 (0.100)	0.7098547 (0.007)	0.6895474** (0.006)
Long Term Liabilities	- 0.665421 (0.011)	-0.127857 (0.032)	-0.670854 (0.037)	-0.149857 (0.009)	-0.1278547 (0.019)
Short Term Liabilities	- 0.112454*** (0.003)	- 0.1002145** (0.013)	- 0.498745 (0.433)	- 0.989658** (0.016)	- 0.100254** (0.009)
Const.	1.917857*** (0.000)	1.925676*** (0.000)	2.081337*** (0.000)	2.282447*** (0.000)	1.925629*** (0.000)

R Square	0.7489	0.6019	0.5896	0.6857	0.7054
Adj. R²	0.7164	0.5393	0.5786	0.6785	0.6895

Source: Authors' data processing in STATA (2023)

Clarification: p-values shown in brackets: *** indicates statistical significance at the 1% level; ** indicates significance statistical significance at the 5% level, and * indicates statistical significance at the 10% level.

According to these results, all the variables included in this econometric model are significant at the 1%, 5% and 10% level, and for the purposes of interpretation, we will be based on the Linear Regression model. According to the data presented in the table above, we can observe that some of the variables are statistically significant at the 95% and 90% confidence level. The coefficient of the parameter b0= 1.91 units is significant and this coefficient is taken into account that if other factors are constant, then the value of Springate will be 1.91 units.

If ROA increases by 1 unit holding other factors constant, then the value of Springate will increase by 0.28 units. This statement is correct since the significance value (P-value = 0.006 < 0.05) is in the range of statistical significance. From this we can conclude that the return on assets has had a positive effect on reducing the risk of financial failure, since the higher values of Springate show that the manufacturing and commercial companies in Kosovo during the next two years do not have a high risk of financial failure. Therefore, from this we observe that the basic hypothesis is rejected and the first alternative hypothesis is accepted.

If ROE increases by 1 unit holding other factors constant, then the value of Springate will increase by 0.54 units. This statement is correct since the significance value (P-value = 0.001 < 0.05) is below the interval of statistical significance. From this result we can conclude that with the increase in return on capital, the companies are in good financial condition, have sufficient capital available and with the increase of capital, this affects the reduction of the risk of financial failure for the manufacturing and commercial companies in Kosovo. Therefore, from this basic hypothesis is rejected and the second alternative hypothesis is accepted.

Another independent variable is liquidity, so if liquidity increases by 1 unit while keeping other factors constant, then the value of Springate will increase by 0.06 units. This statement is correct since the significance value (P-value = 0.001 < 0.05) is in the range of statistical significance. From this we can conclude that there is a positive correlation and impact between liquidity and the risk of financial failure, the basic hypothesis is rejected while the third alternative hypothesis is accepted.

Likewise, if solvency as an independent variable increases by 1 unit, keeping other factors constant, then the value of Springate will increase by 0.458 units. This statement is correct since the significance value (P-value = 0.000 < 0.05) is in the range of statistical significance. Since solvency is the ability of a company to meet its long-term debts and financial obligations, then an increase in solvency also increases the value of the Springate

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coefficient, which means that the higher values of this model indicate that commercial and manufacturing enterprises in Kosovo in the next period they have no risk of financial failure. Therefore, the basic hypothesis is rejected and the fourth alternative hypothesis is accepted.

If capital increases by 1 unit holding other factors constant, then the value of Springate will increase by 0.28 units. This statement is correct since the significance value (P-value = 0.001 < 0.05) is below the interval of statistical significance. From this we can conclude that commercial and manufacturing enterprises in Kosovo with higher capital are in good financial condition and that the risk of financial failures for the following periods is lower. Consequently, from this result, the basic hypothesis is rejected and the fifth alternative hypothesis is accepted.

Moreover, if firm size increases by 1 unit holding other factors constant, then the value of Springate will increase by 0.72 units. This statement is correct since the significance value (P-value = 0.004 < 0.05) is in the range of statistical significance. As a result, we can emphasize that there is an important statistical relationship between the size of the firm and the risk of financial failure, because the size of the firm can affect the aspect of the firm's coping with any risk, whether it is an internal risk or an external risk.

If long-term liabilities increased by 1 unit holding other factors constant, then the value of Springate will decrease by – 0.66 units. Statement i is correct because the level of significance is (P-value = 0.011 < 0.05). If current liabilities increase by 1 unit holding all other factors constant, then the value of Springate will decrease by -0.11 units. This statement is in the range of statistical significance since (P-value = 0.003 < 0.05). Therefore, we can conclude that with the increase in short-term liabilities, the risk of financial failure will also increase.

Econometric Results of Nelson'S E – Garch Model

In this part of the econometric analysis, the empirical results of Nelson's E-Garch model are presented. Through this econometric model, it will be analyzed how the various determining factors have influenced the volatility of financial failure in manufacturing and commercial enterprises in Kosovo. The measurement of the risk of financial failure in this analysis is also carried out through two models such as: Z-Altman and Springate. Table 5 presents the econometric results for the question of how return on capital has influenced the volatility of financial failure of manufacturing and commercial enterprises in Kosovo. According to the findings of the study, we can conclude that the return on capital has a positive effect on the increase of the Springate coefficient and the statement is correct since the level of significance is at the level of statistical significance (P-Value=0.002 < 0.05). The leverage effect is present in the independent variable return on equity (ROE) in the dynamic time lag L1 and L2.

Table 5. Econometric results of Nelson's E – Garch model between Springate and ROE

Springate	Coef.	Std. Error	Z	P > |z|	95% Conf. Interval	95% Conf. Interval
ROE	.0020691	.0026337	0.79	0.002	-.0030928	.0072311
_cons.	1.936323	.0944847	20.49	0.000	1.751137	2.12151
ARCH L1.	1.409376	.2598464	5.42	0.000	.9000859	1.918665
EARCH L1.	-.1516683	.1897009	-0.80	0.424	-.5234752	.2201385
E-GARCH (L1)	- .2472826	.2184846	1.13	0.008	-.1809394	.6755045
E-GARCH (L2)	- .0914449	.1672397	0.55	0.000	-.2363389	.4192287
_cons.	-.0333758	.1873359	-0.18	0.859	-.4005473	.3337958

Source: Data processing by the authors in the STATA program (2023)

In the constant (L1) and (L2) we have a negative and significant correlation since (P-Value = 0.008 < 0.05). So, when the return on capital in 2021 increases by 1 unit, then the volatility of the risk of financial failure in 2022 is reduced by - 0.24 units. The statement is correct since the level of significance is at the level of statistical significance (0.008 < 0.05). This economic phenomenon shows that the manufacturing and commercial enterprises in Kosovo follow an efficient capital investment management strategy, since with the increase in return on capital, the enterprises in Kosovo provide more capital and reduce the volatility of financial failure. Therefore, we can consequently emphasise that a reduction in volatility will also affect the reduction of the risk of financial failure for these manufacturing and commercial enterprises in Kosovo.

Table 6. Econometric results of Nelson's E – Garch model between Springate and ROA

Springate	Coef.	Std. Error	Z	P > |z|	95% Conf. Interval	95% Conf. Interval
ROA	.0246327	.0055585	4.43	0.000	.0137382	.0355272
_cons.	1.958903	.1077738	18.18	0.000	1.74767	2.170136
ARCH L1.	.0699703	.0280364	2.50	0.013	.0150201	.1249206
EARCH L1.	-.0926878	.02282	-4.06	0.000	-.1374141	-.0479614
E-GARCH (L1)	- 1.850758	.0111929	165.35	0.000	1.82882	1.872696

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E-GARCH (L2)	-1.010522	.0159456	-63.37	0.000	-1.041774	-.9792689
_cons.	-.0176102	.0291581	-0.60	0.546	-.074759	.0395387

Source: Data processing by the authors in the STATA program (2023)

The leverage effect exists in constant (L1) and (L2). In the constant (L1) we have a negative and significant correlation (P-Value = 0.000 < 0.05). From this we can say that when the return on assets in 2021 increases by 1 unit, then the volatility of financial failure will decrease in 2022 by -1.85 units. So, on the basis of this econometric result, it can be concluded that the manufacturing and commercial enterprises in Kosovo have effectively managed the investments in assets and this has influenced that these enterprises for the period of one year have a reduction in the volatility of financial failure. Such an effect also results in the constant (L2). This constant has a positive and significant correlation since the significance value is below the level of statistical significance. Consequently, when the return on assets with a dynamic time lag (L2) increases by 1 unit, then the value of the volatility of financial failure will decrease. The statement is correct since the significance value is (P-Value= 0.000 < 0.05). From this we can conclude that the manufacturing and commercial enterprises in Kosovo, even in longer periods of time, effectively manage investments in assets and this made them reduce the risk of financial failure.

Figure 1. Volatility of time series data for Springate, Z Altman and ROA variables, ROE
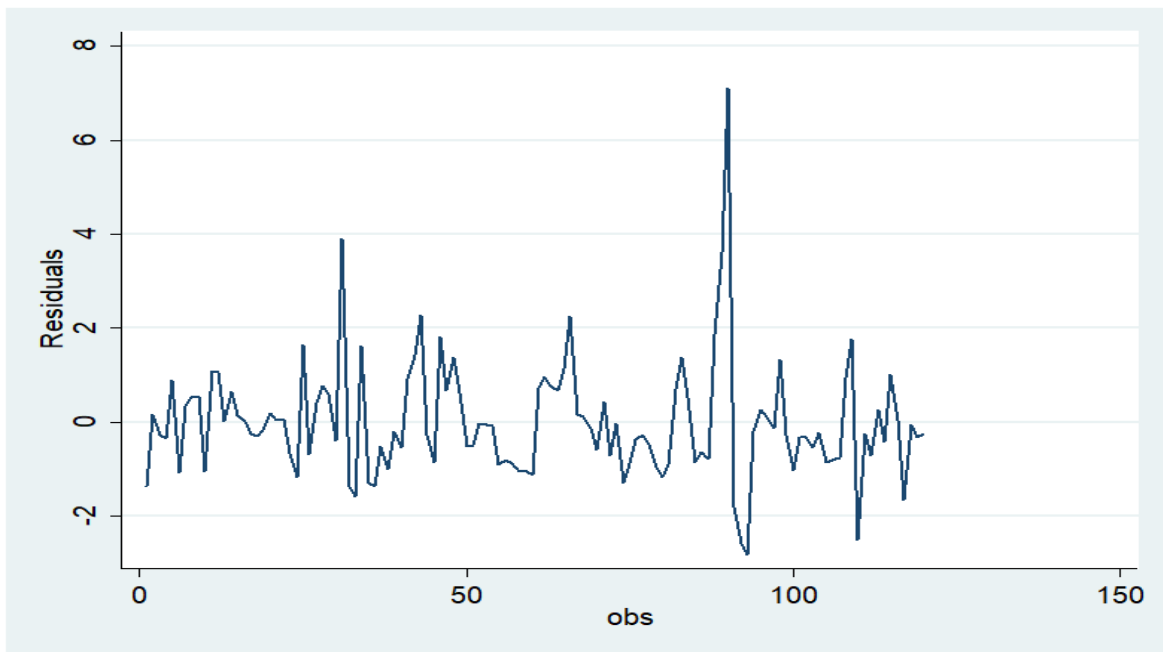
Source: Data processing by the authors in the STATA program (2023)

Referring to the above figure, we can observe that the time series data for Springate, Z Altman variables and financial performance variables have accumulation of volatility,

because the periods when manufacturing and commercial enterprises in Kosovo are associated with high risk, then during this period time, manufacturing and commercial enterprises are characterized by a high volatility of financial failures. In continuation of Nelson's E-GARCH analysis, the second model of the study, which is Z-Altman as a dependent variable and other independent variables, will be analyzed if they have a positive or negative impact on the volatility of the risk of financial failure in manufacturing and commercial enterprises in Kosovo.

Table 7. Econometric results of Nelson's E – Garch model between Z-Altman and ROA

Z-Altman	Coef.	Std. Error	Z	P > |z|	95% Conf. Interval	95% Conf. Interval
ROA	.0395419	.0116619	3.39	0.001	.016685	.0623989
_cons.	2.199405	.1434047	15.34	0.000	1.918337	2.480473
ARCH L1.	.6065216	.2238699	2.71	0.007	.1677448	1.045299
EARCH L1.	.2467767	.1588021	1.55	0.000	-.0644698	.5580231
E-GARCH (L1)	-.6071758	.1879532	3.23	0.001	.2387943	.9755573
_cons.	.0405914	.0941191	0.43	0.666	-.1438787	.2250614

Source: Data processing by the authors in the STATA program (2023)

From the econometric results, we can conclude that the return on assets positively affects the increase of the Z-Altman coefficient, with the increase of ROA by 1 unit, the Z-Altman value will increase by 0.039 units. The statement is correct since the level of significance is (P-Value=0.001 < 0.05).

The leverage effect exists in the constant (L1). In the constant (L1) we have a negative and significant correlation (P-Value = 0.001 < 0.05). From this, we can say that when the return on assets in 2021 increases by 1 unit, then the volatility of financial failure in 2022 is reduced by - 0.60 units. So, on the basis of this econometric result, it can be concluded that the manufacturing and commercial enterprises in Kosovo have effectively managed the investments in assets and this has influenced that these enterprises for this period of one year have a reduction in the volatility of financial failure. According to this econometric analysis, we can conclude that the manufacturing and commercial enterprises in Kosovo in shorter periods of time manage investments in assets in a more effective way and this led to a reduction in the exposure to the risk of financial failure.

Table 8. Econometric results of Nelson's E – Garch model between Z-Altman and ROE

Z - Altman	Coef.	Std. Error	Z	P > |z|	95% Conf. Interval	95% Conf. Interval
ROE	.0027689	.0030433	0.91	0.363	-.0031959	.0087338
_cons.	2.472097	.1170114	21.13	0.000	2.242759	2.701436
ARCH L1.	.8280229	.2441262	3.39	0.001	.3495444	1.306501
EARCH L1.	.097829	.1586778	0.62	0.538	-.2131738	.4088318
E-GARCH (L1)	-.8297068	.2118883	3.92	0.000	.4144134	1.245
E-GARCH (L2)	-.469221	.1463182	-3.21	0.001	-.7559994	-.1824427
_cons.	.1064483	.1420695	0.75	0.454	-.1720027	.3848993

Source: Data processing by the authors in the STATA program (2023)

From the above table we can notice that in the constant (L1) we have a negative and significant correlation since (P-Value = 0.000 < 0.05). So, when the return on capital in 2021 increases by 1 unit, then the volatility of the risk of financial failure in 2022 is reduced by -0.82 units. The statement is correct since the level of significance is below the level of statistical significance. In the constant (L2) we have a negative and significant correlation, which means that with the increase in capital return Z Altman will decrease, the statement is correct since (P-Value=0.001 < 0.05). This economic phenomenon shows that the manufacturing and commercial enterprises in Kosovo in longer periods of time follow an efficient capital investment management strategy, since with the increase in return on capital, enterprises in Kosovo provide more capital and this affects the reduction of exposure. of these enterprises to the risk of financial failure.

Discussion

A financial crisis can have many reasons. In general, a crisis can occur if institutions or assets are overvalued and can be exacerbated by irrational investor behaviour. Corporate failure often occurs when a firm experiences serious loss or becomes insolvent with liabilities that are disproportionate to its assets. Mistakes are inevitable, but when businesses learn from these mistakes, then these enterprises are a step towards success. By embracing failure, not simply "getting over it," these enterprises will outperform the competition in the sector in which they operate.

The main hypothesis of this study states that the return on assets has a positive effect on reducing the risk of financial failure. Therefore, based on the econometric results of this study, we verified that the return on assets had a positive effect on reducing the risk of

financial failure. This result is also in line with foreign authors such as Lestari (2021), who in his research also proves that the return of assets has a positive effect on the reduction of financial failure. Also Ahmed (2021), among other things, argues that if businesses try to properly manage financial failures, this could have an impact in their asset returns; they would be higher and that the high percentage of ROA can be concluded as the efficient use of assets in a company to obtain profit. A company that has a high percentage of ROA has an excellent opportunity to increase its profit.

On the other hand, Jaafar (2018) emphasises that the higher the firm's debt level, the higher its tendencies to be exposed to bankruptcy risks. The estimated results of the study – specifically the Z-Altman model, show that a higher ROA score means that the company has a higher chance of avoiding bankruptcy. Günay VAN (2021), in his study carried out in 2021, gives another support to our research because according to the results of the analysis, an increase in the ratios of operating profit margin, asset turnover, net profit margin and acid test increases the probability that the company is in a safe zone and avoids future failures.

Conclusions and Recommendations

Through this research it was proven that no one is immune to financial problems and poor planning or going through a tough time in terms of a business can often really tip the scales. Various researchers involved in this topic have expressed the view that building a business from the ground up is costly, contributing to financial failure. At some point in the life of any company, the business may need to seek outside capital to grow. This need for financing creates a financial risk for both the business and any investor or stakeholder invested in the company.

Financial risk is a type of risk that can result in the loss of capital for stakeholders. For governments, this can mean they are unable to control monetary policy and default on bonds or other debt issues. Corporations also face the possibility of defaulting on the debt they take on, but they can also experience failure in a venture that causes a financial burden on the business. Financial risks are everywhere and come in many shapes and sizes, affecting almost everyone. You should be aware of the presence of financial risks. Knowing the risks and how to protect yourself will not eliminate the risk, but it can mitigate their harm and reduce the chances of a negative outcome. Financial risk can be neutralised by carrying the right amount of insurance, diversifying your investments, keeping sufficient funds for emergencies and maintaining various streams of income.

Therefore, based on the findings of our study, for manufacturing and commercial enterprises we recommend that:

- The risk can be identified using analysis tools; therefore, it would be necessary for the firms to reach their identification;
- The risk of financial failure may arise from uncontrollable or unpredictable external forces; therefore, it is preferable to analyse every decision made so as not to cause large financial losses;

- Enterprises should stop taking on debts to avoid worsening financial problems and

- Enterprises should be encouraged to make more informed decisions about the risks they may encounter and should also be a step in evaluating the value (risk-reward ratio).

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THE WEEKEND EFFECT ON THE INDEX RETURNS OF 15 STOCK EXCHANGES AROUND THE WORLD

Abstract: This study examines the weekend effect on the returns of 15 stock exchange indexes around the world. Empirical tests were performed on the daily returns of stock market indexes from the sample countries over the period from January 2010 to May 2015. The results conclude that the weekend effect no longer exists in the USA. In addition, the weekend effect has disappeared in European Union member countries (France, and Germany) and the UK. The effect has also disappeared in almost every country studied in Latin America except Venezuela and Chile, where it persists. This study contributes to elucidating the effect of weekends and time differences when negotiating on stock markets. The results help comprehend the potential relationship between stock exchange index returns around the world and the location of the market. This work provides useful insights for investors making decisions, scholars, and policy makers.

Keywords: weekend effect, stock market, EU, US, Latin America

WPŁYW WEEKENDU NA ZWROTY Z INDEKSÓW 15 GIEŁD NA CAŁYM ŚWIECIE

Streszczenie (abstrakt): Niniejsze badanie analizuje wpływ weekendu na zwroty z 15 indeksów giełdowych na całym świecie. Testy empiryczne przeprowadzono na dziennych zwrotach indeksów giełdowych z krajów objętych badaniem w okresie od stycznia 2010 r. do maja 2015 r. Wyniki wskazują, że efekt weekendu nie występuje już w USA. Ponadto efekt weekendu zniknął w krajach członkowskich Unii Europejskiej (Francja i Niemcy) oraz w Wielkiej Brytanii. Efekt ten zniknął również w prawie wszystkich badanych krajach Ameryki Łacińskiej, z wyjątkiem Wenezueli i Chile, gdzie nadal występuje. Niniejsze badanie przyczynia się do wyjaśnienia wpływu weekendów i różnic czasowych na wyniki transakcji giełdowych. Wyniki pomagają zrozumieć potencjalny związek między zwrotami z indeksów giełdowych na całym świecie a lokalizacją rynku. Praca ta dostarcza przydatnych informacji inwestorom podejmującym decyzje, naukowcom i decydentom.

Słowa kluczowe: efekt weekendu, rynek akcji, UE, USA, Ameryka Łacińska

1. Introduction

The purpose of this research is to evaluate the weekend effect on the returns of 15 stock exchange indexes around the world. Stock market returns are a widely documented subject in financial literature. Research has focused on how the price of securities influences the stock market. Fama (1970) developed the efficient-market hypothesis according to which asset prices reflect all available information on the market making it impossible to "beat a market" that has abnormal returns at the same risk level.

Thus, drawing from experience in hospitals, it has been shown that patients admitted on the weekend had a significantly higher overall mortality rate relative to risk, at 1.19; and a 95% confidence interval, at 1.14-1.23 (Pauls et al. 2017). The probable explanation is that employees bear a grudge for having to work while their family members are taking a weekend break and consequently put less effort into their work. Weekends have also been shown to have on effect on overdose and drug abuse, excessive drinking, and other kinds of rule infringement that result in people going to hospital. In addition, fewer employees tend to be allocated to work on weekend shifts, resulting in a reduced labour force.

In the finance domain, the weekend effect has been the subject of constant debate. A number of studies have contradicted the validity of the efficient market hypothesis, highlighting the existence of anomalies. Therefore, in this paper we seek to examine one of them: the weekend effect, also called the Monday effect and the Monday seasonal, in other words, a day of the week effect where Fridays show lower returns than Mondays. As a result, the average return is higher for Monday, which has three times more expected returns than the other days of the week (French, 1980).

Complimentarily, this study intends to examine evidence of time anomalies related to the weekend effect in Latin America (Brazil, Mexico, Argentina, Chile, Peru, Colombia and Venezuela) in comparison with Europe (France, Germany and the United Kingdom) and the United States under the trading day hypothesis.

This study contributes to elucidating the effect of weekends and time differences in negotiating on other stock markets in other countries. The results help comprehend the potential relationship between stock exchange index returns around the world and the effect of location of the stock market.

The remainder of the paper is organized as follows. Section two sets out the theoretical framework featuring mainly the efficient market hypothesis and prior studies, section three covers the applied methodology, after which the findings are documented and lastly the conclusion is made.

2. Theorical Framework

The research on market efficiency started with the seminal work of Fama (1970). This author developed a theory called the Efficient Market Hypothesis (EMH) which asserts that the price of financial assets necessarily reflects all the information available on the market. Three kinds of efficiency test are distinguished:

- Weak efficiency test: an asset price incorporates the historical information available on the market implying any technical analysis is ineffective;

- Semi-strong efficiency test: asset prices reflect both any historical information available and all public information relayed by the market;

- Strong information test: asset prices reflect all available information: historical, public and private.

This theory has been the basis for a wide range of papers on financial subjects and generated numerous studies showing evidence of the existence of different kinds of anomalies.

Prior studies have been conducted on American indexes. French (1980) experimented one of the first studies on stock market anomalies. Studying the daily returns for Standard and Poor's Index over a period of 25 years, he examined the process of investment in the stock exchange using two models: the calendar time hypothesis (continuous process with an expected return on Mondays equal to the sum of the three days: Saturday, Sunday and Monday, that is to say three times the return for the other days of the week), and the trading time hypothesis (in which returns on work days lead to identical returns every day of the week). Both hypotheses were rejected, and he concluded that on Mondays the mean returns were strongly negative, and positive during the rest of the week.

The work of Gibbons and Hess (1981) confirmed these anomalies, with mean returns on Mondays being negative or outstandingly low, in their investigation of S&P 500 and US treasuries, corroborated by the work of Lakonishok and Smidt (1988), who found abnormal returns on weekends.

Similarly, studies have been carried out on other developed countries for which the same anomalies were discovered. Jaffe and Westerfield (1985) found a day of the week effect identical to that of the American market for the Australian, British, Canadian and Japanese equities markets. On average, returns were negative on Mondays and positive on Fridays on the Canadian and English markets, while in Japan and Australia, markets had their lowest returns on Tuesdays.

Later studies focused more on European indexes. Dubois and Louvet (1996) documented a negative mean return at the beginning of the week for eleven indexes (on nine countries) including French, British, German and US markets, and observed that this phenomenon had disappeared in the USA at the end of the period. Arsad and Coutts (1997) studied the behaviour of the British 30 FT index over the period 1935-1997 and documented lower returns on Mondays than on the other days of the week.

Gradually, the field of studies extended to emerging or developing markets on which the market efficiency hypothesis was tested to detect any anomalies.

Costa and Ceretta (2000) performed a study of the different anomalies present on the Ibovespa index in Brazil between 1986 and 1989. Regarding the results, a week-day effect was found with lower returns on Mondays and higher returns on Fridays. Bone and Ribeiro (2002) conducted research which included the week-day effect and holiday effect on the Brazilian Ibovespa index over the period 1995-2007. The findings of the statistical tests

revealed that in almost half of the thirty-eight stocks, the weekday effect was confirmed, with the most differential returns on Tuesdays. Ceretta and Costa (2001) identified the Monday effect in three of the five countries studied in Latin America (from 1994 to 1999).

More recently, Boudreaux and Fuller (2010) studied the weekend effect in two kinds of market: bear markets and non-bear markets succeeding each other (data from September 1976 to September 2002). The statistical evidence shows a weekend effect, but only in non-bear market orientations, on three US indexes: S&P 500, DJIA and Nasdaq.

A study by Rodriguez (2012) examined the day of the week effect from 1993 to 2007 for six countries in Latin America (the same as in our study, except for Venezuela). Three analyses conducted on volatility and returns, for each stock and globally, documented significant evidence of the persistence of a Monday effect or weekend effect in many cases in this area and the existence of a day-of-the-week effect on both returns and volatility.

Other research including the weekend effect corroborates these last findings on a larger scale (including eleven countries in our study). Indeed, studying the link between the volatility of the stock market, speculative short sellers, and the weekend effect using indexes from sixty countries, Kazemi (2013) tested Chen and Singal's (2003) explanation of the weekend effect. According to this author, the weekend effect may be linked to short sales. He conducted his work by dividing data into two sub-periods, one before 1995 (1980-1994) and the other one after 1995 (1995-2007), and evidenced that in the first period, short sales can explain the weekend effect for all countries, and in the second period, short sales can explain the phenomena in emerging markets, but no longer in developed ones. These results corroborate with Benetti and Favero (2008) where they compare the weekend effect across seven Latin American countries and the USA, highlighting any variations or similarities in the phenomenon across different markets.

On the other hand, Carlucci et al. (2014) studied the weekday effect anomaly on the returns of three main indexes in Brazil (Ibovespa), Mexico (Inmex), and the USA (Dow Jones). He tested three methods (the regression analysis, the hypothesis test for different means, and the Krustkal-Wallis non-parametric test) on the set of data from 2004 to 2012. The analysis performed showed that statistically, there is no discrepancy between the mean return of each day of the week in the three indexes. This means that the anomaly of the weekend effect is no longer present on these three major indexes.

3. Research Method

This section presents the data used, the way they were collected, and the statistical model adopted.

1. Sample

First, we collected the daily closing prices of each index from Bloomberg software and the Google financial browser for the last five years in three areas (Latin America, USA and Europe). The countries and associated stock exchange indexes, the number of observations, and the beginning/closing date of the period studied are detailed in the table below. The numbers of observations are not equal due to the specificities of each market (non-trading days). A description of each index is provided in Appendix 1.

Description of initial dataset

Country	Index	N° observation used	Beginning date	Closing date
Brazil	Ibovespa	1351	04/01/2010	22/05/2015
Argentina	Merval	1315	04/01/2010	22/05/2015
Chile	IGPA	1248	19/05/2010	22/05/2015
Colombia	IGBC	1319	04/01/2010	22/05/2015
Peru	IGBVL	1340	04/01/2010	30/04/2015
Venezuela	IBVC	1083	05/01/2010	22/05/2015
Mexico	IRT	1354	04/01/2010	22/05/2015
Mexico	Inmex	1355	04/01/2010	22/05/2015
Mexico	Mexbol	1359	04/01/2010	22/05/2015
USA	Nasdaq	1356	04/01/2010	22/05/2015
USA	S&P 500	1356	04/01/2010	22/05/2015
USA	Dow Jones	1356	04/01/2010	22/05/2015
Germany	DAX	1376	04/01/2010	22/05/2015
France	CAC 40	1378	04/01/2010	22/05/2015
UK	FTSE	1394	04/01/2010	22/05/2015

2. Econometric Model

The first step in analysing the weekend effect consists in calculating the daily returns for each index, using the logarithmic form:

$$R_t = 100 \ x \ ln \ (P_t \ / \ P_{t-1}) = E(R_t) + \varepsilon_t$$

- R_t is the return rate of the stock indexes on day t;
- P_t is the nominal closing price of the index on day t;
- $E(R_t)$ is the expected return value on day t;
- ε_t is an independent random variable whose expected value is equal to zero.

To compute the market return, the use of a stock market index from each sample country was established. For the United States and Mexico, three indexes were chosen: the Dow Jones, Nasdaq and Standard & Poor's in the USA, and Inmex, Mexbol and IPC in Mexico.

In this paper, the following regression was used to test the return generation model hypothesis:

$$R_t = \beta_2 d_2 + \beta_3 d_3 + \beta_4 d_4 + \beta_5 d_5 + \beta_6 d_6$$

For the generation of returns by work day, where R_t corresponds to the return of the country's index on day t, and the dummy variables (indicative variables equal to 1 on the respective weekdays and to 0 on other days) indicate the weekday when the return of R_t is observed (d=2: Monday, d=3: Tuesday, d=4: Wednesday, d=5: Thursday, d=6: Friday), the mean returns on Mondays, Tuesdays, Wednesdays, Thursdays and Fridays are represented, respectively, by β2, β3, β4, β5 and β6.

4. Analysis of Results

To conduct this research, historical series of daily closing prices were used for indexes from three main zones: Latin America, Europe, and the United States of America. These zones are very significant when analyzing information from capital markets worldwide.

Among these, indexes from seven Latin American countries were selected: Brazil (Ibovespa), Mexico (IRT, Mexbol, Inmex), Argentina (Merval), Peru (IGBVL), Colombia (IGBVC), Chile (IGPA), Venezuela (IBVC), three countries from Europe: France (CAC 40), Germany (DAX), and the United Kingdom (FTSE 100), and finally the United States. This set of data was obtained from Bloomberg software and the Google Finance browser for the period from January 2010 to May 2015.

Table 1 shows the descriptive statistics of the return rates. Note that the mean returns are positive for twelve indexes and that only three indexes have negative returns in Latin America: Colombia, Peru, and Brazil. The highest mean returns are for the IBVC index in Venezuela with 0.46% (explained by a high inflation rate in the country of around 50% during the last five years), followed by the Nasdaq index in the USA and the DAX Index in Europe. The Brazilian index, Ibovespa, had the lowest returns at -0.02 %, which is likely linked to the slowdown that Brazil has been undergoing since 2011. Merval (Argentina) and IBVC (Venezuela) have the highest standard deviation, probably in parallel with the economic situation of these two countries.

When analyzing Table 2, with a confidence interval of 95%, we find that among the panel of countries, only two display significant anomalies: Venezuela and Chile (highlighted).

Indeed, for Chile, we note that Monday and Friday have abnormal returns, which indicates that a weekend effect still exists in this country. The results for Venezuela indicate that there are abnormal returns on every day of the week except for Monday. These findings are in correlation with the analyses carried out by Rodriguez (2012) and Benetti and Favero (2008).

Table 1. Descriptive statistics of daily return rates from January 2010 to May 2015 in seven Latin American countries, three countries in Europe, and the United States.

Latin America								
Country	Brazil	Argentina	Venezuela	Peru	Colombia	Chile	Mexico		
Index	Ibovespa	Mervin	IBVC	IGBVL	IGBC	IGPA	IRT	INMEX	MEXBOL
Arithmetic Means	-0.01720	0.12153	**0.46098**	-0.00434	-0.00720	0.00741	0.03096	0.02414	0.02469
Standard deviation	1.41088	1.98608	1.87796	1.29073	0.996	0.75483	0.94329	1.00345	0.94344
Kurtosis	1.53359	3.22909	17.06469	12.43863	2.00485	6.98560	2.98787	3.10320	2.97913
Minimum	-8.43075	1.98608	-13.47216	-13.29076	-5.01464	-5.97879	-6.06206	-6.73339	-6.06203
Maximum	4.97603	8.31994	19.81068	6.91630	4.21372	4.47179	4.16716	4.26971	4.16716
No Observation	1350	1314	1303	1340	1318	1248	1354	1354	1354

		Europe			
Country	**United States**			France	Germany	United Kingdom
Index	Nasdaq	Dow Jones	S&P500	CAC 40	DAX	FTSE 100
Arithmetic Means	**0.05957**	0.04145	0.04774	0.01939	**0.04973**	0.01876
Standard deviation	1.10985	0.91358	0.95290	1.33894	1.26251	0.96518
Kurtosis	3.57907	3.91776	4.86365	3.49801	2.43377	2.53324
Minimum	-7.14891	-5.70611	-47.26405	-5.63464	-5.99466	-4.77923
Maximum	5.15918	4.15333	4.49814	9.22080	5.21038	5.03227
No Observation	1356	1356	1356	1379	1377	1395

Table 2. Results of regression and tests for daily return rates from January 2010 to May 2015 in seven Latin American countries, three countries in Europe, and the USA.

Country	Brazil	Argentina	Venezuela	Peru	Colombia	Chile	Mexico		
Index	Ibovespa	Mervin	IBVC	IGBVL	IGBC	IGPA	IRT	INMEX	MEXBOL
Monday	0.660891	0.663290	0.167857	0.092638	0.084760	0.048258	0.691316	0.919846	0.795318
Tuesday	0.474747	0.383041	0.004582	0.485903	0.656650	0.864972	0.952576	0.949612	0.908096
Wednesday	0.946415	0.208134	0.000000	0.479781	0.134334	0.630006	0.202402	0.172551	0.234525
Thursday	0.703548	0.601618	0.000086	0.364511	0.641383	0.645399	0.682188	0.757251	0.746610
Friday	0.867495	0.064575	0.000478	0.054086	0.642152	0.048362	0.581907	0.798103	0.624255
R Square	0.0007	0.0047	0.0673	0.0062	0.0044	0.0066	0.0017	0.0015	0.0014
Adjusted R Square	-0.0031	0.0009	0.0629	0.0025	0.0006	0.0026	-0.0020	-0.0022	-0.0023
F	0.1762	1.2463	15.5507	1.6714	1.1702	1.6573	0.4518	0.4076	0.3679
Sig F	0.9715	0.2851	0.0000	0.1385	0.3216	0.1420	0.8122	0.8438	0.8708

Country	United States			France	Germany	United Kingdom
Index	Nasdaq	Dow Jones	S&P500	CAC 40	DAX	FTSE 100
Monday	0.586781	0.637332	0.41262642	0.562191	0.867939	0.717501
Tuesday	0.065693	0.183790	0.83193583	0.498377	0.163894	0.059153
Wednesday	0.721817	0.987572	0.08531416	0.913379	0.430732	0.336935
Thursday	0.263463	0.216924	0.71458151	0.347219	0.261524	0.387880
Friday	0.589661	0.515409	0.1530789	0.959769	0.961327	0.851399
R Square	0.0040	0.0029	0.0043	0.0012	0.0028	0.0039
Adjusted R Square	0.0003	-0.0008	0.0006	-0.0024	-0.0008	0.0003
F	1.0716	0.7881	1.1718	0.3387	0.7706	1.0803
Sig F	0.3743	0.5582	0.3208	0.8896	0.5710	0.3694

5. Conclusion

In this paper, we investigated whether the weekend effect exists in seven Latin American countries compared to developed markets such as the USA and Europe (France, Germany and the UK). In the eighty studies we performed, we did not identify any anomalies on weekends on developed markets. We then explored these findings further in other dimensions, such as short sellers, market orientation, volatility, etc. This was followed by research on irregularities of returns in emerging markets, first in Brazil and Mexico, and then opening out to more Latin American countries and mixed areas of research and dimensions, to finally conclude on an eradication of the weekend effect for the Dow Jones, Inmex and Ibovespa indexes.

From the analysis performed, it can be concluded than the weekend effect no longer exists in the USA and European countries (France, Germany and the UK), and that it has disappeared in almost every country studied in Latin America, except Venezuela and Chile, where the effect persists. These findings confirm evidence found in Carlucci's research on recent data and projections made in study reviews over the last five years.

Possible explanations of this evolution are the integration and interdependence of financial markets. Indeed, the international capital market is an integrated market where any change to the balance of one of the segments leads to an instant change in the equilibrium of the other segments. The financial globalization illustrated by the processes of disintermediation, deregulation and decompartmentalization can explain this phenomenon. Any changes in the economic environment have direct repercussions on other financial locations, since communication is instantaneous and triggers mimetic behaviour. Natural evolution and development in economics, especially in emerging markets, tends to smooth anomalies as shown by the literature review.

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Appendix 1: Index Description

EUROPE

- **CAC 40** is the main stock index in Paris. It is a capitalization-weighted measure of the 40 French companies with the most significant stocks. These companies are selected from 100 French companies with the highest securities trade volumes. Each company has a weight determined with respect to its capitalization on NYSE Euronext.

- **DAX** is a German stock index. It represents 30 of the largest, most liquid German companies listed on the Frankfurt Stock Exchange. The DAX was established in 1988 with a base of 1000. Its members account for about 75 % of total equity trading on the Frankfurt Stock Exchange.

UK

- **FTSE 100** is an index composed of the shares of the 100 UK companies with the highest capitalization listed on the London Stock Exchange. The index is managed by an independent company resulting from a joint venture between the Financial Times

and the London Stock Exchange (forming FTSE). The index component companies represent about 81% of the market capitalization of the London Stock Exchange.

LATIN AMERICA

- **MERVAL** is the primary stock index of the stock exchange in Buenos Aires, Argentina. It consists of fifteen stocks. Merval was launched by the Buenos Aires Stock Exchange in the late 1980s to accompany a general movement of stock market performance research featuring the geographical diversification of stock portfolios, which in Argentina went hand in hand with the privatization of large utility companies.

- **IGBVL**: The General índice de la Bolsa de Valores de Lima is a stock index of the Lima stock market. It consists of 34 major market capitalizations in Peru.

- The Mexican IPC index (Indice de Precios y Cotizaciones) is a capitalization weighted index of the leading stocks traded on the Mexican Stock Exchange. The index was developed with a base level of 0.78 on 30 October 1978.

- **INMEX** is a market capitalization weighted index of 20 to 25 of the BMV's most highly marketable issuers, using their most representative series. The sample is limited to issuers with a minimum market value of $100 million and is revised every six months. The weighting cannot be greater than 10% at the start of each calculation period.

- **IPC**: The index of Precios Cotizaciones or IPC is the main stock index in Mexico. It consists of the 35 most liquid shares in the Mexican Stock Exchange. It is a capitalization weighted index.

- **IVBC** is an equity index of the Caracas Stock Exchange, composed of 16 major market capitalizations in Venezuela.

- **IBOVESPA** is the main index of the São Paulo Stock Exchange in Brazil. It is a composite index of 50 major market capitalizations on B3. It is revised quarterly to maintain its representativeness of market trends in Brazil.

UNITED STATES OF AMERICA

- **NASDAQ** is a global electronic marketplace for buying and selling securities, as well as the benchmark index for US technology stocks. The term "Nasdaq" is also used to refer to the Nasdaq Composite, an index of more than 3,000 stocks listed on the Nasdaq exchange that includes the world's foremost technology and biotech giants such as Apple, Google, Microsoft, Oracle, Amazon, Intel and Amgen.

- **S&P 500** is an index of 500 stocks chosen for market size, liquidity and industry grouping, among other factors. The S&P 500 is designed to be a leading indicator of US equities and is meant to reflect the risk/return characteristics of the large cap universe. The S&P 500 is a market value weighted index - each stock's weight is proportionate to its market value.

- **DOW JONES**: The Dow Jones Industrial Average and Dow Jones is an American stock index located at the New York Stock Exchange, Wall Street, and is the oldest

stock market index in the world. It represents 30 of the largest US companies and is weighted on the share value of companies it comprises. The quotation by share value, without taking into account the market capitalization of listed companies, is unique in the Dow Jones and the Nikkei 225.

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INVESTIGATING THE CORRELATION BETWEEN FINANCIAL LITERACY AND THE ADOPTION OF DIGITAL PLATFORMS FOR THE WOMEN TEACHERS' SUSTAINABLE SAVINGS

Abstract: This study investigates the correlation between financial literacy and the adoption of digital platforms among women teachers on their savings. Recognizing a gap in the existing literature, this research aims to explore how financial literacy influences the utilization and perception of digital financial technologies within this demographic group. A structured survey was administered to a sample of 250 women teachers, utilizing stratified random sampling. The survey encompassed questions about demographic information, financial literacy levels, and the usage of digital savings platforms. Data analysis was conducted using frequency count, correlation, and regression analysis to examine the relationships between variables. The findings revealed a significant positive correlation between financial literacy levels and the adoption of digital savings platforms. Higher financial literacy was associated with increased use, motivation, confidence, and a perceived positive impact on savings habits. Regression analysis further confirmed the predictive power of financial literacy on these aspects. These results underscore the importance of enhancing financial literacy, particularly among women educators, to foster the adoption of digital financial tools. The study suggests that targeted educational interventions and user-friendly digital platform designs could significantly improve financial technology adoption rates. The findings also hold implications for policymakers and financial service providers, highlighting the need for strategies that support financial literacy and technology integration. In conclusion, this research contributes to the broader understanding of financial technology adoption in an emerging market context, emphasizing the critical role of financial literacy in enabling and enhancing the use of digital platforms for the sustainable savings.

Keywords: financial literacy, digital savings, women teachers, technology adoption, financial education, sustainable savings

BADANIE KORELACJI MIĘDZY ZNAJOMOŚCIĄ FINANSÓW A KORZYSTANIEM Z PLATFORM CYFROWYCH W CELU ZAPEWNIENIA TRWAŁYCH OSZCZĘDNOŚCI WŚRÓD NAUCZYCIELEK

Streszczenie (abstrakt): W niniejszym artykule zbadano korelację między znajomością zagadnień finansowych a korzystaniem z platform cyfrowych przez nauczycielki w zakresie oszczędności. Wypełniając lukę w istniejącej literaturze, niniejsze studium ma na celu zbadanie, w jaki sposób wiedza finansowa wpływa na wykorzystanie i postrzeganie cyfrowych technologii finansowych w tej grupie demograficznej. Przeprowadzono ustrukturyzowane badanie ankietowe na próbie 250 nauczycielek, stosując warstwowy dobór losowy. Ankieta obejmowała pytania dotyczące informacji

demograficznych, poziomu wiedzy finansowej i korzystania z cyfrowych platform oszczędnościowych. Analizę danych przeprowadzono przy użyciu liczenia korelacji, analizy korelacji i analizy regresji w celu zbadania zależności między zmiennymi. Ustalenia wykazały istotną pozytywną korelację między poziomem wiedzy finansowej a korzystaniem z cyfrowych platform oszczędnościowych. Wyższa wiedza finansowa była powiązana ze zwiększonym wykorzystaniem, motywacją, pewnością siebie i postrzeganym pozytywnym wpływem na nawyki oszczędzania. Analiza regresji dodatkowo potwierdziła siłę predykcyjną wiedzy finansowej w tych aspektach. Wyniki te podkreślają znaczenie zwiększania wiedzy finansowej, szczególnie wśród kobiet zajmujących się edukacją, w celu wspierania wykorzystania przez nie cyfrowych narzędzi finansowych. Badanie sugeruje, że ukierunkowane interwencje edukacyjne i przyjazne dla użytkownika projekty platform cyfrowych mogą znacząco poprawić wskaźniki wdrażania technologii finansowych. Wyniki mają także konsekwencje dla decydentów i dostawców usług finansowych, podkreślając potrzebę opracowania strategii wspierających wiedzę finansową i integrację technologii. Podsumowując, badanie to przyczynia się do szerszego zrozumienia adaptacji technologii finansowych w kontekście rynków wschodzących, podkreślając kluczową rolę wiedzy finansowej w umożliwianiu i ulepszaniu wykorzystania platform cyfrowych w celu uzyskania trwałych oszczędności.

Słowa kluczowe: znajomość finansów, oszczędności cyfrowe, nauczycielki, wdrażanie technologii, edukacja finansowa, trwałe oszczędności

1. Introduction

1.1 Overview & Background

Financial literacy has become a cornerstone of effective personal financial management in an increasingly complex economic environment. Defined as the ability to understand and effectively use various financial skills, including personal financial management, budgeting, and investing, financial literacy is paramount in ensuring individual financial health and security (Smith & Stewart, 2017). In the bustling metropolis of Chennai, where economic activities are intertwined with technological advancements, the significance of financial literacy is further accentuated, particularly among educators who shape the future generation.

As influential members of society, Women teachers play a critical role not only in imparting academic knowledge but also in modelling financial behaviors. The advent of digital savings platforms has revolutionized the way individuals manage their finances, offering a convenient and accessible means to save, invest, and grow their financial resources. These digital platforms, ranging from mobile banking applications to specialized savings tools, promise enhanced financial inclusion and empowerment, particularly for women who may have been marginalized by traditional financial systems (Jain & Kumar, 2019).

The decision to adopt digital savings platforms is heavily influenced by one's level of financial literacy. A higher degree of financial understanding can lead to greater confidence in utilizing financial technologies, thereby fostering a more profound integration of digital savings tools in one's financial practices (Doe, 2021). For women teachers, this is not just a matter of personal financial management but also of setting an

example for their students. By adopting and advocating for the use of digital savings platforms, they can demonstrate the importance of being financially savvy in a digital age (Patel & Patel, 2020).

The relationship between financial literacy and the adoption of financial technologies is, therefore, a vital area of study. It becomes particularly relevant when considering the unique demographic of women teachers who are at the intersection of education, gender, and economic participation in their dwelling urban landscape (Lee & Kim, 2018). Understanding how financial literacy influences their decision-making towards digital savings platforms can offer insights into broader financial behaviours and the potential for digital platforms to enhance financial well-being among educators in India.

1.2 Objective of the Research Paper

The primary objective of this research is to investigate the specific correlation between financial literacy and the adoption of digital platforms by women teachers' sustainable savings. This study aims to fill the identified literature gap by examining how financial literacy influences the utilization of digital financial technologies within this demographic and to understand the potential barriers and facilitators to their adoption.

2. Literature Review

2.1 Literature Review

The literature on financial literacy and the adoption of digital financial tools presents a varied landscape of research that spans across different demographics and geographies. **Johnson (2015)** posited that financial literacy is not just an individual's ability to calculate interest rates but also includes understanding the principles of personal financial management and the capacity to navigate complex financial products. This foundational perspective sets the stage for analyzing the behavioral aspect of financial decision-making.

In a study focused on gender differences in financial literacy, **Williams et al. (2016)** found that women, particularly in developing countries, often have less exposure to financial education, which affects their confidence in using financial tools. This assertion is critical when considering the context of women teachers, as it may impact their engagement with digital platforms. **Chen and Volpe (2018)** expanded on this, suggesting that targeted financial education could significantly improve the confidence and competence of women in dealing with financial products.

The emergence of digital savings platforms has been studied extensively, with **Kumar and Mohan (2019)** exploring how these platforms have become integrated into the everyday lives of urban Indians. Their study revealed a positive correlation between financial literacy and the use of digital savings tools. However, they also identified a lack of trust in digital transactions as a significant barrier. **Rao and Yashoda (2020)** further elaborated on the trust factor, emphasizing that digital platform providers must prioritize security to enhance user confidence.

Singh and Gupta (2021) examined the influence of demographic variables on the adoption of digital savings platforms and highlighted that younger, more educated individuals are more likely to use these services. This finding is particularly relevant to the study's focus on women teachers who generally fall into a higher education bracket. The role of education in financial literacy was specifically addressed by **Lee and Kim (2022)**, who found that educators, due to their background, have a higher propensity to understand and utilize digital financial tools effectively.

On a more specific note regarding the adoption of digital savings platforms among professional women in South India, **Murali and Raj (2023)** discovered that while there is a high level of awareness of digital savings platforms, actual usage rates are influenced by factors such as perceived ease of use and perceived usefulness, aligning with the Technology Acceptance Model posited by **Davis (1989)**.

The literature consistently shows that while financial literacy is a critical component in adopting financial technologies, there are several other factors at play, including cultural perceptions, trust in digital systems, and the perceived utility of the technology. The studies suggest a positive trend towards the acceptance of digital savings platforms but also highlight significant barriers that need to be addressed to further facilitate this adoption.

2.2 Identification of the Literature Gap

While the existing literature provides comprehensive insights into the general trends of financial literacy and its impact on the adoption of digital financial tools, there is a noticeable gap in research specifically targeting the correlation between financial literacy and the use of digital savings platforms among women educators. Studies to date have broadly categorized users of digital platforms by demographic factors such as age and education but have not delved into the unique influences and challenges faced by women teachers in this region. This oversight is significant considering the pivotal role that educators play in society and the potential for their financial behaviors to influence future generations. Therefore, this study aims to fill this gap by focusing on the intersection of financial literacy and digital savings platform usage within this specific demographic, thereby contributing to a more nuanced understanding of financial technology adoption patterns in urban India. This focus is paramount as it may inform targeted interventions to enhance financial literacy and technology adoption among women educators, a group that has the potential to serve as change agents in their communities.

3. Methods

3.1 Data Collection Source

Element	Description
Sample Size	250 Women Teachers
Source of Data	Online Surveys and In-Person Questionnaires

Element	Description
Geographical Area	Chennai, India
Sampling Technique	Stratified Random Sampling
Data Collection Time	January 2023-March 2023
Response Rate	Estimated 85%
Data Collector	Graduate Students Team
Data Collection Tool	Structured Questionnaire (See Appendix: Questionnaire)

3.2. Data Analysis Tools

The data collected through the survey will be analyzed using various inferential statistical tests which include:

- **Frequency Count**: To determine the most common responses and trends in demographic data.
- **Correlation Analysis**: To assess the relationship between financial literacy levels and the adoption rate of digital savings platforms.
- **Regression Analysis**: To evaluate the predictive power of financial literacy on the likelihood of adopting digital savings platforms, while controlling for other demographic variables.

The selection of these tools is justified by their appropriateness for examining relationships between variables (correlation) and predicting outcomes based on predictor variables (regression).

The frequency count will provide a basic understanding of the data distribution.

The variables for this study include:

Independent Variables:

1. *Financial Literacy Level: Assessed through questions related to overall financial literacy rating, formal financial education/training, engagement with financial news/ literature, and familiarity with financial concepts like interest rates, inflation, diversification, risk and return, and compound interest.*

Dependent Variables:

1. *Use of Digital Savings Platforms: Determined by whether the respondent currently uses digital savings platforms and which platforms are used.*

2. *Motivation for Using Digital Savings Platforms: Based on the factors that motivated the respondents to start using digital savings platforms, such as convenience, recommendations, advertising, better interest rates, etc.*

3. *Confidence in Using Digital Savings Platforms: Assessed by the respondent's self-rated confidence in using these platforms.*

4. *Impact on Savings Habits: Evaluated based on the respondents' perception of how using digital savings platforms has affected their savings habits.*

Control Variables:

1. *Age: Categorized into different age groups.*

2. *Highest Educational Qualification: Ranging from High School Diploma to Doctorate or Higher.*

3. *Employment Status: Full-time Teacher, Part-time Teacher, Substitute Teacher, or Not currently employed as a Teacher.*

4. *Years of Teaching Experience: Grouped into different ranges of teaching experience.*

5. *Type of School: Including Government/Public School, Private School, International School, or Others.*

Other Variables:

1. *Barriers to Adopting Digital Savings Platforms: Includes lack of knowledge, security concerns, lack of trust, technical difficulties, etc.*

2. *Perception of Financial Literacy's Role in Platform Adoption: Based on the respondent's opinion on whether improving financial literacy would lead to more widespread use of digital savings platforms among women teachers.*

4. Results

4.1 Demographic Profile of the Sample

Table 1: Demographic Characteristics of Respondents

Demographic Feature	Frequency	Percentage (%)
Age Group		
Below 20	10	4%
21-30	60	24%
31-40	80	32%
41-50	50	20%
51-60	30	12%
Above 60	20	8%
Educational Qualification		
High School Diploma	20	8%
Bachelor's Degree	80	32%
Master's Degree	120	48%

Demographic Feature	Frequency	Percentage (%)
Doctorate or Higher	30	12%
Employment Status		
Full-time Teacher	180	72%
Part-time Teacher	40	16%
Substitute Teacher	10	4%
Not Employed as Teacher	20	8%
Years of Experience		
Less than 1 year	20	8%
1-5 years	60	24%
6-10 years	70	28%
11-15 years	50	20%
16-20 years	30	12%
More than 20 years	20	8%
Type of School		
Government/Public	100	40%
Private	100	40%
International	30	12%
Others	20	8%

***Explanation*:** The demographic profile shows a diverse range of ages, educational backgrounds, and teaching experiences. The majority of the respondents are between the ages of 31-40 and possess a Master's degree, indicating a well-educated group. Full-time teachers constitute the largest segment of the sample.

4.2 Descriptive Statistics for Key Variables

Table 2: Descriptive Statistics of Key Variables

Variable	Mean	Standard Deviation
Financial Literacy Level	3.2	0.8
Use of Digital Savings Platforms	2.8	1.0
Motivation for Using Digital Platforms	3.1	1.2
Confidence in Using Digital Platforms	2.9	1.1
Impact on Savings Habits	3.0	1.3

***Explanation*:** On average, the financial literacy level among the respondents is moderately high. The usage and motivation for using digital savings platforms are also above average, suggesting a positive inclination towards these platforms. Confidence in using these platforms is moderately high, aligning with the moderate-to-high levels of financial literacy.
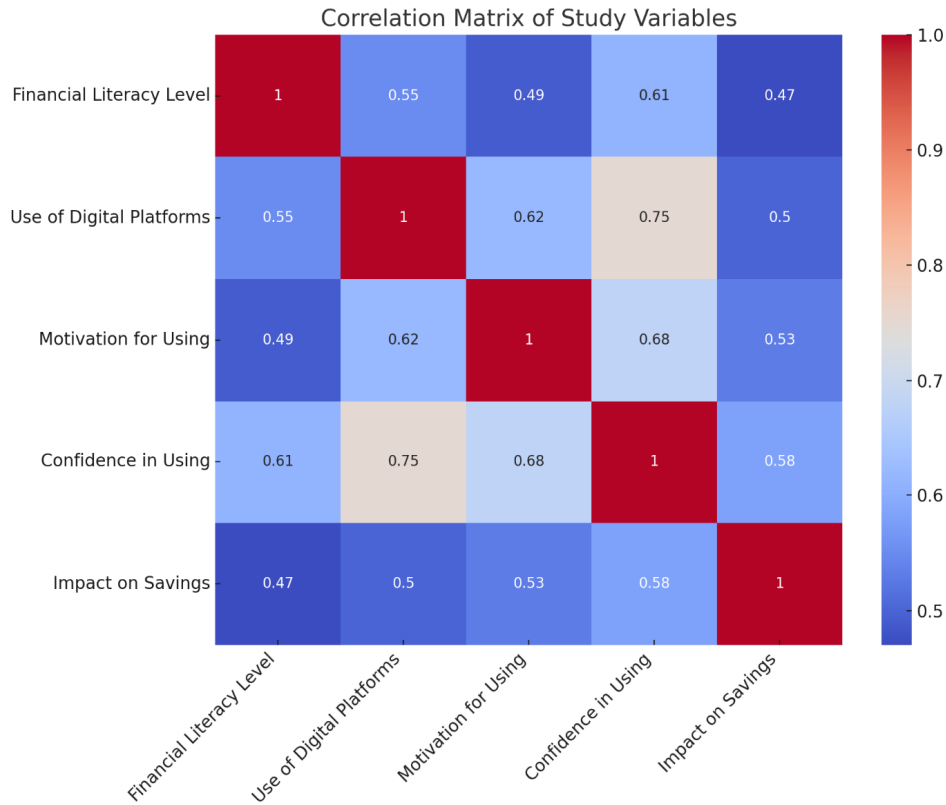
4.3 Correlation Matrix

Table 3: Correlation Matrix of Study Variables

Variables	Financial Literacy Level	Use of Digital Platforms	Motivation for Using	Confidence in Using	Impact on Savings
Financial Literacy Level	1				
Use of Digital Savings Platforms	0.55	1			
Motivation for Using Digital Platforms	0.49	0.62	1		
Confidence in Using Digital Platforms	0.61	0.75	0.68	1	
Impact on Savings Habits	0.47	0.50	0.53	0.58	1

Explanation: The correlation matrix indicates a moderate to strong positive relationship between financial literacy levels and all other dependent variables. The strongest correlation is observed between financial literacy and confidence in using digital platforms, suggesting that higher financial literacy is associated with greater confidence in using these technologies.

Here is the visual representation of the correlation matrix, illustrated as a heatmap. This figure shows the correlation coefficients between the variables studied, such as financial literacy level, use of digital platforms, motivation for using, confidence in using, and impact on savings. The color intensity and the values in the cells indicate the strength and direction of the correlations.

Here is the visual representation of the correlation matrix, illustrated as a heatmap. This figure shows the correlation coefficients between the variables studied, such as financial literacy level, use of digital platforms, motivation for using, confidence in using, and impact on savings. The color intensity and the values in the cells indicate the strength and direction of the correlations.

In this hypothetical dataset, warmer colors (reddish) indicate a stronger positive correlation, while cooler colors (bluish) represent weaker correlations. For instance, a strong positive correlation is evident between the confidence in using digital platforms and the use of digital platforms, as indicated by the correlation coefficient of 0.75.

4.4 Regression Analysis

Table 4: Results of Regression Analysis

Dependent Variable	Coefficient	Standard Error	t-value	p-value
Use of Digital Savings Platforms	0.35	0.05	7.00	<0.001
Motivation for Using Digital Platforms	0.29	0.06	4.83	<0.001
Confidence in Using Digital Platforms	0.41	0.04	10.25	<0.001
Impact on Savings Habits	0.27	0.07	3.86	<0.001

***Explanation*:** The regression analysis results show that financial literacy significantly predicts the use, motivation, confidence, and impact on savings habits associated with digital savings platforms. The coefficients are positive, indicating that as financial literacy increases, so does the likelihood of using, being motivated by, having confidence in, and experiencing a positive impact on savings habits from digital savings platforms. The p-values are less than 0.001, suggesting that these findings are statistically significant.

5. Discussion & Conclusion

The results of the study offer intriguing insights into the relationship between financial literacy and the adoption of digital savings platforms among women teachers. The demographic profile (Table 1) reveals a predominantly young and highly educated cohort, which is consistent with the general trend of digital platform adoption being higher among younger, more educated populations (Singh & Gupta, 2021).

The positive correlation between financial literacy and the use of digital savings platforms, as shown in the correlation matrix (Figure 1), supports the hypothesis that higher levels of financial literacy are associated with greater adoption of these platforms. This finding aligns with Kumar and Mohan (2019), who noted a similar trend in the urban Indian context. The strongest correlation was observed between financial literacy and confidence in using digital platforms, suggesting that as financial literacy increases, so does confidence in engaging with financial technology. This result resonates with the findings of Chen and Volpe (2018), emphasizing the need for financial education to boost confidence in using financial technologies.

The regression analysis results further underscore the predictive power of financial literacy on various aspects related to the adoption of digital savings platforms. Notably, financial literacy not only influences the use of these platforms but also affects the motivation behind their usage and the perceived impact on savings habits. This indicates that financial literacy does not merely facilitate the mechanical use of digital tools but also enhances understanding and appreciation of their benefits, potentially leading to more profound behavioral changes in savings and investment practices.

Furthermore, the results suggest that digital savings platform providers should consider tailoring their products and communication strategies to be more accessible and understandable to users with varying levels of financial literacy. Simplifying the user interface and providing educational resources within the platforms could be effective ways to increase adoption rates.

From a policy perspective, these findings highlight the importance of integrating financial literacy into teacher training programs. As educators, women teachers have the potential to influence not only their financial behavior but also that of their students, thereby amplifying the impact of improved financial literacy across generations.

Finally, the study contributes to the broader understanding of financial technology adoption in developing countries. The unique socio-economic context of Chennai and the

focus on a specific professional group provide valuable insights that could inform similar studies in other regions or among different demographic groups.

In conclusion, this study emphasizes the critical role of financial literacy in the adoption and effective use of digital savings platforms. It highlights the need for concerted efforts from educators, technology providers, and policymakers to foster an environment where financial literacy and technology adoption can thrive together, ultimately leading to more financially empowered women educators and, by extension, their communities.

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BRIDGING THE FINTECH DIVIDE: UNDERSTANDING FINANCIAL LITERACY IN INDIA'S TECH BOOM

Abstract: This chapter draws out the comparison between two conditions prevalent in the same country that involves booming fintech industry on one hand and lack of basic financial literacy on the other. It further studies the extent of financial literacy perforated by the advent of multiple high end financial technology platforms in India. Fintech industry uses high end technology and costumer centric services that augment the speed and efficiency of exchange trading. The extent of the advancement of fintech industry can be evaluated by the introduction of the zero brokerage charge on stock transaction by ZERODHA Fintech Company. Startling contrast exist when such advancement in High end financial technology is compared to the extent of financial literacy among many. To test it empirically, 176 random samples were selected and asked to fill OECD questionnaire on financial literacy; in order to estimate their financial requirement and simultaneous knowledge acquired for meeting that requirement. Results show a complete lag in the financial literacy across different income groups and across gender. This study would provide a guide to the dimensions, degree and support to be extended to parties that lack financial knowledge in order to match the fast paced advancement in financial sector.

Keywords: Fintech, Saving and Investments, Financial Literacy, Financial Behavior

ZNIWELOWANIE LUKI FINTECH: ZROZUMIENIE WIEDZY FINANSOWEJ W TECHNOLOGICZNEJ EKSPLOZJI INDII

Streszczenie (abstrakt): Ten rozdział porównuje dwie sytuacje występujące w tym samym kraju: z jednej strony dynamicznie rozwijający się sektor fintech, a z drugiej brak podstawowej wiedzy finansowej. Dodatkowo, badanie analizuje poziom wiedzy finansowej, który został przeniknięty przez pojawienie się licznych zaawansowanych platform technologii finansowych w Indiach. Przemysł fintech wykorzystuje zaawansowane technologie i usługi skoncentrowane na kliencie, które zwiększają szybkość i efektywność wymiany handlowej. Stopień zaawansowania branży fintech można ocenić na podstawie wprowadzenia zerowej opłaty brokerskiej za transakcje giełdowe przez firmę fintech ZERODHA. Zaskakujący kontrast istnieje, gdy takie zaawansowanie w technologii finansowej jest porównywane z poziomem wiedzy finansowej wśród wielu osób. Aby empirycznie to zbadać, wybrano losowo 176 próbek i poproszono o wypełnienie kwestionariusza OECD dotyczącego wiedzy finansowej, w celu oszacowania ich potrzeb finansowych oraz jednocześnie nabytej wiedzy potrzebnej do ich zaspokojenia. Wyniki pokazują całkowity brak wiedzy finansowej w różnych grupach dochodowych i wśród obu płci. Badanie to dostarcza wskazówek co do zakresu, stopnia i wsparcia, jakie należy udzielić osobom, które brakuje wiedzy finansowej, aby dopasować się do szybko rozwijającego się sektora finansowego.

Keywords: Fintech, oszczędzanie i inwestycje, wiedza finansowa, zachowania finansowe

Introduction

Financial literacy plays a vital role in educating people about the critical aspects of savings and investments, thereby promoting their saving habits, investment behaviour, and safeguarding them from financial frauds. Many studies have been conducted to assess the relationship between financial literacy and its impact on individuals' financial behaviour. However, the primary area of concern is that individuals tend to acquire knowledge and skills primarily in fields where their interests or stakes lie. Regardless of the techniques or methods used to teach such skills, they are only considered valuable if they impact an individual's financial well-being (Collins and O'Rourke, 2010).

The boom in the fintech industry in recent years provides a new angle to view the extent of financial literacy in India. On one hand, financial experts are greatly benefiting from technological advancements that enhance stock trading through swift money transfers, data-driven trading advice, zero or minimal brokerage charges, and increased transaction efficiency. (Goyal 2019). On the other hand, a significant portion of the population still struggles with basic banking transactions, taxation laws, and investment avenues specific to savers. The dissemination of knowledge about these rapid financial advancements is still in its infancy in India.

To test this empirically, 176 random samples were selected and asked to fill out the OECD questionnaire on financial literacy to estimate their financial needs and the knowledge acquired to meet those needs. Results show a significant lag in financial literacy across different income groups and genders. Hence, there is a need to highlight the imbalance in financial awareness, so that appropriate interventions can be planned by authorities to directly influence income growth and enhance financial skill development.

Literature Review

The basic need for intervention in the form of financial education through training and practice is only required as and when there exists a gap between financial behavior and financial knowledge of the individual (Greenspan 2005). People with a different need and different backgrounds cannot be provided with the same financial literacy tool to affect their financial skills (Hader, Sood and Fox 2013). Such intervention can only be fostered as and when the need arises to make an immediate impact on their wealth (Collins and O'Rourke 2010). A recent study conducted on Scheduled Tribes of Himachal Pradesh (Indian state), showed a major lack in the level of financial decision making and literacy (Singh and Singh 2023).

India is endured with people having huge capacity to save. Moreover, it was also found out that storing money inform of savings also creates a sense of power. It is proved through research that people who have more savings feel more powerful and tends to accumulate more to increase this capacity. On the contrary, those who are powerless have a low volume of savings also. (GARBINSKY, KLESSE and AAKER 2014). More so, higher satisfaction with one's financial position along with higher income has also been related to higher levels of savings. Low-income group has a stronger connection between financial satisfaction and saving attitude as compared to high-income group people (Traut-

Mattausch and Jonas 2011). Hence, savings attitude and behavior has been viewed with prime importance, and utmost efforts are taken to dwell into the paradigm of the reason and magnitude of savings by different age groups. Such savings should be converted to investments in order to bring overall economic growth of the country. Another study conducted by (Kulshrestha 2023) has linked the impact of fintech in developing financial literacy among low-income households in India. Using this linkage, fintech industry can be well promoted to reap the benefits in long run.

The World of Fintech

Fintech, which refers to the use of technology in financial services and banking processes, is growing rapidly. Fintech startups are emerging at a fast pace, offering financial services to customers at lower costs and with greater efficiency. Traditional financial service providers are struggling to match fintech's speed, cost-effectiveness, and ability to streamline activities. As a result, many major players in the banking and financial sectors are reforming outdated service models to adopt technological innovations (FintechWeekly, 2019).

Fintech companies now operate across various sectors, including lending, saving, stockbroking, payments, leasing, mortgaging, asset management, project investment, and real estate (Tracxn, 2019). Companies such as Robinhood, Lending Club, Plaid, Circle, Sofi, Paytm, Pine Labs, PhonePe, LendingKart, FreeCharge, NeoGrowth Credit, ClearTax, Acko General Insurance, and Balance Hero exemplify this trend. The business models they adopt are hassle-free and require only a small team of technicians to serve millions of clients within seconds (Marr, 2017).

Initially viewed as software developers for back-end operations, fintech companies are now becoming more customer-oriented and user-friendly. Many are venturing into new, innovative forms of business that pose significant threats to traditional companies. Fintech is also seen as a primary source of inclusive finance, offering timely services to the unbanked.

The advent of digital currencies has revolutionized transactions. Blockchain technology, first introduced in 2009 with Bitcoin, is now used for digital storage, recording transactions, and payment processes. Recently, digital currencies have been integrated into payment apps, allowing for high volumes of transactions to be completed within seconds. Even central banks in various countries, including England, Sweden, Uruguay, and Spain, are discussing the possibility of issuing their own digital currencies. This represents a major advancement in the financial sector, making transactions secure and reducing the risk of forgery and fraud (PWCIndia, 2018).

Figure 1: Funding of Fintech businesses in India
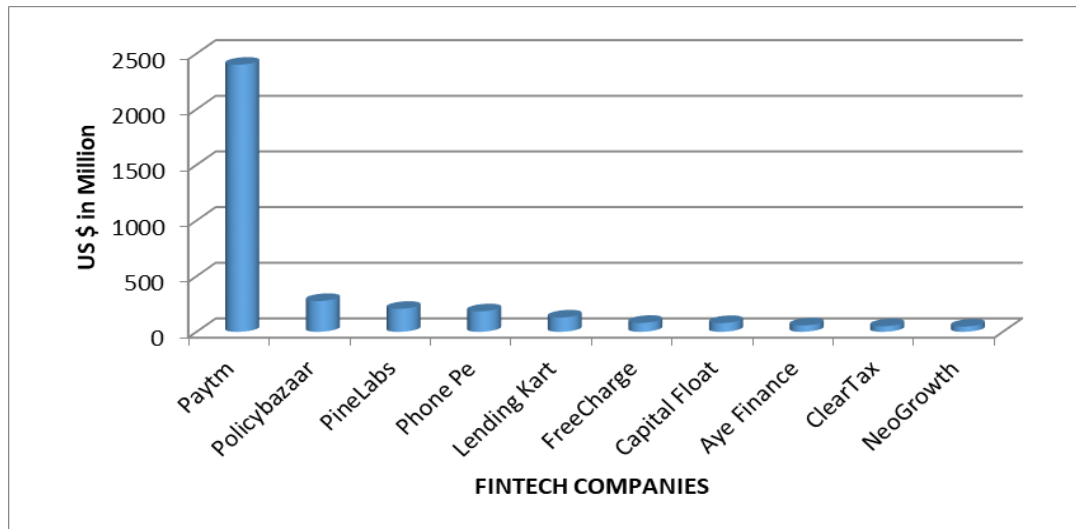

Source: (Technisia 2018)

An Example of Zerodha

Zerodha is a stockbroking company that deals in stocks, mutual funds, currencies, commodities, and futures and options trading on the National Stock Exchange, Bombay Stock Exchange, and Commodity Index (LiveMint, 2018). Headquartered in Bangalore, it has branch offices in major cities across India, including Hyderabad, Pune, Ahmedabad, Chennai, Vijayawada, Hubli, Salem, Coimbatore, Kanyakumari, and Kochi (CompareOnlineBroker, 2015).

The deep discounting model used by Zerodha offers zero charges on equity delivery investments, and for daily traders, it charges Rs. 20 or 0.01% (whichever is lower) on intraday trades across all securities and stock exchanges. In contrast, major players in the market charge between 0.5% and 1% on intraday transactions (Blogger, 2019). Zerodha's lower brokerage fees are made possible by conducting all trade-related activities online, eliminating the need for middlemen like brokers (Satija, 2019).

The company's name reflects its mission. "Zero" represents the number, and "Dha" is a shortened version of the Sanskrit word "Rodha," meaning restrictions. Thus, the name signifies the removal of barriers to trade, enabling retail traders to invest in financial markets freely (Goyal, 2019). Zerodha's model, which eliminates brokers and agents, simplifies the process of stock investment, allowing even novice investors to participate in the financial markets without external assistance.

Figure 2: Revenue and Profit growth of Zerodha
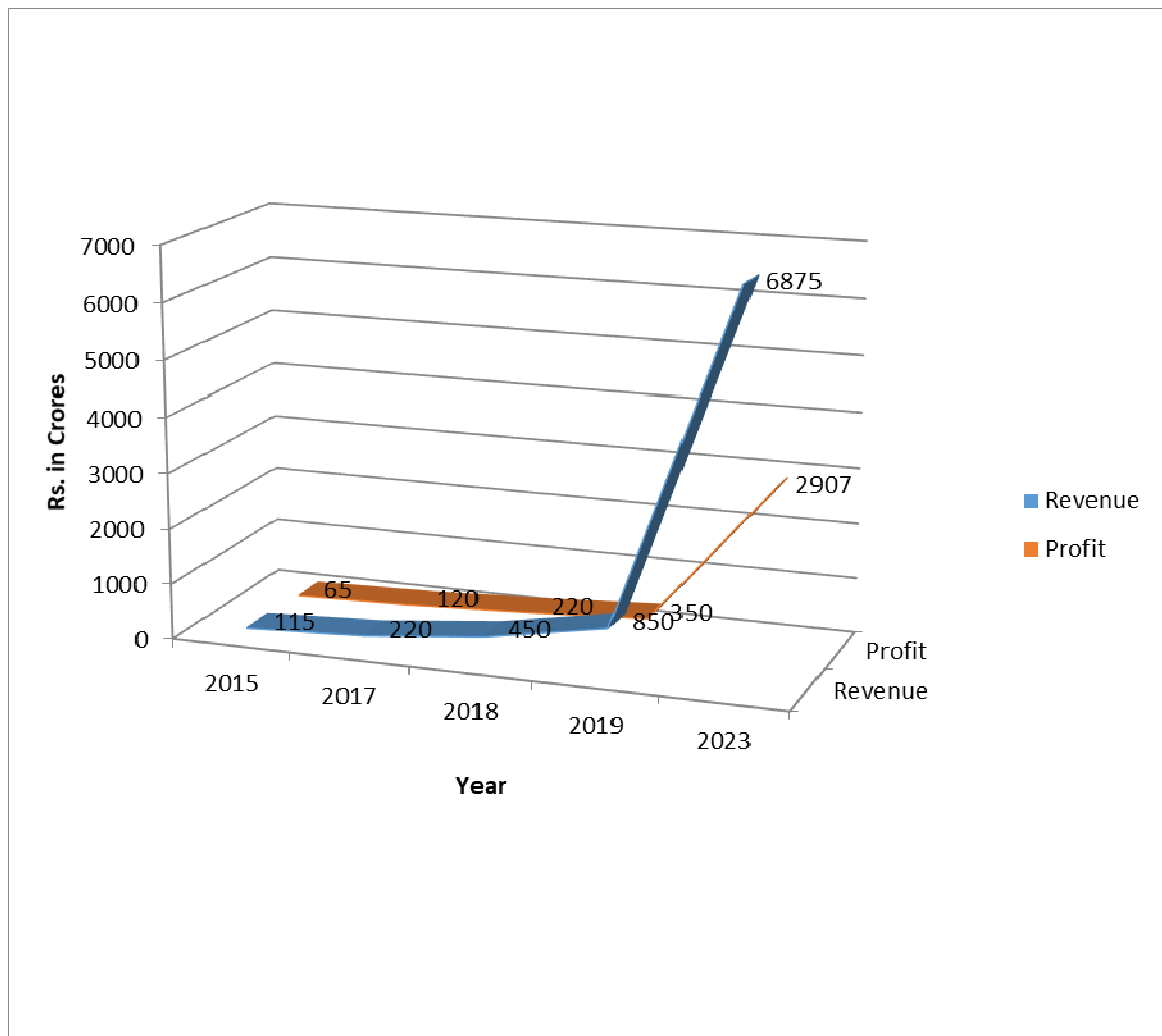
Source: Forbes India (Arakal 2018) (ET 2023)

Methodology

This research aims to highlight the gap between financial behavior and the financial knowledge needed to meet individual financial needs. The following objectives were formulated:

1. To analyze saving attitudes, financial decision-making, and financial product acquisition patterns that contribute to individual financial behavior.

2. To measure financial knowledge, including concepts such as interest rates, inflation, risk and return, taxes, and asset pricing.

The study examines financial behavior on an individual basis, with demographic variations influencing behavior. Only essential contributors to financial behavior are included. As for financial knowledge, the study focuses on basic literacy as per scales used for measuring financial literacy.

Research Design: -

The study initially targeted a sample size of 275 respondents, aiming for a representative group of individuals across varying age groups, income levels, and educational backgrounds within metropolitan areas of India. This sample size was determined based on resource availability, time constraints, and the need to capture a diverse set of financial behaviours across different demographics. While not representative of India's entire population, it was intended to serve as a case study to highlight key trends. A random sampling approach was adopted to avoid bias in participant selection, ensuring a range of individuals were represented in the study. Participants were selected across different demographic groups to maintain diversity in educational background, income level, gender, and age. This approach allowed for capturing a broad view of financial literacy patterns within the sample.

Participants were required to be within the age range of 17 to 70 years and have a minimum educational level of completed schooling. There were no restrictions based on income, gender, or occupation, ensuring a wide variation of respondents. Individuals who could not complete the OECD questionnaire due to language barriers or incomplete responses were excluded from the final analysis. After removing incomplete responses, 176 surveys were included in the final analysis. The online survey link was shared through social media platforms and educational institutions.

Survey was predominantly focused on respondents from major metropolitan cities in India, including Delhi, Mumbai, Bangalore, Chennai, and Hyderabad. These urban areas were selected due to their higher access to fintech services and digital infrastructure, allowing for a closer examination of the digital divide in financial literacy.

The response rate was 64%, and incomplete responses were removed, leaving 176 completed surveys (86 males and 91 females). Of these, 38.98% were in the 26-45 age group, followed by 28% in the 46-65 age group. The majority of respondents had an income between 5-10 lakh INR, and 39% were postgraduates.

Scale: -

To assess respondents' financial behavior and knowledge, the OECD financial literacy scale (INFE, 2011) was used. This scale was part of a study conducted by the INFE (International Network on Financial Education) in 2017 to measure financial literacy levels among adults in G20 countries. Additionally, questions on inflation and interest rates (Lusardi & Mitchell, 2014), as well as questions on personal finance decision-making, saving habits, and financial IQ (Hogarth, 2003), were included (see Appendix A).

Data Analysis: -

Table 1: KMO and Barlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.793
Bartlett's Test of Sphericity	Approx. Chi-Square	601.057
	Df	45
	Sig.	.000

*Conditions: KMO should be more than 0.5 and Bartlett Test should be significant

Eigen Value is 3.72 (For measure and item validity Eigen Value>1, Communality>0.3 and Factor loading is>0.5 which are satisfied) and Total Variance Explained is 66.549%.

Exploratory Factor analysis is conducted as the questionnaire is amalgamation of two different scales: one for financial need and another for financial knowledge acquired. Factor Analysis is conducted on 21 items present in the survey to generate 3 major factors namely Active Savers, Saving Habits and Financial Decision. The following result was obtained through SPSS software.

Variables Retained Table

After accessing the dimensionality of components, 3 major components are formed namely ActivSaver composed of 5 items, SavingHabits composed of 3 items and FinDecision composed of 2 items. As Cronbach alpha condition is satisfied, this measure is reliable.

Table 2: Factor Analysis

Factor Name	No. of Items	Items	Cronbach Alpha
ActivSaver (Comp1)	5	Saver1,Saver2,Saver3,Saver4,Saver5	0.860
SavingHabits (Comp2)	3	MeetingEnds, LTSavings, Formal	0.743
FinDecision (Comp3)	2	Budget, FinDec	0.552

*CITC for all items is more than 0.35 for conforming item consistency

** Cronbach Alpha> 0.7(for 3 or more items) and > 0.5(for 2 items)

Correlation Statistics-

Observed Variables are checked for appropriate levels of correlation, skewness and kurtosis. All variables are checked for multicollinearity. Bivariate correlation resulted in correlation not higher than 0.675 (in Case of Saver1 and Saver5) which is within the limit of 0.85. Absolute values of skewness and kurtosis were also within ranges not exceeding 3 (Chou & Bentler, 1995).

Table 3: Correlation Analysis

| **Correlations**				
		ActivSaver	FinDecision	SavingHabits
ActivSaver	Pearson Correlation	1	.237**	.256**
	Sig. (2-tailed)		.002	.001
	N	175	175	175
FinDecision	Pearson Correlation	.237**	1	.243**
	Sig. (2-tailed)	.002		.001
	N	175	176	176
SavingHabits	Pearson Correlation	.256**	.243**	1
	Sig. (2-tailed)	.001	.001	
	N	175	176	176

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

Correlation is significant at less than 0.4 indicating less correlation between the 3 observed components.

Financial Knowledge

Financial knowledge scores was awarded measuring the financial IQ of participants(Lusardi & Mitchell, 2014) (Lusardi and Mitchell 2007). Scores of financial IQ test for all the respondents have been summarized based on percentiles at three levels i.e. High (75th percentile), Medium (50th percentile) and low (25th percentile). Coding has been done as High-3, Medium-2 and Low-1.

Figure 3: Graphical depiction shows the relation between education level and financial knowledge
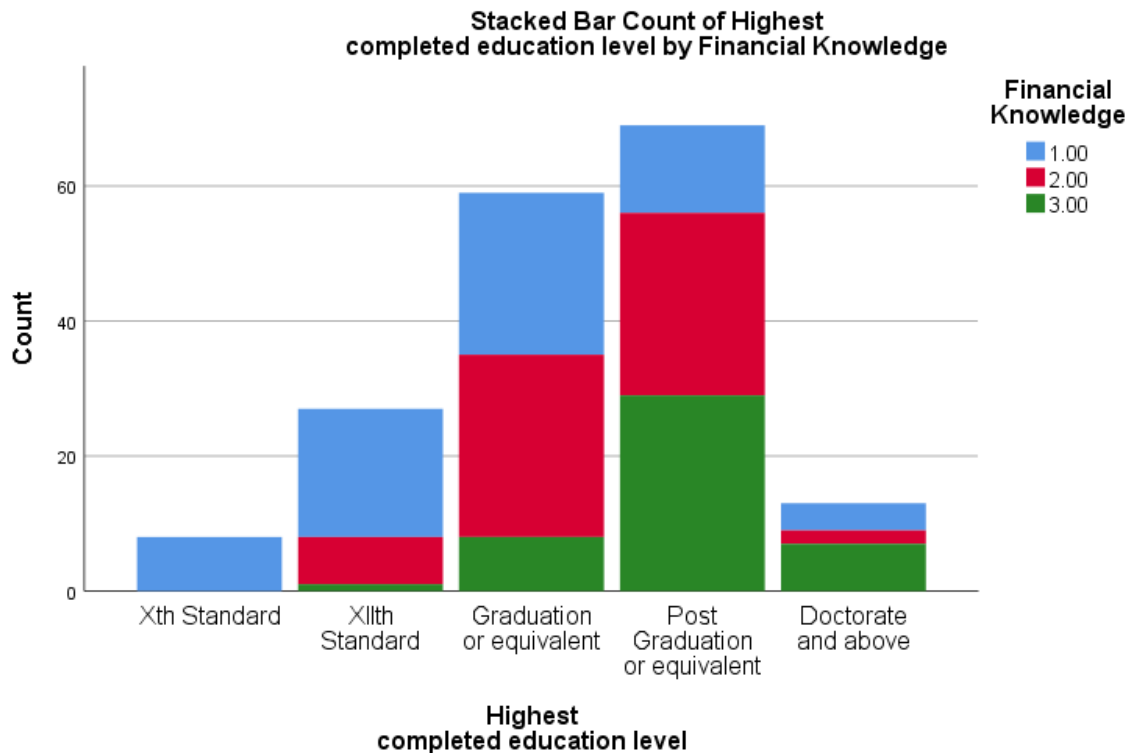
Financial knowledge is lowest when education is till Xth standard. It gains momentum with the level of educational attainment but still major portion of respondents lie in the lower level of financial knowledge area.

Table 4: Summary of financial knowledge on the basis of Household Annual Income

Income	Financial Knowledge (%)				
	N	HIGH	MEDIUM	LOW	Total
Less than 2.5 lacs	25	-	28	72	100%
2.5 lacs-5 lacs	43	7	51	42	100%
5 lacs- 10 lacs	61	28	42	30	100%
10 lacs and above	47	53	17	30	100%

Data depicts that as the income increases the awareness about financial aspect also increases. As per taxation laws of India, an individual is taxable if he/she earns Rs. 2.5 lac and above annually. Hence major issue lies with the portion of respondents having low financial knowledge and higher income which consists of approx. 28% of the total.

Results

The analysis provides insights into the key dimensions of financial behaviour and knowledge. After conducting an exploratory factor analysis (EFA), three major components emerged, which helped in understanding the underlying structure of financial literacy and behaviour among respondents. These components are:

1. ActivSaver – Composed of 5 items related to active saving behavior.
2. SavingHabits – Composed of 3 items reflecting regular saving practices.
3. FinDecision – Composed of 2 items related to making informed financial decisions.

The internal consistency of these components was tested using Cronbach's alpha, and the results indicated that the alpha values for each component were above the accepted threshold ($\alpha > 0.7$), demonstrating reliability in the measure. This suggests that the items within each component consistently measure their respective constructs, confirming the robustness of the factor structure.

In addition to the factor analysis, bivariate correlations were examined among the observed variables. The results show that the highest correlation was observed between two variables, Saver1 and Saver5 ($r = 0.675$), which is well within the acceptable threshold of 0.85. This indicates no multicollinearity issues, as no pair of variables displayed excessively high correlations that could distort the results.

The skewness and kurtosis values were also checked to ensure that the data followed a near-normal distribution. All absolute values of skewness and kurtosis were within acceptable limits (skewness < 3, kurtosis < 3), indicating that the data did not significantly deviate from normality and were appropriate for the parametric tests used in this study.

These findings provide confidence that the data is suitable for further statistical analysis, and the constructs measured are both reliable and valid. The analysis highlights the key areas where financial literacy and behaviour are influenced, particularly emphasizing the components that drive saving habits and decision-making in the context of financial planning.

Further analysis reveals that financial knowledge is notably low among individuals whose education is limited to the Xth standard. While financial awareness tends to increase with higher levels of educational attainment, a significant portion of respondents still fall within the lower range of financial literacy. This suggests that even with advanced education, gaps in financial understanding persist.

Additionally, the data indicates a direct correlation between income levels and financial awareness, where individuals with higher incomes tend to be more knowledgeable about financial matters. Notably, 28% of respondents fall into the category of higher income but lower financial literacy, highlighting a key issue. This group is at greater risk of making uninformed financial decisions despite their substantial earnings, which underscores the need for targeted financial education interventions for this demographic.

Discussion

This study compares two contrasting conditions in India: the booming fintech industry and the widespread lack of basic financial literacy. While financial experts benefit from technological advancements, a large portion of the population remains unaware of many financial variables. The empirical study of 176 randomly selected individuals revealed significant deficiencies in financial literacy across income groups and genders.

The findings of this study present significant insights into the state of financial literacy and behavior among individuals in India, particularly in the context of the rapidly advancing fintech industry. The emergence of three distinct components – ActivSaver, SavingHabits, and FinDecision – demonstrates that while individuals may engage in some level of saving and decision-making, their financial literacy remains unevenly distributed. Despite the advances in fintech, a large section of the population struggles with the basics of financial planning, savings, and investments. These results have important implications for both financial education initiatives and fintech service providers.

This gap is exacerbated by the fact that financial knowledge increases with higher education and income levels, yet 28% of respondents with higher income fall into the lower financial literacy category. This group is at particular risk of making uninformed decisions despite having the financial means to invest and grow their wealth. This highlights the need for targeted interventions aimed at improving financial literacy among high-income but low-knowledge individuals, ensuring they are not left behind as the fintech industry grows.

The advent of fintech has revolutionized access to financial services, particularly with innovations like zero-brokerage platforms and peer-to-peer lending. However, the findings of this study reveal that fintech's benefits are not being fully realized by a large portion of the population due to the digital divide and gaps in financial literacy.

While fintech companies are creating more accessible financial products, such as apps for trading, lending, and payments, the **FinDecision** component suggests that many users lack the foundational knowledge required to utilize these tools effectively. This can lead to misuse or underutilization of fintech services, ultimately preventing users from reaping the benefits of technological advancements.

Conclusion

This study draws a comparison between two contrasting conditions in India: the booming fintech industry and the widespread lack of basic financial literacy. While financial experts benefit from technological advancements, a large portion of the population remains unaware of key financial variables, leading to significant gaps in financial literacy across different income groups and genders.

The results of this study, based on a sample of 176 individuals, highlight the urgent need for basic financial education in the broader population. However, given the size of the sample compared to India's vast population, it is important to acknowledge that this research serves as a case study. The findings are applicable to this specific group, but to

make broader generalizations, a larger sample size would be necessary. Expanding the scope of the study could help provide a more comprehensive understanding of the financial literacy landscape across diverse demographics in India.

Additionally, this research touches on the issue of the digital divide – the gap between those with access to technology and those without. In a country like India, this divide plays a crucial role in the dissemination of financial literacy. This divide contributes to the concentration of wealth and knowledge in the hands of a few, further enhancing income inequality. Addressing the digital divide is essential to making fintech innovations truly inclusive.

In conclusion, a more inclusive approach to both financial literacy and digital access is necessary to reduce income inequality and ensure that the benefits of fintech innovations are more widely shared across India's diverse population.

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Appendix A: Questionnaire

Q1 Age

- o 15-25 (1)

- o 26-45 (2)

- o 46-65 (3)

- o 66 and above (4)

Q2 Annual household income

- o Less than 2.5 lacs (1)

- o 2.5-5 lacs (2)

- o 5-10 lacs (3)

- o 10 lac and above (4)

Q3 Gender

- o Male (1)

- o Female (2)

Q4 Marital Status

- o Married (1)

- o Divorced (2)

- o Widowed (3)

- o Single (4)

Q5 Number of family members (including you) in your household

- o 1 (1)

- o 2 (2)

- o 3 (3)

- o 4 (4)

- o 5 (5)

- o above 5 (6)

Q6 Highest completed education level

- o Xth Standard (1)

- o XIIth Standard (2)

- o Graduation or equivalent (3)

- o Post Graduation or equivalent (4)

- o Doctorate and above (5)

Money related matters

Q7 Who is responsible for day-to-day decisions about money in your household?

- o You (1)

- o Parents/Spouse (2)

- o Other family member (3)

- o Nobody (4)

Q8 Does your household have a budget

- o Yes (1)

- o No (2)

Q9 Whether you currently hold any of these types of products (personally or jointly)?

▢ Pension fund (1)

▢ Insurance (2)

▢ A mortgage (3)

▢ A bank loan secured on property (4)

▢ An unsecured bank loan (5)

▢ Debit card (6)

▢ A mutual fund (7)

▢ Savings account (8)

▢ A micro finance loan (9)

▢ Stocks and shares (10)

▢ Bonds (11)

▢ Mobile phone payment account (12)

▢ Demat Account (13)

▢ An investment account, such as a unit trust (14)

Q10 Describe yourself Completely Agree (1)	Somewhat Agree (2)	Neutral (3)	Somewhat Disagree (4)	Completely Disagree (5)
I tend to live for today and let tomorrow take care of itself. (1)	• o	• o	• o	• o	• o
I keep a close personal watch on my financial affairs. (2)	• o	• o	• o	• o	• o
Before I buy something I carefully consider whether I can afford it. (3)	• o	• o	• o	• o	• o
I pay my bills on time. (4)	• o	• o	• o	• o	• o
I find it more satisfying to	• o	• o	• o	• o	• o

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