BULGARIAN ACADEMY OF SCIENCES

ECONOMIC RESEARCH INSTITUTE

ECONOMIC DEVELOPMENT AND POLICIES: REALITIES AND PROSPECTS

SUSTAINABILITY IN THE CONDITIONS OF GLOBAL TRANSFORMATIONS



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PRESENTED AT THE
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БЪЛГАРСКА АКАДЕМИЯ НА НАУКИТЕ

ИНСТИТУТ ЗА ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ

ИКОНОМИЧЕСКО РАЗВИТИЕ И ПОЛИТИКИ: РЕАЛНОСТИ И ПЕРСПЕКТИВИ

УСТОЙЧИВОСТ В УСЛОВИЯ НА ГЛОБАЛНИ ПРОМЕНИ

СБОРНИК СТАТИИ

ПРЕДСТАВЕНИ НА
МЕЖДУНАРОДНАТА НАУЧНА КОНФЕРЕНЦИЯ,
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CONTENTS / СЪДЪРЖАНИЕ

Foreword **8**
Въведение **9**

PLENARY SESSION
ПЛЕНАРНА СЕСИЯ **10**

Виктор Йоцов / Victor Yotzov
В навечерието на еврото: фискална устойчивост и средносрочни перспективи пред икономическото развитие на България
On the Eve of the Euro: Fiscal Sustainability and Medium-Term Prospects for Bulgaria's Economic Development **11**

GEOECONOMICS, INTEGRATION AND SUSTAINABILITY: NEW REALITIES AND INTERNATIONAL POLICIES
ГЕОИКОНОМИКА, ИНТЕГРАЦИЯ И УСТОЙЧИВОСТ: НОВИ РЕАЛНОСТИ И МЕЖДУНАРОДНИ ПОЛИТИКИ **36**

Virginia Zhelyazkova
Strategic Autonomy and the Green Transition: Geoeconomic Trade-offs in the EU's Critical Raw Materials Policy **37**

Milena Angelova
Impacts of the Global Sustainable Transition on the Economy and Society: Climate Migration **42**

Iana Paliova
Bulgaria's Circular Economy Indicators in Comparative Analysis with Other EU Member States **48**

Simeon Stoilov
The Role of the International Transfer of Innovations and Technologies in an Era of Transformative Geo-economics **55**

Daniela Bobeva-Filipova, Emil Panusheff, Nedialko Nestorov, Atanas V. Pavlov
Impact of the U.S. Import Tariffs on Bulgaria's Economy **60**

Galina Zaharieva
The Effect of EU Plastic Waste Trade Regulations on Exports to Non-OECD Countries **66**

Andrei Rădulescu
The Public Finance in Europe – Structural Developments in France **71**

Iulia Monica Oehler-Sincai
New Approaches in the Relationship Between China and CEE **77**

Jingxin Hu
EU Minimum Import Price: Implementation and Removal–Difference-in-Differences and Event-Study Evidence on Chinese PV Module Exports to the EU **82**

Eduard Marinov
Circular Transitions in Africa: Insights from Entrepreneurs and Practitioners on Opportunities and Barriers **89**

Rytis Milkintas
The Expression of Smartness' Dimensions in the Culture Management: A System of Criteria and Indicators 94

Zvezdelina Zhelyazkova
EU Between Effective Rules for Reporting on Corporate Sustainability and Reducing the Administrative Burden for the Businesses 101

Banu GÜRNEŞ BOZ, Mustafa BOZ
The Impact of Residential Property Sales to Foreigners on Tourism: Antalya Case 106

Biasino Farace, Paola Geatti, Andrea Del Chicca, Erica Varese
Certification Schemes in the Foodservice Sector: The Case of Meat 112

Gualter Fernandes Martins Câmara, Francisco José Ferreira Silva, José António Cabral Vieira
Unveiling the Impact of Weather and Calendar Patterns on Electricity Demand in Off-grid Regions: An Empirical Study 118

Tatjana Drangovska, Marica Antovska-Mitev
Institutions as a Prerequisite for Growth: Projections and Policy Implications for North Macedonia 124

Galateya Kolikova
Regional Cooperation and Bulgaria's Foreign Direct Investment Competitiveness 130

SUSTAINABLE DEVELOPMENT OF REGIONS AND SECTORS
УСТОЙЧИВО РАЗВИТИЕ НА РЕГИОНИ И СЕКТОРИ 134

Yana Kirilova, Dochka Velkova
Global Crises and Municipal Finances: Evidence From Bulgaria 135

Kalina Petrova
Regional Resilience and Economic Adaptation: Challenges and Opportunities of the New NUTS-2 Territorial Division of Bulgaria 144

Nedelin Markov
Modern aspects of regional policy in the context of development of small settlements 150

Maria Kotseva-Tikova
Progress Towards Sustainable Development 156

Iliya Pironkov, Petya Biolcheva, Miglena Molhova-Vladova
Artificial Intelligence as a Catalyst for Sustainable Regional Development in Industry 5.0: From Resource Efficiency to Regional Competitiveness 162

Anton Peychev
How Aggregated Indicators and Data Gaps Distort the Analysis of Waste and the Circular Economy 167

Daniel Petrov
Spatial Economies of Energy Communities: How Urban Density of Collective Self-consumption Reduces Solar Curtailment and Enhances Grid Flexibility in the EU 173

Елица Димова / Elitsa Dimova
Устойчивостта в контекста на дигитализацията в ЕС – ретроспекция и проблеми
Sustainability in the Context of Digitalization in the EU – Retrospect and Challenges 179

Desislava Varadzhakova, Marina Raykova
Domestic Tourism and Sustainable Development: A Bibliometric Analysis 185

Violeta Doneva-Yankulova
Investment Pathways in Tourism: IPO Financing, Public Policy and Sustainable Destination Development: Exploring the Intersection of Capital Markets, Regulatory Frameworks, and Sustainability in Tourism Development Across Central and Eastern Europe 192

Mariana Ianeva, Ralitsa Georgieva
National Identity and Tourism Policy 197

Andrey Zahariev
Real Estate Transactions and Household Wealth in Bulgaria – Stepwise Regression Model of Growth Factors (2020-2025) 202

Иван Бянов / Ivan Byanov
Развитие на селските райони в България – минало, настояще и бъдеще
Rural area development in Bulgaria - past, present, future 210

Gergana Slavova
Economic Development Through the Implementation of a Strategy of Linked and Unrelated Diversification in Agriculture in the North-East Planning Region 216

Veselin Krustev
Sustainability of Bulgarian Field Crops Farms in the Context of the European Development Framework 224

Bozhura Fidanska
Scenarios for the Development of Agricultural Holdings in Areas Facing Natural Constraints Until 2030 232

Monika Kabadzhova, Anton Blagoev
Identifying Trends and Problems in Implementation of Agro-ecological Practices and Innovations by Farm Managers 238

Mihaela Mihailova, Rumena Gandeva
The Contribution of Small Farmers to Ensuring Food Security in Bulgaria 244

ADAPTABILITY AND SUSTAINABILITY OF ENTERPRISES
АДАПТИВНОСТ И УСТОЙЧИВОСТ НА ПРЕДПРИЯТИЯТА 250

Adelina Milanova, Pavlinka Naydenova
The Modern Corporate Human Capital as a Challenge to Sustainable Business Innovation 251

Neviana Krasteva, Tinka Churkova
Building the Employer Brand as a Driver for Achieving Sustainability 256

Antoaneta Ivanova-Bares
Integrating Principal-Agent Theory and Business Process Reengineering: An Analytical Framework for Managing Virtual Teams 262

Galya Taseva
Trade Credit and Financial Sustainability of Enterprises 268

Добрин Иванов / Dobrin Ivanov
Финансиране и устойчивост на българските МСП (2020–2025)
Financing and Resilience of Bulgarian SMEs (2020–2025) 274

Daniela Ventsislavova Georgieva
Media Publications as a Potential Tool for Promoting Sustainable Accountability and Disclosure of R&D and Innovation 281

Spartak Keremidchiev
The Age of Agile for Research Organizations 287

Росица Чобанова / Rossitsa Chobanova
Икономическо развитие, основано на ново знание и провеждани политики
New Knowledge Based on Economic Development and Policies 293

Plamen D. Tchipev
Specifics of Cooperative Business Models in Relation to Existing Corporate Governance Mechanisms 299

Радостина Бакърджиева / Radostina Bakardjieva
Корпоративна устойчивост със социални измерения
Corporate Sustainability with Social Dimension..... 304

Katerina Vojcheska - Nikodinoska
The Impact of ESG Integration on Firms' Financial Performance and Corporate Value 311

MACROECONOMIC AND SOCIAL DIMENSIONS
МАКРОИКОНОМИЧЕСКИ И СОЦИАЛНИ ИЗМЕРЕНИЯ 318

Stela Raleva
Structural Changes and Labour Productivity Dynamics in Bulgaria..... 319

Kristina Stefanova
Labour Productivity in the Education Sector in CEE Countries 326

Йордан Димитров / Yordan Dimitrov
Влиянието на изкуствения интелект върху трудовите процеси в България
The Impact of Artificial Intelligence on the Labor Market: Trends and Challenges..... 332

Dimitar Sabev
From Economic Growth to Sustainable Wellbeing..... 338

Ивайло Янков / Ivaylo Yankov
Декуплиране на икономическия растеж от екологичните натиски: предизвикателства и перспективи пред България
Decoupling Economic Growth From Environmental Pressures: Challenges and Prospects for Bulgaria... 344

Teodora Peneva
Potential Gaps in Bulgaria's Social Climate Plan: Assessing Draft Measures and Impact on Energy-Poor Households..... 350

Nikolay Baltov.....355
Economic Arguments in the Processes of (De)Legitimation of the Green Transition Policy: Two Cases from the Bulgarian Media Discourse 355

Наталия Личева / Natalya Licheva
Публично-частното партньорство в образователната сфера
Public-private Partnership in the Educational Sphere..... 360

Mihaela Todorova
Blockchain in the public sector – opportunities and challenges 367

FOREWORD

This book is a collection of the papers presented at the International Scientific Conference "Economic Development and Policies: Realities and Prospects. Sustainability in the Conditions of Global Transformations" organized by the Economic Research Institute at the Bulgarian Academy of Sciences. The conference took place on November 24th 2025, bringing together scholars, researchers, PhD. Students and industry professionals dedicated to shaping the future of global and regional economies.

The conference continues the series of Annual Scientific Conferences organized by the Institute. The 55 papers compiled here highlight cutting-edge research across a wide spectrum of disciplines and issues. Researchers and practitioners from over 24 academic institutions from 8 countries (Bulgaria, Spain, Romania, Lithuania, Turkey, Italy, Portugal, and North Macedonia) contribute to a vibrant dialogue that links theory with practical application.

The articles in this book reflect the broad analytical scope and interdisciplinary spirit of the Conference. Starting with the keynote speech of Prof. Victor Yotzov on "On the Eve of the Euro: Fiscal Sustainability and the Medium-Term Prospects for Bulgaria's Economic Development," which offered key insights into the country's macroeconomic trajectory, the conference continued with the four thematic areas that address both national and global economic challenges.

The "Geoeconomics, integration and sustainability: new realities and international policies" track explored the shifting global order, regional integration processes, and the sustainability imperatives shaping international economic relations. The "Sustainable development of regions and sectors" track focused on territorial development, sectoral transformations, and regional competitiveness, while the "Adaptability and sustainability of enterprises" track highlighted the strategic, managerial, and operational responses of firms to technological, market, and environmental pressures. The "Macroeconomic and social dimensions" track examined key trends in growth, labour markets, public finance, and social policies. Together, these thematic areas provide a comprehensive platform for discussing the dynamics of contemporary economies and the pathways toward long-term, resilient, and inclusive development in the dynamically changing global economy.

The professional discussions in the respective sessions were moderated by colleagues from the Economic Research Institute – Prof. Daniela Bobeva- Filipova, Prof. Virginia Zhelyazkova, Prof. Mitko Dimitrov, Prof. Spartak Keremidchiev, Prof. Plamen Chipev, Prof. Darina Ruscheva and Prof. Georgi Shopov.

Finally, the members of the Organizing and the Program Committee of the Conference would like to extend our sincere gratitude to all participants for their valuable contributions, active engagement, and dedication to the pursuit of knowledge. We thank the researchers and academics who shared their insights – without your collaboration and enthusiasm, this conference and its collective outcomes would not have been possible. We look forward to continued cooperation and the ongoing exchange of ideas that will shape the future of sustainable and innovative economic development.

From the Compilers

ВЪВЕДЕНИЕ

Тази книга представлява сборник с докладите, представени на Международната научна конференция „Икономическо развитие и политики: реалности и перспективи. Устойчивост в условията на глобални трансформации“, организирана от Института за икономически изследвания при Българската академия на науките. Конференцията се проведе на 24 ноември 2025 г. и събра учени, изследователи, докторанти и представители на практиката, обединени от стремежа да допринасят за формирането на бъдещето на глобалните и регионалните икономики.

Конференцията продължава утвърдената традиция на ежегодните научни конференции, организирани от Института. В настоящия сборник са включени общо 55 доклада, които представят най-нови и актуални изследвания в широк спектър от научни области и проблематики. В научния форум взеха участие изследователи и практици от над 24 академични институции от 8 държави – България, Испания, Румъния, Литва, Турция, Италия, Португалия и Северна Македония, което създаде условия за оживен и ползотворен диалог между теорията и практиката.

Публикуваните статии отразяват широкия аналитичен обхват и интердисциплинарния дух на конференцията. Началото беше поставено с пленарния доклад на проф. Виктор Йоцов на тема „В навечерието на еврото: фискална устойчивост и средносрочни перспективи за икономическото развитие на България“, който предложи ключови прозрения за макроикономическата траектория на страната. Впоследствие дискусиите продължиха в рамките на четири тематични направления, обхващащи както национални, така и глобални икономически предизвикателства.

Направлението „Геоикономика, интеграция и устойчивост: нови реалности и международни политики“ беше посветено на променящия се глобален ред, процесите на регионална интеграция и изискванията на устойчивото развитие в международните икономически отношения. Тематичната област „Устойчиво развитие на региони и сектори“ акцентира върху териториалното развитие, секторните трансформации и регионалната конкурентоспособност. В рамките на „Адаптивност и устойчивост на предприятията“ бяха разгледани стратегическите, управленските и оперативните реакции на фирмите спрямо технологичните, пазарните и екологичните предизвикателства. Направлението „Макроикономически и социални измерения“ анализира ключови тенденции в икономическия растеж, пазара на труда, публичните финанси и социалните политики. В своята цялост тези тематични области предоставят всеобхватна платформа за обсъждане на динамиката на съвременните икономики и пътищата към дългосрочно, устойчиво и приобщаващо развитие в условията на бързо променящата се глобална икономика.

Професионалните дискусии в отделните сесии бяха модерирани от колеги от Института за икономически изследвания при БАН – проф. Даниела Бобева- Филипова, проф. Виржиния Желязкова, проф. Митко Димитров, проф. Спартак Керемидчиев, проф. Пламен Чипев, проф. Дарина Русчева и проф. Георги Шопов.

В заключение членовете на Организационния и Програмния комитет на конференцията изразяват своята искрена благодарност към всички участници за ценния им принос, активното участие и отдадеността им на научното познание. Благодарим на изследователите и преподавателите, които споделиха своите идеи и резултати – без вашето сътрудничество и ентусиазъм тази конференция и нейните колективни научни резултати не биха били възможни. Очакваме с нетърпение бъдещо сътрудничество и продължаващ обмен на идеи, които ще допринасят за формирането на устойчиво и иновативно икономическо развитие.

От съставителите

PLENARY SESSION

ПЛЕНАРНА СЕСИЯ

Виктор Йоцов / Victor Yotzov[1]

В НАВЕЧЕРИЕТО НА ЕВРОТО: ФИСКАЛНА УСТОЙЧИВОСТ И СРЕДНОСРОЧНИ ПЕРСПЕКТИВИ ПРЕД ИКОНОМИЧЕСКОТО РАЗВИТИЕ НА БЪЛГАРИЯ

***Резюме**: Настоящото изследване оценява фискалната устойчивост на България в навечерието на въвеждането на еврото, като я разглежда в контекста на по-широките средносрочни перспективи за икономическо развитие. Анализът комбинира класическата рамка за динамиката на публичния дълг със сценарийно-базиран стрес тест, който интегрира три групи рискове: (i) структурните слабости на българската икономика (ниска производителност, демографски натиск, регионални неравенства), (ii) новите климатични и геоикономически шокове и (iii) последиците от окончателното присъединяване към еврозоната. Методологично изследването надгражда конвенционалния подход, основан на равновесието между лихвения процент, икономическия растеж и първичните салда, чрез въвеждане на състояние-зависими фискални мултипликатори и експлицитно моделиране на външните шокове. Разгърнат е динамичен модел за периода 2025–2035 г., в който се симулират пет алтернативни сценария: базов, сценарий с глобален търговски протекционизъм, климатичен шок, комбиниран шок (търговски + климатичен) и сценарий на влошена глобална финансова среда с трайно положителна разлика между лихвите по обслужването на дълга и реалния икономически растеж. Резултатите показват, че при базов сценарий България запазва позицията си на страна с нисък публичен дълг и изпълнява критериите от Маастрихт, въпреки постепенно повишаване на дълговото съотношение. Най-сериозните рискове възникват при сценарий на продължителна глобална стагнация и по-високи лихвени проценти, когато r–g става трайно положителна и липсват достатъчни първични излишъци – тогава дългът преминава от „ниско“ към „средно“ ниво и навлиза в потенциално нестабилна траектория. Заключението е, че България влиза в еврозоната с относително благоприятна фискална позиция, но устойчивостта ѝ зависи критично от способността да се запази фискалният буфер, да се интегрират климатичните и геоикономически рискове в бюджетното планиране и да се ускори реалната конвергенция чрез структурни реформи и повишаване на производителността.*

***Ключови думи**: фискална устойчивост; публичен дълг; еврозона; сценарийни стрес-тестове; геоикономически шокове; България.*

***JEL**: E62; H63; F45; O52.*

ON THE EVE OF THE EURO: FISCAL SUSTAINABILITY AND MEDIUM-TERM PROSPECTS FOR BULGARIA'S ECONOMIC DEVELOPMENT

***Abstract**: This study assesses Bulgaria's fiscal sustainability on the eve of the adoption of the euro, situating it with-in the broader medium-term prospects for economic development. The analysis combines the classical framework of public debt dynamics with a scenario-based stress test that integrates three groups of risks: (i) the structural weaknesses of the Bulgarian economy (low productivity, demographic pressures, region-al disparities), (ii) emerging climate-related and geoeconomic shocks, and (iii) the implications of the country's definitive accession to the euro area. Methodologically, the study extends the conventional ap-proach—based on the equilibrium between the interest rate, economic growth, and primary balances—by introducing state-dependent fiscal multipliers and explicitly modelling external shocks. A dynamic model is developed for the period 2025–2035, within which five alternative scenarios are simulated: a baseline scenario; a scenario with global trade protectionism; a climate shock; a combined shock (trade plus cli-mate); and a scenario of a deteriorated global financial environment characterized by a persistently pos-itive differential between the interest rate on public debt servicing and real economic growth. The results indicate that, under the baseline scenario, Bulgaria retains its position as a low-debt country and contin-ues to comply with the Maastricht criteria, despite a gradual increase in the debt-to-GDP ratio. The most severe risks arise under a scenario of prolonged global stagnation and higher interest rates, when r–g becomes persistently positive and sufficient primary surpluses are absent; in this case, public debt moves from a "low" to a "medium" level and follows a potentially unstable trajectory.*

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The conclusion is that Bulgaria enters the euro area with a relatively favourable fiscal position, but its sustainability depends critically on the ability to preserve the fiscal buffer, to integrate climate-related and geoeconomic risks into budgetary planning, and to accelerate real convergence through structural reforms and productivity enhancement.

***Keywords**: fiscal sustainability; public debt; euro area; scenario-based stress tests; geoeconomic shocks; Bulgaria.*

***JEL**: E62; H63; F45; O52.*

1. Увод

Фискалната устойчивост се превръща в централен въпрос за малките отворени икономики в Европа в контекста на едновременно протичащи процеси на по-дълбока интеграция и нарастваща геоикономическа фрагментация. България е особен пример в тази перспектива. От една страна, страната поддържа вече почти три десетилетия режим на валутен борд, който дисциплинира фискалната политика и доведе до устойчиво ниско равнище на държавния дълг. От друга страна, тя се намира в навечерието на присъединяване към еврозоната – стъпка, която обещава допълнителни ползи чрез по-ниски лихвени проценти и по-високо доверие, но едновременно увеличава значението на фискалната политика като основен инструмент за макроикономическа стабилизация при липса на национална парична политика.

Опитът от дълговата криза в еврозоната през 2010–2012 г. показа, че формалното изпълнение на номиналните критерии от Маастрихт не е достатъчно условие за устойчивост. Страни, влезли във валутния съюз с относително умерен дълг, се оказаха силно уязвими, когато комбинацията от неблагоприятна външна среда, положителен диференциал между лихвения процент и растежа (**r–g**) и ограничен фискален буфер доведе до бърза динамика на дълга. В този контекст ключовият въпрос за България не е само дали тя влиза в еврозоната с „достатъчно нисък“ дълг, а доколко тази изходна позиция е устойчива при реалистични сценарии за външни шокове и вътрешни структурни напрежения.

Един от съществените фактори, които определят тази устойчивост, е степента и структурата на икономическата интеграция. Българската икономика е силно обвързана с еврозоната чрез търговски потоци, производствени вериги и трудова миграция. Високата търговска интеграция и участието в общия европейски пазар намаляват транзакционните разходи и подкрепят растежа, но същевременно концентрират риска – шокове в ключови партньори (например Германия или Италия) могат да се трансформират в асиметрични шокове за българската икономика. Теорията за оптималните валутни зони подчертава, че в такава среда значението на алтернативните механизми за корекция – мобилност на труда, фискален трансфер, гъвкавост на цените и заплатите – става критично. В българския случай тези механизми са частично ограничени, което изостря ролята на националната фискална политика като първа линия на защита.

Към тези интеграционни измерения се добавя набор от дългосрочни структурни предизвикателства, които имат директни и индиректни фискални последици. Демографската криза – бързото намаляване и застаряване на населението – свива потенциалния растеж, стеснява данъчната база и увеличава разходите за пенсии и здравеопазване. Ниската производителност и технологичното изоставане ограничават скоростта на реална конвергенция, което поддържа **r–g** в неблагоприятни граници при негативни външни шокове. Регионалните неравенства и структурната зависимост от отрасли с ниска добавена стойност усилват чувствителността към промени в глобалните вериги на стойността. Климатичните промени и нарастващата честота на екстремни климатични събития, от своя страна, пораждат едновременно внезапни бюджетни

разходи и трайни щети върху капиталовия запас и продуктивността, което добавя още едно измерение към фискалния риск.

Съществуващата литература върху фискалната устойчивост, въвеждането на еврото и геоикономическите рискове предлага важни концептуални и емпирични ориентири, но рядко интегрира в единна рамка ефектите от интеграцията, климатичния риск и демографската динамика за конкретни малки икономики на „периферията" на еврозоната. В повечето случаи анализите се фокусират или върху класическата динамика на дълга и стрес-тестове спрямо стандартни макроикономически шокове, или върху теоретичните критерии за оптимална валутна зона, или върху изолирани аспекти на климатичните и геополитическите рискове. Това оставя относително недостатъчно изследван въпроса доколко един на пръв поглед „комфортен" дълг може бързо да се доближи до критични нива при неблагоприятна комбинация от интеграционни и структурни шокове.

Настоящото изследване се стреми да запълни част от тази празнина чрез разработване на сценарийно-базирана рамка за оценка на фискалната устойчивост на България в периода на окончателно присъединяване към еврозоната. В основата на анализа стои класическото уравнение за динамиката на публичния дълг, в което съотношението дълг/БВП се определя от взаимодействието между реалния лихвен процент, темпа на растеж и първичното салдо. Тази рамка се разширява в няколко направления. Първо, въвеждането на еврото се третира като институционален шок, който едновременно влияе върху разходите по обслужването на дълга и върху поведението на фискалните власти. Второ, моделът интегрира ефектите от икономическата интеграция и потенциалните асиметрични шокове, произтичащи от търговската и финансовата зависимост от еврозоната. Трето, в анализа се включват климатични и геоикономически шокове, които се проявяват както чрез еднократни фискални натоварвания, така и чрез персистиращи промени в r и g. Четвърто, демографската динамика и свързаните с нея дългосрочни предизвикателства се отразяват имплицитно чрез прогнозите за потенциален растеж и натиска върху ключови разходни системи.

В рамките на този подход се конструират няколко алтернативни сценария за периода 2025–2035 г., които обхващат: базова траектория при умерено благоприятна външна среда; сценарии с търговски протекционизъм и ограничаване на глобалната интеграция; сценарий с повтарящи се климатични шокове; комбиниран сценарий, съчетаващ търговски и климатични напрежения; както и сценарий на продължителна глобална стагнация с трайно положителен диференциал **r–g**. Така се оценява доколко сегашният фискален буфер е достатъчен, за да абсорбира не само стандартни макроикономически колебания, но и натрупването на нови рискове, свързани с интеграцията и дългосрочните структурни тенденции.

Целта на изследването е двойна. От една страна, то предоставя количествена оценка на вероятните траектории на публичния дълг при различни конфигурации на външната и вътрешната среда, като по този начин допринася към дебата за устойчивостта на публичните финанси на България в навечерието на еврото. От друга страна, анализът предлага качествена рамка за интерпретация на тези резултати през призмата на ефектите от интеграцията и дългосрочните предизвикателства – демографски, структурни и климатични. Това позволява формулирането на набор от политически препоръки, насочени към запазване и укрепване на фискалния буфер в средносрочен хоризонт.

В следващите раздели първо се представя обзор на релевантната литература върху фискалната устойчивост, въвеждането на еврото, геоикономическите и климатичните рискове, както и интеграционните ефекти и риска от асиметрични шокове. След това се анализира фискалната рамка на България и спецификите на икономическата ѝ

интеграция. На тази основа се разработва сценарийно-базираният модел за динамиката на дълга и се представят използваните данни и допускания. Последващите раздели обсъждат резултатите от симулациите, извеждат политическите импликации и разглеждат дългосрочните структурни предизвикателства, преди изследването да завърши с обобщение и насоки за бъдещи изследвания.

2. Фискална устойчивост, реална конвергенция и геоикономически рискове – литературен обзор

Класическата литература за фискалната устойчивост поставя в центъра динамиката на съотношението дълг/БВП, определяна от взаимодействието между реалния лихвен процент, темпа на растеж и първичното бюджетно салдо. В емпиричната традиция устойчивостта се тества индиректно чрез връзката между първичния бюджетен излишък и нивото на държавния дълг – ако фискалната политика систематично реагира с по-високи излишъци при по-висок дълг, дългът се счита за устойчив. Тази линия се доразвива в множество изследвания за развитите икономики и страните от ОИСР, които показват, че устойчивостта е по-вероятна при наличие на достатъчно „фискално пространство“ и при благоприятна разлика r–g (Beqiraj, Fedeli, & Forte, 2018). Паралелно, по-приложни изследвания, като ръководството на (Escolano, 2010) за динамиката на публичния дълг и фискалната устойчивост, кодифицират формалните зависимости между дълга, лихвените проценти, инфлацията и циклично коригираните бюджетни салда, което се превръща в стандарт за институционални анализи на МВФ и ЕК.

По-нова литература, включително анализи на МВФ за историческите модели на публичния дълг и пределните нива на устойчивост, подчертава, че **r–g** не е константа, а е силно зависима от глобалната финансова среда, инфлационния режим и рисковата премия на отделните държави. (Nicholls & Peter, 2014) Последните оценки за Европа, базирани на този тип анализи на фискалната политика, показват, че след пандемията фискалното пространство в част от страните от еврозоната се свива, а устойчивостта става чувствителна към дори умерени повишения на реалните лихвени проценти. (Bulíř & Chauhan, 2025) Това поставя по-остро въпроса за поведението на страни с формално „нисък“ дълг, но с уязвимост към външни шокове и трайно положителен диференциал r–g – именно какъвто е и случаят с България.

Вторият голям теоретичен стълб е литературата за оптималните валутни зони и ефектите от паричната интеграция. Още Mundell, McKinnon и Kenen (Mundell, 1961) (McKinnon, 1963) (Kenen, 1969) подчертават, че ползите от обща валута – елиминиране на валутния риск, по-ниски транзакционни разходи и по-дълбока финансова интеграция – са условни на наличието на механизми за корекция на асиметричните шокове (мобилност на труда, гъвкавост на цените и заплатите, фискални трансфери). В емпиричен план Bayoumi и Eichengreen (Bayoumi & Eichengreen, 1997) разработват структурно-VAR-подход за идентифициране на търсене и предлагане шокове и конструират индекс за „оптималност“ на валутните зони в Европа, като показват, че корелацията и структурата на шоковете в ядрото на еврозоната (Германия, Франция, Бенелюкс) са по-близки помежду им, отколкото с периферните икономики. (Kim & Chow, 2003) Това предполага, че за държави със слабо синхронизирани цикли и по-ниска степен на структурна близост, фискалната политика ще поеме по-голяма част от стабилизационната функция след влизане в валутния съюз.

С времето се развива и т.нар. хипотеза за ендогенност на критериите за оптимална валутна зона: по-дълбоката търговска и финансова интеграция сама по себе си води до по-силна синхронизация на бизнес цикъла и до по-голяма хомогенност на шоковете.

Тази идея е емпирично тествана в множество работи за разширения Европейски съюз и еврозоната. (Darvas, 2012) показва, че за новите държави членки търговската интеграция с еврозоната е свързана с нарастваща корелация на цикъла, макар и с отчетливо различия между страни и периоди. Други автори анализират ролята на общата валута за синхронизацията на бизнес циклите в ЕС и заключават, че въвеждането на еврото увеличава съгласуваността на цикличната динамика, но не елиминира напълно асиметричните шокове, особено за периферните икономики.

Конкретно за страните от Централна и Източна Европа литературата показва постепенна, но непълна конвергенция. Изследванията върху съгласуваността на бизнес циклите между ЦИЕ и еврозоната, базирани на филтрирани БВП серии и факторни модели, установяват засилване на корелацията във времето, особено след присъединяването към ЕС и засилването на търговската и финансовата интеграция, но също така подчертават, че някои икономики запазват по-силен собствен регионален компонент на шоковете. (Jiménez-Rodríguez, Morales-Zumaquero, & Égert, 2013) Това е ключово за оценката на фискалната устойчивост, тъй като високата степен на интеграция означава едновременно по-добри перспективи за растеж и по-ниска премия за риск, но и по-бързо предаване на външни спадове към националната икономика. В този смисъл интеграцията действа като двуостър меч: тя повишава потенциала за реална конвергенция и понижава разходите по финансиране, но усилва чувствителността към циклични и структурни шокове в „ядрото" на еврозоната.

В последните години към традиционния анализ на интеграцията се добавя нов пласт – геоикономическата фрагментация и променящата се архитектура на глобалната търговия и капиталови потоци. Доклади на МВФ и на европейски институции подчертават, че след финансовата криза и особено след войната в Украйна рискът от политически мотивирана фрагментация на търговията, инвестициите и технологичните вериги се увеличава, което може да намали ползите от досегашната интеграция и да понижи потенциалния растеж. (IMF - Staff Discussion Notes, 2023) За страни като България, силно интегрирани в европейските производствени вериги и зависими от ограничен набор ключови партньори, това означава засилен риск от асиметрични търговски шокове и засилена волатилност на r–g чрез промени в премията за риск и в глобалната лихвена среда.

Фундаменталната рамка на динамиката на дълга стъпва върху традиционните постулати, които установяват математическата връзка между първичните салда, диференциала между растежа и лихвените проценти, и натрупването на дълг. По-новите разширения на този класически модел въвеждат стохастични елементи, за да отчетат несигурността в макроикономическите променливи, както е демонстрирано във фискалното стрес-тестиране, разработено от МВФ (Adrian, Morsink, & Schumacher, 2020).

В случая с България, европейският контекст въвежда допълнителни институционални фактори свързани с приемането на еврото. Изследванията върху предишни страни, присъединили се към еврозоната, разкриват три отчетливи фискални модела:

- Първоначален ефект на конвергенцията, който временно подобрява показателите за дълга чрез по-ниски разходи по заеми (Kunovac & Pavić, 2017);
- Средносрочен дисциплиниращ ефект в рамките на Пакта за стабилност и растеж (Breuss, 2000);
- Дългосрочни структурни реформи, необходими за поддържане на конкурентоспособността в рамките на валутния съюз (Eggertsson, Ferrero, & Raffo, 2014).

Особената позиция на България като страна с валутен борд добавя още едно измерение. Изследванията показват, че подобни режими обикновено осигуряват по-ниска инфлация, но ограничават гъвкавостта на паричната политика в периода преди приемането на еврото (Колективна монография на катедра "Икономика", 2022).

След началото на военния конфликт в Украйна геоикономическите рискове придобиват все по-важно място във фискалния анализ. Има вече достатъчно натрупани емпирични доказателства (виж по-специално (Demiralay, Kaawach, Kilincarslan, & Semeyutin , 2024) и (Afonso, Alves, & Monteiro, 2024), сочещи, че геополитическият риск се материализира във: (i) по-високи суверенни рискови премии (CDS/доходности), (ii) трайни структурни разходи (отбрана, енергийна сигурност), и (iii) по-слаби показатели за устойчивост. Това изисква поддържане на по-високи първични излишъци и прави консолидацията по-скъпа. В държави на „фронтовата линия“ (Полша/Балтика/Румъния) ефектите са много по-силно изразени главно поради политическите ангажименти за отбрана. Въпреки че изследванията в тази област не са много, към изброените по-горе фактори можем да добавим и волатилност на търговските потоци, която засяга износно-ориентираните отрасли; чувствителност на преките чуждестранни инвестиции към геополитическо напрежение; шокове в цените на суровини, засягащи икономики, зависими от внос на енергия. Тези фактори взаимодействат с вътрешната фискална политика чрез автоматични стабилизатори и дискреционни мерки, създавайки сложни обратни връзки, които затрудняват традиционните оценки за устойчивост.

Взаимодействието между фискалните мултипликатори и икономическите цикли добавя допълнителна нюанси към анализа на устойчивостта. Емпирични изследвания потвърждават, че мултипликаторите се различават съществено както по типове разходи (например публични инвестиции спрямо трансфери), така и в зависимост от фазата на икономическия цикъл (разширение спрямо рецесия) (Sims & Wolff). Това има важни последици за българската фискална политика в периода на конвергенция към еврото, когато ефективността на корекционните мерки може да варира значително.

Най-новите методологични разработки интегрират тези разнообразни фактори в комплексни оценъчни рамки. Мониторът за устойчивост на дълга на Европейската комисия комбинира традиционната динамика на дълга с вероятностен анализ на шокове, докато индикаторите за фискална устойчивост на ОИСР включват измерители на институционално качество. Тези подходи са използвани при формирането на нашия дизайн на сценарии, но ние ги надграждаме чрез експлицитно моделиране на процеса на въвеждане на еврото и неговото взаимодействие с останалите рискови фактори. Нашата рамка се различава от съществуващите изследвания по няколко съществени аспекта:

- Третираме въвеждането на еврото не просто като промяна в лихвените проценти, а като структурен пробив, засягащ едновременно множество фискални зависимости.
- Интегрираме климатичните шокове като ендогенни събития, които пораждат както незабавни фискални разходи, така и трайни ефекти върху растежа.
- Демографското моделиране се простира отвъд статичните коефициенти на зависимост, като улавя динамиката на пазара на труда и производителността и влияе еднакво на всички разглеждани сценарии.
- Сценарийният дизайн експлицитно свързва геоикономическите рискове със секторната уязвимост на българската икономика, предоставяйки по-таргетирани политики от агрегатните анализи.

3. Ефектите от интеграцията

Интеграцията на България в Единния пазар на ЕС е един от ключовите етапи в съвременното икономическо и политическо развитие на страната. От присъединяването през 2007 г. процесът доведе до съществени промени в търговията, преките чуждестранни инвестиции (ПЧИ) и макроикономическата стабилност. Наред с това обаче остават важни предизвикателства, които ограничават пълното използване на потенциала на членството.

Положителни аспекти на интеграцията

Членството в Единния пазар значително разшири търговските възможности на България. Достъпът до пазар с над 500 милиона потребители улесни износа на български стоки и услуги, като износът към ЕС нарасна с над 150% спрямо 2006 г. Основни търговски партньори са Германия, Румъния и други държави от еврозоната, а участието в европейските производствени вериги – особено в автомобилостроенето и електрониката – позиционира България като регионален участник в индустриалната система на ЕС.

Интеграцията стимулира и потока от ПЧИ. След 2007 г. България се превърна в добра дестинация за инвестиции в информационни технологии, автомобилни компоненти, енергетика и услуги. Инвеститорите се възползват от достъпа до Единния пазар и относително стабилната регулаторна рамка. Тези инвестиции подкрепят заетостта, трансфера на технологии и управленски практики и допринасят за частична модернизация на икономиката.

Макроикономическата стабилност също се подобри. През по-голямата част от последното десетилетие България поддържа устойчив растеж, ниска инфлация (с изключение на последните шокове) и сравнително добри показатели на публичните финанси. Европейските фондове подпомогнаха инфраструктурното и регионалното развитие чрез проекти, които трудно биха били финансирани само с национални ресурси.

Ограничения и предизвикателства

Въпреки тези достижения, България остава с ограничена способност да реализира пълните ползи от интеграцията. Слабата институционална и административна среда е сред основните пречки. Корупцията, ниската ефективност на съдебната система и тромавата бюрокрация подкопават доверието на бизнеса и ограничават привличането на дългосрочни, високотехнологични инвестиции.

Регионалните дисбаланси съществено затрудняват икономическото сближаване. Докато София, Пловдив и няколко други центъра успяват да привлекат значителен ресурс, региони като Северозападна България остават икономически маргинализирани, с ниска заетост и високи нива на бедност. Неравномерното усвояване на европейските средства и концентрацията на ПЧИ в ограничен брой райони задълбочават тези различия.

Демографската криза – застаряване и емиграция на млади и квалифицирани кадри – допълнително ограничава капацитета за растеж. Липсата на работна сила, особено в технически и инженерни професии, затруднява привличането и задържането на високотехнологични инвестиции и ограничава възможностите за развиване на иновационен потенциал.

Сериозно ограничение е и специализацията в сектори с ниска добавена стойност. Българската индустрия остава силно ориентирана към трудоемки дейности (текстил, шивашко производство, първично селско стопанство), които осигуряват заетост, но не генерират достатъчна стойност. По данни на Евростат делът на промишленото

производство с висока технологична интензивност е около 3,6% при над 20% средно за ЕС, което показва изоставане в производството на продукти с висока стойност. Значителна част от износа е под формата на суровини и полуготови изделия, които се дообработват в други държави членки; в автомобилните компоненти, например, България често изпълнява функции на поддоставчик с ограничена добавена стойност.

Интеграцията предполага и необходимост от постоянни инвестиции в иновации и научноизследователска и развойна дейност (НИРД), но разходите за НИРД остават около 0,8% от БВП срещу над 2% средно за ЕС. Това поставя страната сред най-слабо иновативните икономики в Съюза. Слабата връзка между академичния сектор и индустрията затруднява превръщането на научните резултати в реални иновации, а ограничената достъпност на финансиране, особено за малки и средни предприятия, възпрепятства модернизацията и излизането нагоре по веригите на стойност.

Силният конкурентен натиск от по-развитите икономики на ЕС допълнително изостря тези слабости. Българските предприятия често изостават по технологично оборудване, достъп до капитал и квалифицирана работна сила. В селското стопанство, например, затрудненията с пълното покриване на стандартите на ЕС и ниската производителност поддържат по-ниска конкурентоспособност. Производителността на труда е около 57% от средното за ЕС, което пряко ограничава способността на икономиката да се конкурира в по-високотехнологични сегменти.

В обобщение, интеграцията в Единния пазар носи значителни ползи – по-висок износ, повече инвестиции, по-стабилна макроикономическа среда и достъп до европейски фондове. В същото време обаче ниската добавена стойност на продукцията, ограничените инвестиции в иновации, недостигът на квалифицирана работна сила и слабата интеграция в по-високите етажи на производствените вериги остават ключови пречки пред устойчивата конвергенция.

Рискове за икономиката, произтичащи от асиметрични шокове

Теорията за оптималните валутни зони (ОВЗ), въведена от (Mundell, 1961), предлага основната рамка за оценка на риска от асиметрични шокове при участие в обща валута. Според Мундъл и доразвилите го (McKinnon, 1963) и (Kenen, 1969), ползите от обща валута зависят от мобилността на труда, синхронизацията на икономическите цикли, степента на търговска и фискална интеграция и гъвкавостта на цените и заплатите. В този контекст българската икономика показва редица слабости: ниска вътрешна мобилност на работната сила, структурни дисбаланси и ограничени механизми за споделяне на риска. De Grauwe, 2018 подчертава, че в страни с подобен профил липсата на самостоятелна монетарна политика увеличава уязвимостта към външни шокове. Фиксираният валутен курс – в българския случай валутният борд – елиминира възможността за корекция чрез девалвация, но не премахва риска от стагнация при ниска конкурентоспособност.

Изследванията на (Bayoumi & Eichengreen, 1997) показват, че периферните икономики с по-слаба икономическа диверсификация и по-ниска корелация на бизнес циклите с „ядрото“ на еврозоната са по-уязвими към асиметрични шокове. Дарвас (Darvas, 2012) стига до сходни изводи за новите членки на ЕС. Фелдщейн (Feldstein, 2012) предупреждава, че за страни с ниска производителност и ограничена фискална децентрализация участието в еврозоната засилва риска от дългови кризи, особено когато фискалната политика не може да компенсира липсата на монетарни инструменти.

Докладите на ИИИ при БАН подчертават няколко ключови риска за България: силна зависимост от износа към ЕС (над 65% от износа е насочен към държави от еврозоната),

ниска гъвкавост на пазара на труда и структурни регионални дисбаланси. Анализите на Световната банка посочват и ниска корелация на българския бизнес цикъл с този на еврозоната, което увеличава вероятността от асиметрични ефекти при обща монетарна политика.

Като страна с валутен борд България е лишена от автономна парична политика, но с присъединяването към еврозоната това обвързване става необратимо и се допълва от участие в общото вземане на решения в рамките на ЕЦБ. Общата монетарна политика се определя от нуждите на еврозоната като цяло и често е ориентирана към големите икономики. В ситуация, в която България е в рецесия, а еврозоната като цяло расте, повишаването на лихвените проценти може да задълбочи вътрешните затруднения.

Структурните слабости – ниска производителност, секторна концентрация в дейности с ниска добавена стойност, зависимост от ограничен набор външни пазари и ПЧИ – увеличават вероятността от асиметрични шокове. Например, спад в автомобилната индустрия в Германия или промяна в търсенето на текстил може бързо да се пренесе в България чрез веригите на доставки. Високата емиграция намалява натиска на пазара на труда, но води до „еднопосочна" загуба на човешки капитал и свива потенциала за възстановяване след шок.

Фискалната рамка на еврозоната не предоставя пълноценен механизъм за автоматично преразпределение между държавите членки. При шок България ще разчита основно на собствените си фискални буфери. Ниското ниво на публичен дълг (около 28% от БВП) създава пространство за реакция, но ниският размер на приходи и разходи (значително под средните за ЕС) ограничава ролята на автоматичните стабилизатори. При сериозен шок страната може да бъде принудена или да използва бързо фискалния резерв, или да повишава данъци, което носи социални и политически рискове.

Застаряването на населението увеличава натиска върху пенсионната и здравната система и прави фискалната позиция по-чувствителна към периоди на слаб растеж. При неблагоприятна комбинация от демографски натиск, ниска производителност и асиметрични външни шокове, фискалното пространство може да се свие по-бързо от очакваното.

Всичко казано по-горе означава, е интеграцията на България в ЕС и еврозоната едновременно намалява някои традиционни макроикономически рискове (валутен риск, достъп до финансиране) и усилва чувствителността към асиметрични шокове, произтичащи от структурата на икономиката и институционалните слабости. За да се използват пълноценно възможностите на еврозоната и да се ограничат рисковете, са необходими целенасочени реформи за повишаване на производителността, мобилността на труда и капацитета на фискалната политика – теми, които се разглеждат в следващия раздел на доклада.

4. Фискалната рамка на България - еврозона и нововъзникващи геоикономически предизвикателства

Фискалната политика на България, провеждана през последните десетилетия, представя уникална комбинация от институционални ограничения, структурни реформи и външни уязвимости. Икономическата политика на страната претърпя значителна еволюция след въвеждането на валутния борд през 1997 г., създавайки особен фискален профил, различен както от този на развитите членки на ЕС, така и от останалите нововъзникващи европейски икономики. В условията на подготовка за приемане на еврото и нарастващи геоикономически рискове, разбирането на тези взаимосвързани фактори е от съществено значение за оценката на дългосрочната фискална устойчивост.

Настояща фискална рамка на България

Режимът на паричен съвет наложи фундаментални ограничения върху инструментариума на макроикономическата политика. При фиксиран валутен курс паричната политика е де факто външно делегирана, а фискалната политика остава основният инструмент за икономическа стабилизация. Това институционално устройство поражда асиметрични реакции спрямо икономически шокове – докато фискалната експанзия може да смекчи рецесиите, липсата на автономна парична политика ограничава възможностите за традиционни стимулиращи мерки.

Динамиката на публичния дълг в България следва стандартната зависимост, при която промяната в съотношението дълг/БВП (B) зависи от реалните лихвени проценти (r) и темповете на растеж (g), както и от първичното бюджетно салдо (PB).

$$\frac{B_{t+1}}{Y_{t+1}} = \frac{1+r}{1+g} \cdot \frac{B_t}{Y_t} - \frac{PB_t}{Y_{t+1}} \qquad 1$$

Данните на НСИ и МФ разкриват няколко специфични характеристики на българската фискална позиция. Публичният дълг възлиза на 23,8% от БВП към края на 2024 г., далеч под средното за страните от ЕС (81%), което предполага наличие на значително фискално пространство. Тази по принцип благоприятна картина обаче прикрива някои сериозни уязвимости: дългът на практика се е удвоил спрямо 2015 г., отразявайки както разходите, свързани с пандемията, така и структурното нарастване на социалните разходи. Първичното салдо премина от излишък от 1,8% от БВП през 2019 г. към дефицит от над 2% през 2024 г., илюстрирайки нарастващия фискален натиск.

Диференциалът между лихвите и растежа (r–g) до скоро беше благоприятен, благодарение на инвестиционния рейтинг на страната и стабилните темпове на растеж. Средният реален лихвен процент по държавния дълг бе около 1,4% в периода 2015–2024 г., докато реалният растеж на БВП е около 2,7%. Това съотношение ограничи натрупването на дълг въпреки първичните дефицити в някои години. Но устойчивостта на тази динамика зависи критично от поддържането на растеж, по-висок от разходите по заемите – условие, което ще стане по-трудно за постигане при демографски спад и неблагоприятни външни условия. Нещо повече – по всичко изглежда, че това благоприятно съотношение няма да бъде в сила през следващите години.

Базов сценарий

Доколкото въвеждането на еврото вече е сигурно, няма да бъдат разглеждани сценарии с неговото отлагане и/или отказ от въвеждане. Във всеки случай, ако тези събития все пак се случат, последиците върху икономиката, в т.ч. и фискалните ще бъда силно негативни. Планираното приемане на еврото представлява едновременно възможност и предизвикателство за фискалната устойчивост. Преходът от паричен съвет към пълноправно членство в еврозоната ще промени няколко параметъра в уравнението на динамиката на дълга. Историческият опит на други страни членки сочи три основни фискални ефекта:

- *Премахване на валутния риск*, което обичайно води до по-ниски разходи за обслужване на дълга. За България оценките сочат, че конвергенцията към лихвените нива в еврозоната може да намали ефективната лихва с 50–100 базисни пункта. Това понижение на r подобрява динамиката на дълга при стабилен растеж.

- *По-строги фискални правила* чрез Пакта за стабилност и растеж. България ще трябва да поддържа дефицити под 3% от БВП и дълг под 60% от БВП. Макар тези критерии да се изпълняват в момента, те ограничават фискалната гъвкавост в бъдещи кризи, особено при липса на независима парична политика.
- *Еднократни разходи*, свързани с институционалната и финансовата адаптация. Проучвания върху предишни присъединявания оценяват тези разходи на 0,5–1,0% от БВП, разпределени за 3–5 години около приемането (Furceri & Karras, 2006). За България това предполага временен натиск върху първичното салдо (РВ), като дълговите показатели ще се влошават през първата половина от прогнозния период, след което ще се стабилизират и дори леко ще почнат да се подобряват.

Нетният ефект зависи от взаимодействието между тези фактори. Прецеденти като Словения показват подобрение на показателя дълг/БВП с 5–8 процентни пункта в първите пет години след приемането, преди стабилизиране на по-ниски равнища, но началната позиция на България се различава съществено – значително по-нисък дълг, но и по-слаби перспективи за растеж – което затруднява директните сравнения.

Геоикономически предизвикателства: глобален търговски протекционизъм

Глобалната икономическа среда през последните години е белязана от тенденции към протекционизъм и геоикономическо напрежение. Политиката на САЩ през 2017–2021 г. под администрацията на Тръмп включваше въвеждане на мита върху стомана, алуминий и други продукти и заплахи за допълнителни търговски бариери, което доведе до конфликти с основни партньори като ЕС. Тази политика очевидно продължава и в този мандат. Макар България да няма голям пряк търговски обмен със САЩ, *косвените ефекти* от подобен протекционизъм могат да бъдат съществени. Те се проявяват по няколко канала: **(а)** търговски – спад на износа на основните европейски партньори (например Германия) към САЩ, който вторично намалява търсенето към български износни производства; **(б)** инвестиционен – повишената глобална несигурност може да охлади преките чуждестранни инвестиции; **(в)** фискален – при икономически спад намаляват приходите от ДДС, корпоративни данъци и осигуровки, което влошава бюджетното салдо. От това следва, че външнотърговските шокове действат като външни фискални шокове, сходни в краткосрочен план с пандемичните или енергийните кризи, но потенциално с по-продължителен структурен ефект.

Като малка отворена икономика България е силно уязвима от сътресения в европейските търговски потоци. Каналите на въздействие са много, като по-важните от тях са:

- *Свиване на износа*: Намаляването на търговията между ключови партньори (Германия, Италия, Румъния) и трети страни води до по-ниско търсене на български междинни стоки. Например, изследванията на (Elekdag, Muir, & Wu) сочат, че 10% спад на германския индустриален износ би понижил растежа на България с 0,3–0,5 процентни пункта.
- *Несигурност при инвестициите*: Геоикономическите напрежения обикновено повишават рисковите премии за нововъзникващи пазари, което може да увеличи разходите по заемите (r в уравнението) още преди приемането на еврото. Преките чуждестранни инвестиции в България вече демонстрират повишена чувствителност към геополитически шокове след 2022 г., което означава, че пълното реализиране на такъв вариант ще има негативни последици както върху лихвените проценти, така и върху растежа.
- *Ценова волатилност на суровини*: Като нетен вносител на енергия, България остава уязвима на ценови шокове. Енергийната криза през 2022 г. показа как

рязкото поскъпване може едновременно да влоши търговския баланс (намалявайки g) и да изисква фискални компенсации (влошавайки PB).

Предварителните оценки, базирани на 1 показват, че комбинация от по-нисък растеж (-1%), по-високи лихви (+0,5%) и по-голям дефицит (с 0,8% от БВП) би повишила съотношението дълг/БВП с приблизително 4 процентни пункта за пет години. В същото време трябва да се уточни, че конкурентното натрупване на ефекти предполага нелинейни въздействия, надхвърлящи простото им сумиране.

Геоикономически предизвикателства: климатични събития и фискален риск

Климатичните промени въвеждат нови измерения във фискалния анализ. България е изправена пред нарастваща честота и тежест на екстремни събития, особено засушавания (застрашаващи 35% от земеделската земя) и наводнения (рискови за 12% от инфраструктурата) (Bocheva, Malcheva, Georgieva, & Koshinchanov, 2022), (Stoyanova, 2023). Цитираните изследвания сочат, че климатичните промени поражда фискален натиск чрез:

- *Директни щети*: Например, оценките сочат, че възстановяването след наводненията през 2014, 2024 и 2025 г. изисква разходи, равняващи се на 0,4% от БВП.
- *Загуби в производителността*: Засушаванията между 2017–2020 г. намалиха продукцията на земеделието с 15–20%, със странични ефекти върху хранителната промишленост (8% от индустриалния БВП). (Bachev, 2018)
- *Адаптационни инвестиции*: Изпълнението на климатичните цели на ЕС изисква годишни публични и частни инвестиции от 2,1% от БВП до 2030 г., с голям фискален компонент (Sahin, Narayanan, & Aleksandrova, 2019).

Климатичните изменения добавят още едно измерение на фискален риск. България вече усеща ефектите на по-честите екстремни метеорологични явления – бури, наводнения, суши и горски пожари. Според доклад на (Germanwatch, 2025), България е била сред десетте най-силно засегнати държави от екстремни климатични събития през 2022 г. През тази година поредица от бури и наводнения у нас причиняват щети на инфраструктура, жилища и земеделски земи, като икономическите загуби се оценяват около 0.3% от БВП. Подобни събития поставят двойно предизвикателство пред публичните финанси: от една страна, намаляват икономическата активност (и съответно данъчните приходи) в засегнатите региони; от друга, изискват непредвидени публични разходи за спешни ремонти, хуманитарна помощ и дългосрочна адаптация на инфраструктурата. По този начин екстремните климатични шокове могат да влошат едновременно бюджетното салдо и да увеличат дълга. Опитът показва, че дори развити страни в Европа търпят значими загуби при природни бедствия – например през 2022 г. Италия губи ~0.4% от БВП, Гърция ~0.8% от БВП поради суши, горски пожари и наводнения. Това подсказва, че при по-тежки сценарии за климатични събития за България е възможно еднократни фискални разходи в порядъка на няколко процента от БВП, които да нарушат устойчивата дългова траектория, ако липсват адекватни буфери или застрахователни механизми. Сценарият „Климатичен шок“ е създаден именно за да илюстрира дългосрочния фискален риск, породен от екстремни климатични събития, които предизвикват внезапни загуби на БВП; увеличават публичните разходи (възстановяване, социална помощ, инфраструктура); влошават първичния бюджетен баланс и имат дългосрочни ефекти върху дълговата устойчивост, особено когато се появят повтарящи се.

Моделът проследява динамиката на публичния дълг (като % от БВП) в отговор на следните климатични сътресения:

Година	Шокови стойности	Обосновка
2028	Нулев растеж (g = 0.0) +	Голяма суша + пожари, значителни загуби в селско стопанство и енергетика, извънредни разходи
	първичен дефицит -1,2%	
2032	Отрицателен растеж (g = -2%) +	Катастрофални наводнения, тежки щети по инфраструктура, евакуации, помощи, загуба на заетост
	първичен дефицит -1,5%	

Източник: Авторови допускания

Очевидно е, че такъв род събития не могат да се предскажат с точност. Трябва да се подчертае обаче, че при моделиране на климатични шокове, важно е да се изследва и включи някаква повтаряемост (цикличност напр. веднъж на 4–5 години), което съответства на циклите на El Niño/La Niña и честота на тежки наводнения и суши в Югоизточна Европа според IPCC доклади и EEA (European Environment Agency). От тази гледна точка този сценарий следва да се разглежда като илюстративен – т.е. какво би могло да се случи в средносрочен план, а не кога точно ще се случи.

Нулев или отрицателен номинален растеж е реалистичен при сериозни природни бедствия, особено ако те обхващат критични отрасли (земеделие, енергетика, туризъм). Бюджетните дефицити отразява нуждата от извънредни плащания към домакинства; възстановяване на публична инфраструктура и евентуално международно финансиране с държавна гаранция. Дори относително редки събития, ако са достатъчно интензивни, водят до структурно по-висок дълг. При повторяемост на шокове и липса на превантивни буфери, устойчивостта на дълга отслабва, въпреки първоначално ниски нива. Това подчертава нуждата от предварително фискално пространство, климатични фондове, и включване на климатичен риск във фискалното планиране.

Демографска динамика: застаряващо население и трудов пазар

Демографските тенденции в България са сред най-неблагоприятните в ЕС, което поражда дългосрочни рискове за икономическия растеж и публичните финанси. Населението се свива и застарява с ускорени темпове: според официалната прогноза на НСИ, до 2035 г. броят на населението ще намалее с над 640 хил. души спрямо днешните нива. Особено тревожно е намалението на работоспособното население – очаква се групата 15–64 г. да се свие с около 420 хил. души до 2035 г. Делът на населението над 65 г. при последното преброяване (2021 г.) достига ~24%. Ако тенденциите продължат, това означава нарастващо съотношение на пенсионери към работници – т.е. по-малко данъкоплатци, издържащи повече хора в пенсионна възраст. Евростат проектира, че България ще има един от най-високите коефициенти на възрастова зависимост в ЕС до 2060 г. (около 60%, или едва 1.7 работещи на 1 пенсионер).

Непосредствените фискални ефекти от демографията се проявяват главно през системата за социално осигуряване. Застаряването оказва натиск върху пенсионната система и разходите за здравеопазване. Последният доклад на ЕК за застаряването (Ageing Report 2024) показва, че публичните разходи за пенсии в България достигат връх от около 8.5% от БВП през 2025 г.[2] От всичко това следва, че в рамките на разглеждания хоризонт (до 2035 г.) демографските фактори ще действат *ограничаващо* върху потенциалния растеж (чрез недостиг на работна сила) и *разширяващо* върху някои бюджетни разходи (пенсии, здраве). Общата картина е,

[2] В проектобюджета за 2026 г. тази стойност вече надхвърля 10 % от БВП.

че демографията постепенно изяжда фискалното пространство: при равни други условия държавата ще трябва да отделя все повече ресурси за пенсии и свързани социални разходи, което увеличава първичните дефицити или изисква компенсиращо вдигане на приходи. Нещо повече – неблагоприятните демографски тенденции не могат да бъдат разрешени нито в краткосрочен, нито в средносрочен план, поради което те присъстват (без да са изрично упоменати) във всички сценарии.

Фискални мултипликатори и фазата на икономическия цикъл

Връзката между фискалната политика и БВП се осъществява чрез *фискални мултипликатори,* а те от своя страна зависят от структурата на икономиката и фазата на цикъла. Като малка отворена икономика, България има сравнително ниски фискални мултипликатори – емпирични изследвания показват, че първичният ефект от увеличение на правителствените разходи е близък до нула (т.е. 1% от БВП допълнителен разход води до под 0.5% допълнителен БВП първата година), докато при понижение на данъците ефектът е малко по-голям (около 0.3–0.4) (Йоцов, 2018). Това се обяснява с високия вносен компонент на потреблението и ограничената способност на икономиката да реагира на вътрешни стимули. Въпреки това, мултипликаторите не са константни – техният размер варира според конюнктурата и вида на разходите. В общия случай важи правилото, че в периоди на спад (рецесии) фискалните мултипликатори са по-високи отколкото в периоди на подем, тъй като има неизползван капацитет и монетарната политика не възпрепятства стимулите. Също така, инвестиционните разходи на правителството имат по-голям ефект върху БВП от текущите разходи за издръжка или нетаргетираните трансфери. В контекста на нашия модел тези съображения са отразени чрез избор на подходящи параметри при шоковете: при симулиране на негативен шок (напр. климатично бедствие), допълнителните правителствени разходи за възстановяване имат известен компенсиращ ефект върху БВП, макар и не напълно, докато при позитивен шок или експанзия ефектите от стимулите са по-умерени. Това гарантира, че сценарийните симулации отчитат не само директното бюджетно влияние, но и *вторичните икономически ефекти* от фискалната реакция в различни фази на цикъла.

Сценарийно-базиран модел за дългосрочна фискална устойчивост

Както вече споменахме, предлаганата рамка надгражда конвенционалния анализ на устойчивостта на дълга чрез интегриране на множество рискови измерения в сценарийно-базиран подход. Разработваме динамична система, в която фискалните променливи взаимодействат с макроикономическите условия, институционалните промени и екзогенните шокове. Основната иновация е в моделирането на тези взаимодействия като взаимозависими процеси, а не като изолирани фактори.

Източници на данни и предварителна обработка

Емпиричният анализ се основава на множество статистически източници, които отразяват фискалната динамика на България. Макроикономическите променливи (растеж на БВП, инфлация и лихвени проценти) са извлечени от регулярно публикуваните данни на НСИ и БНБ. Фискалните агрегати, включително приходи, разходи и държавен дълг, са взети от базата данни на Министерството на финансите. Демографските и трудови прогнози се базират на данните на НСИ и на сайта https://lmforecast.mlsp.government.bg/, докато индикаторите за климатичен риск са интегрирани от оценките на Европейската агенция по околна среда. Данните обхващат периода 2005–2024 г. за историческа калибрация, като прогнозите се разширяват до 2035 г. Всички номинални стойности са дефлирани с хармонизирания индекс на потребителските цени (HICP) на НСИ.

За начална година на симулацията е избрана 2025 г. с нормализиран БВП = 100 (индекс) и съотношение публичен дълг/БВП = 27.8%, което съответства приблизително на отчетното ниво на дълга през м. септември 2025 г. Макроикономическите допускания в базовия сценарий (виж Таблица 1) съответстват на средносрочната прогноза на Министерството на финансите и Евростат: реален растеж около 2.5 - 3% годишно в периода 2025–2030 г., постепенно забавящ се до около 2.5 до 2035 г., при умерена инфлация (2 – 3.5%) и намаляващи лихвени проценти (3% - 4.2%), дължащо се на очакваното влизане в еврозоната. Демографските допускания (намаляващо население и работна сила) са имплицитно отчетени в тази растежна перспектива – например потенциалният растеж е по-нисък от историческия именно заради отрицателния трудов прираст и нуждата от ръст на производителността, компенсиращ недостига на работна ръка. Моделът е детерминистичен и счетоводен по своя характер – т.е. не прогнозира сам по себе си поведението на фискалните власти, а взима като вход зададени времеви редове за икономическия растеж, първичния баланс и лихвените проценти по дълга, и изчислява изхода – траекторията на дълга при тези условия. По този начин могат да се тестват различни *сценарии "какво ако"* и да се оцени устойчивостта.

Дизайн на стрес-тестовите сценарии

Използваме пет алтернативни сценария, чрез които се изследва фискалната устойчивост при неблагоприятни условия.

Таблица 1 Сценарии и основни допускания (2025–2035 г.)

Сценарий	Описание
Базов	Реален растеж около 3% годишно; подобряващ се първичен баланс (от -1,8 % до +0,5% от БВП; намаляваща ефективна лихва по дълга от 4,2 до 3%. Дългът остава устойчив при тези условия.
Търговски шок	Глобално забавяне на търговията поради протекционизъм на САЩ. Моделира се като спад на растежа през 2026–2027 г., следван от възстановяване. Бюджетната политика не се разхлабва (първичният баланс е непроменен), но лихвите леко нарастват между втората и четвъртата година на периода вследствие на по-високата инфлация от по-високите мита.
Климатичен шок	Поредица от екстремни климатични събития в периода. Допуска се настъпване на бедствия през 2028 г. (напр. мащабна суша) и 2032 г. (опустошително наводнение). В тези години реалният растеж пада до 0% (2028) и –2% (2032), а правителството поема допълнителни разходи – първичен дефицит около –1,2% (2028) и –1,5% (2032) за възстановяване и адаптация. През останалите години: растеж ~3%, непроменена фискална политика. Лихвите също са като в базовия сценарий тъй като се счита, че шоковете са времеви и не водят до трайна премия за риск на дълга (може да се разгледа като сценарий с помощ от ЕС/собствени резерви за финансиране на щетите).
Комбиниран	Едновременно реализиране на климатичен и търговския шок. Възможно най-лошия сценарий, при който показателите за дълга се влошават рязко.
Глобална стагнация	Влошена глобална среда с продължителни ефекти: комбинира търговски шок и повишена премия за риск. Растежът се снижава до 1.5% през 2026–2027, след което остава под тренда (около 2–2.5% годишно до 2035). Инвеститорите изискват по-висока доходност – ефективната лихва по дълга нараства на ~4–5% годишно от 2026 г. нататък. Правителството не реализира дискреционни стимули (първичният баланс се запазва както при базисния сценарий, т.е. разчита се на автоматичните стабилизатори). Този сценарий отразява устойчива външна стагнация с r > g, неблагоприятна за дълговата динамика.

Източник: Авторови допускания

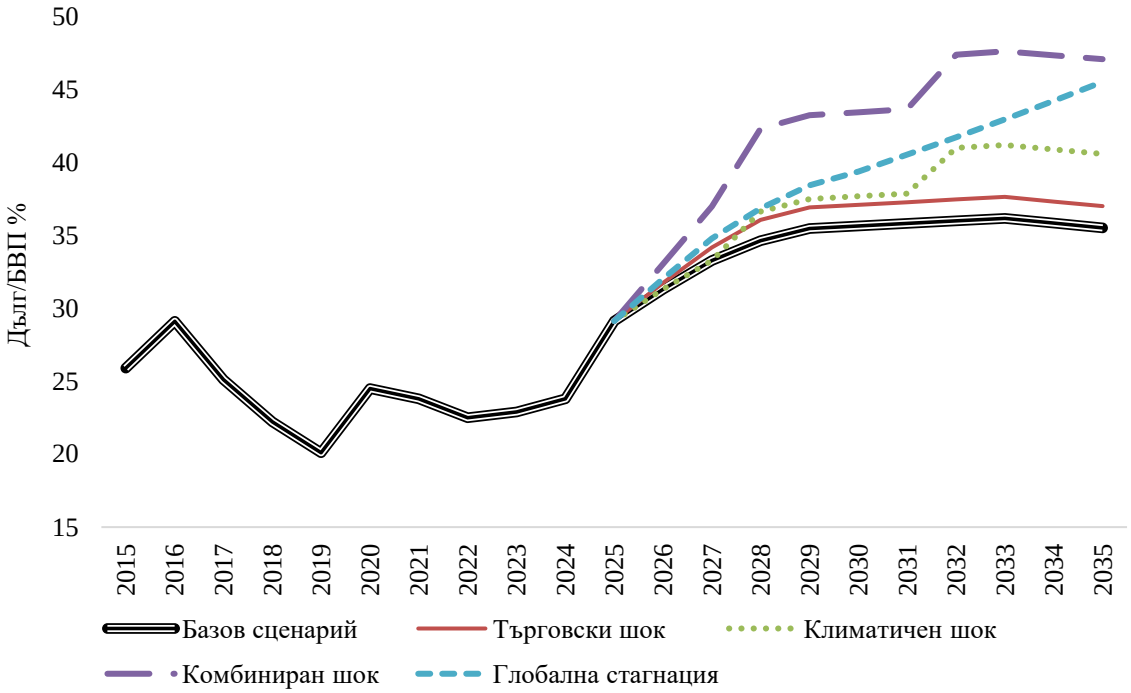
Всеки сценарий модифицира специфични параметри в уравнението, при запазване на останалите константи, за да се изолират каналите на въздействие. В контекста на горните сценарии, важно е да се отбележи, че демографските тенденции са еднакви за всички

сценарии – т.е. не се разглежда отделен сценарий с различна демография, а постепенното намаляване на работната сила е вече отразено в базовата линия на растеж (~3% е сравнително умерен темп, отразяващ именно по-слабия потенциал заради демографията). Също така, фискалните мултипликатори влияят имплицитно: при сценарии с шокове се приема, че част от негативния ефект върху БВП се омекотява от държавните разходи (особено в климатичния сценарий, където публичните инвестиции за възстановяване имат стимулиращ ефект), но не напълно – в съответствие с емпиричните стойности за България.

5. Резултати от симулациите: фискална динамика при различни шокове

Динамика на публичния дълг при различни сценарии

Фигура 1 Прогнозна динамика на публичния дълг на България (% от БВП)



Източник: симулационен модел на автора.

Фигура 1 и Таблица 2 (по-долу) илюстрират траекториите на съотношението дълг/БВП във всеки сценарий. Базовият сценарий показва нарастващо дългово съотношение. Това е очакван резултат предвид допускането, че $r > g$ през целия прогнозен период, а салдото по първичния баланс е негативно през първата половина на периода. С други думи, при базовата макроикономическа среда, публичният дълг на България нараства, но остава общо взето устойчив и далеч под критериите от Маастрихт (60%).

Сценарият с глобален търговски шок (протекционизъм) има по-осезаем ефект върху дълга, макар все още умерен. Заради по-слабия растеж в началото на прогнозния период, *номиналният БВП* е по-нисък спрямо базовия сценарий, което влошава дълговите показатели. Въвеждането на по-високи мита ще има негативен ефект върху инфлацията, което ще наложи известно покачване на лихвените проценти. В симулацията дългът достига около 37% от БВП към края на периода, в сравнение с 35% без този шок. Важно е да се отбележи, че тук приемаме правителството *да не реагира с дискреционна политика* – то не компенсира спада с допълнителни разходи или данъчни облекчения, и също така не затяга извънредно коланите. Ако допуснем, че при рецесия автоматично

възниква малък дефицит (напр. чрез социални плащания и спад на приходите), тогава дългът би нараснал малко повече. Понастоящем обаче България разполага с фискални буфери (натрупан фискален резерв) – които могат да поемат краткосрочен шок, така че сценарият можем да разглеждаме като умерен риск.

Климатичният шок разкрива влиянието на редки, но тежки катастрофични събития (т.нар. „черен лебед"). Поради спецификата на допусканията (шокове през 2028 и 2032 г.), динамиката на дълга тук не е плавна както в останалите сценарии – наблюдават се *два скока* в кривата. Първият скок (условно през 2028 г.) е относително по-малък: дългът нараства от ~31,9% на ~35,2% от БВП, т.е. с около 3 пункта, вследствие на нулевия растеж и дефицит в първичния баланс поради необходимостта от допълнителни разходи за компенсации на последиците. Вторият шок (условно през 2032 г.) е по-силен и изтласква дълга до около 40 % от БВП – увеличение с близо 4 пункта само за година. Това е резултат от комбинирането на дълбок икономически спад (–2% реален растеж) с мащабен спасителен пакет (2% от БВП допълнителни разходи). След тези събития икономиката частично се възстановява, което стабилизира дълга – към 2035 г. като дълговото съотношение е под 40%, леко по-ниско от пика, но значително над базовия сценарий (~34%). Този сценарий подчертава значимостта на климатичния риск: макар и хипотетични, серия от природни бедствия могат да заличат фискалното предимство на ниския дълг. България тръгва от изключително ниско дългово ниво, но един-единствен много тежък инцидент (или няколко средно тежки) би могъл да добави 5–6 пр. п. към дълга. Политическият извод е, че без превантивни мерки (напр. застрахователни схеми, резерви) фискалната позиция не е имунизирана срещу климатични събития.

Комбинираният сценарий (климатичен и търговски шок) логично дава по-неблагоприятна траектория от всеки поотделно. Дългът в този случай нараства от ~28% в началото на прогнозирания период до около 45% от БВП към кулминацията на ефектите (около 2032 г.), след което леко се понижава, оставайки на нива от около 45 %. Комбинираният сценарий е най-стресов за икономиката – той демонстрира, че дори при едновременно настъпване на вътрешен и външен шок българският дълг остава под 50% от БВП, което е индикатор за относителна устойчивост. Същевременно обаче, отстоянието до Маастрихтския праг (60%) не бива да приспива бдителността – фактът, че дълговото бреме нараства с близо 20 п.п. означава повишена уязвимост към следващи шокове.

Таблица 2 Динамика на публичния дълг (% от БВП) по сценарии

	Базов сценарий	Търговски шок	Климатичен шок	Комбиниран шок	Глобална стагнация
2025	27,8	27,8	27,8	27,8	27,8
2026	30,0	30,4	30,0	31,6	30,6
2027	31,9	32,8	31,9	35,4	33,4
2028	33,2	34,6	35,2	40,7	35,4
2029	34,1	35,4	36,1	41,5	36,9
2030	34,2	35,6	36,2	41,7	37,8
2031	34,4	35,8	36,4	42,0	38,9
2032	34,6	36,0	39,8	45,6	40,1
2033	34,7	36,1	40,0	45,8	41,3
2034	34,4	35,8	39,7	45,5	42,5
2035	34,1	35,5	39,4	45,3	43,7

Източник: изчисления на автора. Стойностите за 2025 г. са начални; числата за другите сценарии отразяват ефектите на допусканията.

Силно негативен се очертава и сценарият с влошена глобална среда. Тук съчетаваме продължителен (макар и умерен) спад в растежа със значимо повишение на лихвите – ситуация, при която $r - g$ става трайно положителна и надхвърля 2%. Именно това е класическата предпоставка за дългови проблеми. Резултатите показват постепенна ерозия на дълговата позиция: докато 2025–2027 г. дългът расте относително по-бавно (от ~28% на ~33%), след 2028 г. тенденцията продължава възходящо и с акумулиращ ефект. Към 2035 г. съотношението дълг/БВП приближава 44% и продължава да расте с ~1 пр. п. годишно. С други думи, в този сценарий България би преминала от положение на нисък дълг със устойчиво нарастване към положение на ускоряващо се дългово бреме. Причината е, че при направените допускания правителството не генерира първични излишъци, които да компенсират превишението на лихвата над растежа. Дори при балансиран бюджет (PB=0), ако r > g достатъчно дълго, дълговата тежест ще нараства експоненциално. Нашата симулация обхваща 10-годишен период, през който дългът нараства 15-17 пункта; проекция извън хоризонта лесно показва как при продължаващи условия (например до 2040 г.) дългът може да надхвърли 50% от БВП, ако не настъпи корекция. Този сценарий илюстрира уязвимостта на България към една комбинация от външни шокове, която макар и да не взривява дълга веднага, го поставя на неустойчива траектория. Следователно, необходим е набор от коригиращи мерки – или повишаване на първичния баланс (чрез по-високи приходи или по-ниски разходи), или структурни политики за ускоряване на растежа, или политики за намаляване на рисковата премия (например активна дипломация за избягване на търговски конфликти, поддържане на кредитния рейтинг, разумна дългова стратегия).

Трябва да се подчертае, че стойностите във всички сценарии остават под референтния праг от 60%, което номинално означава, че България запазва дълговата си устойчивост във всеки отделен сценарий. Качествено обаче рисковите различия са съществени: при шоковите сценарии дългът трайно се установява на ново, по-високо равнище (при климатичния) или расте с ускорение (при глобалния), което индикира потенциална ерозия на фискалния буфер и по-голяма експозиция към бъдещи кризи. В комбинирания сценарий от първоначалния модел дългът остава под 50% до 2035 г., но новите фактори могат да тласнат кривата нагоре – особено неприятна е ситуацията на продължителна *стагфлация* или спад с висок риск (глобална финансова криза). Именно там виждаме как чувствителността към параметъра r–g става решаваща: при r≈ g (както бе през по-голямата част от последното десетилетие) дългът е общо взето стабилен, но при обръщане на тази зависимост започва да расте дори без фискални дисбаланси.

Обобщение на основните изводи

Обобщено, основните изводи са:

- *Базовият сценарий* (липса на големи сътресения) предполага стабилен, но растящ дълг (до около 35% от БВП), което е комфортна зона за правителството. Това дава възможност на България да изпълнява критериите за еврозоната и да поеме някои разходи по интеграцията без да застраши устойчивостта.
- *Външният търговски шок* (напр. американски мита и свиване на световната търговия) има по-неблагоприятен ефект върху дълга, но все пак умерен. Той разкрива зависимостта на България от международната конюнктура и нуждата от диверсификация на икономиката. При такъв шок основният негатив е по-ниският растеж, а не толкова пряко висок дефицит.
- *Комбинацията от вътрешен и външен шок* усилва ефектите, дългът нараства с 18 п.п., но остава под критичните стойности. Това показва, че при изходна позиция на нисък дълг България може да понесе дори два едновременни удара и

все пак да остане под нормативните лимити. Тази устойчивост обаче е количествена – качествено тя се изразява в почти двойно по-висок дълг от началния, което намалява гъвкавостта за бъдещи шокове.

- *Новите рискове* (климатичен и глобален) могат да влошат значително картината. Климатичният риск е реален – вече виждаме ежегодни щети в стотици милиони левове, а при катастрофални събития това число би било в пъти по-голямо. Ако такива събития се случат, дългът би скочил рязко – нашият сценарий показа възможно нарастване до ~45% след два големи удара. Глобалният стагнационен сценарий също е много опасен: той демонстрира ситуация, при която *сами по себе си неблагоприятните пазари и рецесията увеличават дълга към възходяща траектория*, дори без фискални волности. В този смисъл външната среда (лихвена и растежна) може да „диктува" съдбата на дълга повече, отколкото вътрешните решения – нещо, което силно напомня за опита на малки отворени страни по време на дълговата криза в еврозоната 2010–2012 г.

Резултатите от сценариите показват, че фискалната позиция на България в началото на периода е устойчива при текущите параметри, но не е имунизирана срещу големи шокове. Ниският начален дълг и относително стабилната приходна база (включително очакваните средства по линия на ЕС и НПВУ) са позитивни фактори, които помагат дори стресови сценарии да не излизат извън контрол. Например, въвеждането на еврото, съчетано с известен търговски шок, не успява да тласне дълга над 40% от БВП – ниво, което все още е много далеч от проблемно. Това говори за фискална устойчивост в краткосрочен план.

Най-големият риск обаче произтича от *външни фактори*, които едновременно влошават икономическия растеж и повишават несигурността относно финансирането. В нашия разширен анализ идентифицирахме два такива фактора: климатичните бедствия и глобалната стагнация. Те имат потенциал да влошат както бюджета (чрез непланирани разходи или спад на приходите), така и да променят фундаментално средата ($\boldsymbol{r}$ и $\boldsymbol{g}$). Климатичните събития действат по-скоро като *еднократни шокове*, на които може да се отговори с временни мерки, но честотата им е неизвестна – възможно е да зачестят, което означава кумулативен ефект върху дълга. Глобалната стагнация е по-коварна, защото представлява *персистиращ шок* – продължителен период на нисък растеж и високи разходи по дълга, който изтощава фискално дори дисциплинирани правителства.

Политическата икономия на реакцията към шоковете също е от значение. Ако при възникване на шок (външен или вътрешен) политиката тръгне към проциклично увеличаване на разходите (например популистки стимули, увеличение на заплати и пенсии за сметка на дълга), това би довело до допълнителен натиск върху дълговата динамика. В нашите сценарии подобен подход бе симулиран, но можем да го допълним с вариант, в който има умишлено фискално разхлабване. За съжаление текущата политическа ситуация в България прави напълно възможен един такъв вариант. Лесно е да се предвиди, че тогава дългът би растял още по-бързо. В този смисъл, сегашната фискална устойчивост не бива да се приема за даденост – тя е условна и силно зависима от провежданата икономическа политика.

Последствия и препоръки към икономическата политика

Изследването показа, че България се намира във фискално стабилна ситуация, но навлиза в период на значими промени – евроинтеграция, демографски преход, климатични рискове и несигурна глобална икономика. За да се запази и укрепи устойчивостта на публичните финанси, е необходим проактивен подход към фискалното

управление. По-долу формулираме няколко направления за политика, стъпвайки на резултатите от сценариите:

Диверсификация и укрепване на приходната база – Анализът показа, че шоковете оказват сериозно влияние върху, затова подобряване на събираемостта и разширяване на данъчната основа са ключови. Конкретни мерки включват засилване на контрола върху ДДС и акцизите, особено в сектори с високи нива на сива икономика, както и обмисляне на нови източници на приходи, които са по-малко проциклични. Например, въвеждане на екологични данъци или дигитални такси може да има двоен ефект – да подкрепи адаптацията към климатичните промени и да донесе постъпления, независими от традиционния икономически цикъл. Също така, намаляване на прекомерната зависимост от косвени данъци (които рязко спадат при криза) чрез реформи в корпоративното облагане и осигурителната система би направило бюджета по-устойчив при външни шокове. В условията на застаряващо население е желателно да се предприемат политики за повишаване на активността и заетостта – по-дълъг трудов живот, стимули за привличане на работна сила отвън (висококвалифицирани мигранти) – така че основата от осигурителни вноски да не ерозира толкова бързо.

Стриктен контрол върху публичните разходи и реформи за ефективност – При въвеждането на еврото има риск от разходен популизъм (напр. натиск за увеличение на заплати, пенсии, социални помощи) под предлог компенсиране на евентуални ценови ефекти. Необходимо е да се удържи такава тенденция чрез силна рамка за разходите. Препоръчва се въвеждане на вътрешно разходно правило – например максимален растеж на дискреционните разходи, свързан с потенциалния растеж (както се прави на ниво ЕС). Също така, реформи за повишаване на ефективността на големите разходни системи (здравеопазване, образование, социално осигуряване) са наложителни. Това означава, че с наличните ресурси трябва да се постигат по-добри резултати – например електронно здравеопазване за намаляване на течовете, оптимизация на училищната мрежа при спадащо ученическо население, по-добро таргетиране на социалните помощи. Такива реформи биха освободили фискално пространство, което може да се пренасочи към приоритетни инвестиции или за намаляване на дълга. В контекста на климатичните рискове, това включва и преоценка на бюджета за отбрана и вътрешен ред – част от ресурсите може би трябва да се насочат към *гражданска защита, превенция и инфраструктурна климатична устойчивост*. Инвестирането „сега“ в укрепване на диги, горски противопожарни системи, водни резервоари и др. може да изглежда като разход, но спрямо сценария на бъдещи бедствия е всъщност спестяване на много по-голям разход по-късно.

Интегриране на климатичния риск във фискалното планиране – България следва да изгради стратегия за климатична фискална устойчивост. Това включва създаване на *специален резервен фонд за природни бедствия*, който се попълва ежегодно (например с 0.1–0.2% от БВП) в добро време и се използва при кризисна необходимост. Също така, по-широко използване на застраховки – насърчаване на застраховането на публична инфраструктура и субсидиране на застрахователни премии за земеделците срещу суша, слана и наводнения. На международно ниво България може да участва в механизми като общоевропейски фондове за солидарност при бедствия. Разходите по адаптация (например строителство на инфраструктура за защита от наводнения) не бива да се разглеждат като обикновени капиталови разходи – те са *инвестиция в намаляване на бъдещи бюджетни загуби*. Затова правителството би могло да обоснове по-голям целеви дефицит в някои години, ако той е насочен към климатична адаптация с висока възвръщаемост. Например, изграждането на модерна система за напояване и воден

мениджмънт би струвало определен процент от БВП, но би предпазило икономиката от щети, надвишаващи този процент многократно във времето (по сценария за суша). Тук е важна ролята и на европейските средства – ефективното използване на Фонда за възстановяване и устойчивост (НПВУ) и други програми за зелен преход би намалило необходимостта от национално финансиране на тези мерки. Съществено е и подобряването на капацитета за *бързо усвояване* на помощ при бедствия – за да може ако настъпи криза, средствата (национални или европейски) да достигнат целта навреме и да ограничат вторичните загуби.

Превенция на дългови рискове и оптимизация на дълговата структура – За да минимизира ефекта от неблагоприятен сценарий като глобалната стагнация, правителството трябва проактивно да управлява портфейла на държавния дълг. Това включва удължаване на матуритетите на съществуващия дълг при все още ниски лихвени равнища – така се заключва ниска цена за по-дълго и страната печели време, дори ако пазарните лихви скочат. Текущото ниво на дълга позволява да се издадат по-дългосрочни облигации (напр. 10-15-20 годишни) без да се притесни пазарът. Също така, важно е да се разнообразят източниците на финансиране – освен чрез еврооблигации, България може да ползва и заеми от международни институции (ЕИБ, МВФ при нужда на предпазни линии, двустранни споразумения). Поддържането на висок кредитен рейтинг е ключово – това зависи от спазване на фискалната дисциплина и изпълнение на реформи, които рейтинговите агенции следят. Ако рейтингът се подобри до А- примерно, рисковата премия автоматично ще спадне, което би помогнало точно при сценарий на глобална несигурност (когато инвеститорите бягат към по-висок рейтинг). Във вътрешен план, Министерството на финансите трябва да развие аналитичен капацитет за стрес-тестове на дълга – подобни на тук представения, но регулярно обновявани с актуални данни – и да ги ползва при изготвяне на средносрочната бюджетна рамка. Например, ако се забележат признаци на устойчиво **r>g**, бюджетната политика трябва автоматично да премине към по-рестриктивна позиция (или стимули за растеж, ако е възможно) за да компенсира.

В заключение, фискалната устойчивост на България към момента е задоволителна, но е изправена пред нови изпитания. Комбинацията от еврозона, климатични изменения и геоикономически сътресения ще изисква от управляващите висока степен на гъвкавост и предвидливост. Основните стълбове на успеха ще бъдат: придържане към дисциплина и буфери в добри времена; готовност за бързи и адекватни мерки при шок; и стратегически инвестиции в устойчивост – както икономическа, така и физическа (инфраструктурна и демографска). Само така България може да преодолее предстоящото десетилетие, запазвайки дълга си под контрол и подготвяйки икономиката за дългосрочен просперитет въпреки неблагоприятните тенденции.

6. Предизвикателства и перспективи пред икономическото развитие в по-дългосрочен план

Периодът след началото на икономическите реформи в началото на 90^{те} години на миналия век е белязан от редица предизвикателства, които поставят на изпитание устойчивостта на макроикономическата среда в България. Преодоляването на тези предизвикателства е ключово за дългосрочния икономически растеж и конвергенцията с по-развитите страни в ЕС. В настоящата част се разглеждат ключовите проблеми, свързани с демо-графската криза, ниската производителност на труда, регионалните неравенства, енергийната зависимост и инфлационния натиск. Освен това са анализирани перспективите за устойчиво развитие чрез дигитализация, зелена икономика и ефективно управление на ресурсите от ЕС.

Демографска криза и ефекти върху икономиката

Демографската криза е едно от най-сериозните структурни предизвикателства за България. Намаляването на населението, застаряването и емиграцията водят до свиване на работната сила и увеличаване на социалните разходи. Според НСИ (НСИ, 2021), населението на България е намаляло с над 844 000 души между 2001 и 2021 г., като делът на хората над 65 години е достигнал 23.5% през 2021 г. Намаляването на работоспособното население създава сериозен натиск върху пазара на труда. Липсата на квалифицирана работна ръка ограничава възможностите за икономически растеж и иновации, като секторите с висока добавена стойност, като информационните технологии, усещат най-силно недостига. Независимо от факта, че държавата е приела Националната стратегия за демографско развитие на населението (2012–2030), ефектите от мерките остават ограничени. Според някои експерти (Vladimirova, 2020), необходим е по-цялостен подход, включващ стимули за завръщане на българските емигранти, активни политики за насърчаване на раждаемостта и интеграция на етническите и социално изключени групи в икономиката.

Ниска производителност на труда и иновации

Производителността на труда в България остава сред най-ниските в ЕС, въпреки известния напредък през последните две десетилетия. През 2022 г. БВП на заето лице в България е около 57% от средното за ЕС (Евростат, 2023). Ниската производителност ограничава конкурентоспособността на икономиката и възможността за повишаване на заплатите. Причините за ниската производителност са породени главно от:

- *Недостатъчни инвестиции в образование и квалификация*: Според данни на СБ (2019), инвестициите в образованието като процент от БВП в България са сред най-ниските в ЕС. Това ограничава подготовката на кадри за съвременната икономика.
- *Липса на иновации*: Разходите за НИРД в България са под 1% от БВП, докато средното за ЕС е 2.3% (Евростат, 2020).
- *Застаряваща инфраструктура*: Въпреки инвестициите в транспортната мрежа, технологичната и индустриалната база остават неконкурентоспособни.

Регионални неравенства и икономическа концентрация

Регионалните икономически дисбаланси са дългогодишен проблем за България, като икономическата активност остава концентрирана в София и няколко други големи града. Северозападният регион, например, е най-бедният в ЕС, с БВП на глава от населението под 40% от средното за ЕС (Евростат, 2021). Основните причини за сериозните регионални неравенства се коренят в:

- *Липса на инвестиции в инфраструктура и услуги*: Недостатъчната инфраструктурна свързаност ограничава икономическото развитие на периферните райони.
- *Недостатъчен достъп до финансиране*: Малките и средни предприятия в селските райони срещат трудности при достъпа до кредити и субсидии.
- *Емиграция от селските райони*: Според статистиката на НСИ (2020), над 30% от населението в Северозападния регион е мигрирало към София или чужбина.

Енергийна зависимост и зелена трансформация

Енергийната зависимост на България е друг ключов проблем, който ограничава устойчивостта на икономиката. През 2022 г. България внася над 75% от енергийните си

ресурси, което я прави изключително уязвима към глобалните енергийни кризи (Евростат, 2022). Сериозна остава зависимостта от руски енергийни доставки, а войната в Украйна и санкциите срещу Русия изострят допълнително енергийната несигурност на страната. Към тези проблеми следва да добавим неефективна енергийна инфраструктура - загубите в електропреносната мрежа са сред най-високите в ЕС, което води до увеличени разходи за потребителите. Съществен проблем е и бавният напредък в зеления преход. Съгласно данните на (Евростат, 2022), делът на възобновяемата енергия в България е 22%, което е значително под средното за ЕС от 32%.

Инфлация и глобална несигурност

Инфлацията е основен проблем през последните години, особено след пандемията COVID-19 и войната в Украйна. През 2022 г. инфлацията в България достига 15.3%, което е сред най-високите нива в ЕС. Основните причини за това са ръстът на цените на енергията и храните, както и глобалните прекъсвания на веригите на доставки. Правителството въвежда мерки като енергийни субсидии за домакинствата и бизнеса, както и замразяване на цените на основни стоки. Въпреки това, експертното мнение (Величков, 2024) гравитира около разбирането, че тези мерки имат временен и палиативен ефект и е необходимо да се насърчи вътрешното производство и енергийната независимост, за да се ограничи инфлационният натиск. Основните предизвикателства пред България – демографската криза, ниската производителност на труда, регионалните дисбаланси, енергийната зависимост и инфлацията – изискват целенасочени политики и дългосрочни усилия. Въпреки тези проблеми, перспективите за развитие са обещаващи благодарение на европейските програми за финансиране, зеления преход и дигитализацията. Успехът на страната зависи от способността на институциите да управляват ефективно тези ресурси и да стимулират устойчив растеж.

7. Заключение

Изследването показа, че България навлиза в еврозоната от позиция на относително нисък публичен дълг и стабилна макроикономическа среда, но в условия на натрупване на дълбоки структурни и външни рискове. Анализът потвърждава, че класическият подход към фискалната устойчивост – основан на взаимодействието между лихвен процент, икономически растеж и първично салдо – остава валиден, но вече не е достатъчен сам по себе си. Новите източници на несигурност – климатични бедствия, геополитическо напрежение, фрагментация на световната търговия и демографски натиск – изискват по-богат, сценарийно-ориентиран инструментариум, който да отчита нелинейни ефекти и състояние-зависими фискални мултипликатори.

Симулационните резултати подсказват, че при разумни допускания базовата траектория на дълга остава управляема и далеч под Маастрихтския праг дори при умерено влошаване на външната среда. България се възползва от комбинацията „нисък начален дълг – фиксиран валутен курс – очаквано влизане в еврозоната", която ограничава риска от внезапни промени в пазарните настроения. В сценарии на търговски протекционизъм и изолирани климатични шокове фискалната позиция се влошава, но не излиза извън границите на устойчивостта – дългът нараства, но остава под 50% от БВП. Това показва, че фискалният буфер е реален, а не номинален.

В същото време моделът разкрива, че устойчивостта е крехка по отношение на комбинацията от продължителна глобална стагнация и по-високи лихвени проценти. Когато **r–g** стане трайно положителна и фискалната политика не осигурява систематични първични излишъци, дългът започва да нараства по-бързо и плавно преминава от „комфортен" към „среден" риск, а в по-дълъг хоризонт може да навлезе и

в експоненциална траектория. Това е особено проблематично за икономики като българската, в които демографският профил, ниската производителност и слабата мобилност на труда ограничават потенциала за растеж и способността за абсорбиране на шокове.

Оттук следва, че ключовата задача на фискалната политика през следващото десетилетие не е просто да запази съществуващия нисък дълг, а да предотврати ерозирането на фискалния буфер. Това изисква, *първо*, диверсификация и укрепване на приходната база чрез подобряване на събираемостта, ограничаване на сивия сектор и премереното разширяване на данъчната основа. *Второ*, необходим е по-строг контрол върху разходите и преосмисляне на големите разходни системи (здравеопазване, образование, социално осигуряване) в светлината на демографския преход – без това дългосрочната устойчивост на публичните услуги е поставена под съмнение. *Трето*, климатичният риск трябва да бъде интегриран в бюджетното планиране, а не да се третира като изцяло „външен“. Създаването на стабилен, прозрачен и добре капитализиран фонд за природни бедствия, обвързан с ясни правила за акумулация и ползване на средствата, би намалило необходимостта от *ad hoc* фискални интервенции при всяко екстремно събитие. Паралелно с това е необходима по-активна политика за насърчаване на частните инвестиции в адаптация и зелена трансформация, така че бюджетът да не поема сам целия разход. *Четвърто*, управлението на държавния дълг следва да остане консервативно и прозрачно. Удължаването на матуритета, поддържането на диверсифицирана база от инвеститори и активното управление на лихвения риск са необходими предпоставки, за да не се материализират неблагоприятните сценарии за $\boldsymbol{r - g}$. В условията на обща валута и общ паричен режим, именно фискалната политика и дълговата стратегия остават основни инструменти за гарантиране на макроикономическата стабилност.

Накрая, устойчивостта на публичните финанси не може да бъде разглеждана изолирано от дългосрочните фактори на растежа. Демографската криза, ниската производителност на труда, регионалните неравенства и енергийната зависимост ограничават потенциала за реална конвергенция. Без ускоряване на растежа чрез инвестиции в човешки капитал, иновации и инфраструктура фискалният буфер неминуемо ще бъде изчерпан от бавен, но постоянен натиск. В този смисъл резултатите от сценариите не бива да се интерпретират като комфортен „сертификат за устойчивост“, а като предупреждение: България има рядката възможност да влезе в еврозоната с нисък дълг и относително стабилни финанси – но запазването на това предимство ще зависи от политическата воля да се провеждат непопулярни, но необходими структурни реформи.

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GEOECONOMICS, INTEGRATION AND SUSTAINABILITY: NEW REALITIES AND INTERNATIONAL POLICIES

ГЕОИКОНОМИКА, ИНТЕГРАЦИЯ И УСТОЙЧИВОСТ: НОВИ РЕАЛНОСТИ И МЕЖДУНАРОДНИ ПОЛИТИКИ

Virginia Zhelyazkova[1]

STRATEGIC AUTONOMY AND THE GREEN TRANSITION: GEOECONOMIC TRADE-OFFS IN THE EU'S CRITICAL RAW MATERIALS POLICY

Abstract: *The European Union's pursuit of strategic autonomy in the context of its green transition has placed critical raw materials at the heart of geoeconomic policy. This paper examines the tensions between the EU's internal ambitions for resource sovereignty and its external commitments to sustainable development, open trade, and global integration. Focusing on the Critical Raw Materials Act and its strategic targets, the study explores how the EU attempts to reduce dependencies–particularly on China–while promoting circularity, innovation, and resilience across supply chains. The analysis highlights the emerging trade-offs between security of supply and environmental sustainability, especially in the sourcing and processing of raw materials in non-EU countries, including those in Africa and Latin America Through a policy and literature-based approach, the paper identifies the risk of green protectionism and offers a framework for aligning geoeconomic strategy with equitable, sustainability-oriented partnerships. The findings contribute to the broader debate on how the EU can balance strategic autonomy with a cooperative and inclusive global green transition.*[2]

Keywords: *Strategic autonomy, critical raw materials, green transition, geoeconomics, circular economy*

JEL: *F50, Q56, O13, F18, Q38*

1. Introduction

The transition toward a climate-neutral economy has turned the question of who controls access to critical raw materials into one of Europe's most urgent strategic dilemmas. Materials such as lithium, nickel, and rare earth elements are indispensable to renewable energy, electromobility, and digital technologies. Yet their extraction and processing are highly concentrated in a few countries, leaving Europe exposed to supply disruptions and geopolitical leverage.

In this context, strategic autonomy has evolved from a defense concept into a guiding principle of economic governance. The adoption of the Critical Raw Materials Act (CRMA) represents the EU's attempt to translate that principle into concrete policy. The Act seeks to strengthen domestic industrial capacity while maintaining Europe's openness to trade and investment (European Commission, 2023b; Regulation (EU) 2024/1252).

This paper explores how the CRMA embodies the Union's balancing act between autonomy and interdependence. It situates the regulation within wider debates on European political economy and argues that the EU's green transition cannot be understood without examining the institutional mechanisms through which autonomy is pursued–mechanisms that increasingly link climate policy, industrial strategy, and external relations.

2. Conceptual Framework

The concept of strategic autonomy first emerged in the EU Global Strategy (EEAS, 2016), framed as the capacity to act independently while cooperating globally. Initially associated with defense and security (Fiott, 2018), it expanded into industrial, technological, and environmental policy after the COVID-19 crisis exposed vulnerabilities in supply chains (Mariotti, 2025).

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From an analytical standpoint, autonomy can be read through two theoretical lenses. The first is neofunctionalism, which explains how integration in one area–such as climate policy–spills over into adjacent domains like industry and trade. The Critical Raw Materials Act is a clear instance of this: environmental objectives have triggered deeper economic coordination, consistent with the logic described by Bickerton, Hodson and Puetter (2015).

The second lens is complex interdependence theory (Keohane & Nye, 1998). It views international relations not as a zero-sum game but as a web of mutual dependences that requires management rather than decoupling. This framework is increasingly relevant to Europe's green transition, where value chains for clean technologies depend on cross-border flows of materials, knowledge, and investment.

Contemporary scholarship builds on these foundations. Bradford (2020) describes the EU's global influence through regulation–the "Brussels effect." The notion of Market Power Europe, originally introduced by Damro (2012), has been further developed by Meunier and Nicolaïdis (2019), who examine how the EU's trade and investment policies have become instruments of geopolitical influence, projecting European values through standards rather than coercion. At the same time, autonomy must not degenerate into protectionism. Works such as those clearly frame the EU's challenge: to maintain openness while building resilience.

Against this theoretical background, the CRMA serves as both a test and an expression of what autonomy can mean in practice. Its 2030 benchmarks–10 % extraction, 40 % processing, 25 % recycling within the EU, and a maximum of 65 % import dependence for a particular material from a single third country – translate strategic ambition into measurable governance (European Commission, 2023b). In doing so, the Act transforms interdependence from a liability into a policy tool, grounded in diversification, circularity, and sustainability.

3. Methodology

This study applies a qualitative and interpretive approach, combining document analysis with thematic coding. The goal is not to quantify outcomes but to understand how policy language constructs strategic intentions. Twelve core EU and related documents published between 2016 and 2024 form the analytical corpus. These include the CRMA, the Green Deal Industrial Plan, the Trade Policy Review (2021), and the EU's partnership memoranda on raw materials with Canada (2021), Namibia (2022), and Chile (2023).

Each text was examined line by line to identify patterns of discourse related to autonomy, resilience, sustainability, and cooperation. The analysis followed a three-dimensional coding framework derived from neofunctionalism and complex-interdependence theory:

1. Sovereignty – the Union's collective capacity to act and coordinate.
2. Sustainability – the integration of ecological goals into industrial competitiveness.
3. Reciprocity – the structuring of external partnerships and diversification.

In total, 186 text segments were coded and synthesized into thematic clusters reflecting governance logic. Triangulation with secondary analyses (Tagliapietra & Veugelers, 2023; IEA, 2022; Matthijs & Meunier, 2023) ensured coherence. Quantitative indicators–import-concentration ratios, recycling shares, and investment trends–served to substantiate qualitative findings.

This interpretive design offers flexibility while maintaining analytical rigour. It allows exploration of how the EU conceptualises autonomy as a relational rather than isolationist construct. The emphasis is placed on meaning and coherence rather than numerical measurement, acknowledging that the CRMA remains a young, evolving framework.

4. Results and Discussion

The analysis with the application of the above outlined three-dimensional framework shows that the EU's discourse has moved from general aspirations for resilience toward a coherent regulatory architecture that governs interdependence.

The coding process produced 186 text segments, grouped as 71 under sovereignty, 83 under sustainability, and 32 under reciprocity. These frequencies reveal emphasis but also timing: the earliest documents, such as the EU Global Strategy (2016), employed autonomy mainly in symbolic terms, whereas the Critical Raw Materials Act (2024) converts it into operational benchmarks and institutional mechanisms. Cross-referencing over time shows a steady increase in explicit references to "joint action," "resilient supply," and "strategic projects of Union interest," confirming the hypothesis that crises accelerated functional integration–a neofunctionalist dynamic consistent with Bickerton et al. (2015).

Sovereignty as collective capacity.

The coding results were complemented with interpretive analysis of institutional design. The CRMA's creation of a European Critical Raw Materials Board and its monitoring functions illustrate a transfer of competence to the EU level. Through comparative reading of legislative texts and supporting communications, it became evident that the Act reframes sovereignty as capacity to coordinate and to anticipate risk. This interpretation is strengthened by triangulation with Matthijs & Meunier (2023) and Meunier & Nicolaïdis (2019), who identify regulatory coordination as a distinctive form of European power. The quantitative validation–tracking the share of EU extraction and recycling capacity in Eurostat datasets–shows modest growth since 2020, signaling the initial impact of policy alignment. Sovereignty, therefore, is becoming a measurable collective property rather than a national one.

Sustainability as competitiveness

The sustainability dimension, the largest in the coding dataset, exhibits rich internal diversity. Early communications spoke of "responsible sourcing," while the CRMA uses legal terms such as "environmental footprint" and "recycled content." The progression reflects institutional learning. To interpret this, secondary literature was used to cross-check conceptual consistency: Mazzucato & Semieniuk (2017) emphasise mission-oriented governance, and Rodrik (2014) stresses on the developmental role of green industrial policy. When compared to the CRMA's quantitative targets–40 % processing and 25 % recycling within the Union–these theories help explain how sustainability has evolved into an instrument of competitiveness. According to the IEA (2022), in the European Union about half of base-metal production is from secondary (recycled) sources, but recycling of critical raw materials (such as lithium or rare earths) remains extremely limited. The combination of coding and quantitative benchmarking thus illustrates that sustainability is both the normative driver and the limiting factor of Europe's autonomy.

Reciprocity and managed interdependence

The reciprocity dimension captures how external cooperation underpins resilience. Coded references to "partnership," "mutual benefit," and "diversification" were concentrated in the 2021–2024 period, corresponding to the EU's conclusion of memoranda with Canada, Namibia, and Chile. Textual interpretation of these agreements shows that each integrates sustainability criteria and knowledge transfer–elements absent from earlier trade policy documents. Triangulation with the IEA (2022) and Garcia Calvo (2022) validates this pattern: the EU increasingly conditions access to its market on environmental and governance

standards. Quantitative validation adds context: according to Eurostat, 46 % of the EU's rare-earth imports in 2024 originated from China, while data already show diversification, with new projects in Africa and Latin America under negotiation. These findings confirm the interpretation of *strategic openness*–resilience built through normative partnerships rather than decoupling.

Cross-dimensional insights

When the three coding categories are read together, an integrated picture emerges. Cross-references in the texts–where recycling targets (sustainability) are linked to international cooperation (reciprocity)–appear in nearly a quarter of the coded segments. This interweaving suggests that the EU conceives autonomy not as an end-state but as a process of balancing internal and external pillars. Sovereignty depends on collective governance; sustainability provides its ethical and industrial foundation; reciprocity anchors it globally.

Applying the full methodological design–coding, triangulation, and descriptive validation–thus yields several overarching results. First, the CRMA translates strategic autonomy into quantifiable policy through its 2030 targets and institutional structures. Second, the balance between high environmental standards and administrative feasibility remains delicate, reflecting the hybrid governance problem identified by Schmidt & Thatcher (2022). Third, diversification policies have begun to change Europe's supply geography but require stronger investment frameworks to achieve scale.

5. Conclusions

The analytical synthesis therefore supports the central argument: the CRMA institutionalizes a new form of governed interdependence, where autonomy is achieved through cooperation, not withdrawal. Its design converts normative commitments–climate goals, sustainability, reciprocity–into instruments of strategic capacity. Yet the results also show that this transformation is partial and contingent. The success of the CRMA will depend on sustained coordination, political trust among member states, and credible long-term partnerships with the Global South.

The study thus argues that strategic autonomy, properly understood, is not the opposite of openness, but a framework for governing interdependence. The EU's challenge lies in sustaining this delicate equilibrium between sovereignty and solidarity as it navigates the complex realities of the green transition.[3]

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Milena Angelova[1]

IMPACTS OF THE GLOBAL SUSTAINABLE TRANSITION ON THE ECONOMY AND SOCIETY: CLIMATE MIGRATION

***Abstract**: The global transformation towards sustainability is challenging the existing economic and social models, requiring a new understanding of mobility, security, and development. The climate migration is emerging to be one of the most serious challenges of the 21st century, with significant potential to transform the geopolitical order and economic models and to exacerbate social inequalities and tensions in vulnerable regions. The article aims at gathering and reviewing existing literature and secondary data as to provide better understanding of climate migration, by examining its factors, characteristics, nature and trends, as to contribute to tracing and forecasting these processes and to help advancing their strategic governance.*

***Keywords**: climate migration, sustainability, security*

JEL: *F20; F52; F61*

1. Introduction

Rapid climate changes and multi-crises since 2020 have been challenging existing economic and social models, requiring a new understanding of mobility, security, and development. The climate migration is emerging to be one of the most serious challenges of the 21st century, with significant potential to transform the geopolitical order and economic models and to exacerbate social inequalities and tensions in vulnerable regions. By reviewing the existing literature and secondary data, the article aims at better the understanding about the climate migration. Further, it examines its factors, characteristics, nature and trends.

The interaction between climate changes and migration is one of the most complex contemporary challenges, demanding focused scientific attention. By 2050 a combination of ecological treats and natural disasters are expected to force approximately 1.2 billion of people to migrate – generally from Global South to North (EPRS, 2023). This depicts a worrying trend of forming migration waves that further interfere into big migration streams and calls to urgently orient fundamental scientific research towards creating models for tracing and forecasting these processes and for their adequate strategic governance. As an external boarder of the EU and the Schengen area, Bulgaria is at the centre of these processes - as being both transiting and accepting country for migrants.

2. State of play

A review of existing literature underscores that environmental change interacts with and is mediated by other drivers of migration, increasing complexity of the relationship between them. Factors that induce climate migration may be of environmental, social, economic, and political nature. Forced displacement following sudden- or slow- onset environmental events, offers a more tangible category for analysis, raising specific practical and legal concerns (Kraler, at al., 2020). In addition, it may adversely affect immobilised populations, such as those facing protracted displacement situations as a result of conflict, persecution or violence.

Academic literature examines climate change and their impact on migration, both internal and external. Studies clearly emphasize the role of climate migration as a leading global challenge (Hunter, Simon, 2023; Nabong et al., 2023) and define its exceptional relevance as a scientific

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field in which many aspects remain unexplored. As one of the most pressing issue to be addressed emerges the necessity for gathering data to feed evidence- and fact- based formulation of national, regional, and global policies for proactive governance of climate migration (Hoffmann et al., 2023). Many studies focus on the need to deepening the scientific knowledge in the following areas:

- Mapping natural disasters caused by climate change (especially in the global South) and predicting their impacts applying interdisciplinary scientific approach and innovative research methods (Oakes et al., 2023; Ghosh, Orchiston, 2022);
- Improving understanding of the multifaceted nature, complex causes, and determinants of climate migration (Parrish et al., 2020);
- Human rights, health, and cultural aspects and dimensions of migration (McClain et al., 2025; McMichael, 2023; Zellentin, 2010);
- Linking this phenomenon with global security issues (Ari, Görakpinar, 2020) and its economic and social dimensions (Marotzke et al., 2020; Lustgarten, 2020).

Filling these gaps in scientific research is becoming increasingly urgent given the rapid pace of currently occurring changes, for which there is lack of reliable assessment methodologies (Ghosh, Orchiston, 2022) and forecasting models are scarce. This is because estimates vary, and authorities, businesses, and society find it difficult to understand the risks and challenges arising from increasingly rapid and large-scale migration processes.

3. Methods applied and study findings

The study is conducted as a desk research of existing secondary data and literature, including scientific papers, policy documents and legal cases. The results underline the complex impact of environmental change on migration. While the lattre interacts with and is mediated by other drivers of migration, it is a fact that environmental factors have played a crucial role to induce migration. While displacement following 'sudden-onset events' (flood, typhoons, wild fires) of environmental nature are easier to trace and document, the environmental migration is driven mainly by 'slow-onset events' (drought, shifting of seasons, change of sea levels).

Climate migration defined

Providing a solid definition of climate migration is a pre-requisite for understanding better the factors that affect it and for determining the avenues and methods for relevant data collection.

Contemporary scientific literature does not offer a consensually accepted definition of climate migration. However, it finds that the climate risks are affecting human mobility. This creates need for in-depth and context-specific understanding of all elements that shape this phenomenon in order to develop effective responses. Starting point in this quest shall be précising the terminology used in order to reveal the connections and interceptions between climate and migration. This task is complicated by the plethora of different terms used, that contain different nuances regarding the rights and obligations of the different actors involved (German Environment Agency, 2020). The driving forces behind individuals' displacement or decision to migrate are described with various terms, including: "environmental", "ecological", "climate", and these are combined also with terms that are referring to the people on the move: "displaced persons", "migrants", "refugees" and others (Mayer, Nicholson, 2023). Table 1 depicts different definitions. Some of them are centred around environmental drivers of migration, while others stress on its multiclausal nature or on its legal and policy implications (IOM, 2009).

Table 1. Terms and definitions related to climate migration

Term	Definition / notes	Source
Internally displaced persons	Forced or obligatory leaving of a people from their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or **natural or human-made disasters**, and who have not crossed an internationally recognised State border	IOM, 2019
Environmental displacement	Forced displacement caused by environmental factors, for example a flood or drought.	Kraler, at all, 2020
Temporary/seasonal migratition	A risk-reduction strategy, primarily used by rural households in less-developed regions with highly seasonal precipitation	IOM, 2019
Environmental migration	The movement of persons or groups of persons who, predominantly for reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are forced to leave their places of habitual residence, or choose to do so, either temporarily or permanently, and who move within or outside their country of origin or habitual residence	IOM, 2019
Disaster displacement	Situations where people are forced to leave their homes or places of habitual **residence as a result of a disaster or in order to avoid the impact of an immediate and foreseeable natural hazard**. Forced displacement related to a disaster, whether related to environmental or other causes.	Nansen initiative, 2015 Kraler,at all,2020
Environmentally induced migration	En masse migration in anticipation of worsening conditions, where environmental factors play a role. Migration driven in significant part by environmental factors, but not forced, can also be understood as an adaption strategy.	Council of Europe, 2008, Kraler, at all, 2020.
Human mobility in the context of disasters, climate change, and environmental degradation	The definition encompasses all traditional forms of human mobility (migration, displacement and relocation), thus including both internal and international movements of voluntary or forced nature. On the other hand, it emphasizes the major environmental triggers of mobility, namely disasters (which could be natural hazards or man-made disasters), climate change and environmental degradation.	UNFCCC (Cancun Adaptation Frame-work)
Climate (environmenttal) refugee	Environmental migrants: whose movement is clearly of a forced nature. Persons who are forced to leave because of impacts of climate change.	IOM, (2019, p.32) Kraler,at all,2020.

Source: Author's adaptation of secondary data.

Based on thorough analysis of different concepts, climate migration's definition can be derived from the definition of the environmental migration. This connection reflects the growing number of situations where environment is changing because of the climate change. Therefore, the IOM concept of environmental migration (IOM, 2019) can be developed as basis for defining climate migration as "*the movement of a person or groups of persons for reasons of climate change, are obliged to leave their habitual place of residence, or choose to do so, either temporarily or permanently, within a State or across an international border*".

Climate migration factors and mobility patterns

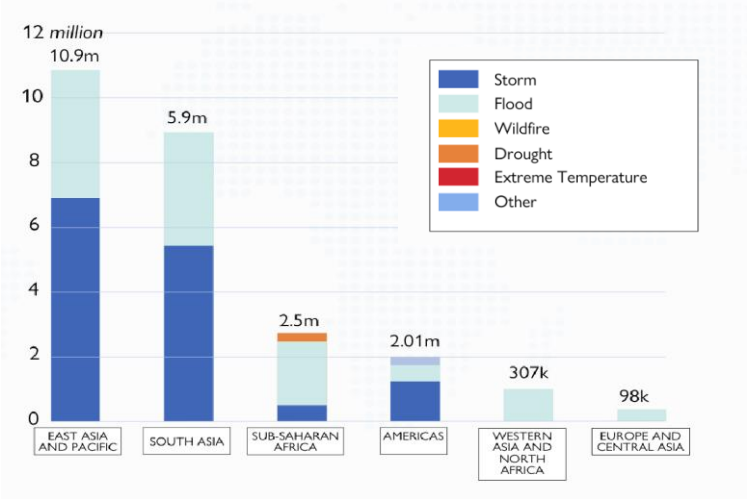
Literature review shows that the driver of population movement are not static, but they evolve over time and it is reflected by the legal framework (Ionesco et al., 2016). This constitutes important challenge when it comes to identifying drivers of migration. The factors described in the scientific sources can be generally grouped into: push (pushing people to leave their usual habitat (because of poverty, lack of nutrition, war, drought, etc.)) and pull (attracting populations to a new area (motivated by better jobs prospects, family links, education etc.)) factors (Everett, 1966). Push factors appear to be of more relevance, as they drive people to

leave their usual habitat – in terms of regions and countries. Most often, population movement are driven by rapid onset events, that occur internally and force people to leave the areas affected at very short notice. In such cases, usually entire communities are affected, and not single individuals or families. Slow onset events, on the other side, usually cause a much bigger impact, driving mass mobility of population, but the effects are produced in a slower pace and thus are more difficult to quantify.

Climate change affects human mobility directly or, more likely, in combination with other factors:

- Shifting seasons due to weather-related changing patterns are important driver of mobility in combination with unexpected disasters that they cause (for example, El Niño, floods and landslides in Uganda (2024), Nepal's early start of monsoon season (2025)|;
- Desertification, rising sea levels, early melts, permafrost and other climate changes;
- Weather-related extremes that come with increased frequency and magnitude (i.e., cyclones, storms, floods, heatwaves);
- Intensified rivalry over growingly scarce or changing resources, because of disruptions on agricultural patterns, thus reducing yields.

Figure 1. Population displaced by rapid-onset events annually (average 2013-2022), per world region



Source: IOM based on data from IDMC (2023)

Climate change cause a clear impact by affecting the environmental drivers of mobility. As a result, it triggers different human mobility patterns, which may be systematized as: forced or voluntary, permanent or temporary, cross-border or internal, planned relocation, or displacement. Climate change obviously will have a huge impact over human mobility in the future: some recent estimates stipulate that between 3.3 and 3.6 billion people currently inhabit environments vulnerable to climate change (IPCC, 2023). In addition, majority of sudden-onset weather events usually happen in South Asia, East Asia, and the Pacific. These regions report overwhelming volume of weather-related displacements between 2013 and 2022 (Figure 1).

Climate migration in figures

With the start of new millennium, the world faces new, constantly aggravating challenges. This gave rise to a greater migration flows, that can be connected to climate events (Table 2). The figures show great differences, with factor of variation of 32.

Table 2. Climate migration in figures

Estimation	Source	Notes
More than 2 billion people, expected to double by 2050 1.2 billion people could be displaced by 2050	UN, 2017b	Live in countries with high water stress Displacement caused by climate events
23.7 million internal displacements worldwide in 2021	IDMC, 2022	Linked to climate change
Between 44 and 216 million people by 2050	Clement, et all, 2021	Could become climate migrants within their own countries without serious efforts to limit greenhouse gas emissions
1.2 to 1.4 billion people to be affected by climate migration by 2050	EPRS, 2023	If nothing is done to address the causes, migration from Global South to North
Between 3.3 and 3.6 billion people currently live in environments vulnerable to climate change	IPCC, 2022	Climate change is an important driver of population mobility, including migration

Source: Author's adaptation of secondary data.

The large variation of the estimates is quite expected and can be explained with the:

- Lack of precise data that quantifies climate as the cause for migration;
- Failure to trace and map migration flows linked to climate changes and especially with slow-onset events;
- Substantive methodological challenges that cause estimates to be imprecise and highly uncertain and that prevent producing robust numbers.

Some more elements shall be considered as well. For example, majority of vulnerable people affected by climate change often are displaced internally. However, many of them also move across borders and in that case may need of international protection. Unfortunately, there are no comprehensive data on these processes and the methodology behind most source is not always sound. Quite often terminology is biased (Institute for Economics and Peace, 2020). The substantial differences between estimates and figures when assessing the scale of climate migration can be explained with the volatility of the assumptions used and the lack of sound data available. Therefore, a conclusion can be drawn that so far there are methodological hiccups that make using figures to assess the scale of this phenomenon quite unhelpful at best. Providing a realistic estimate of the number of climate migrants requires an orchestrated effort and contributing to this seems to be an important area for future research.

4. Conclusions

Environmental migration is a complex phenomenon, shaped by diverse environmental drivers of a different scope, intensity and duration, and each of them may involve different needs and frameworks. Therefore, it only can be tackled based on holistic approach that addresses both root causes and consequences of the nexus between environmental change and migration and displacement. Addressing climate change through development, trade and other policies is a key element of prevention.

More conceptual clarity is inevitable for better understanding climate migration and for gathering precise data for evidence-based policy making. Together with more robust data collection and analysis, it is necessary to explore EU member states' readiness to address environmental factors in supra-national and national policies on migration and asylum, and to elaborate and adopt a position on the climate change-migration nexus.

Given the global nature of climate migration, it is necessary to promote and strengthen international cooperation in addressing the issue. Both EU and Bulgaria shall explore avenues to leverage their participation in international initiatives to foster the further development of tools and policies to help the world most affected areas by these environmental events, including through technical and financial assistance. These efforts should encompass the development and expansion of measures in reaction to crises as well as forward-looking approaches that address future risks.

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BULGARIA'S CIRCULAR ECONOMY INDICATORS IN COMPARATIVE ANALYSIS WITH OTHER EU MEMBER STATES

Abstract: *The European Commission and the Member States are developing comprehensive public policy packages to promote the circularity transition in the economy. The EU Circular Economy Framework established in 2018 aims to assess the progress in achieving the EU circular economy goals in the Member States. In March 2020, the EU Circular Economy Action Plan set up new ambitious targets to boost the process of decarbonisation and circular economy in the Member States aligned with the EU climate objectives for 2030. The Circular Economy Act, which is proposed by the European Commission for public consultation in 2025, is scheduled to be adopted in 2026. In this regard, the study perceives the EU Circular Economy Framework in relation to the decarbonisation and circular economy tasks set by the Multiannual Financial Framework 2021-2027 and NextGenerationEU. The study examines the new developments in dimensions and indicators of the European Circular Economy Framework in 2023. It analyses the challenges facing Bulgaria in a comparative analysis with other Member States in achieving the EU average for some indicators of the first three dimensions of the EU Circular Economy Framework - production and consumption, waste management and secondary use of materials.*

Keywords: *Public policy, circular economy, government regulations*

JEL Classification Numbers: H30, H23, G38

1. Introduction

The EU Green Deal launched in December 2019 aims the European Union to become climate neutral by 2050. The European Green Deal Investment Plan should mobilize at least €1 trillion for public and private investment over the next decade (European Commission 2020a). In March 2020, the EU Action Plan for Circular Economy set up a robust and coherent product policy framework for boosting business production models of sustainable products and services, and for consumption patterns to prevent waste. The plan aims also to "enhance the Single Market for secondary raw materials, increasing the supply of high-quality recycled materials and stimulating demand for these materials within the EU" (European Commission 2020b). Public policies on climate neutrality and transition to circular economy set up by the EU Multiannual Financial Framework 2021-2027 have become among the highest priorities of Member States for the period 2021-2027. The EU Recovery and Resilience Mechanism under the NextGenerationEU initiative devoted substantial funds to stimulate investment in green economy under the national recovery and resilience plans.

2. Challenges of Bulgaria and other Member States in the implementation of the EU circularity objectives

In 2018, the European Commission introduced the EU Circular Economy Monitoring Framework for assessment of the transition towards circular economy. The framework was categorised into four dimensions: "production and consumption", "waste management", "secondary raw materials" and "competitiveness and innovation" (European Commission, 2018). The indicators were designed to assess the progress of initiatives aimed at transitioning to circular economy across all phases of the life cycle of raw materials, goods and services. They also covered aspects related to innovation and competitiveness.

Based on the report and recommendations of the European Court of Auditors, the Circular Economy Monitoring Framework was updated in May 2023, adding a new fifth dimension called

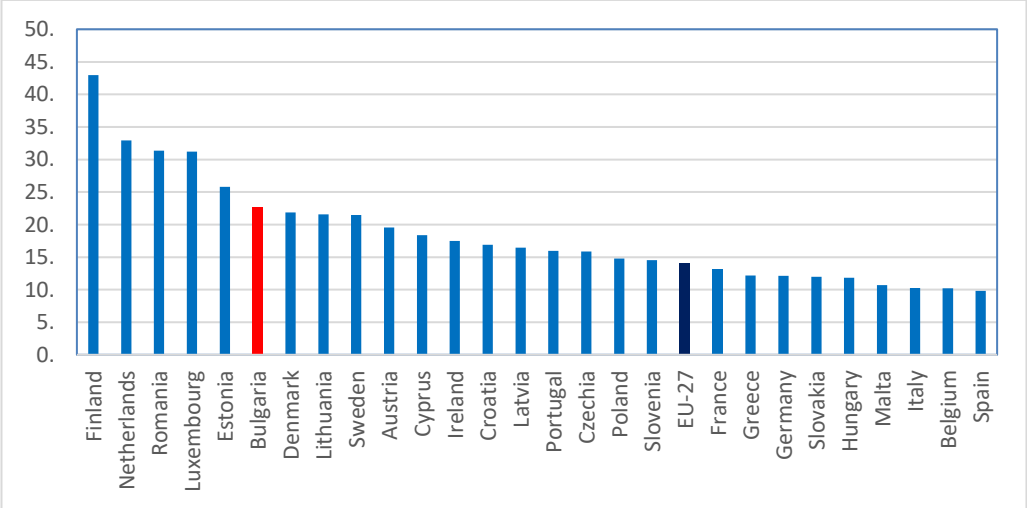
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"global sustainability and resilience" (EU Court of Auditors, 2023). As a result, the updated Circular Economy Monitoring Framework now contains 5 thematic areas, 11 main groups of indicators, with individual indicators that have a different starting year. The indicators reported by Member States to Eurostat are with different deadlines, and thus, the latest data by indicators in Eurostat database are not for the same year. At the European level, the progress in the circular economy indicators is assessed by the European Environment Agency and the European Semester's regular country reports prepared by the European Commission.

"Production and consumption" dimension

"Material footprint" as an indicator of the dimension "production and consumption" of the EU Circular Economy Monitoring Framework estimates the global extraction of materials caused by final consumption and investment in a given economy. This indicator measures „raw material consumption which includes all materials needed throughout the production chain of a given product, regardless of the industry or country where the emissions occur" (Eurostat, 2025).

Figure 1. Material footprint changes in EU Member States for 2024 (in tonnes per capita)



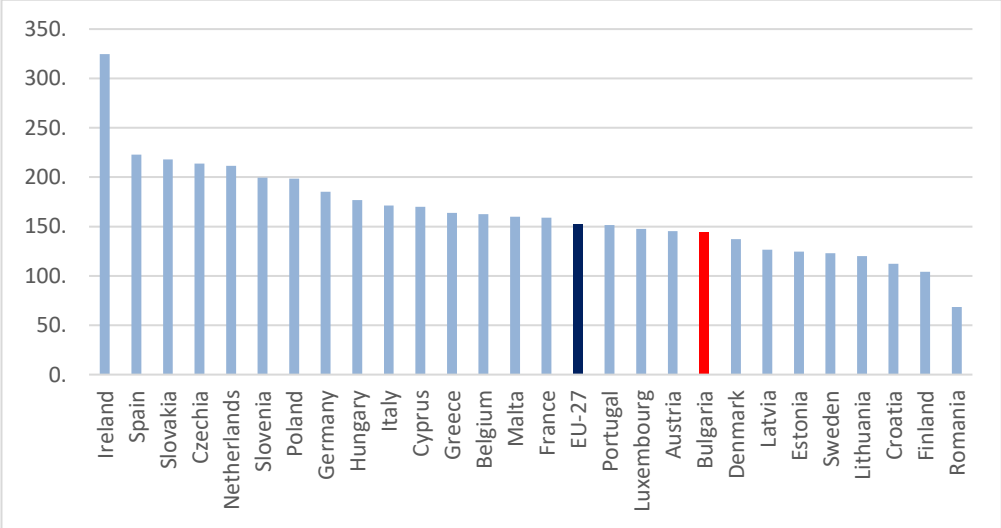
Source: Eurostat (2025)

Material footprint for EU average stood at 14.1 tonnes per capita for 2024, while for Bulgaria it amounts to 22.7 tonnes per capita for 2024, with a tendency for further increase. Bulgaria's material footprint indicator enlarged by 6 p.p. between 2015 and 2024, and places Bulgaria among Member States with an increasing material footprint, such as Estonia, Latvia, Lithuania and Romania. Material footprint of Romania (31.3 tonnes per capita) is even higher than Bulgaria's one, and increased substantially in a decade. Some advanced economies also recorded high level of material footprint. Austria (19.6 tonnes per capita) has adopted a comprehensive circular economy strategy to address the challenges of high level of its material footprint, targeting a 25% reduction in its domestic material footprint by 2030. Scandinavian countries noted even higher levels of material footprint indicator for 2024, of which Finland (42.9 tonnes per capita), Denmark **(**21.9 tonnes per capita) and Sweden (21.3 tonnes per capita). The three countries' high material footprint is driven by heavy reliance on resource-intensive industries - Finland with mining and forest products, Sweeden - with like timber and iron ore form the basis of its industry, which relies on resource extraction. In Denmark the three largest sectors, including construction, manufacturing and the food industry are part of the circular economy strategies and transformative polities for reduction of its material footprint (European Environmental Agency (EEA), 2025a).

Other Member States like Spain, Belgium, Germany, Italy, Slovakia, Greece and Malta reported lower than the EU average material footprint between 10.3-12.2 tonnes per capita for 2024 (EEA, 2025a). Some Member States from Central and Eastern Europe like Slovakia and Hungary are reported material footprint below the EU average. Poland, Slovenia and Czechia are moving towards the EU average (Eurostat, 2025). Slovenia's material footprint with 14.5 tonnes per capita in 2024 is close to the EU average, but slightly higher than in 2019 and 2020. Despite the new strategy for a circular and innovative industry, Czechia also reports that its material footprint increased from 16.4 to 18.5 tonnes per capita between 2020 and 2022, remaining above the EU average (European Commission, 2024).

Resource productivity2 is another indicator of the dimension "production and consumption. It is defined as „the annual quantity of raw materials extracted from the domestic territory of the local economy, plus all physical imports minus all physical exports" (Eurostat, 2025). Ireland, Spain, Slovakia, Czechia and the Netherlands are the leaders for this indicator for 2024. Bulgaria (144.2%) is performing below the EU average (152.2%), but better than Scandinavian with resource-intensive industries, and Baltic countries, Croatia and Romania.

Figure 2. Resource productivity in the EU for 2024, (index 2000 =100)



Source: Eurostat (2025)

"Waste generation per capita" and "generation of municipal waste per capita" are also indicators of the dimensions "production and consumption". The latest data for these indicators as of the time of this study are for 2022.

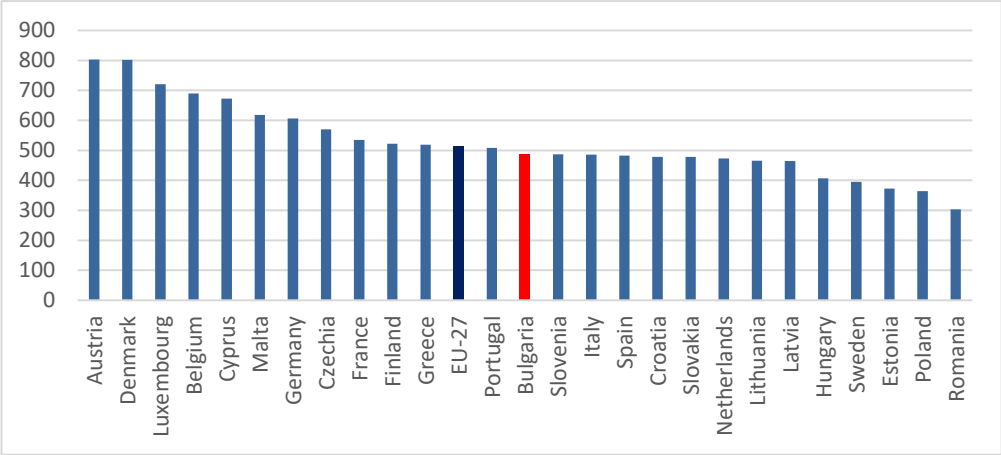
Waste generation per capita is defined as „total waste generated in a country including major mineral wastes (all NACE activities plus households), divided by the average population of the country" (Eurostat, 2025). Bulgaria generates 15 tonnes total waste per capita, which is triple more than the EU-27 average of 5 tonnes per capita for 2022. Bulgaria also has the third highest percentage share in the EU of total hazardous waste generated (Finland 29.3 tonnes, Germany 21.4 tonnes, Bulgaria 13.7 tonnes). Bulgaria's waste generated by construction and demolition activities almost doubled between 2010 and 2020, reaching 1.15 million tonnes, and in 2022 it accounted for 7.7% of total waste (EEA, 2025b).

Generation of municipal waste per capita relates to waste generated by households, though similar wastes from sources such as commerce, offices and public institutions may be

[2] The indicator is defined as GDP divided by domestic material consumption (DMC). The term 'consumption', as used in DMC, denotes apparent consumption and not final consumption.

included. Bulgaria generated 488 kg of municipal waste per capita, slightly below the EU-27 average of 515 kg per capita. Bulgaria still relies heavily on landfilling, although the landfill rate has decreased significantly over the last 10 years, reaching 54% in 2022 (compared to an EU average of 23%). Also, data on municipal waste show discrepancies, especially for the reference year 2021. There are also discrepancies in data on packaging waste, which makes it difficult for the European institutions assessing Bulgaria's progress to circular economy (EEA, 2025b).

Figure 3. Municipal waste per capita in the EU Member States for 2022 (kg per thousand EUR)



Source: Eurostat (2025)

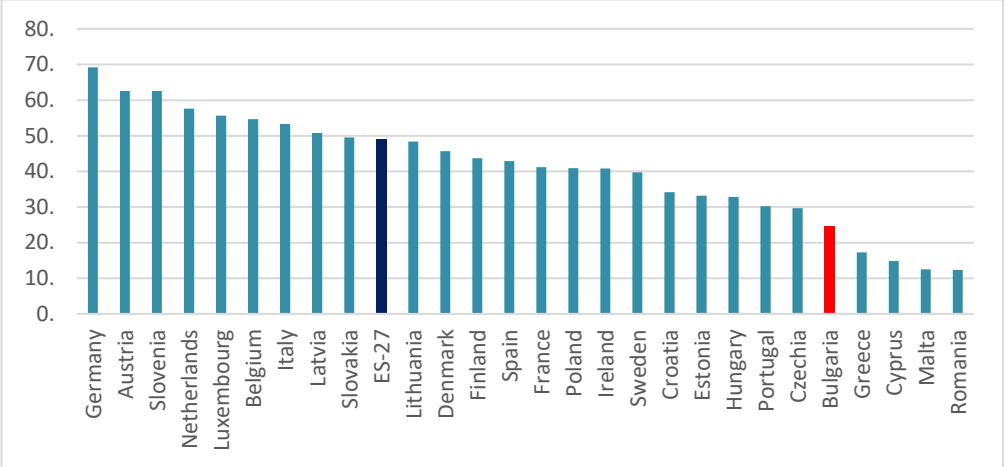
Bulgaria is assessed by the European Commission as „being at high risk of not meeting the 2025 recycling targets for municipal waste and packaging waste". In terms of occupational health and safety in a circular economy, fatalities in waste management and material recovery are above the average for all sectors of the economy and above the EU average in Bulgaria (European Commission, 2024).

"Waste management" dimension

The dimension "waste management" of the EU Circular Economy Framework encompasses indicators for waste recycling, including at total and municipal levels. They monitor „the level of recycling of total waste, municipal waste, all waste excluding major mineral waste, packaging waste, and waste of electrical and electronic equipment" (Eurostat, 2025). The latest data for these indicators as of the time of this study are for 2022.

The EU municipal waste recycling rate was 49% in 2022 and aims for 55% by 2025. The targets are even more ambitious for 2030 and 2035 with 60% and 65%, according to the EU Waste Framework Directive (European Parliament and Council, 2008). Many EU Member States are at risk of not meeting the 2025 recycling targets. Bulgaria's recycling rate of municipal waste was 25% for 2022, significantly below the EU-27 average, while Romania, Malta, Cyprus, Greece recycled less than 20% of municipal waste. Germany, Austria, Slovenia, the Netherlands, Belgium, Luxembourg, Italy, Switzerland and Latvia achieved recycling rates of 50% or higher. Germany ranks first in the EU in recycling municipal waste, reaching a rate of 69.2% in 2022 (EEA, 2025c).

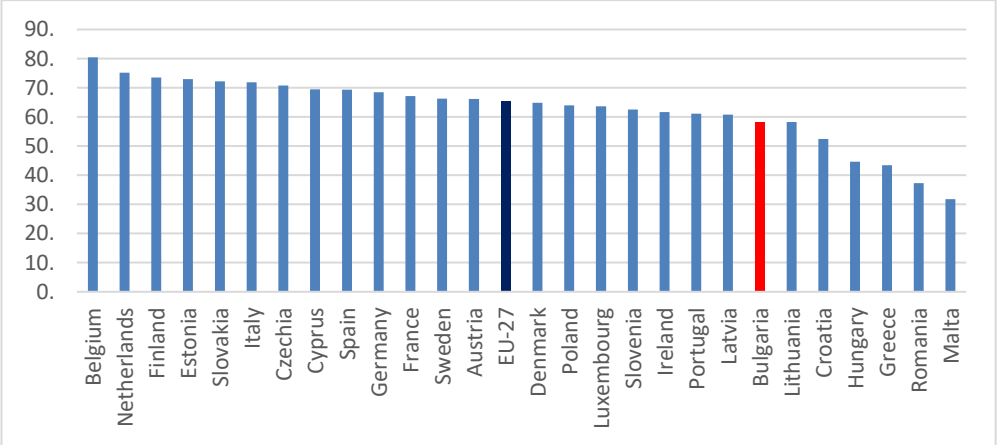
Figure 4. Recycling of municipal waste (% of total waste) for 2022



Source: Eurostat (2025)

The EU has set a target to recycle 65% of all packaging waste by the end of 2025, increasing to 70% by 2030. These targets are part of the EU Packaging and Packaging Waste Regulation (PPWR), which also includes material-specific recycling targets, reductions in overall packaging waste, and bans on certain single-use plastics (European Parliament and Council, 2025).

Figure 5. Recycling of packaging waste (% of total waste) for 2022



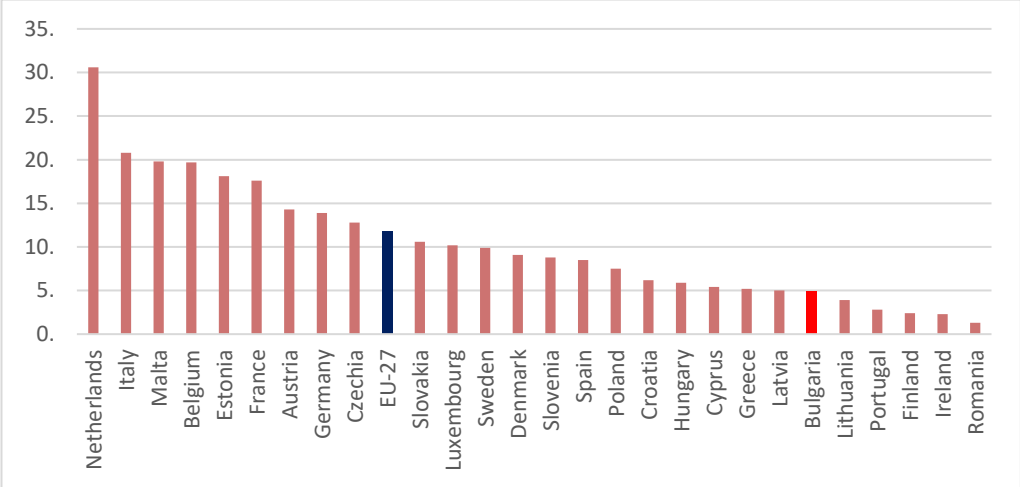
Source: Eurostat (2025)

Bulgaria with 58.3% recycling rate of packing waste is below the EU average (65.3%) and the target for 2025. The country reported better results than Romania and Greece as neighbour countries, but struggles from efficient measures in all activities related to waste management mainly managed and monitored by the municipalities. Thirteen countries have recycling rates of packing waste higher than the EU average and the target for 2025. Belgium is the best performer in the EU in terms of packaging waste recycling with 80% for 2022 compared to the EU average of 65.3%. Belgium is followed by the Netherlands and Finland (Eurostat, 2025).

"Secondary raw material" dimension

The indicator „circular material use rate" (CMUR) of the "secondary raw material" dimension of the EU Circular Economy Framework measures „the share of material recycled and fed back into the economy - thus saving extraction of primary raw materials - in overall material use" (Eurostat, 2025).

Figure 6. Circular material use rate of the EU Member States for 2023



Source: Eurostat (2025)

Circular material use rate in Bulgaria was 4.9% doubled compared to 2010, which is however well below the EU average. In 2023 the CMUR at EU-27 level stood at 11.8%, increasing by 1.1 pp compared to 2010. The countries with the highest CMUR for 2023 are the Netherlands, Italy, and Malta, while Romania, Ireland, Finland and Portugal had the lowest rates for 2023 (EEA, 2025d).

3. Conclusion

The policy for circular economy at the EU level has been pursuing since 2015, although some Member States have been following a long-standing policy in this area, and other are gaining pace. The circular economy's objectives have gained momentum since 2020, when the new Action Plan for Circular Economy for the transition to a circular economy was announced. The EU Circular Economy Framework's indicators for Bulgaria analysed in this study show that the efficiency of public policy at the national level, and businesses' commitment to circularity still needs more efforts to achieve the EU goals and to ensure a unified approach to sustainability.

The study demonstrates that Bulgaria and other the EU Member States are experiencing challenges in the implementation of measures for improvement of the observed indicators of the EU Circular Economy Framework related to its dimensions production and consumption, and waste management. Bulgaria's performance of the observed indicators show that the economy is exposed to inefficiencies, which reduces progress towards achieving circular economy objectives. The country is below the EU average (except generation of municipal waste per capita) and targets for 2025. There is no significant progress in the polluter pays principle, as Bulgaria continues to delay the implementation of a fairer calculation of waste collection fees after the adoption of the necessary legal basis. Municipalities are delaying the implementation of fairer waste collection fees due to resistance from businesses and households.

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Simeon Stoilov[1]

THE ROLE OF THE INTERNATIONAL TRANSFER OF INNOVATIONS AND TECHNOLOGIES IN AN ERA OF TRANSFORMATIVE GEO-ECONOMICS

***Abstract**: The post-globalization era is defined by transformative geo-economics, where techno-nationalism, supply-chain disruptions, and the securitization of technology reshape global relations. Economic policy increasingly serves strategic objectives, as competitiveness and interdependence are redefined. Within this environment, the International innovations and technology transfer (IITT) becomes a crucial mechanism for sustaining growth and resilience. IITT acts both as a transmission channel and as a multiplier of systemic transformation, enabling adaptation and innovation in fragmented global networks. Beyond productivity gains, it reshapes the social dimension of development by influencing consumer behavior and quality of life. The growing interdependence between technology, security, and sustainability underscores the need for effective governance of innovation transfer to consolidate Europe's technological and economic sovereignty in an unpredictable geo-economic order.*

***Keywords**: international transfer of innovations and technologies; geo-economics; global value chains; sustainable growth; competitiveness.*

JEL: *F02; F55; Q56; O31; O33; O19*

1. Introduction

The global economy is undergoing profound geo-economic restructuring driven by overlapping crises, rapid technological change and shifts in production systems. Decarbonization and new sustainable materials are reshaping industrial models and creating dependencies around renewable energy and critical raw materials. Pandemic shocks, conflicts and persistent supply-chain instability further amplify these pressures, reinforcing the need for resilient production and energy systems. Combined with geopolitical fragmentation, technological rivalry, and resource competition, these dynamics erode the predictability of globalization and intensify the race for technological leadership.

States increasingly link economic resilience to control over strategic technologies. The securitization of innovation marks a shift toward techno-nationalism, making technology a central competitive factor. This tension between interdependence and control defines the new IITT environment. Historically, IITT has supported industrial cohesion and productivity growth, as shown in Schumpeterian, evolutionary and endogenous growth theory. In today's fragmented order, it stabilizes economies through diffusion and transforms them by reshaping industrial structure, skills and institutional capacity. Its impact depends on access to external technologies and strong national absorptive capabilities.

For cohesion economies such as Bulgaria, IITT is central to narrowing structural gaps and integrating into European value chains. Persistent disparities between innovation potential and realised outcomes across the EU expose the limits of assessment tools, especially for indirect transformations in human capital, supply chains and institutions–factors crucial for long-term convergence.

To address this gap, the study introduces the Ripple Effect Model (REM), which conceptualizes technology transfer as a multidimensional process generating cumulative economic, social, environmental and institutional effects. By capturing direct and indirect transformations, REM

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enhances policy coherence, identifies bottlenecks and guides investment toward interventions with the highest systemic impact.

Applied to Bulgaria, the analysis situates national challenges within broader European and global dynamics. It argues that sustainable adjustment requires institutionalising IITT as a continuous capability-building process. In a world defined by uncertainty and technological rivalry, strategic governance of IITT is essential for competitiveness, resilience and growth. Technological capability has become a core strategic resource, determining both national resilience and international influence (Frey, 2025).

2. The geo-economic transformation (Disruption)

States increasingly pursue strategic autonomy by tightening control over advanced technologies. China and the United States exemplify this through large-scale industrial policies linking technological dominance to security. The EU instead seeks to balance autonomy with cooperation, defining technological sovereignty as the capacity to secure and govern critical technologies within an interdependent system (Cantner & Pyka, 2001; Cohen, 2021; Zysman & Newman, 2022).

Although related, technological sovereignty and techno-nationalism differ: sovereignty emphasizes capability and resilience within interconnected networks, while techno-nationalism prioritizes geopolitical competition and insulation. Both reshape the global political economy, reinforcing what Farrell and Newman (2019) call “weaponized interdependence”.

Structural disparities and the implementation gap in the EU and Bulgaria

The EU has developed one of the world’s most extensive systems for coordinating research and innovation, yet performance remains uneven. Structural asymmetries, fragmented governance and limited tools for assessing socioeconomic impact weaken its capacity to translate investment into transformation. A persistent divide separates innovation leaders in Northern and Western Europe from emerging innovators in the South and East. Strong infrastructures, capital markets and public–private coordination accelerate diffusion in frontrunner economies, while underfunded systems, weaker institutional interfaces and limited absorptive capacity constrain progress in cohesion regions. These disparities have produced a dual-speed Europe, in which technological capability–and therefore competitiveness–remains concentrated in a few economies, challenging the Union’s collective technological sovereignty.

Bulgaria illustrates this implementation gap. Despite significant access to Horizon Europe and cohesion funding, its national innovation system remains underdeveloped. Interaction between universities, research institutes and industry is limited, hindering commercialization, while public R&D spending is among the lowest in the EU. Weak intermediary structures–technology transfer offices, regional hubs and other coordinating mechanisms–further restrict absorptive capacity and dampen spillover effects. Formally integrated into EU programmes, Bulgaria nonetheless demonstrates weak functional convergence: participation rates are high, yet transformation outcomes remain modest.

These challenges are fundamentally institutional. EU frameworks still emphasize compliance and input indicators rather than outcomes related to productivity, competitiveness and cohesion. Without dynamic feedback loops, policymakers cannot effectively track diffusion, identify bottlenecks or evaluate systemic effects. Misalignment between EU-level objectives and national priorities reinforces formal rather than functional convergence, while administrative rigidities in smaller member states undermine long-term capability building. As a result, short-term fund absorption often displaces the development of sustained innovation capacity.

Bridging this gap requires evaluation models that capture the multisectoral diffusion of IITT and reveal how knowledge circulates across economic, social and institutional domains. Innovation must be understood as a systemic process whose effects propagate through interconnected structures. New analytical tools are therefore essential for assessing how technology transfer multiplies institutional, economic and social capacities, guiding more effective governance and targeted investment.

Nobel validation and the path toward measurable innovation

The 2025 Nobel Prize awarded to Aghion, Howitt, and Mokyr reinforces the insight that innovation and diffusion jointly drive sustained growth. Aghion and Howitt show that innovation depends on competitive experimentation supported by institutions that foster learning and diffusion, while Mokyr demonstrates that technological progress thrives in cultural environments promoting openness and trust. Where institutions restrict access or monopolize knowledge, stagnation follows.

These perspectives converge on a core policy principle: innovation loses transformative power when confined, and transfer without absorption remains ineffective. EU disparities stem less from funding than from weaknesses in coordination, learning, and diffusion. Without structured feedback loops, even well-resourced systems underperform. For cohesion economies such as Bulgaria, strengthening interfaces among universities, industry, and government is essential to internalize external knowledge and generate multiplier effects.

Thus, IITT becomes the mechanism linking growth, resilience, and sustainability. Effective governance requires tools that trace how innovation spreads and transforms institutions and economies. The next section introduces one such tool: the Ripple Effect Model (REM).

3. The REM - measuring the dynamics of technology transfer

Traditional EU evaluation focuses on inputs and outputs, missing how innovation diffuses through supply chains, skills, and institutions. REM addresses this by viewing diffusion as a wave that generates successive economic, social, environmental, and institutional effects. It captures both direct productivity gains and broader structural change.

REM integrates four linked dimensions:

- **Economic** – productivity, investment, and value creation;
- **Social** – employment, skills, and human capital;
- **Environmental** – energy efficiency, carbon footprint decreasing, resource use, and circularity;
- **Institutional** – governance quality and intermediary structures.

By connecting these domains, REM identifies bottlenecks in absorptive capacity and coordination. It is designed for policy integration and can be applied within the European Semester, the Innovation Scoreboard, and cohesion evaluations. For Bulgaria, it offers a tool to shift from fund absorption to capability building.

REM also supports comparative assessment, highlighting sectors with the highest multiplier effects and interventions with maximal systemic impact. It reframes technology-transfer governance as an evidence-based strategy aligned with Nobel-endorsed principles of learning, diffusion, and institutional coherence.

4. Historical lessons - technology transfer as a driver of systemic transformation

Modern industrial development has always relied on learning from external technologies. When transfer is structured and continuous, it drives lasting transformation; when it stagnates, progress halts.

The Soviet Union's early industrialization (1928–1937) illustrates the power of coordinated technology transfer: large-scale imports of Western machinery and expertise enabled rapid industrial growth. By contrast, the closed and bureaucratic model of the 1960s–1970s shows how isolation and weak institutional learning produced stagnation.

Japan and South Korea offer complementary lessons. Japan's early post-war success stemmed from selective adaptation, but later overprotection limited diffusion. South Korea institutionalized continuous learning by combining foreign technology absorption with rapid upgrading supported by coordinated state–industry–science collaboration, achieving global competitiveness.

The United States represents hybrid openness: competitive markets, strong IP regimes, and major public investment attract global talent and sustain technological leadership.

Across these cases, successful technology transfer produced cumulative gains in skills, institutions, and industrial capacity-mirroring the logic of REM. Where feedback loops weakened, effects dissipated. For Europe and cohesion economies such as Bulgaria, the lesson is clear: technology transfer must be institutionalized as a continuous, measurable, and strategically governed process.

5. Conclusions

The analysis demonstrates that the international transfer of innovations and technologies plays an increasingly strategic role in an era defined by geo-economic transformation. Geopolitical rivalry, technological reconfiguration and regionalized supply chains elevate the importance of capability building, absorptive capacity and institutional readiness. For the European Union, technological sovereignty depends not only on investment but also on reducing internal disparities and strengthening functional convergence. For Bulgaria, the evidence shows that institutional constraints–not geographical or financial limitations–are the primary barrier to translating participation into transformation.

By integrating geopolitical analysis, structural assessment and advanced economic theory, the study confirms the thesis introduced at the outset: IITT is no longer a peripheral mechanism of modernization but a core driver of competitiveness, resilience and long-term development. Strengthening its governance, measurement and strategic coordination is essential for ensuring that smaller economies can participate meaningfully in Europe's technological future.

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IMPACT OF THE U.S. IMPORT TARIFFS ON BULGARIA'S ECONOMY

***Abstract**: This paper evaluates the direct and indirect effects of the U.S. import tariffs introduced in August 2025 on the Bulgaria's economy. Using elasticity-based models and global value chain analysis, the evaluation estimates a total export loss of €626.9 million, equal to 1.46% of Bulgaria's goods exports, and a projected GDP decline of 0.36%. While short-term impacts are measurable, long-term outcomes will depend on U.S. market adjustments and the ability of Bulgarian exporters to adapt to new competitive conditions. The results highlight the need for targeted measures, policies and adaptive strategies to mitigate external shocks in the current global trade environment.*

***Keywords**: International trade, Tariffs, Bulgaria – U.S. trade relations*

***JEL**: F13, F14, F17, C51*

1. Introduction

The 15% ceiling of import tariffs imposed by the United States on goods originating from the European Union have already begun to generate observable effects across European economies. Bulgaria is also affected as part of this broader dynamic. The modified tariffs introduced in August 2025 cover approximately 85% of Bulgarian exports to the United States, with differentiated tariff rates applied across the product categories. These include a 15% supplementary rate on the majority of goods, and 50% rates on selected metals such as steel, aluminium, and copper. This paper presents the results of a structured impact evaluation based on an empirically grounded and previously developed methodology. By applying elasticity-based models and market structure analysis, it offers a reproducible framework for evaluating the impact of external trade shocks on small open economies embedded in global value chains. The results quantify both the direct and indirect effects of U.S. tariff measures on the Bulgarian economy. The analysis provides concrete estimates of export losses, GDP contraction, and trade balance adjustments, while also addressing broader implications for value-added trade, industrial adaptation, and economic resilience.

2. Conceptual and Methodological Framework

The current evaluation is based on a previously developed comprehensive methodology by a team of the Economic Research Institute at the Bulgarian Academy of Sciences. The methodology was prepared at the request of the Ministry of Economy and Industry of the Republic of Bulgaria. The detailed methodology applied in this evaluation is fully described in two previous academic studies, covering the initial tariff measures, introduced by the U.S government in April 2025 (see Bobeva et. al., 2025a and Bobeva et. al., 2025b). In that sense, the current evaluation covers the modified tariff measures that came in force as per Executive Order No. 14326 of the United States Government of July 31, 2025.

The methodology applied for evaluating the direct impact of the introduced U.S. reciprocal tariffs on Bulgarian imports is based on a structured multi-stage approach that integrates elasticity analysis, market structure classification, and macroeconomic adjustment. It aims to

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quantify the reduction in export volumes, the corresponding loss in trade and the effect on gross domestic product (GDP). The methodological core relies on two elasticity coefficients:

- Price elasticity of imports with respect to tariffs (φ), that measures the extent to which tariffs affect import prices. A value of φ=0.945 is applied, based on the American Enterprise Institute (Corinth & Veuger, 2025).
- Demand elasticity with respect to price (ε), that captures the sensitivity of U.S. import demand to import price changes. A value of ε=2 is applied as per Boehm et al., 2023.

In that sense, the expected direct loss of Bulgarian exports to the United States of America is calculated by applying the following generalized estimation equation:

$$\Delta L = E0 - E0 \times (1 - (\varepsilon \times (\phi \times (t1 - t0))))$$

***where*:**

ΔL – change in Bulgaria's imports to USA (loss);
E_0 – initial value of the exports to USA / respectively the imports to USA before the change;
ε – coefficient of demand elasticity for imported goods with respect to the import prices;
ϕ – coefficient of price elasticity of the imports with respect to the tariffs;
t_1 – new tariff rate on the imports of goods to USA after the change;
t_0 – tariff rate on the imports of goods to USA prior to the time before the change.

In addition to the direct impact of the U.S. reciprocal tariff measures, the evaluation incorporates a framework for estimating the indirect effects arising from Bulgaria's participation in global value chains (GVCs). These effects reflect the role of Bulgarian export of intermediate goods, raw materials and capital goods in the production processes of its 30 main trade partners that subsequently export goods to the United States[2]. An import intensity-based approach is developed to define the expected impact based on a detailed analysis of significant export commodity items. For each commodity, the participation in processing and subsequent export to the USA is evaluated. Partner-specific values of import intensity, U.S. share, tariff rates, and elasticities are applied, which allows for a more precise estimate of the indirect effects. The indirect export impact is estimated by applying the following generalized estimation equation:

$$\Delta ExportsBGi = ExportsBGi \times IIi \times USsharei \times (1 - TRi) \times PEi$$

where:

ΔExportsBGi – expected reduction in Bulgarian exports tied to processing for the US, aggregated across all commodities i.
ExportsBGi – value of Bulgarian exports of commodity i (capital goods, intermediate goods, or raw materials).
IIi (Import Intensity) – share of imports embodied in exports of the partner country for commodity i.
USsharei – relative share of the partner's exports of commodity i directed to the US market.
TRi (Tariff Rate) – tariff rate imposed on commodity i in exports to the US.
PEi (Price Elasticity) – responsiveness of US demand to price changes for commodity i.

[2] Certain intermediate goods exported by Bulgaria are expected to be significantly affected, particularly those destined for markets such as China, Hong Kong, Serbia, North Macedonia and others.

The data sources include International Trade Centre (ITC) statistics, with the analysis covering Bulgaria's entire export of goods classified at the six-digit level of the Combined Nomenclature (CN) with regards to direct impact, and a more than 50% sample with regards to the indirect impact. Moreover, there is a discrepancy between Bulgarian goods reported as imported by the United States and those recorded as exported from Bulgaria that is considerable. For this reason, the present evaluation relies on U.S. import statistics of Bulgarian goods, as reported by the International Trade Centre (ITC).

The value of Bulgaria's exports to the United States accounts for only 3.3% of the country's total exports, suggesting that the potential direct losses are relatively limited. However, Bulgaria`s economy is expected to incur not only direct but also indirect export losses. A significant share of Bulgaria's exports to the European Union and to other global markets consists of intermediate rather than consumer goods, part of which are subsequently incorporated by trade partners into their own exports to the United States.

Exports to the U.S. represent 7% of Bulgaria's total exports to non-EU countries and are characterized by fragmentation and irregularity. Based ITC data, over a ten-year period, only 33% of product groups consistently appear in Bulgaria's export list to the U.S., while the remaining 67% fluctuate, reflecting a highly variable export structure.

For the purposes of the evaluation, an ad valorem equivalent is applied to all goods covered by the measures for which specific (non-ad valorem) tariffs are in force. The evaluation is based on 2024 trade data.

3. Evaluation of the direct impact of the U.S. import tariffs on Bulgaria's Economy

In accordance with Executive Order No. 14326, adopted by the United States Government on July 31, 2025, the newly imposed tariffs directly affect Bulgarian goods accounting for approximately 85% of country exports to the U.S. market. This corresponds to a trade volume of €1.2 billion, while the remaining €186.5 million of exports are exempt from the measures. In total, 13% of Bulgarian exports to the U.S. are exempt from tariffs, while 2% remain unclassified due to data limitations. The structure of the tariffs impact includes three main components:

- A **15% supplementary tariff rate** that covers 67% of Bulgarian exports to the U.S., resulting in a weighted average tariff of 12.5%.
  A **50% tariff rate** on imports of **steel and aluminium** that covers 14% of Bulgarian exports.
  A **50% tariff rate** on **copper and copper products** that covers an additional 4%.

Table 1. Estimated Direct Impact of the U.S. Tariffs on Bulgarian Exports

Loss of Export (EUR million)	Relative Share of Bulgarian Exports to the U.S. (%)	Relative Share of Bulgaria's Total Exports (%)	Revised Trade Balance with the U.S. (EUR million)[3]	Estimated GDP Reduction (%)
468.18	**32.78**	**1.09**	**+507.89**	**0.27**

Source: Authors' own calculations based on data from Trade Map, ITC, and the U.S. official sources, including Presidential Executive Order No. 14326 of 31st July 2025, Presidential Proclamation on Adjusting Imports of Steel and Aluminium into the United States, issued under Section 232 of the Trade Expansion Act of 1962, signed by the U.S. President on June 3, 2025, and effective as of June 4, 2025 and Presidential Proclamation on Adjusting Imports of Copper Products, issued under Section 232 of the Trade Expansion Act of 1962, signed by the U.S. President on July 30, 2025, and effective as of August 1, 2025.

[3] The positive sign indicates that Bulgaria's bilateral trade balance with the United States remains in surplus, despite the overall export loss.

Table 1 presents the results of the evaluation of direct impact of the U.S. tariffs on Bulgarian exports. Based on 2024 trade data, the estimated annual direct loss to the Bulgarian economy amounts to €468.18 million, representing 32.78% of Bulgarian exports to the United States and 1.08% of Bulgaria's total exports to the world. The projected decline in exports is expected to result in a 0.27% reduction in GDP. The most severely affected goods are those previously subject to zero or minimal tariffs (below 1%) prior to the introduction of the 15% rate. These include medical instruments, sunflower seeds, measuring devices, and certain types of engines. Conversely, three product groups are expected to remain unaffected, as their pre-existing tariff rates already exceed the 15% threshold, including cheese and curd, t-shirts and undershirts and other textile items.

Nevertheless, a substantial share of Bulgaria's foreign trade consists of intermediate goods, which are used in production processes abroad before being re-exported. For this reason, the indirect effects of the newly introduced U.S. tariffs are also evaluated. The developed methodology estimates the potential loss of Bulgarian exports to other countries that utilize these intermediate goods in the manufacture of products destined for the U.S. market – Table 2.

Table 2. Estimated Indirect Impact of the U.S. Tariffs on Bulgarian Exports

Product Group | Exports Covered (%)		**Reduction in Classified Exports (EUR '000)**	**Total Reduction in Bulgaria's Goods Exports (EUR '000)**
Capital goods	63%	**96 750**	**158 717**
Intermediate goods	58%		
Raw materials	63%		

** The applied classification of product groups is derived from individually developed transition key between CN and BEC. The conversion from CN (Combined Nomenclature) to BEC (Broad Economic Categories) has been carried out by applying World Bank's HS 1988/92 "Stages of Processing" methodology (WITS Product Metadata). This procedure groups tariff lines into consumer goods, intermediate goods, capital goods, and raw materials, enabling analysis of tariff escalation along the production chain. While this approach ensures comparability across countries, it involves aggregation that may obscure product-level heterogeneity and sector-specific nuances https://wits.worldbank.org/Product-Metadata.aspx?lang=en*

Source: Authors' own calculations based on data from Trade Map, ITC, and the U.S. official sources, including Presidential Executive Order No. 14326 of 31st July 2025

Under the evaluation, an average tariff rates imposed on Bulgaria's main trading partners are applied as the estimates are adjusted using elasticity coefficients that reflect U.S. market responsiveness to price changes in the affected product categories. In addition, a detailed analysis is conducted of the export flows of goods containing Bulgarian value added, focusing on the import intensity of the partner countries and the share of their exports directed to the United States. Based on this approach, the estimated potential indirect loss amounts to €158.72 million, which represents 0.37% of Bulgaria's total goods exports and 0.09% of its gross domestic product (GDP). Although the overall indirect effects appear relatively modest in macroeconomic terms, they are highly concentrated in specific sectors, where the losses are expected to be significant. These sectors are characterized by a high degree of integration into global value chains and a strong dependence on downstream exports to the U.S. market.

Table 3. Estimated Overall Impact of the U.S. Tariffs on Bulgarian Exports

Total Loss in Export Value		**Estimated GDP Reaction (%)**
Direct + Indirect Impact (EUR million)	**Relative Share of Bulgaria's Total Export of Goods (%)**	**(Export-Import)**
468.18 + 158.72 = 626.9	**1.09 + 0.37 = 1.46**	**0.27 + 0.09 = 0.36**

Source: Authors' own calculations based on data from Trade Map, ITC, and the U.S. official sources, including Presidential Executive Order No. 14326 of 31st July 2025, Presidential Proclamation on Adjusting Imports of Steel and Aluminium into the United States, issued under Section 232 of the Trade Expansion Act of 1962, signed by the U.S. President on June 3, 2025, and effective as of June 4, 2025 and Presidential Proclamation on Adjusting Imports of Copper Products, issued under Section 232 of the Trade Expansion Act of 1962, signed by the U.S. President on July 30, 2025, and effective as of August 1, 2025.

The total estimated impact of the newly introduced U.S. reciprocal tariffs on Bulgarian imports –including both direct and indirect effects – is calculated at €626.9 million**,** representing 1.46% of Bulgaria's total exports of goods. Given Bulgaria's gross domestic product (GDP) of €103.8 billion in 2024, the projected one-year reduction in exports to the United States is expected to result in a 0.36% decline in GDP. The magnitude of the long-term effects will depend on the degree of market adjustment in the United States and the ability of Bulgarian exporters to adapt to higher price levels and shifting competitive dynamics.

4. Conclusion

The findings confirm that U.S. import tariffs exert measurable direct and indirect pressure on Bulgaria's trade, leading to an estimated export loss of €626.9 million (1.46% of total goods exports) and a projected GDP decline of 0.36%. Although the short-term effects are concentrated in specific sectors, long-term consequences will depend on exporters' adaptability and evolving U.S. market conditions. The results emphasize the importance of measures, policies and strategies aimed at strengthening resilience and sustaining competitiveness within global value chains. Compared to similar national assessments, Bulgaria's impact falls within the medium-high range (0.3–0.5% of GDP), though methodological differences across countries limit direct comparability.

The detailed evaluation shows that the direct effects are particularly pronounced, with losses of €468.18 million, or nearly one-third of Bulgaria's exports to the United States, translating into a 0.27% reduction in GDP. The most vulnerable product groups are those previously subject to minimal tariffs, such as medical instruments, sunflower seeds, measuring devices, and certain types of engines, while some goods–like cheese, curd, and basic textiles–remain unaffected due to already high tariff levels.

Beyond these direct impacts, the analysis highlights the importance of indirect effects stemming from Bulgaria's role in global value chains. Intermediate and capital goods and raw materials exported to partner countries and subsequently re-exported to the U.S. account for an additional estimated loss of €158.72 million, or 0.09% of GDP. Although modest in aggregate terms, these indirect effects are concentrated in sectors with high integration into international production networks, underscoring Bulgaria's exposure to external shocks transmitted through global trade linkages.

Taken together, the evidence demonstrates that Bulgaria's economy vulnerability lies not only in the scale of direct export losses but also in the structural dependence of certain industries on downstream U.S. demand. This dual impact reinforces the need for targeted policies, diversification of export markets, and strategies to strengthen competitiveness within global

value chains. Addressing these challenges will be critical to mitigating the adverse consequences of tariff escalation and ensuring sustainable long-term growth.

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Galina Zaharieva[1]

THE EFFECT OF EU PLASTIC WASTE TRADE REGULATIONS ON EXPORTS TO NON-OECD COUNTRIES

***Abstract**: This article examines the impact of the 2019 amendments to the Basel Convention and Commission Delegated Regulation (EU) 2020/2174 on exports of plastic waste from the European Union to non-OECD countries. To assess the effects, an intervention analysis using interrupted time series with a seasonal ARIMA(1,0,0)(0,0,1)_12 model with three exogenous predictors: time, intervention, and time since intervention is applied. The study is based on monthly data for the period 2018-2023 extracted from the UN Comtrade database for HS code 3915: Waste, parings and scrap of plastics. The results show that although the regulation initially led to a decline in exports, a positive trend emerged after the intervention, leading to a significant cumulative positive effect by the end of the observation period. The findings suggest a successful adaptation by exporters to the new regulatory framework.*

***Keywords**: plastic waste, international trade, interrupted time series, ARIMA model*

JEL: *F02, F14, Q53*

1. Introduction

Among the priorities of the European Union (EU) countries is the implementation of the circular economy principles, with a view to using products and resources more sustainably and creating less waste. To achieve this goal, the EU adopts numerous policies and regulations that evolve over time. In 2013, the Green Paper "On a European Strategy on Plastic Waste in the Environment" laid the foundation for a number of legislative changes related to plastic waste, the negative impact of which on the environment is becoming increasingly tangible. The Green Paper emphasizes, on the one hand, the need to increase the recycling capacity for this waste, and on the other hand raises questions about its trade. According to the Green Paper, the lack of sufficient control over exports simultaneously creates pressure on the environment through unregulated exports to other countries and at the same time generates losses for the EU economy due to the non-use of waste as a resource. Between 1999 and 2011, exports of plastic waste from EU Member States increased fivefold, mainly to countries in Asia (EC, 2013). Following China's 2018 ban on waste imports, a large part of these trade flows was redirected to non-OECD countries, mainly in Southeast Asia. This increase created environmental problems in some countries, due to overloading of processing systems or unregulated imports. In 2019, the international community took a new step towards increasing control over the trade in plastic waste. This was reflected in the amendments to Annexes II, VIII and IX to the Basel Convention, which were adopted at the fourteenth meeting of the Conference of the Parties to the Basel Convention and aimed to enhance the control of the transboundary movements of plastic waste and to clarify the scope of the Convention as it applies to such waste. These amendments to the Convention have required corresponding changes in EU legislation. In 2020, Commission Delegated Regulation (EU) 2020/2174 (European Union, 2020) was adopted, which introduced changes to the annexes to Regulation (EC) No 1013/2006 of the European Parliament and of the Council on shipments of waste. The aim of this study is to examine the effect of these regulatory changes on the export of plastic waste from the EU to non-OECD countries.

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2. State of the problem

After the introduction of the ban on the import of waste from China in 2018, the world witnessed serious shifts in players on international markets. Many of the major exporters had to find new markets or make efforts to build their own capacity for processing and recycling this waste. The EU, for which China was a major export market, was in a similar situation. After the imposed restrictions, exports of plastic waste to this market decreased by 95% in the period 2017-2018 (Kettunen, Gionfra, & Monteville, 2019). This, as well as the restrictions imposed a little later by other Asian countries to which trade flows were directed, put the EU in the need to find a solution to deal with waste, which reflected in an increase in landfilling and incineration. This, in turn, started a process of reforming EU policy in this area and building capacity for recycling and reuse of waste and severely limiting exports outside the community and the OECD. According to some authors, the amendments to the Basel Convention and the tightening of EU and OECD policies, with changes in waste export rules, especially for non-OECD countries, will impose different models in the international trade in plastic waste, as trade between countries, regions and organizations with similar or identical rules will increase (Li, Ward, Hai Xiang Lin, & Tukker, 2025). It is believed that such models will create positive environmental and economic benefits in the future.

What the statistics show in a global perspective is that the volume of plastic waste exports is decreasing by almost half for the period 2017 – 2022 (Park, Brown, Laubinger, & Börkey, 2024). In 2022, exports to China and Hong Kong SAR amounted to only 1.1% of the amount traded globally. The initial effect of the import ban in China was reflected in an increase in exports of plastic waste and scrap, mainly to non-OECD countries in South and Southeast Asia, but after 2019 a decrease in the quantity was observed. At the same time, exports to the EU, including intra-EU trade, increased. Imports to non-OECD countries decreased by 9% between 2021 and 2022, but they still remain one of the largest importers of plastic waste and scrap.

These data give us a good idea of global trends in the trade in plastic waste and scrap, but do not provide us with information on the basis of which to assess the causality between these trends and the amendments to the Basel Convention and the changes in the EU Waste Shipment Regulation (EC) 1003/2006 through Delegated Regulation (EU) 2020/2174, which entered into force on 1st of January 2021. The observed changes could also be due to other factors such as the Covid-19 pandemic or the lingering effects of China's ban. The quasi-experimental method of interrupted time series provides an opportunity for such an assessment. This method allows us to isolate the effect of the regulation from other simultaneous changes by modelling the trends before the intervention and comparing them with the observations after the intervention.

3. Methodology and data description

For the purpose of this research monthly data were extracted from the UN Comtrade Database (HS code 3915 "Waste, parings and scrap of plastics") for the period 2018 – 2023, or a total of 72 observations for each reporter. The dataset contains the export values for all single reporters available. The values of unspecified reporters (such as free zones, areas, other Europe, etc.) were excluded. For two countries (Austria and Estonia) partially mirror data were used, transformed from CIF values to FOB values using the margins published in the OECD International Transport and Insurance Costs of Merchandise trade (ITIC) dataset for the group 3915 "Waste, parings and scrap of plastics". The monthly data were aggregated by different groups. For processing and modelling the data, Excel and SPSS were used.

For the analysis of the effects of Delegated Regulation (EU) 2020/2174 on the EU's plastic waste exports to non-OECD countries, we employ an interrupted time series (ITS) analysis with ARIMA modelling. Based on the fundamental work of Box and Tiao (Box & Tiao, 1975)

on intervention analysis and the guidance given by Schaffer. Dobbins and Pearson (Schaffer, Dobbins, & Pearson, 2021), we specified a seasonal ARIMA(1,0,0)(0,0,1)$_{12}$ model with three exogenous predictors: time, intervention and time_since_intervention. It has the following formal expression:

$$Y_t = \mu + \phi_1 * Y_{t-1} + \beta_1 * time_t + \beta_2 * intervention_t + \beta_3 * time_since_intervention_t + \Theta_1 * \varepsilon_{t-12} + \varepsilon_t$$

where:

Y_t – export value from EU to non-OECD countries at time t in millions USD;
μ – constant;
ϕ_1 – autoregressive coefficient AR(1);
Y_{t-1} – export value one month prior;
β_1 – coefficient for linear time trend (slope before intervention);
β_2 – coefficient for step change (level shift);
β_3 – coefficient for slope change after the intervention;
time – represents the time since the start of the period (1 to 72);
intervention – intervention dummy variable (0 before the intervention; 1 after the intervention);
time_since_intervention – time since the intervention (0 before the intervention; 1.2.3 …after);
Θ_1 – seasonal moving average (MA) coefficient at period s=12;
ε_{t-12} – error term from 12 months ago;
ε_t - random error;
t – months number (1 – 72).

4. Research results

The results of the Ljung-Box Q test (Ljung-Box Q(18) = 11.904, Sig. = 0.751) show that there is no autocorrelation in the residuals, as the p-value is greater than the chosen significance level of 0.05 and therefore the null hypothesis that there is no serial correlation in the residuals is not rejected. This indicates that the specification of the model is adequate. R-squared is 0.582, which means that the model can explain 58.2% of the variance.

Table 1. Model Description

Model Description			
			Model Type
Model ID	value_mln	Model_1	ARIMA(1,0,0)(0,0,1)

Source: Author's calculations

Table 2. Model Statistics

Model Statistics									
		Model Fit statistics				Ljung-Box Q(18)			Number of Outliers
Model	Number of Predictors	Stationary R-squared	R-squared	MAE	Normalized BIC	Statistics	DF	Sig.	
value_mln-Model_1	3	0.582	0.582	2.500	2.778	11.904	16	0.751	0

Source: Author's calculations

Table 3. ARIMA Model Parameters

ARIMA Model Parameters								
					Estimate	SE	t	Sig.
value_mln -Model_1	value_mln	No Transformation	Constant		24.069	2.507	9.600	0.000
			AR	Lag 1	0.527	0.123	4.290	0.000
			MA. Seasonal	Lag 1	-0.299	0.129	-2.315	0.024
	intervention	No Transformation	Numerator	Lag 0	-5.137	2.959	-1.736	0.087
	time_since_intervention	No Transformation	Numerator	Lag 0	0.578	0.172	3.360	0.001
	time	No Transformation	Numerator	Lag 0	-0.254	0.115	-2.212	0.030

Source: Author's calculations

The AR(1) coefficient ϕ_1 is 0.527 (Sig.=0.000), indicating moderate positive autocorrelation. This means that the current monthly export values are moderately influenced by the values from the previous month. If the export value from the EU to the non-OECD countries in the previous period was high, the current period is expected to be also higher. The seasonal MA coefficient measures what part of the error from the same month a year ago is included in the current error. The value of the coefficient Θ_1 is -0.299 (Sig. = 0.000) indicating that the positive shocks from 12 months prior have led to a slight negative correction in current values. The β_1 coefficient is negative and statistically significant (β_1 = -0.254, Sig. = 0.030). It shows a downward linear trend in EU export values to non-OECD countries of 0.254 million USD per month during the period 2018-2023, independent of the intervention. In other words, there were some structural changes in the EU-non-OECD trade not related to the EU's regulation. The β_2 coefficient for immediate level shift is also negative and is statistically significant at 90% confidence level. Its value of β_2 = -5.137 (Sig. = 0.087) indicates an immediate decrease in monthly EU's export values to the non-OECD countries in January 2021, which could be related to additional compliance costs, changes in the supply chains or other reasons. The coefficient β_3 is 0.578 and significant at the 95% confidence level (Sig. = 0.001) and shows that after the initial drop (level change) in EU's exports after the regulations entered into force, they started to increase by 0.578 million USD monthly. This could be the result of successful adaptation by exporters to the new regulatory environment through changing their strategies via market diversification, product innovations, or other managerial decisions.

The policy effect on the EU's exports to non-OECD countries can be calculated monthly from the time of regulation implementation as can be calculated as $\beta_2 + \beta_3 * t$ (time_since_intervention) (Wagner, Soumera, Zhang, & Ross-Degnan, 2002). For the month of implementation (January 2021), t = 0 and the effect equals to β_2, or -5.137 million USD. For the following month (February 2021) the effect is -5.137 + 0.578 * 1, or -4.559 million USD. For the last month (December 2023), the effect is 15.09 million USD (-5.137 + 35 * 0.578). The data show that monthly effects change over time and transition from negative to positive after September 2021. The cumulative intervention effect is the sum of all monthly effects and totals approximately 179.2 million USD.

5. Conclusions

The study examined the impact of the 2019 amendments to the Basel Convention and Commission Delegated Regulation (EU) 2020/2174 of 19 October 2020 amending Annexes IC, III, IIIA, IV, V, VII and VIII to Regulation (EC) No 1013/2006 of the European Parliament

and of the Council on shipments of waste on exports of plastic waste from the European Union to non-OECD countries. For the intervention analysis, we employed interrupted time series with a seasonal ARIMA (1,0,0)(0,0,1)_12 model with three predictors. The results show that the changes in the regulations had a dual impact. In January 2021 (intervention month) there was an immediate negative impact of 5.137 million USD. This initial decline was followed by a positive trend of 0.578 million USD, and after 9 months exports exceeded the counterfactual values. By the end of the study period the cumulative effect totalled approximately 179.2 million USD. Our findings show that the regulation changes created short-term disruptions, but the positive long-term trend indicates that they do not necessarily lead to permanent trade decline. These findings are consistent with data for 2023 and 2024 showing an increase in the amount of plastic waste exported from the EU to non-OECD countries (BAN, 2025). The study has some limitations. It covers the period 2018-2023. It does not consider changes in EU legislation from 2024 which further strengthen the rules for plastic waste exports to non-OECD countries.

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Andrei Rădulescu[1]

THE PUBLIC FINANCE IN EUROPE – STRUCTURAL DEVELOPMENTS IN FRANCE

***Abstract**: France (the second-largest economy of the European Union and of Euroland) has recently been confronted with the severe deterioration of public finance. In terms of the budget deficit/GDP ratio, France ranked first in Euroland and third in the EU during 2Q 2025 (Eurostat, 2025). The financial markets have penalized France with higher borrowing costs, as the yield on 10-year bonds has been above the Eurozone average since June 2024. Furthermore, in July 2025, France paid the same interest rate as Greece on the 10-year Government bonds for the first time in history (Eurostat, 2025). These developments and the weak growth pace of the economy (below 1% Y/Y over the past quarters) determined the increase of the public debt/GDP ratio to a record high level, above 115% in 2Q 2025, the third largest level in the EU (Eurostat, 2025). In this paper, standard econometric tools are employed, and the Eurostat database is utilized to analyze the structural developments in public finance in France and Germany from 2002 to 2025. Our results point out the divergence in terms of the structural component of the budget deficit between France and Germany in recent years, leading to the widening of the gap in terms of public debt/GDP ratio to over 50pps.*

***Keywords**: public finance, France, Germany, structural deficit*

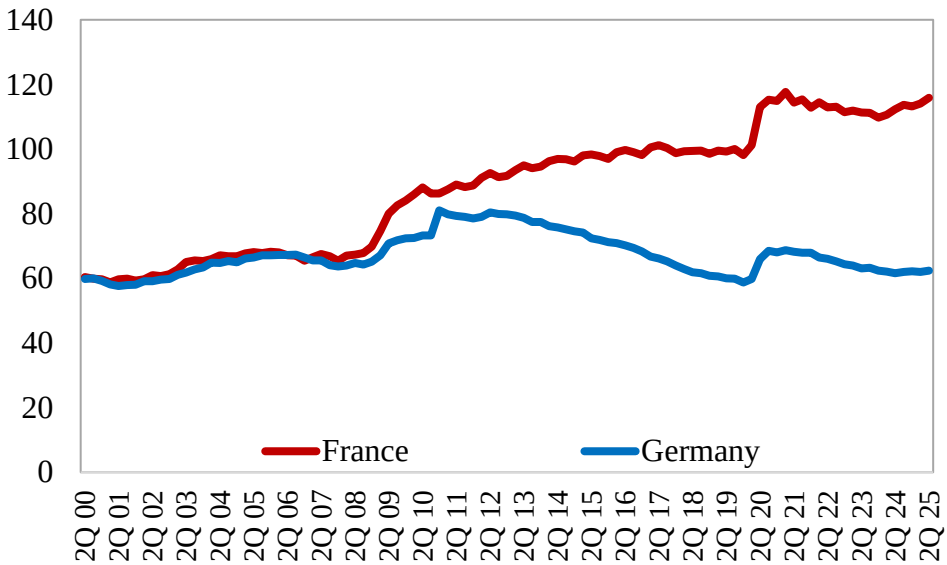
JEL: *G12, E43, E62*

1. Introduction

The public finance stance has presented a deteriorating trend in recent years in France, the second-largest economy of the European Union, and in the Eurozone, with a nominal GDP of over EUR 2.9 trillion in 2024 (Eurostat, 2025).

The budget deficit/GDP ratio initiated an upward trend in 3Q 2022 and presented a level above 5% since the fourth quarter of that year (Eurostat, 2025). Furthermore, the public debt/GDP ratio resumed the upward trend in 1Q 2024, reaching a record high level of 115.8% in the second quarter of 2025, as represented in the following chart (Figure 1).

Figure 1. Public debt/GDP ratio in France and Germany during 2Q 2000 – 2Q 2025



Source: representation based on the database of the Eurostat (2025)

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One can notice the widening gap between France and Germany (the engine of the European Union economy) in terms of the public debt/GDP ratio in recent years, to above 50pps for the fifth quarter in a row in the second quarter of 2025 (Eurostat, 2025). This evolution was determined by the consequences of the global shocks (including the outbreak of the crisis in Ukraine), and by the domestic political challenges, including the high level of instability, as reflected by the frequent changes of the Government (6 Prime Ministers since 2020).

In this context, the financing costs of the public debt have significantly increased in France in the recent months, the yield on the 10-year bonds (a benchmark for the financing costs in the long-run) reaching 3.51% in September 2025, the highest level since April 2011 (the period of the public debt crisis in Europe) (Eurostat, 2025).

This paper applies standard econometric tools and uses the database of Eurostat (2025) in order to analyze the structural developments in terms of public finance in France and Germany. On the one hand, we estimate the annual potential growth pace of the economic activity in the second-largest economy and in the first economy of the EU. On the other hand, we estimate the structural and the cyclical components of the budget deficit/GDP ratio in both countries.

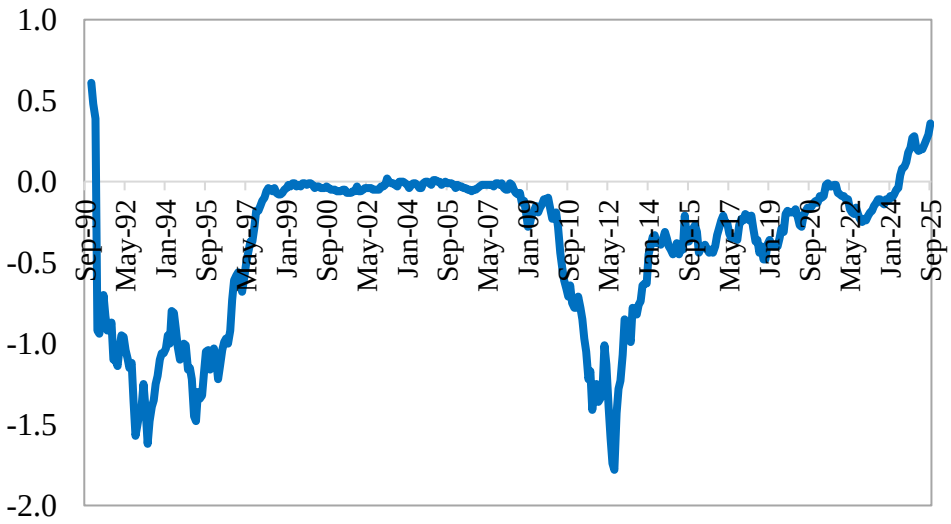
The rest of the paper has the following structure: the next chapter briefly presents the recent developments in terms of public finance in France; the methodology is described in the third chapter; the interpretation of the results is done in the fourth chapter; the conclusions are drawn in the last chapter.

2. State of the Problem

In recent quarters, France has been confronted with unprecedented challenges in terms of public finance, in a context dominated by the increasing political instability, following the 2024 elections (Vitenberg, 2025).

The high level of the budget deficit (above 5% of GDP since the 4th quarter of 2022, compared with below 3% of GDP in the Eurozone in the first half of 2025 (Eurostat, 2025)), corroborated with the political turmoil, supported the upward trend of the borrowing costs. The yield on the sovereign bonds for the 10-year maturity in France has outpaced the average for the Eurozone since June 2024, while this gap hit in September 2025 highest level since February 1991, as represented in the following chart (Eurostat, 2025).

Figure 2. Gap in terms of the yield on 10-year sovereign bonds (France vs. Euroland) (pps)

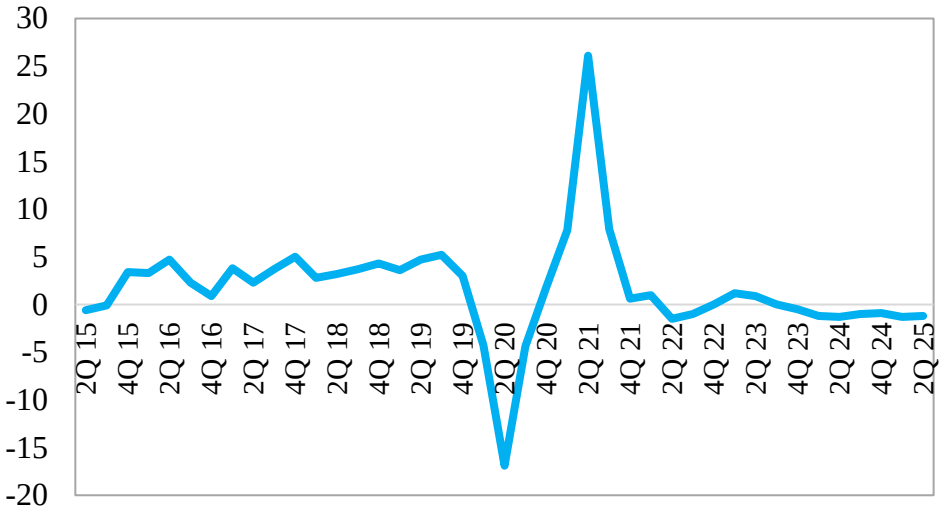


Source: representation based on the database of Eurostat (2025)

In this context, in October Moody's (2025) cut the outlook for the sovereign rating of France, from stable to negative, as the fragmented political landscape would have a negative impact on the speed of the structural reforms.

The deteriorating public finance and the high level of global uncertainty and domestic political instability in France have hurt the investment climate. The gross fixed capital formation contracted for the seventh quarter in a row in the 2Q 2025, by an annual rate of 1.2% (Eurostat, 2025).

Figure 3. Gross fixed capital formation in France (annual rate) (%)

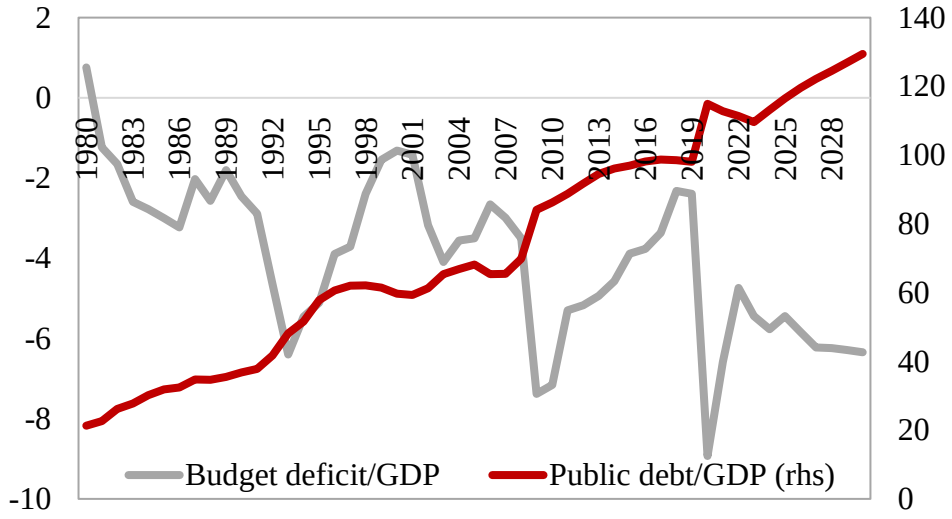


Source: representation based on the database of Eurostat (2025)

Last, but not least, the outlook for the public finance stance in France is negative, as for instance, the pension reform package was recently postponed until the Presidential elections in 2027 (Kirkegaard, 2025).

In fact, the autumn 2025 forecasts of the International Monetary Fund (2025) indicate the persistence of the budget deficit / GDP ratio in France above 5% in 2025 and 2026, and the widening to levels above 6% from 2027 to 2030. Furthermore, in this macroeconomic scenario, the public debt/GDP ratio would increase in France from 113.1% in 2024 to 116.5% in 2025, 119.6% in 2026 and to almost 130% in 2030, as can be noticed from the following chart.

Figure 4. Budget deficit/GDP vs. public debt/GDP in France (%)



Source: representation based on the database of the International Monetary Fund (2025)

3. Methodology

In this paper, we use standard econometric tools and the database of Eurostat (2025) to estimate the structural components of the budget deficit in France and Germany during the period 2002 – 2025.

On the one hand, we estimate the annual potential growth pace and the output gap in France and Germany by implementing the Hodrick-Prescott filter (Hodrick and Prescott (1997)). This is one of the most used methods to distinguish between the structural and the cyclical components of the macroeconomic variables, being based on the following relation:

$$\textbf{Min} \sum_{t=1}^{T} (\ln Y_t - \ln Y_t^*)^2 + \lambda \sum_{t=2}^{T-1} ((\ln Y_{t+1}^* - \ln Y_t^*) - (\ln Y_t^* - \ln Y_{t-1}^*))^2 \quad (1.1).$$

In this relation (1.1) Yt, Yt*, and λ represent the annual rate of the GDP and of the potential GDP, and a smoothness parameter.

In this paper, we worked with quarterly observations for the annual rate of the GDP during the period 1Q 2002 – 2Q 2025, from the database of Eurostat (2025). In this context, we considered a value of 1,600 for this smoothness parameter, as recommended by Hodrick and Prescott (1997) while working with quarterly observations.

On the other hand, we estimated the structural and the cyclical components of the budget deficits in France and Germany by considering the following relation (Balassone and Monacelli, 2000):

$$def_t = def_s + def_c \quad (1.2).$$

In this relation, deft, defs and defc are the total budget deficit, its structural component, and its cyclical component (as % of GDP).

The cyclical component of the budget deficit can be derived based on the following relation:

$$def_c = (Y_t - Y_t^*) \times \eta \quad (1.3).$$

where Yt – Yt* represents the output gap, while η is the budgetary elasticity (the change in the budget balance as a response to the change in the GDP).

For this budget elasticity, we used the estimates of the European Commission (Mourre et al., 2014): 0.603 for France and 0.551 for Germany.

The structural component of the budget deficit is obtained by the difference between the total budget deficit and its cyclical component.

In this paper, we worked with E-Views software.

4. Research Results

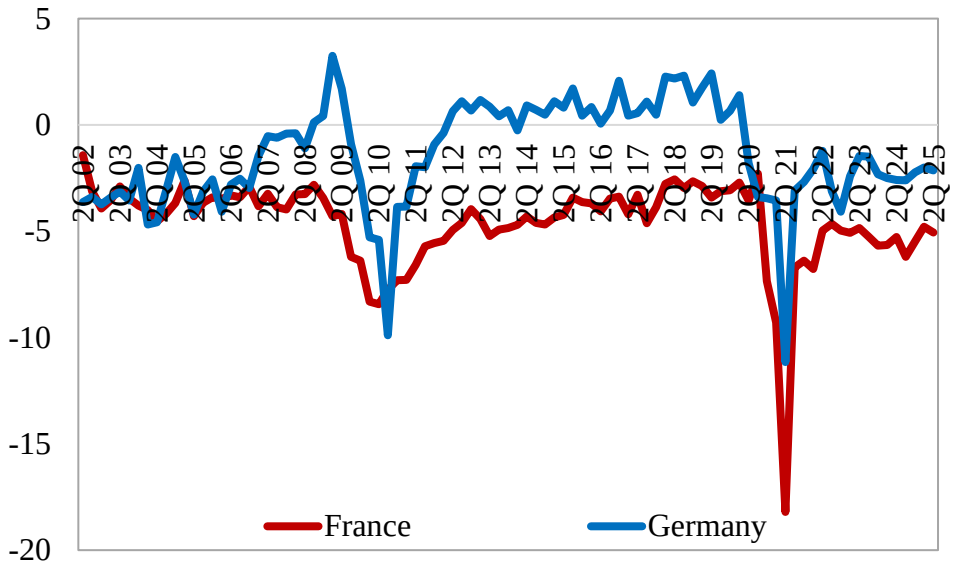
On the one hand, the results of the econometric analysis point out the downward trend for the annual potential growth pace in France in the recent years, towards 1.25% in the second quarter of 2025. This is the weakest pace since the fourth quarter of 2020, during the period of the COVID-19 pandemic.

This evolution has been mainly determined by the tough investment climate in France, in the context of the domestic challenges in terms of public finance and political tensions, and of the high level of uncertainty at the EU / world level.

On the other hand, according to the results of our econometric analysis, the structural component of the budget deficit has deteriorated in France since the end of 2022, the year of the intensification of the geopolitical tensions in Europe, following the outbreak of the crisis in Ukraine.

This component of the budget deficit has presented values above 5% of GDP since the fourth quarter of 2022, except for 2Q 2023 and 1Q 2025. Furthermore, one can notice the fact that the structural component of the budget deficit in France is converging towards the highest level since 2021, a period when the second-largest economy of the European Union was confronted with the waves of the coronavirus pandemic (the worst health crisis in the world in more than 100 years).

Figure 5. Structural component of the budget deficit (% GDP)



Source: representation based on the results of the econometric estimates, using the database of Eurostat (2025)

In the case of Germany (the largest economy in the European Union and in the Eurozone), the results of our econometric analysis indicate a negative annual rate of potential GDP for the sixth quarter in a row in the second quarter of 2025. This deterioration trend was determined by the consequences of the multiple shocks in recent years for the locomotive economy of Europe, which was highly dependent over the past decades on the imports of cheap oil and gas from Russia and exports of high-value-added goods to the emerging markets. Since 2022, these pillars have ceased to function.

On the other hand, the structural component of the budget deficit has been on an adjusting trend, towards levels close to 2% of GDP in Germany in the first two quarters of 2025 (2.0% and 2.1%), according to the results of our econometric analysis, represented in Figure 5. These are the lowest levels since the third quarter of 2023.

The low level of the structural component of the GDP in Germany (and the divergence compared with the developments in France) reflects the commitment of the Administration towards budgetary discipline in Germany. In fact, since the beginning of 2023, the budget deficit/GDP ratio has been below 3%, except for the first quarter of 2024.

5. Conclusions

The stance of public finance in France is critical at present, while no miracles are foreseen in the short run. In this respect, we point out that the nominal cost of long-term financing of the public debt in France is higher compared to the nominal growth pace of the economic activity (real GDP and inflation expectations).

In other words, France is confronted at present with the so-called snowball effect in terms of public debt.

Therefore, the risks for the outbreak of another public debt crisis in Europe are on the upside, especially if the climate on the international financial markets deteriorates. This scenario can happen anytime, given the high level of valuations and the persistence of trade and geopolitical tensions.

In this scenario, the European Central Bank may use for the first time the Transmission Protection Instrument (TPI), created in the summer of 2022. The TPI would normalize the relationship between economic law, governance, and market discipline (Peychev, 2022).

Last, but not least, we underline that the public debt-to-GDP ratio is also on an upward trend in the U.S. and in China, the largest economies in the world.

Therefore, the risks for a global financial crisis with the starting point in public finance this time (not in the private finance, as happened in 2007) are very high, a perspective also reflected by the upward trend for the price of gold.

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Iulia Monica Oehler-Sincai[1]

NEW APPROACHES IN THE RELATIONSHIP BETWEEN CHINA AND CEE

***Abstract**: At present, one can trace four categories of CEE countries according to their attitude towards China: pillars of China-CEE cooperation (Serbia and Hungary); countries aligned with the EU attitude towards China and NATO objectives (most CEE countries, which are included in subcategories dominated by either prudence or pragmatism); countries discouraged to cooperate with China by Western mass media (Bosnia-Herzegovina); provocative partners (Czechia and the Baltic States). Taking into account relevant factors currently undermining relations in the 14+1 framework, one can assume that the future of China-CEE cooperation is uncertain. Among the EU member states, the majority of the CEE countries see the United States similar to Czechia (as stated in its Indo-Pacific Strategy): a natural partner and close ally. By contrast, China is seen simultaneously as a partner, as an economic adversary, and especially as a systemic rival. This paper has as its main objective the analysis of various factors currently influencing CEE relations with China and explains why the former enthusiasm towards cooperation has vanished.*

***Keywords**: China, CEE, EU, 16+1, 14+1*

JEL: *F50, F55, F59*

1. Introduction

This analysis[2] has as its main objective the re-evaluation of the Central and Eastern European Countries' (CEE) attitudes towards China in comparison with the situation before the Strategic Outlook adopted by the European Union (EU) in 2019. The China-CEE cooperation platform (or 16+1), launched in April 2012, has undergone radical changes in the last decade, with the Greece's entry in 2019 followed by the withdrawal of Lithuania in 2021, and Estonia and Latvia in 2022. The initial structure of the four clusters of countries, taking into account their intensity of cooperation with China (Oehler-Sincai, 2017, Table 1), has changed profoundly. Hungary has remained the only EU Member State openly in favour of cooperation with China, i.e., an *active participant*. In May 2024, China and Hungary elevated ties to an "all-weather comprehensive strategic partnership for the New Era". Among the Western Balkan countries, Serbia has also remained an *active participant* in the China-CEE cooperation. In May 2024, Serbia became the first European country to declare a "community of common destiny" with China, eight years after "China's first comprehensive strategic partnership in the Central and Eastern European region".

Instead, Romania's relationship with China has changed radically. Key national political leaders have emphasized more and more resolutely that "Romania should not go too far in the area of cooperation with states situated outside the area of Euro-Atlantic values" (Oehler-Sincai, 2022). Romania is no longer an *ambitious partner* as regards cooperation with China, but might be included in the cluster of countries "aligned with the EU attitude towards China".

2. State of the Problem

The CEE countries' attitude towards China can be described as a delayed reaction to the deep changes in Sino-European relations. The EU's approach toward China has changed dramatically since 2015. At the EU-China summit of 29 June 2015, in the joint statement were underlined the following aspects (European Council, 2015): Celebrating the 40th anniversary

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[2] Preliminary results of this paper have been presented at the PERSPECTIVES 2030 Workshop II, which took place online on August 26, 2025, organizer: Institute of International Politics and Economics, Belgrade, Serbia.

of EU-China diplomatic relations, both sides confirmed their strong interest in each other's flagship initiatives, namely the Belt and Road Initiative. They decided to establish a new Connectivity Platform to develop synergies between their relevant initiatives and projects.

10 years later, in July 2025, at the 25th summit marking 50 years of diplomatic relations, there was no joint statement. European Commission President Ursula von der Leyen concluded that bilateral relations have reached a "clear inflection point" and that China must propose realistic solutions to bilateral issues (EUEA, 2025).

The permanent critiques related to the BRI and 16+1 strongly influenced CEE countries, with two notable exceptions: Hungary and Serbia. Step by step, most of the CEE actors were discouraged to intensify their cooperation with China, a situation determined by both general and specific factors. For instance, in Bosnia-Herzegovina, Chinese projects came under Western mass media scrutiny (Borić, 2024). In the case of North Macedonia, which became a member of NATO in 2020, one can also notice a sharp decline in cooperation with China (Gjorgjioska, 2024).

3. Methodology or Methodological Approaches

This paper is based on a qualitative analysis in order to achieve its main objective: to identify the main categories of CEE countries according to their attitude towards China, as compared to the period of strong EU-China relations. The literature review and official declarations, strategies, and priorities reveal four main categories, but very different than those revealed in a previous research of eight years ago. In the complex matrix of bilateral cooperation, one can remark new factors, such as the war in Ukraine, as well as European countries' position on the Taiwan issue and the Dalai Lama issue.

4. **Research Results**

Main changes

In terms of political will to strengthen the cooperation ties with China, we resorted in 2017 to a simple clustering method in order to identify the main groups inside the CEE-16 (Oehler-Șincai, 2017). By analyzing the lists of implemented measures of Bucharest, Belgrade, and Suzhou Guidelines for Cooperation between China and CEE-16, the number of coordinating bodies hosted by each CEE-16 country, and the pace of fulfilling the undertaken commitments, we identified four groups (Table 1).

Romania was described as an atypical case among the CEE-16. On the one hand, it had a significant potential of cooperation with China and it recognized it. On the other hand, the level of cooperation was much lower than the potential and it undertook commitments in order not to be left behind, but the pace of implementation was too slow.

The situation has changed. The war in Ukraine and China's strategic alignment with Russia triggered a broad re-think in relations with China. It was also the war in Ukraine that spurred cooperation between some EU member states (Baltic States) and Taiwan, violating the One China Principle. But even before the war, enthusiasm for the cooperation mechanism waned because of widening trade deficits with China, as well as China's failure to deliver on pledges of billions of dollars in investments (Ifri-MERICS-Real Instituto Elcano, 2025).

Currently, one can trace four categories of countries according to their attitude towards China (Table 1).

Table 1: Four groups of countries in terms of cooperation with China, 2025 versus 2017

2017 (16+1, without Greece)		**2025 (14+1, with Greece)**	
Active participants	Poland, Hungary, Czech Republic, and Serbia	**Pillars of China-CEE cooperation**	Hungary and Serbia
Ambitious partners	Romania, Latvia, Slovenia, Bulgaria, and Macedonia	**Countries in general aligned with the EU attitude towards China and NATO objectives (some more cautious, others more pragmatic)**	Almost all the other member states of CEE, plus North Macedonia and Albania (the first one, a NATO member since March 2020, the second one since April 2009).
Followers	Lithuania, Croatia, Estonia, and Slovakia	**Countries discouraged to cooperate with China by Western mass media**	Bosnia-Herzegovina
Laggards	Albania, Bosnia-Herzegovina, Montenegro	**Provocative partners**	Czechia, Baltic States

Source: Table elaborated by the author.

A country included in the second category but very close to the first group is also Slovakia. Robert Fico's new approach and endeavors to come closer to China have borne fruit: the Sino-Slovak strategic partnership took shape in late 2024, with perspectives of deepening economic and political cooperation, in spite of the opposition parties.

Serbia and Hungary are pillars of China-CEE cooperation.

Serbia is China's first comprehensive strategic partner in CEE. Strategic partnership relations between the Republic of Serbia and the People's Republic of China were established in 2009, further deepened during 2013, and then raised to the level of a comprehensive strategic partnership in June 2016. In October 2023, the two countries signed a free-trade agreement (FTA), marking China's first FTA with a European country. In 2024, China and Serbia decided to build a community with a shared future. As regards Hungary, China sees this country as an economic gateway to the EU. China and Hungary elevated bilateral relations to "all-weather comprehensive strategic partnership" during President Xi's visit on 9 May 2024. Hungary has opposed various EU resolutions and investigations on China.

Poland is "far more cautious" and inclined towards "pragmatism without principles" under the new President, Karol Nawrocki, successor of Andrej Duda. Since 2017, Poland's approach towards China has become more cautious. As concerns critical infrastructure, technology transfer, and economic dependency, Chinese FDI is increasingly seen through a security lens. Russia's invasion of Ukraine has highlighted the risks of Chinese control over strategic assets (Ifri-MERICS-Real Instituto Elcano, 2025; Nawrotkiewicz, 2025).

Based on the literature review (Fürst, 2023; Ministry of Foreign Affairs of the Czech Republic, 2022, etc.), one can assert that Czechia has become a provocative partner, via close relations with Tibet and Taipei. Czechia's attitude towards China has become increasingly negative and skeptical, and the position of the Czech President, Petr Pavel, strongly contrasts with that of the previous President, Miloš Zeman. The Czech Republic's "natural partner and close ally with important interests in the region is the United States". "In agreement with the EU, the Czech Republic sees China simultaneously as a partner, as an economic adversary, and as a systemic rival. Accordingly, the Strategy anticipates possible cooperation with China in areas where our interests overlap, and acknowledges that we remain divided on many issues such as human rights".

The Taiwan issue and the Dalai Lama issue are factors undermining relations in the 14+1 framework. In the literature have been tracked three categories of countries taking into account their cooperation intensity with Taiwan: vanguards (Czechia, Poland, Lithuania); low-visibility (Slovakia); pragmatists (Hungary); and laggards (Šimalčík et al., 2023).

In Bulgaria (a strategic partner of China since July 2019), President Rumen Radev strongly supports cooperation with China. On the one hand, "a growing network of joint initiatives – spanning business, academic, and media exchanges – along with a community of local facilitators of Chinese influence, is laying the groundwork for expanding bilateral engagement". On the other hand, there are critics emphasizing attendant risks, especially amid the geopolitical rivalry between China and the West (Filipova, 2024).

Croatia has a Position of "Neutrality and Quietism". According to Šelo Šabić (2024), the construction of the Pelješac bridge under the 16+1 framework propelled the Sino-Croatian relationship into what was termed a 'diamond stage' of relations. However, the subsequent impact of global geopolitical shifts, accentuated by the COVID-19 pandemic, US-China tensions, and the Russian aggression on Ukraine, prompted a recalibration in Croatia's approach towards China.

As regards Greece (a strategic partner of China since 2006), Stroikos (2022) emphasizes that, although Beijing and Athens continue to stress the importance of their partnership, a series of recent developments indicate that, after reaching a high point between 2016 and 2019, Sino-Greek relations are now entering a period of 'normalization' characterized by adjustments and constraints mainly as a consequence of a reconfigured geopolitical environment.

5. Conclusions

This paper is not an exhaustive research on the new approaches in the relationship between China and CEE. After the withdrawal of the Baltic States from the 16+1 cooperation platform in 2021-2022, there are several additional candidates for exit. One of them is the Czech Republic, which is not involved in BRI projects and openly criticizes China's foreign policy.

Romania belongs to the category of countries aligned with the EU attitude towards China and NATO objectives, in the subcategory where cooperation with China is not encouraged. One can remark in this larger group countries such as Slovakia, Bulgaria, and Poland, where powerful politicians have been able to keep a strong relationship with China, beyond simple proposals, action plans, or memoranda, in spite of intense critiques. In Poland, for instance, the previous President Andrzej Duda managed to insert his vision on bilateral cooperation into the Polish Action Plan for 2024-2027. Poland, which is politically close to the Baltic countries, is the main beneficiary in CEE of China's projects to build railways and increase container traffic to Europe (Melnikova, 2023), and the Polish elites watch both opportunities and threats in the bilateral relationship.

The position of several CEE countries on the Taiwan issue and the Dalai Lama issue is a new factor undermining relations in the 14+1 framework, underlining once again that the future of this framework is uncertain, despite the opportunities of cooperation with China.

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Jingxin Hu[1]

EU MINIMUM IMPORT PRICE: IMPLEMENTATION AND REMOVAL–DIFFERENCE-IN-DIFFERENCES AND EVENT-STUDY EVIDENCE ON CHINESE PV MODULE EXPORTS TO THE EU

***Abstract**: Using monthly customs data from the EU-27 from 2010 to 2019, this paper examines the causal impact of two institutional shocks, the implementation and removal of the Minimum Import Price (MIP), on Chinese PV module exports to Europe. Identification combines a China-vs-others difference-in-differences with importer-by-month fixed effects and importer-clustered standard errors, plus event studies centered on both policy dates. MIP implementation significantly depressed imports from China; after removal, China's share rose significantly relative to other sources. The evidence shows that, under the green transition, switching from trade defense to deregulation quickly reconfigures source composition and concentration, offering quantitative guidance for industry–trade policies that jointly pursue decarbonization and supply-chain resilience*

***Keywords**: EU Minimum Import Price (MIP); China–EU trade; difference-in-differences (DiD); event study; supply-chain resilience.*

JEL: *F13; F14 ; C23*

1. Introduction

In recent years, global trade protectionism has risen, with the use of trade remedies such as anti-dumping measures becoming increasingly frequent, particularly against Chinese exports (Bown, 2011; Niu et al., 2018). While such measures are typically temporary under World Trade Organization rules, research suggests they can have long-term impacts on trade flows and market dynamics: even after the policy is lifted, suppressed trade often struggles to fully recover, and temporary trade barriers can leave lasting distortionary effects (Silberberger et al., 2022).

Empirically, EU remedies sharply compressed China's PV import share; post-withdrawal, the rebound was far smaller than the initial drop and has not returned to pre-policy levels, implying short-run shocks with path-dependent persistence. Heterogeneity tests show weaker recoveries in transshipment hubs (Netherlands, Germany, Spain), where logistics chains and re-export accounting dilute measured gains–consistent with the "Rotterdam effect." Source concentration (HHI) rose markedly during the anti-dumping period and, while easing after withdrawal, remained above pre-policy levels, indicating sticky structural adjustments.

This paper's experiment adds evidence on the dynamic effects of trade barriers, quantifying post-exit recovery and its constraints–relevant for understanding long-term policy effectiveness and hidden costs. For policymakers, temporary protection can shape market dynamics well beyond its formal end; design and withdrawal should anticipate induced structural adjustments.

2. State of the Problem

Antidumping measures are imposed by country–product and, per WTO rules, should sunset within five years, yet many are extended or reimposed; even after removal, affected flows seldom return to pre-restriction levels (Silberberger et al., 2022). Temporary barriers can thus leave lasting distortions, underscoring the need to study whether import-market effects persist.

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In PVs, the 2012–2013 EU–China case was among the largest on record. Most work surveys institutions rather than quantifies trade-flow or market-structure shifts. Using 2007–2020 data, Lin & Liu (2025) show EU/US AD/CVD sharply reduced China's PV module exports to Europe, redirected shipments to third countries, and pushed some capacity to domestic sales–reshaping global networks via re-exports and demand substitution.Compared to quantitative studies on trade flows, literature on the EU PV case has tended to focus on micro-level responses from firms and financial market effects. EU/US AD news moved Chinese PV stock prices and raised within-sector synchronicity (Huang et al., 2016); EU tariffs hit large private firms hardest, with SOEs less affected (Crowley et al., 2019). Chinese OFDI into EU PV clustered in Germany but could not replace lost exports (Curran et al., 2017). Macro-quantitative evidence on EU import-source structure–and causal tests of post-policy share recovery or path dependence–remains scarce.Against this gap, this paper examines how EU trade barriers and their removal reallocate market shares between China and other sources, and whether effects persist.

3. Methodology

This paper uses a difference-in-differences (DiD) design on monthly panel data to estimate how the policy changed each importer's share of purchases from China, treating China as the "treated" source and others as controls. The dependent variable is the monthly share of Chinese-sourced PV modules in total imports. Estimation relies on PPML with high-dimensional fixed effects to purge common shocks. Following Fally (2015), with appropriate fixed effects PPML predictions aggregate to observed importer×month totals, ensuring estimated shares match actual shares.

The three equations used in this article are as follows:

Implementation period effect – July 2013 to December 2017

$$\ln E\left(y_{ipt} \mid X\right) = \beta_1 \, CN_p \, PolicyOn_t + \alpha_{it} + \gamma_p \quad (1)$$

Revocation period effect – after September 2018

$$\ln E\left(y_{ipt} \mid X\right) = \beta_2 \, CN_p \, Post_t + \alpha_{it} + \gamma_p \quad (2)$$

Revocation period × hub heterogeneity

$$\ln E\left(y_{ipt} \mid X\right) = \beta_1 \, CN_p \, Post_t + \beta_2 \, CN_p \, Post_t \, Hub_i + \alpha_{it} + \gamma_p \quad (3)$$

where

y_{ipt}: imports of importing country i from source p in month t.
CN_p: Indicators of origin being China (China = 1, ROW = 0).
$PolicyOn_t$: Indicators during the implementation period from July 2013 to December 2017.
$Post_t$: Indicators after revocation starting from September 2018.
Hub_i: Indicators of the hub importing country (Netherlands/Germany/Spain = 1).
α_{it}: Importing country × month fixed effects.
γ_p:Source fixed effects.

This paper uses PPML rather than log-linear OLS for three reasons: (i) log-OLS is inconsistent under heteroskedasticity, whereas PPML models outcomes on the original scale and remains consistent (Santos Silva & Tenreyro, 2006); (ii) PPML naturally accommodates zeros without dropping observations; and (iii) within a PPML–FE setup, this paper follows the high-dimensional FE logic of Correia et al. (2020) while avoiding explicit estimation of massive dummies via a binomial simplification.

For inference, standard errors are clustered by importing country to allow intra-group correlation and heteroskedasticity. Overall, policy effects are identified from China–control contrasts, common shocks are purged via high-dimensional FEs, and PPML with cluster-robust SEs secures consistency and robustness.

4. Research Results

Based on EU-27 monthly customs data (2010–2019), this section estimates the contrasting effects of price undertakings during the implementation period (July 2013–December 2017), when both price undertakings and trade remedies were in effect, and during the withdrawal period (September 2018 onwards) following the termination of the undertakings (Eurostat, 2025). To purify common shocks across importing countries and months, the regressions include importing country × month fixed effects and robust standard errors clustered by importing country.

Table 1. Main Regression Results: Implementation vs. Removal

	Implementation: MIP/AD–CVD period (2013-07 to 2017-12)	Removal: post-MIP (≥ 2018-09)
Coefficient (β)	–1.3686***	0.2065**
Incidence rate ratio (IRR – 1)	–74.6 %	+22.9 %
95 % CI for β	[–1.46, –1.28]	[0.007, 0.406]
95 % CI for IRR – 1	[–76.7 %, –72.2 %]	[+0.7 %, +50.1 %]
Observations	3 356 importer-month pairs	3 356 importer-month pairs
Fixed effects	Importer × Month; Partner	Importer × Month; Partner
Clustered SE	Importer	Importer

*Significance levels: p*** < 0.01, p** < 0.05, p* < 0.10*

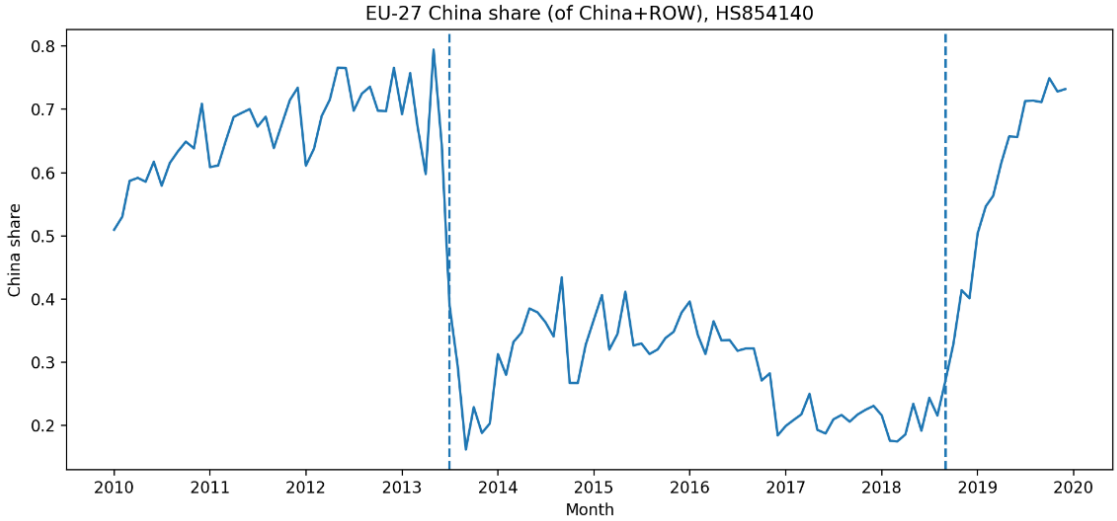
Source: Author's calculations, 2025.

The results show that during the implementation period, China's import share relative to other sources declined significantly, with a point estimate corresponding to an IRR−1 of approximately −74.6%, demonstrating a strong and highly precise suppressive effect. After the price commitments were withdrawn, the share rebounded modestly but statistically significantly, by approximately +22.9%. This suggests that the policy shift from trade defense to easing constraints reshapes the source structure in a relatively short period of time. However, the magnitude of the rebound after withdrawal was significantly smaller than the prior decline, suggesting persistent friction and path dependencies within market structures and customs clearance networks.

The series shows that the two institutional shocks reshaped the source structure rapidly and persistently, clearly capturing the responses to the two shocks at a monthly frequency. Following the implementation of anti-dumping/countervailing measures and minimum import prices in July 2013, the share plummeted from its previous high to approximately 0.15–0.25, remaining at a low level for the entire implementation period. Following the withdrawal of price commitments in September 2018, the share experienced a rapid and sustained rise, climbing above 0.7 in the subsequent quarters. This overall series is consistent with the causal

estimates in Table 1 in terms of direction and timing: a significant suppression during the implementation period and a significant rebound after withdrawal (see Figure 1).

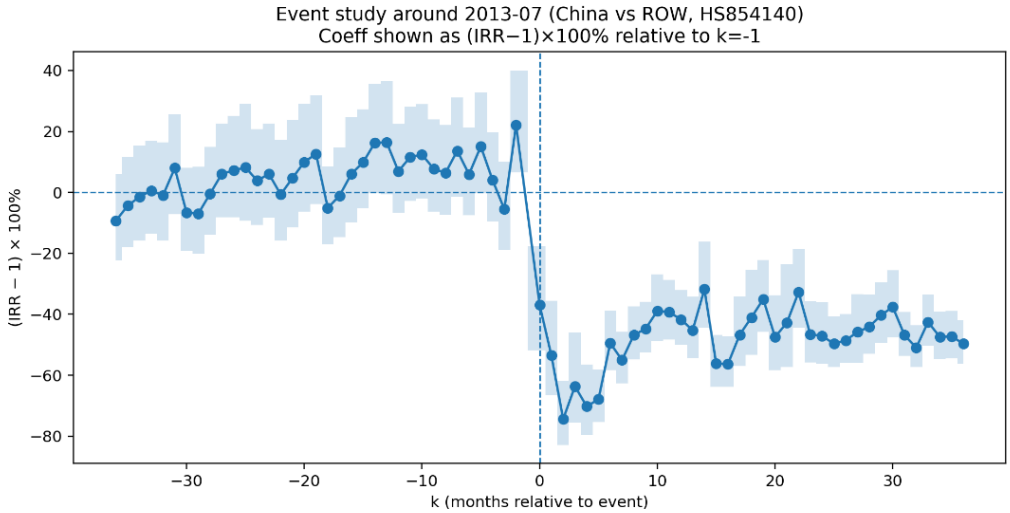
Figure 2. EU-27 China Share over Time (of China+ROW), HS854140



Source: Author, 2025.

Centered on the July 2013 implementation, the event study shows a sharp, persistent decline. In a long pre-event window, estimates hover around zero with confidence bands covering zero, supporting parallel trends. Near k=0, coefficients turn abruptly negative, deepening to about −60% to −80% in subsequent months and settling into a sustained negative plateau, with only brief, non-systematic retracements. Post-event confidence intervals lie well below zero, indicating a strong, precisely estimated dampening effect. These dynamics align with the baseline regression for the implementation period and establish the reference point for the conditional recovery after withdrawal (see Figure 2).

Figure 2. Event Study around July 2013: China vs. ROW (IRR−1, %)

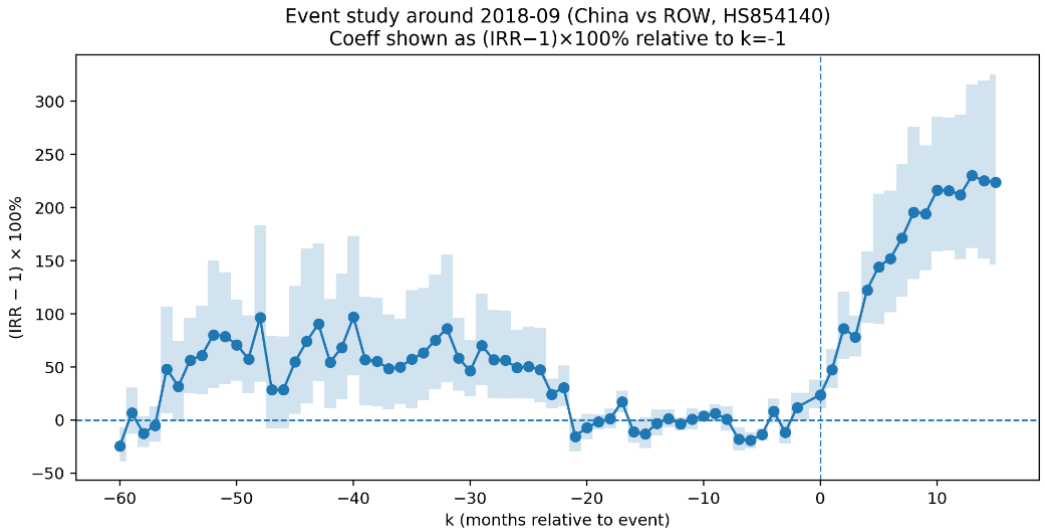


Source: Author, 2025.

The event study around the September 2018 withdrawal shows a brief lag, then a steady climb that stabilizes at a high level. Over a long pre-event window, coefficients hover near zero without an upward trend; a slight negative appears a few months pre-event, consistent with

continued constraints from the price undertaking and supporting measures. At k=0 the estimate turns positive and rises monotonically, crossing significance at k≈4–6 months and reaching about +200% vs. baseline by k≈10–12 months. Confidence bands stay above zero for most post-event periods, indicating a clear, statistically significant rebound. The gradual, not instantaneous, recovery suggests frictions–existing orders and inventories, price renegotiation, and channel reconfiguration–had to be absorbed. The sustained late-period plateau implies a shift toward a new equilibrium rather than a transient bounce (see Figure 3).

Figure 3. Event Study around September 2018: China vs. ROW (IRR−1, %)



Source: Author, 2025.

Table 2. Heterogeneity: Post–Removal Effect in Re-export Hubs

	Post (β_1)	Post × Hub (β_2)	Net effect in hubs ($\beta_1 + \beta_2$)
Coefficient (β)	1.2114***	–0.7446*	0.4668
OR – 1 (≈ IRR – 1)	+235.8 %	–52.5 %	+59.5 %
95 % CI for β	[0.492, 1.931]	[–1.545, 0.055]	[−0.609, 1.543]
95 % CI for OR – 1	[+63.6 %, +589.4 %]	[–78.7 %, +5.7 %]	[−45.6%, +370.5%]
Observations	3 356 importer-month pairs	3 356 importer-month pairs	3 356 importer-month pairs
Fixed effects & clustering	Importer × Month; clustered by importer	Importer × Month; clustered by importer	Importer × Month; clustered by importer

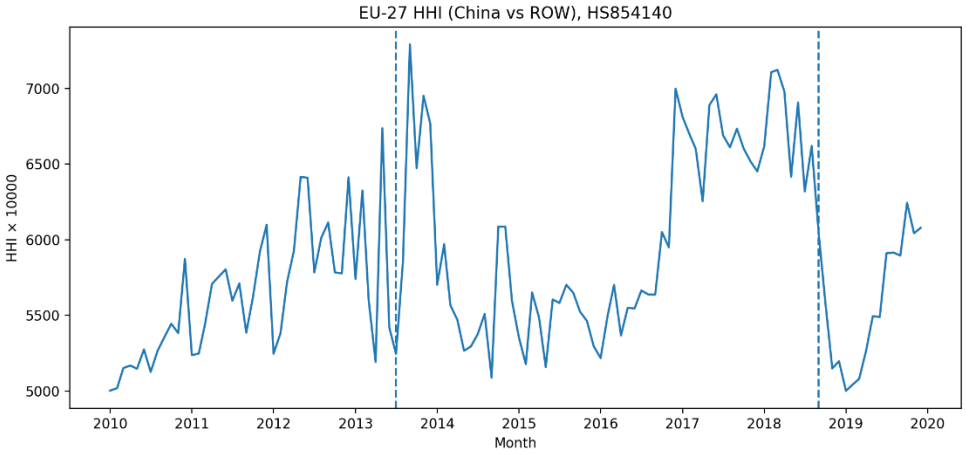
*Significance levels: p*** < 0.01, p** < 0.05, p* < 0.10*

Source: Author's calculations, 2025.

Heterogeneity indicates a strong, robust post-removal rebound of Chinese-origin imports in non-hub countries, but a markedly weaker one in transshipment hubs–consistent with each hub's logistics role. In the Netherlands, the transit–transshipment–re-declaration chain dilutes the measured rebound; in Germany, intra-EU redistribution via warehousing, consolidation, and inland ports means Germany-as-importer shares understate final-demand recovery; in

Spain, Iberian–Mediterranean entry followed by dispersion causes similar dilution. Pooling the baseline rebound with hub differentials implies an in-hub net effect of ~59.5% with a wide interval–i.e., a positive but limited and less statistically robust recovery. Economically, transshipment chains, re-export pricing, demurrage/warehousing frictions, and "Rotterdam effect" mirror-statistics buffer and delay China's post-removal share recovery.

Figure 4. EU-27 Import Source Concentration (HHI×10,000, China vs. ROW)



Source: Author, 2025.

The concentration series shows two shocks. After implementation (July 2013), HHI jumped and stayed elevated for years, reflecting China's sharp share drop and a tighter "China–ROW" split. After removal (Sept 2018), HHI fell as China's share rebounded but only modestly, then plateaued/edged up within a year–implying deregulation quickly reshaped sources, yet deconcentration was sticky. Trade defenses raised concentration; removal partly reversed it but not to pre-policy lows, indicating fast short-run adjustment and constrained long-run diversification (see Figure 4).

5. Conclusions

The evidence presented in this article suggests that the EU's PV intervention in China and its withdrawal are not mirror images. While withdrawal triggered a rebound in market share, the magnitude and speed were constrained by channel friction, transshipment chains, and structural stickiness, demonstrating a significant "aftereffect" of the policy. In the short term, it can rapidly reshape the source structure; in the long term, through the entry and exit of enterprises, contract renegotiation, and reconfiguration of supply networks, the withdrawal will continue to influence the market structure. The heterogeneity of hub ports further demonstrates that logistics and statistical calibers dilute the visibility of the withdrawal effect in official statistics, making the true transmission more circuitous and slower, thus placing higher demands on the evaluation window and indicator selection.

Policy design should align the sequence with the pace of the green transition: exiting before upstream and channel rebalancing slows recovery, while prolonged protection raises concentration and path dependence–and thus de-concentration costs. Evaluations must explicitly detect transshipment/re-declaration, using mirror and port-level data to avoid hub-dilution bias. Given twin goals of decarbonization and resilience, no single trade-defense tool can optimize both short-term prices and medium-term structure, so a phased, auditable exit paired with diversification and industrial/financial instruments is needed to curb policy-inertia-driven stickiness.

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Eduard Marinov[1]

CIRCULAR TRANSITIONS IN AFRICA: INSIGHTS FROM ENTREPRENEURS AND PRACTITIONERS ON OPPORTUNITIES AND BARRIERS

***Abstract**: In Africa, circular economy (CE) is both a waste management framework and a development strategy capable of driving industrial transformation, innovation, and employment. Despite contributing under 4% of global emissions, the continent faces severe climate impacts, including droughts, floods, and resource scarcity. This article combines literature review, SWOT analysis, and ten semi-structured interviews with entrepreneurs and practitioners to examine Africa's CE transition. Findings reveal structural barriers – limited infrastructure, finance, and fragmented policies – alongside opportunities in renewable energy, community initiatives, and youth-led entrepreneurship.*

***Keywords**: Circular Economy; Africa; Sustainable Development; Innovation; Entrepreneurship.*

JEL: *Q56; O13; L26.*

1. Introduction

Africa's development trajectory is increasingly shaped by the tension between economic growth and environmental sustainability. Although the continent contributes less than four percent of global greenhouse gas emissions, it faces disproportionate climate-related risks, including recurrent droughts, resource scarcity, and environmental degradation, which threaten food security and socio-economic stability (IEA, 2023; UNECA, 2024). These challenges have spurred interest in models that reconcile growth with sustainability.

Circular economy (CE) offers a promising approach. Unlike the linear "take–make–dispose" model, CE emphasizes resource efficiency, reuse, and regeneration, keeping materials in circulation while reducing waste (Ellen MacArthur Foundation, 2021). Beyond environmental benefits, CE is increasingly recognised as a vehicle for industrial transformation and inclusive development. In Africa, it can support green job creation, strengthen resilience to global shocks, and generate new forms of value in sectors such as agriculture, construction, energy, and e-waste management (Käsner et al., 2023; ACEN, 2025).

Most research and policy discussions, however, remain focused on macro-level strategies, overlooking the practical experiences of entrepreneurs, cooperatives, and community innovators driving CE on the ground. Many African societies have long practiced circularity through repair, reuse, and informal recycling, predating formal policy frameworks (Muriithi & Ngare, 2023). Understanding these grassroots initiatives and the barriers they encounter is essential to bridging theory and practice.

This article addresses this gap through a combined approach: a review of academic and policy literature, a SWOT analysis of Africa's CE transition, and ten semi-structured interviews with entrepreneurs and practitioners across multiple countries. The interviews provide bottom-up insights into CE perceptions, scaling constraints, and opportunities for innovation. By integrating practitioner perspectives with broader frameworks, the article demonstrates that CE represents both an environmental necessity and an economic opportunity. Realising its potential requires addressing infrastructural and financial barriers, recognising the informal sector, and embedding CE within coherent national and regional development strategies.

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2. State of the Problem: A SWOT analysis of CE in Africa

Africa's transition toward CE is shaped by a combination of structural strengths, persistent weaknesses, promising opportunities, and pressing threats (**Error! Reference source not found.**). Understanding these dynamics is essential to contextualize the continent's efforts to integrate CE principles into broader strategies for sustainable growth.

Table 1. SWOT analysis of CA in Africa

Strengths	**Weaknesses**
- Potential for economic growth through renewable energy and green transition. - Alignment with global climate goals, opening access to international finance. - Abundant natural resources (solar, wind, hydropower) to support circular practices.	- Inadequate infrastructure for recycling, composting, and energy distribution. - Persistent energy inequality: over 600 million people lack electricity. - Implementation risks due to poor adaptation of imported technologies.
Opportunities	**Threats**
- Technological innovation in renewables and resource efficiency. - Increased financial and technical support from international actors. - Expanding capacity building for skills, training, and education in CE.	- Dependence on natural resource extraction, with risks of environmental and social conflict. - Global economic volatility, especially energy market fluctuations. - High vulnerability to climate change impacts (droughts, floods, extreme weather).

Source: Created by the author.

Africa's CE potential rests on its abundant natural resources and alignment with global sustainability goals. CE initiatives in renewable energy, recycling, and green industrialisation can create jobs and enhance resilience (UNECA, 2024). Solar, wind, and hydropower resources support circular energy systems, while cultural traditions of repair and reuse align with CE principles (IEA, 2023; Käsner et al., 2023). Engagement with international climate frameworks improves access to finance and technical support.

Challenges remain significant. Many countries lack infrastructure for recycling, composting, and clean energy distribution, while over 600 million people remain without electricity (UNECA, 2024). Technological dependence and poorly adapted imported systems risk implementation failures (Käsner et al., 2023). Fragmented policies and weak institutional coordination further slow progress.

Opportunities stem from technological advances, expanding local capacity, and international support. Innovations in renewable energy, digital platforms, and resource-efficient production offer pathways for sustainable growth. UNIDO, the EU, and other partners are increasing financial and technical assistance, while investments in education and training build CE skills (UNIDO, 2024; Muriithi & Ngare, 2023).

External threats include reliance on resource extraction, global commodity volatility, and climate hazards that may offset development gains (AJLabs, 2023). CE transitions could also exacerbate inequalities if multinational corporations dominate over local actors (Schröder et al., 2019).

Overall, the SWOT analysis shows that Africa's circular transition holds promise but faces fragility. Realising its potential requires addressing infrastructural gaps, integrating informal actors, and ensuring inclusive policies, while mitigating systemic weaknesses and external threats to transform CE from isolated initiatives into a driver of sustainable, long-term growth.

3. Methodological Approaches

The study employs a qualitative, exploratory design to examine how CE practices intersect with economic growth in Africa. Given CE's relative novelty on the continent and the diversity of socio-economic contexts, an inductive approach was chosen to capture both systemic factors and practitioner experiences.

The methodology integrates three complementary elements. First, a review of academic and policy literature situates CE within debates on sustainability, industrial transformation, and development policy (UNECA, 2024). Second, a SWOT analysis maps internal strengths and weaknesses alongside external opportunities and threats, providing a structured lens to assess Africa's transition (ACEN, 2025; Käsner et al., 2023).

Third, the empirical core consists of ten semi-structured interviews with entrepreneurs and practitioners engaged in CE initiatives across East, West, and Southern Africa. Participants were selected through purposive and snowball sampling from networks such as the African Circular Economy Network and Switch Africa Green. Their enterprises cover sectors including plastics recycling, e-waste management, sustainable agriculture, and upcycling.

Interviews, conducted virtually between January and May 2025, followed a thematic guide addressing business models, regulatory frameworks, financing, and socio-environmental impacts. Each lasted 45–60 minutes, was recorded with consent, and transcribed verbatim. Data were coded iteratively to identify recurring themes, divergences, and links to the literature.

This triangulated approach – combining literature, SWOT analysis, and practitioner insights – captures structural drivers of CE adoption in Africa while grounding the analysis in lived entrepreneurial realities, ensuring relevance for both scholarly and policy debates.

4. Research Results

The ten semi-structured interviews with entrepreneurs and practitioners across East, West, and Southern Africa highlight both opportunities and barriers in advancing CE practices. Participants represented diverse sectors – plastic recycling, e-waste, composting, sustainable fashion, construction, and renewable energy – and included small and medium-sized enterprises (SMEs), community cooperatives, and informal actors. Their testimonies reveal recurring themes that complement the SWOT analysis and deepen understanding of Africa's circular transition.

- Perceptions of CE and sustainability. Interviewees emphasized that CE is increasingly viewed as an economic opportunity rather than merely an environmental agenda. Recycling plastics, processing organic waste, and designing sustainable textiles were cited as profitable niches. Respondents underlined that CE resonates with traditions of repair and reuse, but its transformative potential is not widely recognized beyond urban centers. Rural communities often perceive it as waste management, not industrial growth.
- Infrastructure and finance challenges. Across interviews, the lack of infrastructure was the most consistent barrier, including limited recycling facilities, inadequate logistics, and high energy costs. Financing was another constraint: SMEs struggle to access credit due to collateral requirements, while community initiatives lack formal recognition. Donor-funded pilot projects rarely scale beyond small operations, reflecting literature on weak monitoring and fragmented governance (UNECA, 2024).
- Role of the informal sector. Informal workers – waste pickers, repair shops, and neighborhood cooperatives – sustain material recovery but remain outside legal frameworks, with no access to finance or social protection. Integrating them through

cooperatives or recognition schemes would improve efficiency and social justice, confirming broader findings on inclusive growth in Africa's CE (Muriithi & Ngare, 2023).

- Digital innovation and youth entrepreneurship. Respondents described mobile platforms enabling repair services, peer-to-peer resale, or traceability of recycled materials via blockchain. Youth-led start-ups leverage digital solutions to bypass infrastructural gaps, though innovations remain fragile without systemic backing. Africa's digital economy provides avenues for "leapfrogging" into sustainable models (WEF, 2022).
- Perceived benefits and risks. Practitioners cited reduced urban waste, job creation for women and youth, and resilience to climate shocks. Risks include multinational dominance of high-value markets and potential replication of inequalities if policies neglect inclusion (Schröder et al., 2019).

The interviews reinforce the SWOT analysis: strengths include Africa's resource base and entrepreneurial energy, while weaknesses mirror infrastructural deficits, limited financing, and fragmented policy (Käsner et al., 2023). Opportunities arise from international partnerships, capacity building, and digital innovation, whereas threats stem from global market volatility and climate vulnerability. Both frameworks emphasize informal sector integration and supportive policies as critical to sustainable CE transitions.

The research confirms Africa does not start from zero: traditions of reuse and repair are embedded in communities (ACEN, 2025). It also illustrates how fragmented governance frustrates entrepreneurs and underscores the demand for inclusive sustainability, gender recognition, and rural participation. Practitioners highlight gaps between ambitious international frameworks and local realities, such as costly EU certifications or banks' reluctance to fund unproven CE models.

Finally, the interviews stress that CE cannot advance in isolation but must be embedded in industrial, agricultural, and climate policies (UNIDO, 2024; UNECA, 2024). The findings reveal a dual narrative: Africa's CE is propelled by youthful innovation, abundant renewable resources, and community traditions, yet constrained by infrastructural, financial, and institutional weaknesses. These insights validate scholarly concerns while foregrounding practitioners' lived realities, offering concrete directions for inclusive policy and practice. CE in Africa emerges not only as an environmental agenda but as a nascent economic paradigm, whose success depends on overcoming barriers, integrating informal actors, and scaling grassroots innovation into systemic change.

5. Conclusions

The study shows that the circular economy in Africa is more than a technical approach to waste management; it represents an emerging development paradigm with potential to create jobs, foster innovation, and strengthen resilience. Combining semi-structured interviews with practitioners and a SWOT analysis, the findings reveal a dual reality: substantial opportunities exist alongside persistent systemic weaknesses.

Interviews indicate that CE is increasingly seen as an economic opportunity. Entrepreneurs and community groups view recycling, composting, and renewable energy as avenues for income generation and industrial development. Yet, they confront constraints such as inadequate infrastructure, limited financing, and fragmented governance, reflecting structural weaknesses highlighted in the literature and underscoring the need for institutional coherence and supportive financial mechanisms.

A key theme is the central role of the informal sector. Waste pickers, repair workers, and cooperatives sustain material recovery systems but remain largely unrecognized in formal

policy. Their inclusion is essential for both efficiency and equity. Youth-led digital innovation also emerged as a driver of CE, though its long-term impact depends on systemic support. These perspectives emphasize the importance of inclusive policies and alignment with broader development objectives.

The SWOT analysis situates these insights: Africa's strengths, such as renewable resources and entrepreneurial dynamism, coexist with vulnerabilities related to resource dependence and climate risks. Opportunities from international cooperation, capacity building, and digital leapfrogging can only be realized within coherent industrial, agricultural, and climate strategies.

Ultimately, Africa's CE must be grounded in local realities. Success requires empowering local actors, mobilizing inclusive finance, and scaling grassroots innovations. Traditions of reuse and repair, combined with youthful energy and abundant resources, position Africa not merely as a recipient of circular models but as a source of innovation and leadership in shaping a sustainable, resilient future.

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Rytis Milkintas[1]

THE EXPRESSION OF SMARTNESS‘ DIMENSIONS IN THE CULTURE MANAGEMENT: A SYSTEM OF CRITERIA AND INDICATORS

***Abstract**: The national culture of the country is an integral foundation of a successfully developing state. Today's challenges have led to the ineffectiveness of traditional public management models. Therefore, as the world becomes more globalized, rapid technological transformations occur, favorable conditions have been created for the formation of a new branch of the new public management model - the smart management model. Smart management is becoming an integral part of today's cultural management. The mentioned change in public management models towards smart management is gradually taking place in the field of Lithuanian culture as well - many cultural sector services are moving to the digital space in order to increase their accessibility, more effective mechanisms for the activities of cultural institutions are being applied, and the most suitable cultural policy model for Lithuania is being sought. The gradual change of the public management model to the smart public management model was actualized by Jucevičius, Pauliukevičiūtė (2018), who began to develop a system of 6 dimensions of smartness in cultural management, however, sets of indicators were not created for the 4 dimensions of smartness, but only assigned criteria. The study aims to supplement the concept of six dimensions of smartness in cultural management and 24 criteria initiated by Pauliukevičiūtė and Jucevičius with sets of indicators for four dimensions and to summarize the sets of indicators proposed in the two-dimensional concept, thereby completing a unified system of six-dimensional sets of indicators.*

***Keywords**: Smartness, smart culture management.*

JEL: *M 39*

1. Introduction

In the context of Lithuanian science, there is only Jucevičiaus et al. (2017) chapter "Theoretical assumptions of the expression of smartness dimensions in cultural management" by Jucevičiaus, Šiugždinienė et al. (2017) in Smart Social System (2017). Stanislovaitienė's (2016) dissertation on the expression of the dimensions of smart public management in Lithuania and other scientific works on separate dimensions of smartness and their expression, but not in cultural management.

Smartness and its expression in cultural management in the works of foreign authors are examined from various aspects (Musial, 2019; Mattocks, 2017; Torfing et al. (2016); Woronkowicz, 2018; Gil-Garcia, et al., 2016, but no foreign authors having formed a coherent system of expression of smartness dimensions in cultural management.

2. State of the Problem

Smartness in global scientific works has mainly been studied as a topic of smart cities (smart cities) or regions, the concept of smartness in management has not been studied much even in the global scientific literature. The expression of smartness has been little studied in the context of cultural management: single dimensions have been studied. The model of the expression of smartness dimensions in cultural management is incomplete and has not been tested in real operating conditions. Jucevičius et al. 2018 thesis is considered the basis of the developed system.

3. Methodology

The study implements a general qualitative research strategy, which creates the prerequisites for revealing the phenomenon under study based on pragmatism (ontological approach), social constructivism (epistemological approach) and applying qualitative research data collection

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and analysis methods. Literature analysis, synthesis, comparison, and generalization are used for theoretical research.

4. Research Results

The six dimensions of smartness' in cultural management analyzed in more detail by the aforementioned authors: 1) strategicity, treated as the ability to focus on the long-term perspective by anticipating changes and thus exploiting opportunities and reducing the impact of threats (Musial, 2019); 2) creative development is associated with constant renewal, improvement and the pursuit of innovation, as well as creative adaptation to ongoing development changes (Woronkowicz, 2018; Mattocks, 2017); 3) Harmonization of interests in the cultural sector is perceived as a complex multifaceted process, during which stakeholders with different positions interact, which are aimed at harmonizing (Osabajo et al. 2023); 4) Empowered cultural sector parties are defined as systematic, continuous learning-based development of the cultural sector (Selmer et al. 2021); 5) the harmony of intellectual and technological capital is described as the use of a variety of goal-oriented, high-quality intellectual and technological capital by enabling intellectual and physical resources (Caputo et al. 2023); 6) the culture of shared value creation is described as the process of creating tangible and intangible (social value), which is derived from the concept of social responsibility (Jucevičius et al. 2017).

Strategics dimension

Table 1. Criterion 1: perception of the object of cultural policy formed and implemented at the state level

At the state level, culture is perceived as a distinctive area of public life, which is an integral and unique direction of state-formed policy, with a number of distinctive features that are unique to it Crothers 2021

Source: compiled by the author.

Table 2. Criterion 2: understanding of the factors determining cultural management by strategic decision-makers

The political context of the application and implementation of cultural management is understood, which is combined with the trends in the development of culture in the European Union and their influence on national culture Šiugždinienė et al. 2019

Source: compiled by the author.

Table 3. Criterion 3: clear direction of cultural policy in strategic documents for the development of the cultural sector

The directions of development of the cultural sector- clearly identified and defined by priorities, goals, tasks, essential activity priorities are distinguished, a refined strategic vision is created Juszczyk et al. 2023

Source: compiled by the author.

Table 4. Criterion 4: professional management of cultural policy implementation

A detailed analysis of the strengths, weaknesses, opportunities and threats of the cultural sector has been carried out. Strategies for the development of different areas or branches of the cultural sector have been prepared Baesu et al. 2013

Source: compiled by the author.

Creative development dimension

Table 5. Criterion 1: Cultural policy that encourages creativity

In the formation and implementation of cultural policy, active cooperation takes place at all major institutional levels of decision-making, adoption, and execution Paquette, 2018

Source: compiled by the author.

Table 6. Criterion 2: A distinct approach to national-level cultural policy

Strategic sector development documents clearly define the essence of national cultural policy and its distinctiveness Svensson et al. 2016

Source: compiled by the author.

Table 7. 3 criterion: Entrepreneurial approach to the development of the cultural sector

A high degree of opportunity recognition, assessment of rapidly changing environmental challenges, proactivity, and innovativeness in making and executing strategic decisions Pyykkönen et al. 2017

Source: compiled by the author.

Table 8. 4 criterion: Creative solutions for policy implementation

In the activities of government institutions, the latest management methods and advanced practices are applied creatively and flexibly Baltrėnas et al. 2015

Source: compiled by the author.

Harmonization of interests in the cultural sector dimension

Table 9. Criterion 1: Understanding the expectations and needs of stakeholders

The needs and expectations of stakeholders are understood Amoo et al. 2023

Source: compiled by the author.

Table 10. Criterion 2: Understanding the influence of interest groups on the development of the cultural sector

The perceived influence of stakeholders on cultural management Osabajo et al. 2023

Source: compiled by the author.

Table 11. Criterion 3: Ability to involve different stakeholders in decision-making

The necessity of interinstitutional cooperation is recognized Unterhitzenberger et al. 2023

Source: compiled by the author.

Table 12. Criterion 4: Ability to reconcile the positions and interests of stakeholders

Manifestations of empowered citizenship in decision-making and service quality improvement processes Webster et al. 2018

Source: compiled by the author.

Empowered cultural sector parties dimension

Table 13. Criterion 1: A functioning system of measures for the development of the cultural sector

In the strategic documents for the development of the cultural sector, specific measures for sector development are clearly defined Selmer et al. 2021

Source: compiled by the author.

Table 14. Criterion 2: The development of the cultural sector is carried out competently

Strategic decision-makers and planners are aware of the diversity of theoretical frameworks and implementation models in cultural management Bilan et al. 2019

Source: compiled by the author.

Table 15. Criterion 3: Conditions have been created for the continuous training and professional development of specialists in the cultural sector

Improving specialists' competencies by developing the ability to more easily adapt to changing environmental conditions Jucevičius et al. 2017

Source: compiled by the author.

Table 16. 4th criterion: Ensured rational autonomy of cultural subjects

Clearly defined boundaries of institutions implementing national-level strategies for the development of the cultural sector Pauliukevičiūtė et al. 2016

Source: compiled by the author.

Harmony of intellectual and technological capital dimension

Table 17. Criterion 1: Understanding of the intellectual resources of the cultural sector

Understanding of human capital Channuwong et al. 2025

Source: compiled by the author.

Table 18. Criterion 2: Understanding of technological tools in the cultural sector

Systematic implementation of technological novelties and innovations Caputo et al. 2023

Source: compiled by the author.

Table 19. Criterion 3: Ability to digitize intellectual capital by leveraging technological capital

Digitization of intellectual capital in the aspect of human capital Bangbon et al. 2023

Source: compiled by the author.

Table 20. Criterion 4: The ability to harmoniously combine intellectual and technological capital in terms of knowledge, structural, and technical potential

Creating and developing collaboration networks by leveraging knowledge and technological potential Dumay et al. 2018

Source: compiled by the author.

The culture of shared value creation dimension

Table 21. Criterion 1: Understanding the logic and importance of creating shared value

Participants in the cultural field perceive a consistent and systematic process of creating a shared value system Pauliukevičiūtė et al. 2016

Source: compiled by the author.

Table 22. Criterion 2: Decision-making is based on the search to create shared value

Integrating social (societal) issues into the organization's strategy, shaping the organization as socially responsible Wieland 2017

Source: compiled by the author.

Table 23. Criterion 3: Characteristic democratic culture of collaboration

Solving societal problems in the cultural field that correspond to the organization's direction of activity, taking into account the needs of consumers of cultural products Beschorner et al. 2017

Source: compiled by the author.

Table 24. Criterion 4: Ensured rapid response to changes in internal and external circumstances important for creating shared value

A systematic analysis of an organization's external environment is performed with the aim of transforming changes into organizational opportunities and thus achieving strategic goals and obtaining financial benefits Lopez 2020

Source: compiled by the author.

5. Conclusions

A model of the expression of smartness' dimensions in cultural management has been developed - a system of dimensions, criteria and indicators. The concept developed by the author of the article will be tested in real operating conditions, and the trajectory of change and asymmetries will be determined.

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Zvezdelina Zhelyazkova[1]

EU BETWEEN EFFECTIVE RULES FOR REPORTING ON CORPORATE SUSTAINABILITY AND REDUCING THE ADMINISTRATIVE BURDEN FOR THE BUSINESSES

***Abstract**: Recently the European Commission has adopted a new package of proposals to simplify sustainability reporting rules and increase competitiveness. Corporate Sustainability Reporting Directive should have been transformed into national laws by July 6, 2024, at the latest while as of the end of November 2024, only 15 countries had fully or partially transposed the CSRD and strong debates at all levels boosted the reform.*

***Keywords**: (environmental social governance; sustainability reporting)*

***JEL:** F15; Q01; Q5.*

1. Introduction

In 2022 new governance framework was introduced as part of the European Green Deal and the EU's Sustainable Finance Agenda with the core purpose of ensuring that businesses actively contribute to the net zero transition. The Corporate Sustainability Reporting Directive (CSRD) and the Corporate Sustainability Due Diligence Directive (CSDDD) form the foundation of the EU's new legislative framework on corporate sustainability. They share a common goal – to make businesses more transparent, accountable, and sustainable. While CSRD focuses on standardizing ESG reporting and transparency, CSDDD enforces corporate responsibility in global value chains and ensures businesses actively prevent environmental and social harm. This new framework together with the EU Taxonomy Regulation faced strong opposition and criticism from both business communities and political groups – especially for practical implementation issues. As of November 2024, only 15 of the 27 EU Member States had fully or partially transposed the CSRD into national law. Some of these Member States include Belgium, Bulgaria, Croatia, Czech Rep., Denmark, Finland, France, Hungary, Ireland, Italy, Latvia, Lithuania, Romania, Slovakia and Sweden. This showed incomplete progress across the EU, with many jurisdictions still in process or subject to infringement procedures for missing the 6 July 2024 deadline. As a result, in January 2025 several European parties, explicitly called for a two-year delay and a comprehensive review of the sustainability omnibus package.

2. The idea to bring more transparency and best ESG practices in private sector while contributing to the net zero emissions goals

The framework will evaluate how a company performs in areas beyond just financial returns – specifically its environmental impact, social responsibility, and governance practices. Though highly burdensome, this instrument is getting increasingly used by investors, regulators, partners, interested parties and consumers to assess long-term sustainability and transparency of the companies.

The CSRD replaces the previous Non-Financial Reporting Directive (NFRD). It requires large and medium-sized companies to report detailed information about their environmental, social, and governance (ESG) impacts.

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Its main objectives are:

- To ensure greater transparency for investors and the public.
- To make sustainability measurable and comparable through standardized reporting.
- To encourage responsible corporate behavior and long-term thinking.

The Omnibus Reform aims to:

- Simplify and harmonize the complex web of EU sustainability laws.
- Reduce regulatory overlap and reporting burden on companies.
- Address the growing criticism that ESG regulation has become too fragmented and costly.
- Maintain the EU's leadership in sustainable finance while preserving competitiveness.

The EU has postponed the implementation of the Corporate Sustainability Reporting Directive (CSRD) for certain companies by two years. This decision is part of the Omnibus Simplification Package, aimed at reducing regulatory burdens and enhancing EU competitiveness. The "Stop-the-Clock" Directive, officially adopted on April 17, 2025, delays CSRD reporting for companies that have not yet started reporting:

- Wave 2 (Large EU companies): First reports are now due in 2028, covering the 2027 financial year.
- Wave 3 (Listed SMEs): First reports are now due in 2029, covering the 2028 financial year.

For companies with fewer than 1,000 employees that will be no longer within the CSRD scope, the EU plans to introduce a Voluntary Sustainability Reporting Standard for Non-Listed SMEs (VSME). This framework, developed by the European Financial Reporting Advisory Group (EFRAG), allows smaller entities to report on sustainability matters voluntarily, without the stringent requirements of the CSRD.

The EU has also enacted a two-year delay for the implementation of CSRD reporting requirements. Companies that were previously scheduled to begin reporting in 2026 or 2027 will now commence in 2028, providing additional time for compliance.

3. Methodological approaches that will guide the new governance framework

The European Sustainability Reporting Standards (ESRS) are a set of detailed reporting standards developed by EFRAG (the European Financial Reporting Advisory Group) under the Corporate Sustainability Reporting Directive (CSRD). They define what sustainability information companies must disclose, how it should be presented, and which metrics and indicators should be used. The ESRS are divided into two main categories:

1. Cross-cutting standards that apply to all companies and cover general requirements:

- ESRS 1: General requirements – scope, materiality, reporting principles.
- ESRS 2: General disclosures – governance, strategy, risk management, and metrics.

2. Topical standards which cover specific ESG topics:

- Environment (E1–E5): Climate change, pollution, water and marine resources, biodiversity, resource use and circular economy.
- Social (S1–S4): Own workforce, workers in the value chain, affected communities, consumers, and end users.
- Governance (G1): Business conduct, including ethics, anti-corruption, and lobbying.

Key Features of the framework are:

1. Double Materiality: Companies must report both how sustainability issues affect their business (outside-in) and how their operations impact people and the environment (inside-out).
2. Link to EU Taxonomy: Companies must disclose the share of their activities that are Taxonomy-aligned (i.e., environmentally sustainable under EU law).
3. Digital Reporting: Reports must be submitted in a digital format using the European Single Electronic Format (ESEF) for transparency and accessibility.
4. Assurance Requirement: Sustainability information will be subject to external verification (audit) to ensure accuracy.

The standards are extensive – over 1,000 data points – making implementation demanding and costs are significant for companies. Significant investment is needed for data collection, IT systems, and training, while some concepts and metrics still require clarification and sector-specific guidance.

The Corporate Sustainability Reporting Directive (CSRD) now applies only to companies with over 1,000 employees and annual turnover exceeding €50 million total assets over €25 million.

The deadlines for CSRD and CSDDD have been postponed with 2 years and CSRD first reports will be due in 2028 (originally 2026) and for CSDDD due diligence obligations commence in 2028 (originally 2027). The Omnibus Package proposes:

- Reducing the number of data points required in sustainability reports
- Eliminating certain evaluations for smaller companies
- Increasing materiality thresholds to exclude activities not exceeding 10% of a company's turnover, capital expenditure, or total assets
- Exemptions for SMEs
- Large corporations will still be subject to ESG reporting requirements but will benefit from simplified and streamlined processes.
- Supply chain due diligence will be less burdensome, focusing on direct suppliers and extending assessment intervals.

It is important to note that EFRAG is currently revising the ESRS to simplify and reduce the reporting burden. In July 2025, EFRAG released Exposure Drafts proposing a significant reduction in the number of datapoints, aiming to decrease the reporting requirements by approximately 57%. These proposed changes are part of the European Commission's Omnibus Simplification Package and had been open for public consultation until September 29, 2025. EFRAG plans to submit its final technical advice to the European Commission by November 30, 2025. Therefore, while the initial ESRS indicators have been finalized, companies should stay informed about the ongoing revisions to ensure compliance with the most current standards.

A recent survey highlights the challenges associated with the implementation of the CSRD among European listed undertakings. While the Directive marks a significant step towards harmonized and transparent sustainability reporting, the survey lists a range of issues affecting its implementation (European Issuers Report, 2025). According to the survey, delayed transposition of the Directive in many Member States has created uncertainties for companies attempting to align with evolving national requirements. At the organizational level, companies are grappling with the complexities of double materiality assessments, the granularity of value chain reporting, and sustainability assurance, often relying on external support due to gaps in guidance and clarity.

Table 1. Advantages and disadvantages of ESG reporting standards–comparison

Advantages	Disadvantages
Increased incentives for "Net zero" transition	Increased administrative burden for companies
Improved operational Efficiency	Increased expenses
Increased reputation, credit ratings and financing conditions	Difficulties in creating and maintaining consistent ESG data bases
Better opportunities to attract investment	High Implementation Costs
Increased knowledge and capacity on ESG issues in the mid to long run	Measurement Challenges
Improved risk management	Regulatory uncertainty
Employee retention and social engagement	Compliance Complexity
Long-Term Value Creation	Greenwashing Risk and market Mispricing

Source: EU Legal ESG and Omnibus packages

4. Results

The current EU framework consists of multiple overlapping reporting and compliance requirements. Companies face duplicated data requests, inconsistent definitions, and unclear links between the different regulations. Businesses are calling for streamlined obligations and a single, coherent ESG reporting framework. The directives were primarily designed for large corporations but indirectly affect SMEs through supply chain obligations and due diligence demands. Many SMEs lack the resources to comply, leading to calls for simplified templates or phased implementation. The CSRD, Taxonomy, and SFDR each use different technical criteria and timelines, causing confusion. A revision could harmonize definitions, reporting metrics, and data structures across all sustainability regulations.

With global competition intensifying, some argue the EU should pause or recalibrate the omnibus package to avoid putting European companies at a disadvantage compared to other regions.

Some policymakers argue that the EU's sustainability agenda has become too bureaucratic, prioritizing compliance over real impact. Others, mainly from green and social-democratic groups, defend the framework, saying delays would undermine the European Green Deal and global climate leadership.

On the other hand, ESG can influence a variety of companies' performance factors like risk analysis and its reduction, stakeholder interactions and quality management, all of which contribute to better decisions. Companies that fully understand sustainability and place an emphasis on it can identify risks that may not have been previously detected, as well as companies with stronger ESG practices, will have more access to finance and increased efficiency, which will result in cost savings while building sustainability and resilience over the long run. (Radzi, et al., 2023).

5. Conclusions

Ongoing changes to EU sustainability legislation have created considerable regulatory uncertainty. Companies are investing heavily in external consultancy services to interpret evolving ESG criteria and reporting requirements.

Companies argue the current framework involves too many overlapping obligations – different timelines, reporting standards, and disclosure systems. Firms have already spent significant resources on consultants, audits, and data systems to comply, even though many rules remain uncertain. Preparing ESG reports according to the European Sustainability Reporting

Standards (ESRS) requires significant data collection, auditing, and software investment. Many firms argue that compliance costs could divert resources from innovation and competitiveness.

Rapid regulatory changes have created instability and discouraged long-term investment decisions, while strict EU sustainability rules may increase costs compared to competitors in the U.S. or Asia with less stringent ESG regimes.

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THE IMPACT OF RESIDENTIAL PROPERTY SALES TO FOREIGNERS ON TOURISM: ANTALYA CASE

Abstract: *This study aims to examine the impacts of the sale of residential properties to foreigners on tourism. Face-to-face interviews were conducted with hotel and travel agency managers by using a semi-structured questionnaire in Antalya in 2024, Content analysis was used to analyze the data. Participants stated that the sale of residential properties to foreigners has positive impacts such as ensuring foreign investment inflows and closing the foreign exchange deficit. On the other hand, direct and indirect negative impacts were identified as follows; Due to the extreme increases in housing rents and sales prices in the region, the migration of competent tourism workers to other regions is leading to a decline in service quality in the tourism sector. Furthermore, the operation of illegal accommodation businesses in properties purchased by foreigners negatively affects accommodation businesses. Foreigners' purchases from chain stores selling imported goods result in a loss of foreign currency. The study shows that negative impacts are much greater than positive ones. The exodus of skilled tourism workers resulting from excessively high apartment sales and rental prices will negatively affect the tourism sector. The resulting decline in service quality could reduce the number of tourists seeking high-quality service, and potentially tarnishing the image of Turkish tourism. Furthermore, illegal accommodation operations are a significant issue that has negative effects in terms of both security and accommodation businesses.*

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Keywords: *Foreign; property sales; Antalya tourism, tourism stakeholders.*

JEL: O18; R31; L83.

1. Introduction

Following the availability of housing and citizenship to foreigners in Turkey, foreigners started to buy estates. Turkey's natural and cultural attractions, human relations, climate, history, social, and tourism opportunities are of great importance in foreigners' demand for housing in Turkey (Görer Tamer et al., 2010; Davarcıoğlu Özaktaş, 2019; Kadı, 2014). Turkey's geographical location, real estate prices, cultural ties, and incentives offered to foreign investors are also influential to purchase housing in Turkey (Akyol, Gül, 2025). Turkey's more affordable living costs compared to other EU countries is another determining factor (Görer Tamer et al., 2010). Due to depreciation of Turkish Lira housing prices become affordable for foreigners (Davarcıoğlu Özaktaş, 2019; Yanar, Demir, 2022; Arslan, Kasa, 2020). Wars and conflict in neighboring countries in the North and Middle East have led many people to migrate to Turkey (Akalın, 2024). Other factors influencing foreigners' demand for housing in Turkey include granting Turkish citizenship to foreigners, the removal of the principle of reciprocity, and regulations such as VAT exemptions (Davarcıoğlu Özaktaş, 2019; Yanar, Demir, 2022). The removal of obstacles to foreigners' housing acquisition through legal regulations enacted in Turkey at certain periods has led to a significant increase in the number of foreigners purchasing property (Eliküçük, Polat, 2021; Artul, Ergün, 2022).

2. State of the Problem

After the sale of housing to foreign nationals was permitted, foreigners have began to purchase homes in large numbers, particularly along the Mediterranean and Aegean coasts, where

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tourism is developed. Housing sales to foreigners have both positive and negative consequences. In recent years, the negative impacts, particularly on the tourism sector, have been frequently reported in various media (Antalya Bugün, 2023; Turizm Gazetesi, 2023; Turizm Proje, 2023; Dünya Gazetesi, 2023). Many foreigners purchase multiple residences and illegally rent out their unused residences to other tourists. Similarly, it's a common practice for foreigners who purchase a residence to rent it out when they don't use it This study aims to examine positive and negaative impacts of the sale of residential properties to foreigners on tourism.

3. Methodology

The field work realized in Antalya, where foreigners buy houses intensively, and considered as Turkey's tourism capital. The universe of the research consists of hotels and travel agencies operating in Antalya. A semi-structured questionnaire form was developed and used, as one of the qualitative research methods. Face-to-face interviews were conducted with hotel and travel agency managers in Antalya city center, Kemer, Side/Manavgat, and Alanya provinces in July 2024. Interviews lasted an average of 30 minutes and were realized with 20 managers. Content analysis was used to analyze the obtained data.

4. Research Results

Demographic information of the participants is shown in Table 1. Due to scientific ethics rules, participants' names were not disclosed and were coded as K1, K2, … K20. Participants ranged in age from 20 to 61 and were at least high school graduates.

Table 1. Demographic data of interviewers

Interviewer	Age	*Gender*	*Education*
K1	*24*	*Male*	*University*
K2	*21*	*Male*	*Lycee*
K3	*27*	*Female*	*University*
K4	*61*	*Male*	*Lycee*
K5	*45*	*Male*	*University*
K6	*48*	*Male*	*Lycee*
K7	*37*	*Male*	*University*
K8	*54*	*Male*	*Lycee*
K9	*40*	*Male*	*Master degree*
K10	*53*	*Male*	*Lycee*
K11	*20*	*Male*	*Lycee*
K12	*44*	*Male*	*University*
K13	*35*	*Male*	*University*
K14	*29*	*Male*	*Lycee*
K15	*39*	*Female*	*University*
K16	*47*	*Male*	*University*
K17	*49*	*Male*	*University*
K18	*59*	*Male*	*Lycee*
K19	*53*	*Male*	*Lycee*
K20	*50*	*Male*	*Lycee*

Source: Field study data of the research

The themes resulting from the analyses are shown in Table 2. Participants' views on the impact of foreign housing purchases and how this situation affects the tourism industry are discussed under five themes.

Table 2. Themes addressed in the study

No.	*Theme*
1	*Positive imparcts of housing sales to foreigners*
2	*Negative imparcts of housing sales to foreigners*
3	*Economic impact of housing sales to foreigners in tourism industry*
4	*Tourism stakeholders affected by housing sales to foreigners*
5	*Illegal rental activities*

Source: Field study data of the research

Participants' views on the positive aspects of housing sales to foreigners are presented in Table 3. Participants stated that selling housing to foreigners is beneficial because it facilitates their acquisition of citizenship. Some participants, viewed housing sales to foreigners as positive from both social and economic perspectives. They stated that foreigners who buy house contribute to cultural richness, help to generate income by bringing foreign currency into the economy, and that foreigners staying in the properties they purchase or renting them out allows tourism to expand throughout all seasons.

Table 3. Findings Regarding Positive Impacts of Housing Sales to Foreigners

Theme	*Statement*
Positive Impacts of Housing Sales to Foreigners	*Obtaining citizenship*
	Investing
	Foreign exchange inflow
	Permanent tourist accommodation
	Cultural richness

Source: Field study data of the research

Participants coded K1, K6, K8, and K13 expressed their positive opinions as follows:

K1: "It has a positive impact. It creates an advantage, especially for those seeking citizenship and those who want to invest. It provides a significant cash flow from abroad to the country. It is advantageous in terms of reducing the foreign exchange deficit. However, if foreigners are to acquire citizenship and invest, they must bring in a high amount of foreign currency. Citizenship can be granted to those who invest rather than purchase housing."

K6- "It has provided a cash inflow to the country."

K8- "It has created an input into the national economy."

K13: "It is important for the economy. There is permanent foreign accommodation. Local tradespeople need cash."

Table 4. Findings Regarding Negative Impacts of Housing Sales to Foreigners

Theme	*Statement*
Negative Impacts of Housing Sales to Foreigners	*Rising housing rents*
	Increased housing purchase prices
	Difficulties of Turkish citizens to access housing
	Exodus of tourism employees
	Damage to demographic structure
	Decrease in hotel overnight stays
	Illegal accommodation activities

Source: Field study data of the research

Participants' opinions on the negative impacts of housing sales to foreigners are presented in Table 4. Most participants stated that housing sales to foreigners have increased housing rents and prices in the region. Due to diffuculties in accessing housing, tourism employees have

begun to migrate from the region. Illegal accommodation businesses have been leading to a decrease in hotel room nights. Some participants also noted that foreign buyers are disrupting the region's demographics structure, with some areas experiencing a predominantly foreign population.

Participants coded K6, K9, and K11 expressed their opinions about the negative effects of housing sales to foreigners as follows;

K6: "When they rented out their homes, the occupancy rates of apart hotels decreased. They don't buy holiday packages because they stay for free and rent out their homes."

K9: "High housing prices and rents created a housing problem for locals. High prices caused tourism employees to leave the region. Tourists also face with high prices, so they turn to chain stores. Local businesses and service sector are suffering. Local employees are also migrating"

K11: "Due to illegal rentals, there is unfair competition. They do not have any employment cost, do not pay any tax.

Participants' views on the economic impact of housing sales to foreigners on the tourism industry are presented in Table 5. Some participants stated that housing sales to foreigners have a positive revenue-generating impact on the tourism industry. However, most participants stated that negative economic impacts are much greater, such as increasing real estate prices, reducing tourist spending, illegal housing rentals and agency activities, and reducing the number of overnight stays in apartments and small hotels.

Table 5. Findings Regarding Economic Impact of Housing Sales to Foreigners on the Tourism Industry

Theme	*Statement*
Economic Impact of Housing Sales to Foreigners on the Tourism Industry	*Increase in real estate prices*
	Decrease in expenses
	Income-generating effect
	Illegal activities
	Reduction in the number of overnight stays

Source: Field study data of the research

K1, K6, K8, and K13 expressed their views on the economic impact of housing sales to foreigners on the tourism industry as follows:

K3: "Tourists spend less by renting a flat. It has affected hotels economically."

K5: "There is a negative impact. Those who used to come as tourists are no longer tourists. They rent out their accommodations during their absence."

K12: "Resident foreigners organize illegal tours to other tourists

K15: "We observe a decrease in tourism revenue due to the decrease in hotel room sales. This decrease also causes tourism personnel to be unemployed during the season."

K20: "It has affected negatively the occupancy rates in hostels, apart hotels, 2-, 3-, and 4-star hotels."

Participants' views on tourism stakeholders affected by housing sales to foreigners are presented in Table 6. Some participants stated that construction firms and real estate companies were positively affected by housing sales to foreigners. Negatively affected other tourism stakeholders whose access to housing has decreased due to rising rents and sales prices include, local residents, accommodation businesses, and travel, tour, and transfer service agencies.

Table 6: Findings Regarding Tourism Stakeholders Affected by Housing Sales to Foreigners

Theme	*Statement*
Tourism Stakeholders Affected by Housing Sales to Foreigners	*Accommodation Enterprises*
	Travel Agencies
	Transfer Service Agencies
	Tour Service Agencies
	Construction Companies
	Real Estate Agents
	Local Residents

Source: Field study data of the research

The opinions of participants K1, K2, K9, K12, K16, and K18 regarding tourism stakeholders affected by housing sales to foreigners are as follows:

K1: "The accommodation sector, travel agencies, transfer, and tour agencies have been affected. Foreign home buyers are not participating in tours organized by agencies. They rent vehicles and travel on their own. The accommodation sector has been the most affected. There are vacancies in 5-star hotels during the tourist season. Aparthotels have also been negatively affected.

K2: "Travel agencies are being negatively affected. Because foreign buyers are familiar with the region and have traveled extensively, they are reluctant to participate in tours."

K9: "Hotels and all other tourism stakeholders have been affected. It is difficult to find employees. There are job losses. The number and capacity of small hotels have decreased."

K12: "Accommodation businesses have been affected. We used to be able to sell tours to Russian tourists. However, this has dropped from 10% to 1% in the last two years. There are no high sales during the tourist season this year." "Online sales have greatly affected our tours." There are scammers who commit fraud through online tour sales. It's difficult to find contacts in online sales. Many tourists have chosen uncertified online sales instead of travel agencies."

K16: "The real estate sector and construction companies have benefited the most. 3- and 4-star hotels, guesthouses, and boutique hotels have suffered the most. The entire tourism sector will suffer in the long run. Agency and transportation businesses have become increasingly pirated."

K18: "Construction companies have profited. Small guesthouses and boutique hotels have been negatively affected."

5. Conclusions

The findings of the research indicate that housing sales to foreigners have numerous positive and negative, direct and indirect impacts on the tourism sector. As in other countries, housing sales to foreigners positively impact the national economy due to their foreign currency-generating effect. They also play a role in attracting foreign investors and extending the tourism season to all seasons. Interviews indicate that the required purchase price for foreigners to purchase housing in Turkey should be higher. Foreign demand for housing is beneficial for the construction sector. Real estate companies also generate revenue. However, to prevent a leakage in the economy, it is necessary to investigate whether real estate companies are foreign companies.

According to participants, negative impacts are greater than positive ones on the tourism sector. The most significant impact, as cited by most participants, is the excessive increase in housing rents and sales prices in the region. Access to housing has become increasingly difficult for locals and tourism workers. This situation leads to emigration from the region and loss of employment. This migration of workers could also lead to the emigration of qualified personnel in large hotels in the region, leading to a decline in service quality. Decreasing service quality could lead to a risk of high-quality tourists turning to other regions or countries.

It has been observed that foreign homebuyers are illegally renting their properties to others while they are not in use. This situation negatively affects small and medium-sized accommodation businesses in particular, decreasing occupancy rates and overnight stays. Furthermore, foreign home owners are observed providing illegal tour and transfer services to tourists. These uncertified activities create unfair competition, financially harm small and medium-sized businesses in the region, and generate tax and employment losses. Furthermore, it negatively affects locals' perceptions of foreigners.

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CERTIFICATION SCHEMES IN THE FOODSERVICE SECTOR: THE CASE OF MEAT

***Abstract**: Certifications play a key role in the agri-food and meat industries, where consumers, stakeholders, and legislative frameworks influence production practices and the sector's economic, social, and environmental impacts. This study analyses certification schemes in the foodservice sector with reference to beef, pork and poultry, the most widely marketed variety of meat in the EU. The objective is to identify which standards attract the authors' interest and whether the certifications examined vary according to the geographical area or the authors' country of affiliation. To achieve these goals, this research carries out a systematic literature review using the PRISMA model. Findings indicate that certifications in the foodservice sector mainly cover the domains of animal welfare, food safety and quality, cultural aspects, and consumer behaviour. The findings establish the foundation for further research, which aims to integrate certification schemes into foodservice and support competitiveness of all meat producers of the supply chain in the meat sector.*

***Keywords**: Meat; Foodservices; Certification Schemes; Systematic Literature Review; Prisma Model*

***JEL**: M10*

1. Introduction

The certification schemes play a strategic role within the agri-food sector and, in particular, in the meat industry, where the growing focus on quality, safety, and sustainability is reshaping production and consumption dynamics (Hammoudi et al., 2009).

In the foodservice sector, this function becomes even more significant, as companies operate within an environment shaped by both consumers and stakeholders and by regulatory frameworks (Bux, Amicarelli, 2025). In this context, certifications translate principles of safety, quality, and sustainability into verifiable practices, serving as key tools for managerial decisions and sector-wide competitiveness (Conter, 2025).

In the European Union (EU), the meat sector is a key part of the agri-food system for its economic, cultural, and nutritional importance (Eurostat, 2024; Smith et al., 2022). Beef, pork, and poultry dominate EU markets and play a central role in both institutional and commercial foodservice (European Commission, 2022).

In recent years, scientific interest in certifications within the foodservice sector has been steadily increasing (Bux, 2025). However, the literature still pays limited attention to the systematic analysis of the standards it focuses on, and to how certification adoption may vary according to geographical context. In light of this gap, the present study aims to investigate the certification schemes analyzed in the literature with reference to beef, pork, and poultry, in order to: (i) the standards towards which the authors' interest is directed; and (ii) if the certifications analysed by scholars may vary depending on the geographical area under consideration and/or the country of affiliation of the corresponding author.

Using a systematic literature review (SLR) based on the PRISMA model, this study offers an overview of foodservice certification schemes, outlining key challenges and opportunities for

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operators and policymakers, and supporting strategies to integrate certifications for greater competitiveness and sustainability in the meat sector.

2. Methodology

To achieve the research objectives, an SLR was conducted (Snyder, 2019). To ensure transparency, objectivity, and reproducibility, the authors adopted a stepwise approach: (1) defining the research design (scope, questions, period, subject areas, document types, languages); (2) searching relevant manuscripts using a structured search string in selected databases; (3) collecting data following PRISMA guidelines (Page et al., 2021) to identify, screen, and select studies; (4) extracting key information from each included paper; (5) integrating results through quantitative and qualitative synthesis; and (6) critically interpreting the findings.

The databases selected for this SLR were Scopus and Web of Science. Despite a certain degree of overlap between the two, they complement one another, and this integration of searches serves to minimise the risk of database selection bias, thereby ensuring a more representative sample of global research output.

Given the limited studies on certifications in the foodservice industry related to beef, pork, and poultry, no restrictions on time, subject area, or document type were applied to ensure comprehensive results. The only limitation concerned language, as only papers in English, Spanish, and Italian were included, reflecting the authors' linguistic competence. Each manuscript was personally reviewed to assess its suitability for inclusion in the analysis. Keywords related to meat, certification, and foodservice were selected and used in a structured search applied to titles, abstracts, and keywords.

Consequently, the following search string was applied: "meat" AND "certif*" AND ("hospitality" OR "restaurant" OR "catering" OR "canteen" OR "foodservice" OR "food service" OR "horeca"). Boolean operators "OR" (for synonymous terms) and "AND" (to connect core concepts) were used to refine the query. Final update of the results was completed on September 27, 2025.

2.1 Data collection

A comprehensive meta data catalogue has been collated in Microsoft Excel worksheets, encompassing the following categories: author affiliation; citations; bibliographic information; keywords; and abstracts.

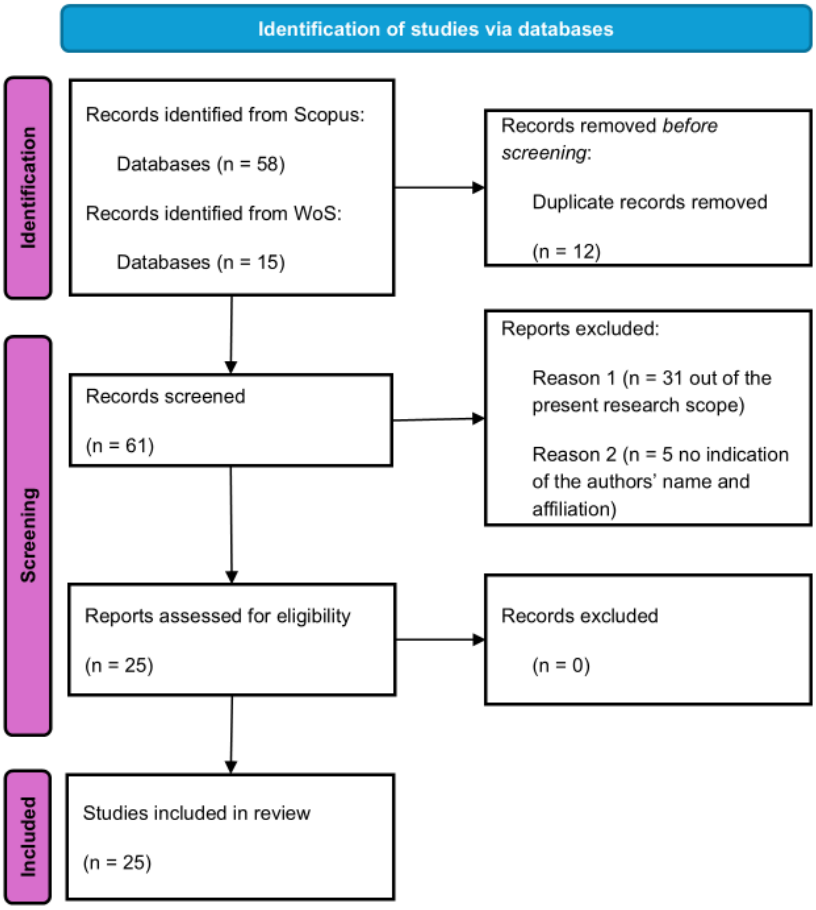
In accordance with the PRISMA model, the selected contributions from the databases have been identified, selected, analysed and screened for relative pertinence.

Each step underwent rigorous review and refinement, with all records independently examined by all authors to minimise bias. In cases of disagreement, discussions were held until consensus was reached. Studies were included only if they investigated certifications in the foodservice sector specifically related to the meats analysed in this study - beef, pork, and poultry. The article selection process, illustrated in Figure 1, resulted in a final sample of 25 articles.

3. Research Results

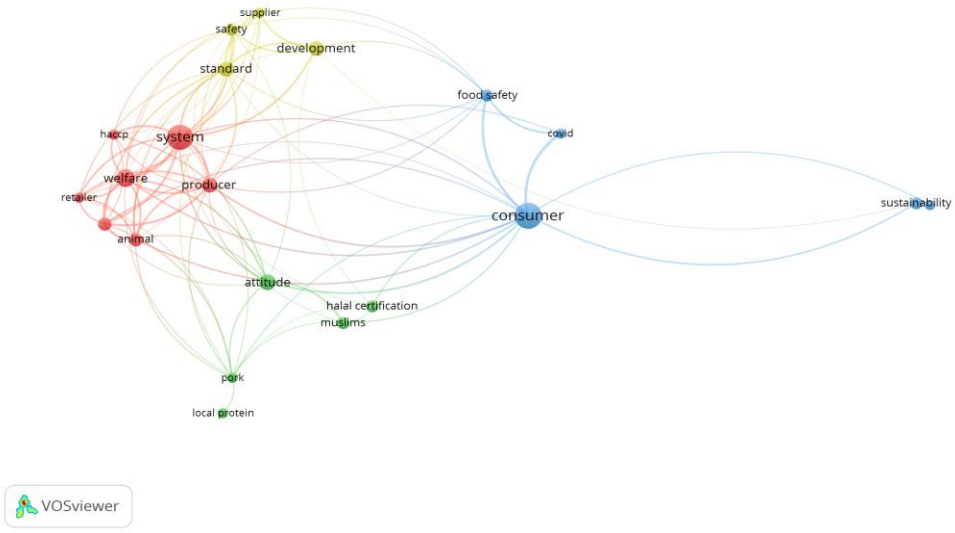
To achieve a more in-depth thematic analysis, bibliometric mapping was conducted using VOSviewer software. Keyword mapping enabled the visualisation of the research domain's thematic structure, revealing the most frequent co-occurring terms and their relationships. The analysis produced a conceptual network that identified thematic clusters representing the main research directions on certifications in the foodservice sector (Figure 2).

Figure 1. PRISMA model



Source: Personal elaboration by the authors.

Figure 2. Vos Viewer data.



Source: Personal elaboration by the authors.

The map generated with VOSviewer highlights four main thematic areas in research on foodservice certifications:

1. Animal welfare and production systems (AW&PS - red cluster): focuses on production management and animal welfare;
2. Food safety and quality standards (FS&QS - yellow cluster): includes the creation of standards and protocols that ensure product quality;
3. Cultural and religious aspects (C&R - green cluster): emphasizing how cultural and religious beliefs shape consumption and certification systems;
4. Sustainability and consumer behavior (S&CB - blue cluster): showing the growing focus on sustainability, health, and social impact in food choices.

Table 1 reports, for each cluster, the related geographical area, type of certification or assessment tool, and reference authors.

Table 1. Main characteristics of the selected papers.

Certification clusters	**Geographical area**	**Type of certification/assessment tool/guidelines**	**Author(s)**
i) AW&PS	USA	Certified Humane; Animal Welfare Approved; Global Animal Partnership (GAP)	Victor Spain et al., 2018
	France	Animal welfare certifications (generic)	Dumont et al., 2018
	Spain	Welfare Quality® assessment system	Velarde, Dalmau, 2012
	Canada	Global Animal Partnership's (GAP's) 5-Step™ Animal Welfare Rating Standards	Duncan et al., 2023
	Netherlands	Good Farming Practice; HACCP; ISO	Noordhuizen, Frankena, 1999
ii) FS&QS	Malaysia	HACCP	Subramaniam et al., 2023
	Spain	HOSPIFOOD® Certification	Garcia, 2015
	Pakistan	Self and third-party certification	Butt et al., 2024
	Turkey	Geographical indications	Akgöz, Karagöz, 2024
	USA	Certified Organic; Certified Humane; Certified Grass-Fed	Crandall et al., 2013
	UK	BRC; ISO 9001:2015; GFSI; Codex Alimentarius	Manning, 2018
	China	HACCP	Lai et al., 2024
iii) C&R	Indonesia; South Korea; India; Indonesia; Indonesia; Indonesia; USA; Italy	Halal certification	Aggraeni et al. 2025; Osman et al., 2025; Arafath, 2025; Ikawati et al., 2024; Widodo et al., 2023; Rishelin, Ardi, 2020; Atalan-Helicke, 2015; Giovine, 2014
	Spain	Protected Geographical Indication (PGI)	Casamayor Sebastián, Garcìa Perera, 2019
	USA	Kosher	Blech, 2009
iv) S&CB	Italy	Certified sustainable wood	Piochi et al., 2023
	USA	Marine Stewardship Council; Aquaculture Stewardship Council; Certified Organic; Certified Humane; Certified Grass-Fed	Richards, Vassalos, 2025
	Canada	Eco Certification scheme	Fennell, Markwell, 2015

Source: Personal elaboration by the authors.

Table 1 shows that scholars are particularly interested in certifications related to cultural aspects in Southeast Asian countries. Topics such as "AW&PS" and "S&CB" are primarily studied by scholars in Western Europe and the United States. Finally, the issue of safety and quality is the subject of research regardless of the nationality of the authors identified by the SLR.

5. Conclusions

As stated, this study examines the certifications explored by scholars in the foodservice sector and the possible link between the authors' geographical affiliation and the type of certification.

The main results of this study highlight four clusters (AW&PS, FS&QS, C&R, S&CB). With reference to these thematic areas, the scholars highlighted different interests, differing by geographical area, with the exception of food safety and quality, which is a common interest for all researchers.

Further investigation of this topic is needed to highlight its evolution over time more clearly and to provide competitive support to all operators in the foodservice sector supply chain, taking into account the geographical area in which they operate.

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UNVEILING THE IMPACT OF WEATHER AND CALENDAR PATTERNS ON ELECTRICITY DEMAND IN OFF-GRID REGIONS: AN EMPIRICAL STUDY

Abstract: *The Azores archipelago, located in the middle of the Atlantic Ocean, offers a unique setting to study the determinants of energy consumption. Its isolation from the mainland grid makes it a natural experiment where energy production is directly linked to consumption, providing an opportunity to analyze the determinants of energy consumption in archipelagos or isolated regions. This study aims to investigate the relationship between energy consumption and climate variables in an off-grid region, using the island of São Miguel in the Azores archipelago as a case study, from 2018 to 2022. Hourly data on total energy consumption and renewable energy consumption on São Miguel were collected, along with climate data (temperature, solar radiation, humidity, precipitation, and wind speed) and calendar variables (day of the week and holidays). The analysis was performed using panel data methodology with fixed effects, for total energy emission and for renewable energy emission separately. The results show that total energy consumption and renewable energy consumption are influenced by climate variables, albeit with impacts of different magnitudes and directions. The day of the week and holidays also had a significant negative effect on energy consumption. The study's findings can be used to develop policies to promote a more efficient and sustainable energy management in islands and other regions with limited access to the electricity grid.*

Keywords: *energy consumption; renewable energy; climate variables; off-grid*

JEL: *Q41; Q42; Q54*

1. Introduction

According to (World Electricity Transition, 2024), global electricity demand continues to climb, growing 2.5% in 2022, in line with the average in the last decade. This growth is driven by factors like increasing access to electricity and the electrification of transportation and heating sectors. While fossil fuels still dominated electricity generation in 2023, making up 61% of the world's total, the extraordinary growth rate of low-carbon wind and solar power has begun to reverse this trend. Electricity is a crucial input for industry and production, and per-capita electricity consumption is a key indicator of development across different countries (Bayraktutan et al., 2011).

Understanding the factors influencing energy consumption is therefore essential for effective energy planning and policy design. Prior studies identify four main categories of determinants: social and economic, climate-related, calendar, and technological.

This study investigates how climatic variables (temperature, solar radiation, humidity, precipitation, and wind speed) and calendar variables (day of the week and holidays) affect electricity consumption in an off-grid region. Using São Miguel Island (Azores) as a case study, we analyze hourly data from 2018 to 2022 through a panel data model with fixed effects. The aim is to quantify how these variables shape total and renewable energy consumption and to explore differences in demand between weekdays and weekends.

Unlike most existing studies, this research draws on the experience of a natural laboratory: an island system disconnected from the mainland grid, where electricity production and consumption are closely intertwined. In this setting, energy flows occur within a self-

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contained balance between generation and demand, without the influence of external connections. This unique context offers a clearer and more authentic view of how weather conditions and time patterns shape energy use in daily life, providing valuable insights into the challenges faced by isolated regions.

The findings are expected to enhance the understanding of energy use dynamics in isolated regions and support the formulation of policies aimed at promoting efficient, resilient, and sustainable energy management in small island territories, which represents a critical step toward achieving broader energy transition goals.

2. State of the Problem

Electricity consumption is a key indicator of a country or region's economic and social development, having been associated with economic growth, urbanization, and improved living standards for several decades. Numerous studies have examined its determinants, which are generally grouped into four main categories: social and economic, climatic, calendar-related, and technological factors.

Empirical research highlights a strong relationship between energy use and economic growth. (Apergis, Payne, 2010) found a long-run equilibrium between renewable energy consumption and GDP among OECD countries, while (Bayraktutan et al., 2011) confirmed a positive and bidirectional relationship between renewable generation and economic growth. Similarly, (García-Amate, Ramirez-Orellana, 2018) identified distinct effects of total energy use and electricity consumption on economic performance, showing that while electricity consumption fosters growth, total energy use may have adverse effects.

Socioeconomic factors, including income and urbanization, are central to understanding energy demand. Studies by (Achão, Schaeffer, 2009) and (Lenzen et al., 2013) demonstrated that household income growth significantly alters energy consumption patterns. (Su et al., 2022) extended this perspective, revealing non-linear effects of urbanization, industrialization, aging, and trade openness on renewable energy use across 116 countries. In developing contexts, income inequality and evolving consumption habits have also been shown to drive differences in energy efficiency (Abreu et al., 2021; Zheng et al., 2024).

Climatic and calendar variables play an equally relevant role. Temperature, solar radiation, humidity, precipitation, and wind speed have all been associated with fluctuations in energy demand. Early studies, such as (Davies, 1958), and later works by (Mirasgedis et al., 2006) and (Räsänen et al., 2010), demonstrated that temperature is the dominant driver of short-term demand variation, while humidity and rainfall have secondary but non-negligible effects. More recent research using high-resolution data confirms that weather influences not only total consumption but also its daily patterns, particularly between weekdays and weekends (Kang, Reiner, 2022; Trotter et al., 2016).

Finally, energy behavior is also shaped by technological and behavioral responses to environmental change. (Randazzo et al., 2020) observed that rising temperatures increase air conditioning use, especially among wealthier households, potentially exacerbating energy inequality. (Shahbaz et al., 2022) further identified that investment in human capital and research can mitigate energy intensity, while industrial expansion tends to increase it.

Overall, existing literature highlights the complex interaction between climatic, socioeconomic, and temporal factors in shaping electricity demand. However, most studies have focused on interconnected or continental systems, and there is still limited understanding of how these dynamics operate in isolated and off-grid regions. This research

aims to fill that gap by examining an island system where production and consumption are directly connected.

3. Methodology or Methodological Approaches

To account for the differences in electricity consumption throughout the day, we employed a panel data estimation with 24 groups (representing each hour of a day) and 1,826 days (from January 1, 2018, to December 31, 2022). This resulted in a total of 43,824 observations.

The dependent variable is energy consumption, in hour i and in day t (EC_{it}). The independent variables include: Temperature ($X1_{it}$); Radiation ($X2_{it}$); Humidity ($X3_{it}$); Sea Water Temperature ($X4_{it}$); Precipitation ($X5_{it}$); Wind Speed ($X6_{it}$); and two dummy variables, one for Weekend ($D1_{it}$) and another one for Holiday ($D2_{it}$).

$$EC_{it} = \alpha_0 + \alpha_1 X1_{it} + \alpha_2 X2_{it} + \alpha_3 X3_{it} + \alpha_4 X4_{it} + \alpha_5 X5_{it} + \alpha_6 X6_{it} + \delta_1 D1_{it} + \\ + \delta_2 D2_{it} + \gamma_i + \varepsilon_{it} \quad (1)$$

$$t = 1, \ldots, 1{,}826$$

$$i = 1, \ldots, 24$$

In Equation 1, α_k represents the relationship between energy consumption and each of the weather variables (Xk_{it}) and δ_1 and δ_2 represent the relationship between energy consumption and the corresponding calendar variable. We estimated two models: one for non-renewable energy and another one for renewable energy.

In the analysis performed, a model with panel data was used as a basis. In this context, γ_i represents all differences between the hours of the day that are stable over time (unobserved heterogeneity). In a random effects model, γ_i is also assumed to be independent of everything on the right-hand side of equation (1). In a fixed effects model, γ_i is treated as a set of fixed constants, which is equivalent to allowing γ_i to be correlated with the other covariates. By allowing such correlations, we control for time-invariant variables, whether observed or not. Using the Hausman test, the most suitable model was chosen from the fixed effects and random effects versions of the model.

4. Research Results

4.1 Total energy emission model

The model for total electricity consumption was estimated using 43,628 hourly observations for the period 2018–2022. All climatic and calendar variables were found to be statistically significant at the 1% level.

For total energy consumption, temperature and solar radiation exhibit a negative relationship with electricity use, suggesting that warmer and brighter conditions reduce the need for heating and lighting. Conversely, humidity, precipitation, wind speed, and sea water temperature have positive effects, indicating higher demand during humid or adverse weather conditions when people spend more time indoors or use cooling systems. Calendar variables are also significant: weekends and holidays are associated with lower total consumption, reflecting reduced industrial and commercial activity. Overall, total consumption appears more sensitive to climatic variations than to temporal patterns.

Table 1. Summary of estimation results for total and renewable energy consumption

Total energy emission	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
Temperature	-793.5349	24.01816	-33.04	0.000	-840.6109	-746.4589
Radiation	-32.63116	1.155665	-28.24	0.000	-34.89629	-30.36604
Humidity	539.2666	7.109748	75.85	0.000	525.3313	553.2018
Water temperature	3636.548	32.09352	113.31	0.000	3573.644	3699.452
Precipitation	4097.553	1227.26	3.34	0.001	1692.102	6503.005
Wind speed	2499.419	43.8066	57.06	0.000	2413.557	2585.281
Weekend	-27060.41	298.6155	-90.62	0.000	-27645.7	-26475.12
Holiday	-10357.71	711.0951	-14.57	0.000	-11751.47	-8963.95
_cons	102936.8	667.345	154.25	0.000	101628.8	104244.8

Number of obs: 43,628
Group variable: Hour
Number of groups: 24
F (8, 43596) = 4950.39
Prob > F = 0.0000
F test that all u_i = 0: F(23, 43596) = 2056.64
Prob > F = 0.0000

Source: Own elaboration.

4.2 Energy emission model of renewable energy

The second model focuses on renewable energy consumption, which in São Miguel depends primarily on geothermal, wind, hydro, and solar sources. As in the previous analysis, all explanatory variables are statistically significant at the 1% level, though the direction and intensity of effects differ from those obtained for total energy consumption.

Table 2 – summarizes the estimated coefficients and the expected signs of each variable for the renewable energy consumption model

Renewable energy emission	Coefficient	Std. err.	t	P>|t|	[95% conf. interval]	
Temperature	-677.4289	19.463	-34.81	0.000	-715.5768	-639.2811
Radiation	2.275878	.9364878	2.43	0.015	.4403448	4.111411
Humidity	238.8988	5.76135	41.47	0.000	227.6064	250.1911
Water temperature	858.8259	26.00683	33.02	0.000	807.852	909.7997
Precipitation	-3564.723	994.5041	-3.58	0.000	-5513.969	-1615.477
Wind speed	2933.047	35.49847	82.62	0.000	2863.47	3002.625
Weekend	732.8928	241.9816	3.03	0.002	258.6044	1207.181
Holiday	6964.294	576.2325	12.09	0.000	5834.868	8093.721
_cons	52976.15	540.7798	97.96	0.000	51916.22	54036.09

Number of obs: 43,628
Group variable: Hour
Number of groups: 24
F (8, 43596) = 1385.52
Prob > F = 0.0000
F test that all u_i = 0: F(23, 43596) = 9.47
Prob > F = 0.0000

Source: Own elaboration.

The results indicate that solar radiation, humidity, precipitation, wind speed, and sea water temperature have positive effects on renewable energy consumption. These variables increase renewable generation capacity, especially from solar, hydro, and wind sources, and consequently raise the share of renewables in the local energy mix. In contrast, temperature

shows a negative relationship, reflecting lower overall energy demand and possible reductions in renewable output during warmer periods.

Calendar variables are also significant. Both weekends and holidays are associated with higher renewable energy use compared to weekdays. This pattern can be explained by the lower total energy demand during these periods, which allows renewables to supply a larger proportion of the island's electricity needs, given their priority in the grid.

In summary, renewable energy consumption in São Miguel is closely linked to local weather and temporal conditions. The results underline the importance of adaptive management strategies that make better use of favorable weather and demand patterns to maximize renewable energy generation and reduce dependence on fossil fuels in isolated systems.

5. Conclusions

This study examined the relationship between energy consumption and climate and calendar variables on the island of São Miguel, an off-grid region in the Azores archipelago, during the period 2018 to 2022. Using a panel data analysis of fixed effects, the results highlight the significant impact of climate and calendar variables on total and renewable energy consumption.

The results show that temperature and solar radiation have opposite effects on total energy consumption, with higher temperatures reducing consumption and solar radiation allowing a greater balance of energy needs. However, variables such as humidity, water temperature, precipitation and wind speed generate an increase in total energy demand. Focusing specifically on renewable energy consumption, it responds differently: although higher temperatures can reduce energy consumption, solar radiation, humidity, water temperature, precipitation and wind speed have positive effects, increasing production of renewable energy, especially from solar and wind sources. The influence of calendar variables was also significant, with weekends and holidays presenting lower global demand for energy, which allowed a greater contribution from renewable energy in balancing energy demand. This highlights the potential for optimized energy management in off-grid regions, prioritizing renewable sources during periods of lower demand.

In summary, the findings from São Miguel Island highlight the interaction between climatic and calendar factors with energy consumption in isolated regions. By developing adaptive energy policies that reflect these dynamics, off-grid regions can improve their energy efficiency and sustainability, aligning with broader global goals on climate change mitigation and resilient energy management.

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Tatjana Drangovska, Marica Antovska-Mitev[1]

INSTITUTIONS AS A PREREQUISITE FOR GROWTH: PROJECTIONS AND POLICY IMPLICATIONS FOR NORTH MACEDONIA

Abstract: *The New Institutional Economics assigns a significant role to institutions within long-term economic development models. In the context of sustainable development, institutions are regarded as the fourth component, and the development of the institutional system is considered a prerequisite for steering national economies toward sustainable growth paths. This paper aims to examine the role of institutions in fostering economic growth, with a specific focus on North Macedonia. The quality and capacity of institutions in North Macedonia are assessed using selected international indicators, including the Worldwide Governance Indicators (WGI), the Corruption Perceptions Index (CPI) etc. In light of the identified weaknesses within the country's institutional system, the paper presents macroeconomic projections that outline North Macedonia's potential development trajectory over the next two decades, assuming the implementation of reforms in key institutional areas.*

Keywords*: institutions, economic growth, Republic of North Macedonia, Worldwide Governance Indicators, IFs.*

JEL: *O43; O11; P48.*

1. Introduction

The 2024 Nobel Prize in Economic Sciences, awarded to Daron Acemoglu, Simon Johnson, and James A. Robinson, highlights the central role of institutions in determining economic prosperity. Their research explains cross-country income disparities largely through differences in institutional quality. Post-transition economies in Europe, including North Macedonia, continue to struggle with transition through sustained growth and convergence due to weak institutional capacity and ineffective reform implementation.

Despite the recognized importance of governance (institutional quality), empirical research on the relationship between institutional quality and economic growth in emerging economies, particularly North Macedonia, remains limited. To address this gap, the present study analyzes the impact of institutional quality on North Macedonia's economic growth and projects potential outcomes under institutional reform scenarios. Through this scenario-based approach, the paper provides empirical evidence on the role of good governance in promoting development, contributing to both academic debate and policy design.

The paper is structured as follows: Section 2 reviews the theoretical framework and national context; Section 3 outlines the methodology; Section 4 presents and interprets empirical results; and Section 5 concludes with key findings and policy implications.

2. State of the Problem

In recent decades, institutions have been recognized as fundamental determinants of long-term economic growth within the framework of New Institutional Economics. As North (1990) argues, both formal and informal institutions shape incentives, reduce uncertainty, and influence transaction costs, thereby affecting overall economic performance. Building on this, Acemoglu, Johnson, and Robinson (2001, 2004, 2024) emphasize that inclusive institutions promote investment, innovation, and sustainable development, while extractive institutions impede broad-based growth. Beyond economic outcomes, institutions are also

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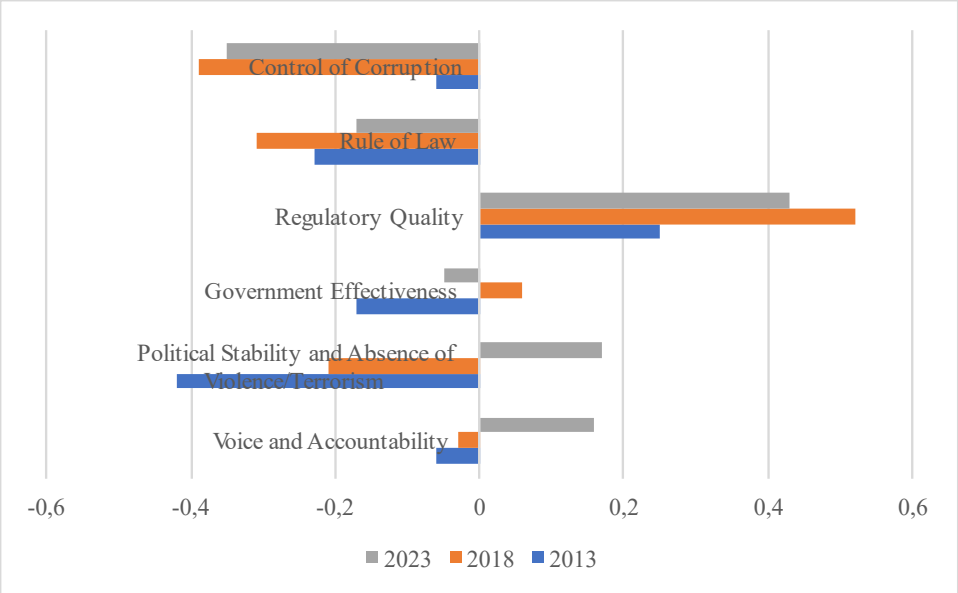
vital for sustainable development. Meadowcroft (2007) identifies them as the "fourth pillar" of sustainability–alongside economic, social, and environmental dimensions–highlighting their role in governance, policy coordination, and the implementation of long-term strategies.

Empirical measures such as the Worldwide Governance Indicators (WGI) (Kaufmann, Kraay, & Mastruzzi, 2010) and the Corruption Perceptions Index (CPI) provide key tools for assessing institutional quality, capturing dimensions such as: voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption.

For North Macedonia, institutional weaknesses remain a critical constraint to economic progress. Despite macroeconomic stability and ongoing EU-aligned reforms, persistent weaknesses in governance, rule of law, and public administration effectiveness continue to hinder development. Consistently low WGI and CPI scores indicate challenges in regulatory quality, government effectiveness, and corruption control, all of which undermine investor confidence and constrain sustainable growth.

Figure 3 presents the main components of the Worldwide Governance Indicators (WGI) for North Macedonia. The steady improvement in *Voice and Accountability* suggests greater citizen participation, enhanced media freedom, and stronger civil liberties over the past decade. Similarly, progress in *Political Stability and Absence of Violence* reflects increased stability, likely influenced by NATO accession and reduced internal conflict risks. In contrast, the decline in *Government Effectiveness* underscores ongoing difficulties in public service delivery and administrative efficiency. *Regulatory Quality* remains relatively favorable for business, while the negative scores for *Rule of Law* point to persistent issues with judicial independence, legal enforcement, and public trust. The most concerning dimension is *Control of Corruption*, which has deteriorated, indicating heightened perceptions of corruption, elite capture, and weak enforcement.

Figure 4. WGI trends by components in North Macedonia, selected years



Source: World Bank, 2025.

Recent empirical evidence supports these findings. Lazarov and Simeonovski (2023) link output volatility to weak institutional resilience, while Ziberi et al. (2022) emphasize the importance of human capital and fiscal governance. Reports by the IMF (2024) and OECD

(2025) note modest institutional improvements but highlight ongoing challenges in anti-corruption enforcement and political commitment.

These weaknesses underscore the need for comprehensive institutional reform that goes beyond formal legislative alignment with the EU acquis. Strengthening the functionality, accountability, and integrity of public institutions is essential, as policy implementation remains hindered by limited administrative capacity, politicization, and weak enforcement, constraining North Macedonia's ability to leverage its geographic and human capital advantages.

3. Methodology or Methodological Approaches

This study applies a mixed-methods approach to examine the relationship between institutional quality and economic performance in North Macedonia. The qualitative analysis identifies key governance challenges.

For the quantitative analysis, the International Futures (IFs) Model is employed as the primary analytical tool. Developed by the Frederick S. Pardee Center for International Futures at the University of Denver, IFs is an integrated global forecasting system that links multiple subsystems (economy, governance, demography, education, health, energy, and technology) to simulate complex causal relationships over time (Pardee Center for International Futures, 2022; United Nations, 2018). Its inclusion of endogenous feedback mechanisms makes it particularly suitable for assessing the dynamic, cross-sectoral impacts of institutional reforms in small and transition economies such as North Macedonia.

The analysis in this paper focuses on two core sub-models: Governance and Economy. In the paper are employed the following variables:

- Institutional quality (independent variables): estimated through indicators of government effectiveness, regulatory quality, corruption control, economic freedom, civil and political freedom.
- Economic performance (dependent variable): estimated through GDP and GDP per capita.

In IFs, independent variables are expressed as multipliers (e.g., 1 to 1.3 represents a 30% improvement). Table 2 summarizes the variables and reforms magnitudes, with 2023 as the base year.

Table 3. List of independent variables and interventions

Activity	Parameter	Magnitude
Strengthening institutions to implement policies and regulations that support private sector growth	Govregqualm	1.3
Strengthening institutions to prevent and combat corruption	Govcorruptm	1.4
Improving public service quality, independence, and policy implementation efficiency	Goveffectm	1.4
Increase of economic freedom	Econfreem	1.3
Strengthening legal, institutional, and political frameworks to support freedom of expression	Freedom	1.3

Source: Authors elaboration.

The study considers two scenarios:

- **Current Scenario:** Assumes continuation of existing trends and policies, based on IFs default calibration for North Macedonia (version 8.38 North Macedonia), integrating data from global sources such as the OECD, IMF, World Bank, and UNDP.

- **Reform Scenario:** Assumes improvements in institutional quality, operationalized through adjustments to governance parameters (Table 1), to assess their long-term impact on GDP and GDP per capita.

The IFs model uses data from international databases, including the World Bank (GDP), Worldwide Governance Indicators, Transparency International, Fraser Institute, and Freedom House (institutional quality), cross-validated with official Macedonian statistics. The model is calibrated using historical data from 2000–2023, with projections extending to 2045, enabling long-term analysis of institutional reforms on economic growth and living standards in North Macedonia.

The simulation process follows those steps:

- Establishment of current growth trajectory based on historical data on institutional and economic performance for North Macedonia
- Modifying selected independent variables to reflect the institutional reforms impact
- Running model to assess the effects on GDP and GDP per capita
- Interpretation of outcomes to inform policy recommendations.

Although the IFs model provides a comprehensive analytical framework, it has certain limitations. Its reliance on aggregated institutional indicators may overlook qualitative aspects of governance, and projections depend on assumptions about external factors such as EU integration and geopolitical stability. Nevertheless, the model remains a useful tool for assessing long-term scenarios and identifying key reform priorities.

4. Research Results

Simulation results highlight that institutional quality is key to long-term economic growth in North Macedonia, with marked differences between Current and Reform scenarios.

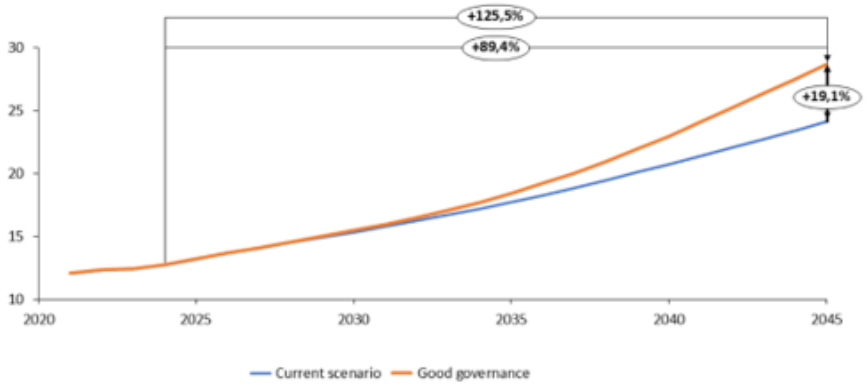
Under the Current scenario, which assumes the continuation of existing institutional and development trends without substantial reforms, the Macedonian economy is projected to grow at an average annual GDP growth rate of 2.9% through 2045. This rate is notably below the country's estimated potential growth rate and insufficient for achieving convergence with EU average income levels. As a consequence, the economic gap between North Macedonia and EU member states is projected to widen further, exacerbating disparities in living standards. According to the IFs model projections, GDP per capita (in constant 2017 USD) will increase by approximately USD 2.670 by 2030 and USD 10.580 by 2045, compared to the base year of 2024.

By contrast, the Reform scenario, which incorporates improvements in institutional quality– such as enhanced government effectiveness, regulatory quality, corruption control, economic freedom, and civil liberties–yields significantly stronger economic outcomes.

As shown in Figure 2, by 2045, the Reform Scenario yields a 19% higher GDP than the Current Scenario, reaching USD 28.7 billion, with an average annual growth rate of 4.8%, closer to the country's potential growth rates.

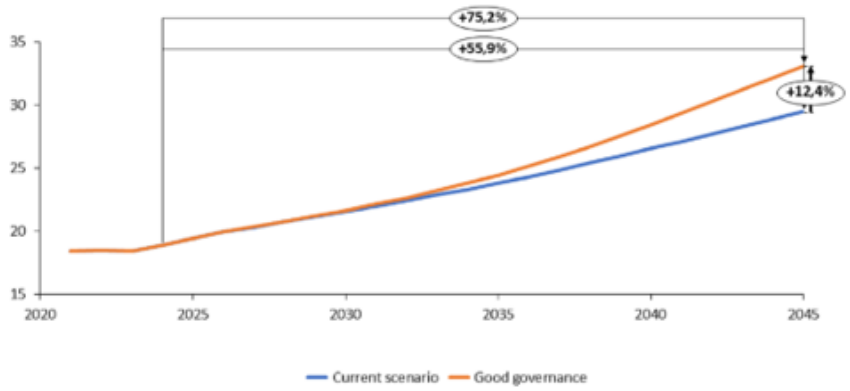
Similarly, as illustrated in Figure 3**,** GDP per capita in the Reform Scenario is projected to reach approximately USD 33.120 by 2045, representing a 12% increase over the Current Scenario in the same year. This reflects not only higher productivity but also improved living standards for the population in the country.

Figure 2. Impact on GDP (constant 2017 USD), Current scenario vs Reform scenario



Source: Authors calculations using the IFs platform version 8.38 North Macedonia.

Figure 3. Impact on GDP per capita (constant 2017 USD) Current scenario vs Reform scenario



Source: Authors calculations using the IFs platform version 8.38 North Macedonia.

The results highlight the significant economic gains achievable through improved institutional quality, supporting the institutional economics literature that identifies institutions as key determinants of long-term growth (Acemoglu et al., 2005; Rodrik et al., 2004). The divergence between scenarios emphasizes the importance of institutional complementarities and the mutually reinforcing effects of economic and political reforms, particularly in transition economies (Roland, 2000). For North Macedonia, enhancing institutional performance across sectors can address structural weaknesses and unlock growth potential. The simulations indicate that institutional reforms are foundational, not merely supportive, for sustainable development; without them, the country risks remaining on a low-growth trajectory with persistent income disparities and underdevelopment relative to the EU.

5. Conclusions

Institutions play a central role in shaping long-term economic development, as demonstrated by both theoretical and empirical evidence. For countries such as North Macedonia, strengthening institutional quality is essential for achieving sustainable growth and

convergence with more developed economies. Policy measures should focus on improving governance, reducing corruption, enhancing regulatory quality, and ensuring effective reform implementation. Policymakers must also account for the political context to secure broad support and sustainability of reforms, as neglecting political dynamics can undermine their effectiveness. Investing in inclusive and accountable institutions is vital for North Macedonia's long-term prosperity and successful integration into the European economic landscape.

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Galateya Kolikova [1]

REGIONAL COOPERATION AND BULGARIA'S FOREIGN DIRECT INVESTMENT COMPETITIVENESS

Abstract: *Regional cooperation is increasingly recognised as an important factor in enhancing a country's ability to attract foreign direct investment. For Bulgaria, a strategically located Southeast European nation, regional integration frameworks play a vital role in shaping its investment climate. This paper explores how Bulgaria's participation in regional cooperation initiatives influences its competitiveness in securing foreign direct investments. Regional integration promotes economic stability, expands market accessibility, and fosters investor confidence–elements essential for attracting sustainable investment. Infrastructure interconnectivity, harmonised regulatory environments, and cross-border partnerships within Southeast Europe create synergistic benefits that amplify Bulgaria's appeal to foreign investors. By situating Bulgaria's investment performance within the context of its regional peers, this study aims to reveal the extent to which coordinated regional efforts enhance its relative attractiveness. The analysis draws on empirical data, including foreign direct investment inflow trends, international competitiveness indices, and regional development programs, to substantiate these claims. Despite evident advantages, Bulgaria faces challenges such as policy fragmentation and insufficient strategic alignment that limit its capacity to fully leverage regional cooperation benefits. Addressing these constraints through targeted policy measures is crucial. The study contends that a consolidated and proactive regional integration approach is important for consolidating Bulgaria's position as a competitive destination for foreign investment in Southeast Europe.*

Keywords*:foreign direct investment; regional cooperation; Bulgaria*

JEL: ***F21; F23***

1. Introduction

This paper investigates the role of regional cooperation as an important determinant of Bulgaria's competitive position in attracting foreign direct investment (FDI). Bulgaria, situated in Southeast Europe, sits at a strategic crossroads with significant economic potential enhanced by its integration within regional frameworks. This study posits that regional economic integration, through enhanced economic stability, improved infrastructure, harmonised regulations, and collaborative cross-border partnerships, creates a conducive environment for foreign investors. This analysis aims to highlight how these factors, alongside Bulgaria's domestic attributes, impact its relative attractiveness as an FDI destination.

2. State of Play

Bulgaria has experienced dynamic changes in FDI flows over the past decades influenced by its transition to a market economy, EU accession in 2007, and evolving regional cooperation. FDI inflows grew steadily until the global financial crisis of 2008, peaking around 2007 before declining sharply and subsequently stabilising. According to UNCTAD's World Investment report 2025 Factsheet for Bulgaria, in 2023, FDI inflows reached over USD 5 billion but showed a significant drop to approximately USD 3 billion in 2024, reflecting both global economic headwinds and internal challenges such as policy fragmentation (UNCTAD,2025).

The country offers competitive advantages like one of the lowest corporate tax rates in the region (10%), comparatively low labour costs, and no foreign ownership restrictions in most sectors. Nevertheless, Bulgaria faces challenges including skilled labour shortages, inconsistent regulatory frameworks, and governance concerns. Infrastructure interconnectivity

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and regional trade agreements with Southeast European neighbours amplify market accessibility, yet Bulgaria's full potential in regional FDI benefits is constrained by insufficient strategic coordination and fragmented policy implementation.

3. Methodology

The research relies on a mixed-method approach combining empirical data analysis with comparative evaluation. Quantitative data sets include FDI inflows (2022–2024) and international competitiveness indices. The study employs secondary data analysis examining determinants such as GDP growth, labor costs, trade integration, workforce quality, EU integration. These variables capture market potential, efficiency, and institutional environment effects on FDI attraction.

Additionally, the study performs a comparative analysis with peer Southeast European countries, focusing on the impact of coordinated regional initiatives like trade liberalization, infrastructure connectivity projects, and harmonized regulatory frameworks that foster investor confidence and economic stability. This methodology allows tracing the role of regional cooperation mechanisms in shaping Bulgaria's investment climate.

The study draws upon three primary theoretical lenses: (1) Dunning's OLI (Ownership-Location-Internalization) Paradigm, which posits that FDI is driven by firm-specific advantages, location factors, and internalization benefits (Dunning, 1980); (2) the New Economic Geography Theory, emphasizing agglomeration effects and regional clustering (Krugman, 1991); and (3) Institutional Theory, highlighting the importance of regulatory quality, governance, and institutional trust in influencing FDI flows (North, 1990). These frameworks collectively explain how Bulgaria's regional cooperation initiatives enhance location advantages and reduce perceived investor risk.

To ensure consistent findings, the study uses multiple data sources (e.g., statistical databases, government reports, academic research) to cross-check facts.

4. Results

The table format facilitates a comparative analysis of how regional cooperation and economic factors influence FDI inflows into Bulgaria, supporting the empirical assessments.

Table 1. Economic indicators measuring Bulgaria's investment competitiveness, 2022 - 2024

Year	FDI Inflows (USD million)	GDP Growth (%)	Labor Cost Index (% change)	Digital Trade Integration Index	Workforce Education Level (%)
2022	4 347	4.04	14.4	0.07578	75.4
2023	5 011	1.89	14.1*	0.07980	75.7
2024	3 090	2.81	13.9*	0.09758	75.9

**Provisional data*

Sources: UNCTAD,World Bank, Eurostat, OECD

FDI inflows (UNCTAD, 2025) represent the total annual foreign direct investment attracted by Bulgaria. GDP growth (%) (World bank, 2025) measures the annual economic growth rate of Bulgaria, indicating market potential and economic stability - key factors for attracting FDI . The Labour Cost Index (Eurostat, 2025) reflects the relative cost of labour in Bulgaria compared to peer countries. Lower labour costs can be a competitive advantage for investors. The Index of Digital Trade Integration and Openness (OECD, 2025) presents a picture of international digital trade discussions and commitments. It ranges from zero - no digital trade

integration or openness, to one - full integration and openness across all relevant issues and partners. Workforce Education Level (%) (World Bank, 2025) indicates the percentage of the employed population with tertiary education of total working-age population with advanced education, measuring human capital quality - essential for an investor's decisions.

The analysis confirms that market potential indicated by GDP growth and digital trade integration are strong positive determinants of FDI inflows into Bulgaria. The quality of the workforce, particularly tertiary education level, significantly enhances investment attractiveness. EU integration markedly increases investor confidence, reflecting institutional alignment and regulatory harmonization across the region.

The FDI to GDP ratio indicates the overall competitiveness of the economy to attract and retain FDI. Bulgaria, maintains a relatively high investment attractiveness, which has however been declining in recent years. The high FDI/GDP ratio (over 50%) can lead to technological progress, as is evident from the growth of investment in Bulgaria in the ICT sector, where new jobs have been created and productivity has increased. On the other hand, however, it can also be an indicator of increased dependence on foreign capital (and potential crises in the event of a sharp decline in FDI, as is currently observed), displacement of local companies from the market or increased foreign control in key sectors.

Regional cooperation fosters infrastructure projects and cross-border business partnerships that reduce trade costs and risks, enhancing Bulgaria's competitive position. However, policy fragmentation and lack of strategic coordination between regional cooperation platforms and national governments limit the full realization of regional synergies.

Empirical data demonstrate that investors increasingly value not only domestic economic conditions but also institutional alignment and regional synergies as prerequisites for sustainable foreign investment. Despite EU membership contributing positively, Bulgaria's ability to capitalize on regional cooperation advantages remains partially underutilized, signaling the need for focused policy action.

To strengthen regional coordination and enhance Bulgaria's competitiveness in attracting foreign direct investment (FDI), the following policy recommendations are proposed:

- Establish clear institutional frameworks: Create or reinforce centralized regional coordination bodies with strong legal mandates, political authority, and dedicated resources to facilitate cooperation among national and regional stakeholders. These bodies should have the capacity to manage joint regional development projects and streamline communication across sectors. Example of such regional level institution is The Nordic Council established in the Northern region of Europe.
- Harmonize regulatory and legal standards: Standardize regulations across Southeast European regional partners to minimize discrepancies affecting cross-border investments. Policies should focus on simplifying administrative procedures, aligning eligibility criteria for investment incentives, and facilitating 'region proofing' of national strategies to ensure coherence. Integration to the European Union also supports this process since it requires from all member states and the associated countries regulatory alignment to the EU legislation.
- Enhance strategic planning and joint decision-making: Develop integrated strategic frameworks that include national governments, regional authorities, and private sector stakeholders. This will promote consensus-building on shared priorities, improving investment climate predictability and fostering pooled budgeting for infrastructure and innovation programs.

- Invest in cross-border infrastructure and connectivity: Prioritize joint infrastructure projects that improve transportation, energy, and digital networks, reducing trade and investment costs. Coordination in these areas will increase market accessibility and investor confidence in the region.
- Build capacity and encourage collaboration: Provide training and resources to regional officials and agencies to strengthen administrative capacities for coordination. Encourage public-private partnerships and cross-border business networks to leverage local expertise and innovation.
- Monitor and adapt policies continuously: Implement monitoring mechanisms to assess regional policy impact on FDI attraction, ensuring flexibility to adjust strategies dynamically in response to emerging challenges.

These recommendations aim to maximize Bulgaria's and its neighbors' benefits from regional cooperation, underpinning sustainable FDI inflows and economic growth.

5. Conclusion

Regional cooperation strengthens Bulgaria's competitiveness in attracting FDI by stabilizing the economic environment, improving market access, and fostering investor confidence through infrastructural and regulatory alignment. The country's strategic location, competitive taxation, and educated workforce are critical assets enhanced by deeper integration within Southeast Europe.

Nonetheless, challenges related to policy fragmentation and insufficient coordination between Bulgaria's national strategies and regional frameworks constrain its full investment potential. Targeted measures to streamline policy, enhance strategic collaboration within regional platforms, and invest in infrastructure and workforce development are essential.

The findings underscore the importance of a consolidated regional integration approach as a catalyst for Bulgaria's sustained role as a competitive FDI destination in Southeast Europe.

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SUSTAINABLE DEVELOPMENT OF REGIONS AND SECTORS

УСТОЙЧИВО РАЗВИТИЕ НА РЕГИОНИ И СЕКТОРИ

Yana Kirilova, Dochka Velkova[1]

GLOBAL CRISES AND MUNICIPAL FINANCES: EVIDENCE FROM BULGARIA

***Abstract**: Financial crises strike municipal finances more severely with longer recovery periods compared to state finance, while crises of non-financial origin do not impact so negatively local governments. Local own source revenues have limited growth potential as they usually do not play the role of automatic stabilizers as major state taxes do and are have territorial and base limitations.*

***Keywords**: global financial crisis; fiscal policy; public finance; local taxes*

JEL: *E62; E63; E65; G28; H60; H72*

1. Introduction

The world has witnessed a series of global crises during the recent decades – the global financial crisis of 2008-2009, the COVID-19 pandemic, energy and geopolitical crises, wars and rapid climate changes. All these have significant impact on public finance by causing shocks on public revenues and expenditures leading to decline in tax revenues and public investments and limited access to capital markets. On the other hand, crises increase the need for social assistance, health care, infrastructure and public sector crisis mitigation interventions.

Municipal finance is particularly vulnerable in this context. Local governments usually have limited own source revenue generation capacity and are highly dependent on central government transfers and external sources to ensure continuous flow of local public services. In conditions of global instability, these resources may turn out to be insufficient or insecure, questioning the local governments' resilience to provide quality service.

The study of public finance and in particular of municipal finance resilience in conditions of global crises becomes a key issue. It helps to identify the "weak" points in public financing and on the other hand – to outline mechanisms for increasing the adaptability and financial stability.

2. Status

Global crises differ in both origin and typology, resulting in heterogeneous effects on public finances. Consequently, the selection of the research focus—specifically, the determination of which types of crises and their respective impacts on municipal finance are to be examined - must be articulated with precision. The present article investigates the implications of two distinct crises for municipal finance in Bulgaria:

- The 2008-2009 global financial crisis. It started in the USA as a mortgage crisis caused by the mass granting of high-risk housing credits. When many debtors ceased to repay their debts, the real estate prices dropped and the creditor banks and investment funds experienced tremendous losses and many of them collapsed. The bankruptcy of giants like Lehman Brothers and the bailouts for other financial institutions led to panic in the global financial system causing the crisis to spread rapidly beyond USA affecting banks and markets all over the world. That led to deep recession, decline in production, trade, services and employment and is defined as one of the most serious economic shocks since the Great Depression of the 1930s (IMF, 2008; Tong et al, 2008).

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- The COVID-19 pandemic. On 11 March 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a global pandemic followed by massive lockdowns all over the world. The first lockdown in March 2020 lasted about 3 months depending on the policies of the different countries (94 days in Bulgaria) and was the most severe one leading to closure of schools, businesses, transportation, etc. The next lockdowns later on in 2020 and 2021 were less restrictive in terms of duration and affected entities, however having huge impact on the socio-economic life. In the peaks of the COVID 19 pandemic – March 2020 and March 2021 respectively 50 000 and 105 000 deaths/week were reported as about 7,1 million people died due to COVID 19 all over the world (WHO statistics).

The emergence and progression of both crises are temporally bounded, which allows their impact on municipal finance to be more effectively observed and analyzed in the post-crisis period. The global financial crisis of 2008–2009 had a predominantly financial origin, whereas the COVID-19 pandemic stemmed from non-financial factors and had far broader socio-economic implications. This makes it possible to trace the impact of two fundamentally different crises on municipal finance in Bulgaria.

3. Methodology

Municipal finances constitute an integral component of the public finance system, as local governments participate in intergovernmental fiscal relations and are responsible for the provision of a significant share of public services. Accordingly, the present study applies an analytical approach aimed at examining the dynamics and structure of municipal finances within the broader context of public finance and the general economic framework. The analysis draws on data from Eurostat, the IMF, the World Bank, the Ministry of Finance of Bulgaria, the Bulgarian National Bank, the National Association of Municipalities in the Republic of Bulgaria (NAMRB), and the Economic Research Institute at the Bulgarian Academy of Sciences. The period 2007–2024 was selected to capture the effects of both crises under consideration.

4. Results

General economic environment

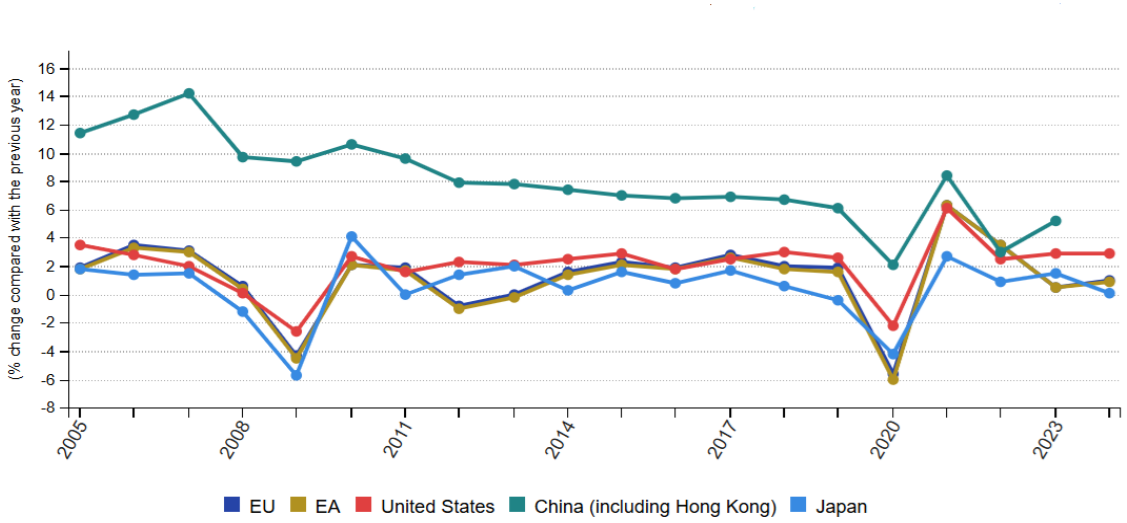
The real GDP rate of change of major economies started to decline in 2008 as a result of the global financial crisis reaching the lowest levels in 2009. The recovery started in 2010 as in 2011 it reached the pre-crisis levels. The Eurozone sovereign-debt crisis (2011–2013) caused a second recession in the EU, pushing GDP back down as it returned to its pre-crisis levels in 2015 (European Central Bank, 2015).

The economic shock caused by the COVID-19 crisis led to significant decline of world's GDP in 2020. The recovery process started in the second half of 2020, as economic growth followed in 2021. However, the negative effects of the crisis in terms of disrupted global supply chains and permanently affected sectors like tourism, transport, etc., led to unequable recovery for the different world economies (World Bank, 2022, WTO, 2021).

The global financial crisis hit Bulgarian economy with a one-year time lag and the effect was not so catastrophic compared to the US and EU economies. This was due to the specifics of the country's financial market and bank system, which was "peripheral" to the global financial markets at that time. Thus the 2008 financial shock did not strike directly, however it affected the Bulgarian economy indirectly the next year through the real economy – decrease in exports (due to the declining demand in the EU countries, which are the main foreign trade partners of

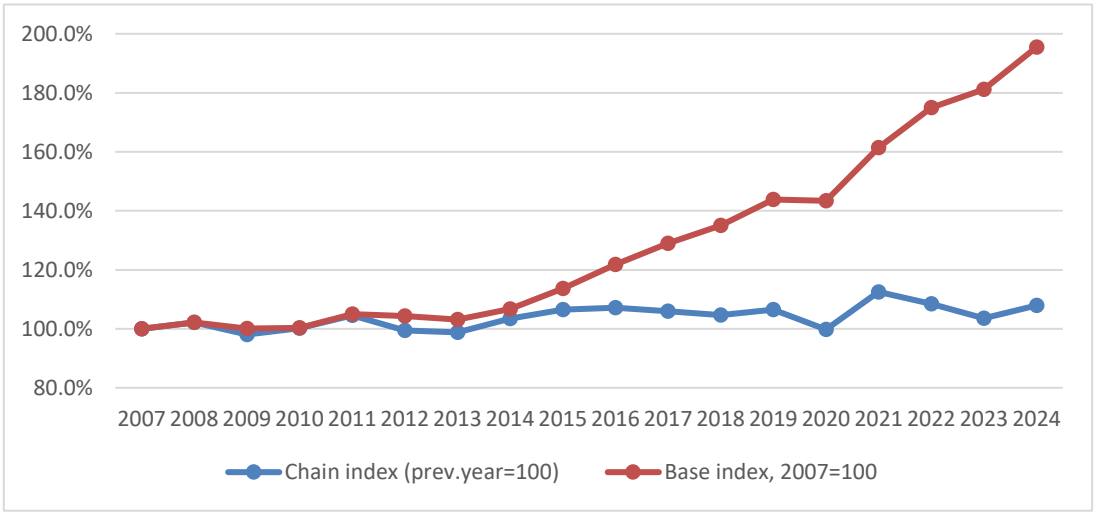
Bulgaria) and foreign direct investment. This mechanism caused Bulgaria's GDP fluctuations until 2014 because of the EU recession following the Eurozone sovereign-debt crisis. The COVID-19 crisis directly affected the Bulgarian economy, as lockdowns were simultaneously imposed across the world. However, the GDP declined in 2020 by only 1% compared to the other major economies because the country's economy was less dependent on global services and supply chains (Magistretti, G. et al, 2024).

Figure 1. Real GDP rate of change of major economies, 2004-2024



Source: Eurostat

Figure 2. Real GDP rate of change of Bulgaria, 2007-2024



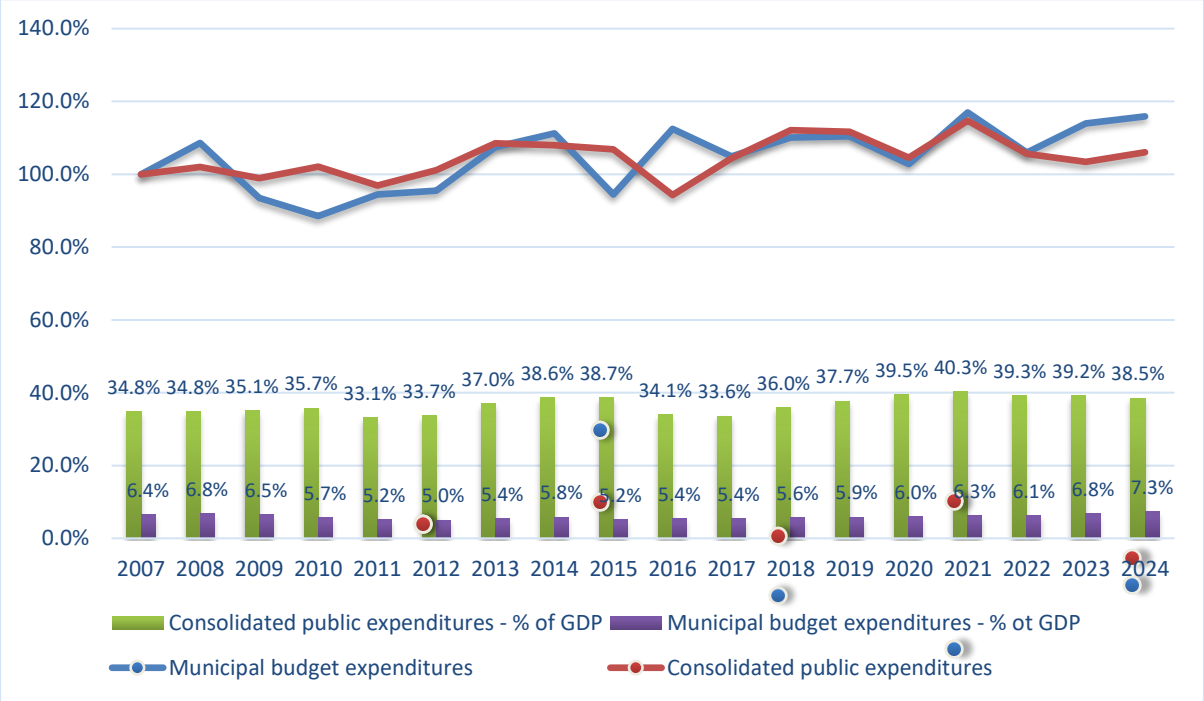
Source: National Statistical Institute (NSI)

The government expenditures in 2008-2010 rose as a counter-cyclical response either through the automatic stabilizers like unemployment and social benefits, as well as a result of special dedicated assistance packages to the financial institutions. This caused rising government deficits as % of GDP in 2009 and 2010 like (-12,9%) and (-11,1%) in USA, (-6,3%) and (-6,7%) in the Euro zone (IMF Fiscal Monitor, 2010).

In 2020, the public budget support to counteract the pandemic crisis amounted to EUR 6 trillion (7,5% of world's GDP), and this is twice higher that the funds spent to counteract the global financial crisis 2008-2010 (IMF, Annual Report of ERI-BAS, 2022).

Public expenditures in Bulgaria did not increase in 2009-2010 in contrast to many other countries that implemented active counter-cyclical fiscal policies. Bulgaria operated under a currency board arrangement, which significantly constrained the government's ability to employ monetary and fiscal instruments to mitigate the effects of the crisis. Consequently, the country adopted a less popular approach – prioritizing fiscal consolidation and discipline over fiscal expansion. The public expenditures in Bulgaria continued to experience indirectly the stagnation of the country's GDP resulting from the Eurozone sovereign-debt crisis (2011–2013), and they reached their pre-crisis levels in real terms just in 2012. The share of public expenditures in GDP remained about 35% compared to most EU countries where it reached 45-50% (OECD, 2012). The public expenditures in Bulgaria rose significantly in the COVID-19 crisis as they reached the highest shares in GDP for the entire 2007-2024 period.

Figure 3. Public expenditures in Bulgaria in real terms, 2007-2024 (%, chain index)

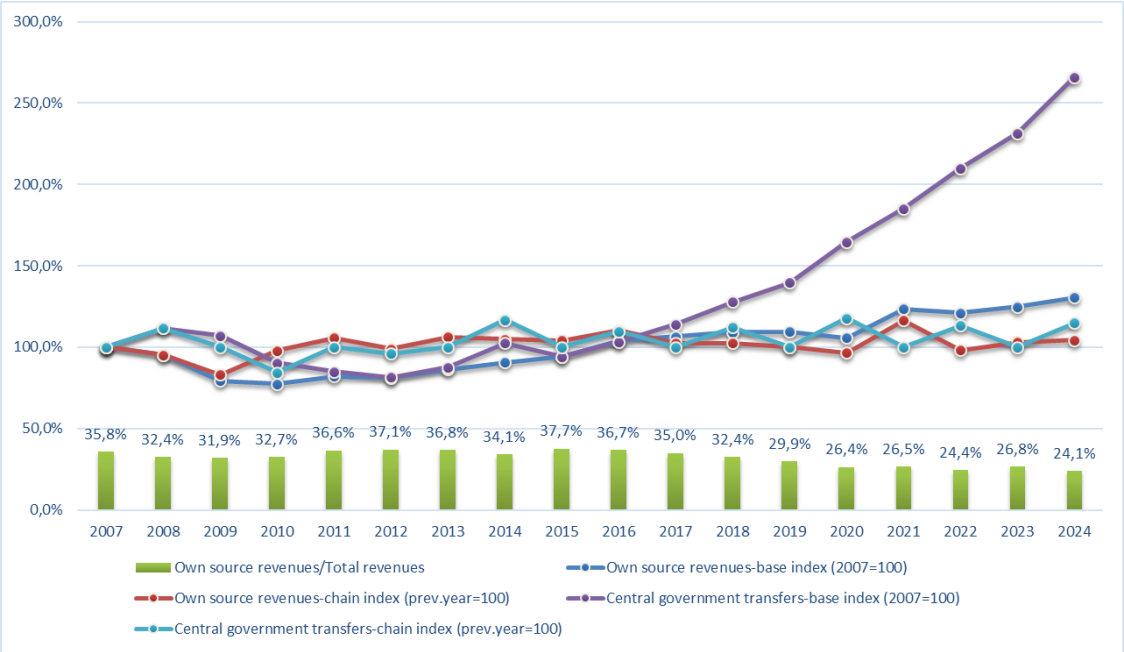


Source: MoF, NSI, NAMRB, own calculations

Municipal budget expenditures in Bulgaria declined significantly during the global financial crisis with annual decline rates of 6,6% in 2009, 11,5% in 2010 and 5,6% in 2011 compared to 1,1% and 3,1% decline of the consolidated public expenditures in 2009 and 2011 and 2,1% growth in 2010. The municipal budget expenditures reached their pre-crisis levels in real terms just in 2016 as their share in GDP also decreased. During 2020–2021, municipal budget expenditures in Bulgaria increased at a rate comparable to that of overall public expenditures, primarily because of additional intergovernmental transfers aimed at mitigating the effects of the COVID-19 pandemic.

The municipal own source revenues declined significantly during the turbulent period of the global financial crisis and could not recover at pre-crisis levels until 2016. The low growth rates after 2016 compared to the subsidies and transfers from the central government led to decreasing shares of the municipal own source revenues in the total municipal budget revenues.

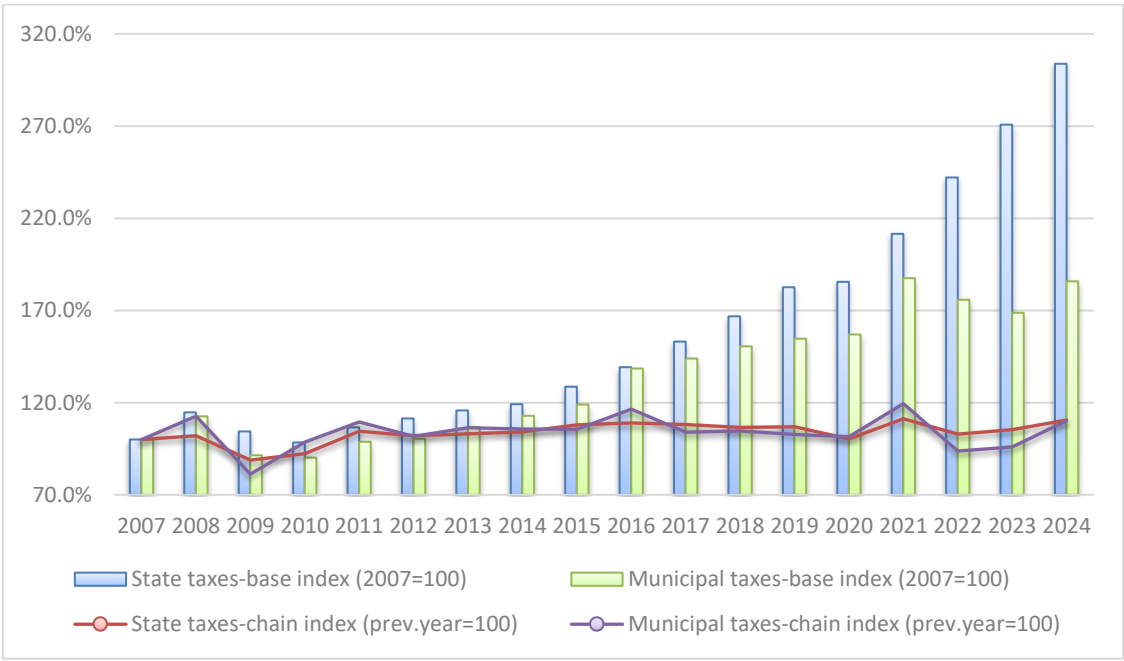
Figure 4. Municipal own source revenues and central government transfers to municipalities in Bulgaria in real terms, 2007-2024



Source: NAMRB, own calculations

Prior to the global financial crisis tax revenues formed 36% of municipal own source revenues in Bulgaria. These included revenues from real estate tax, tax on real estate transactions, vehicle tax and inheritance tax. A new local tax on the incomes of small local businesses like hairdressers, tailors, repair works, etc. was introduced in 2008, and in 2011 a local tourist tax was introduced as well. The real estate tax and the tax on the real estate transactions are the main determinants of the municipal tax revenues forming respectively 21% and 56% of them in the pre-crisis 2007.

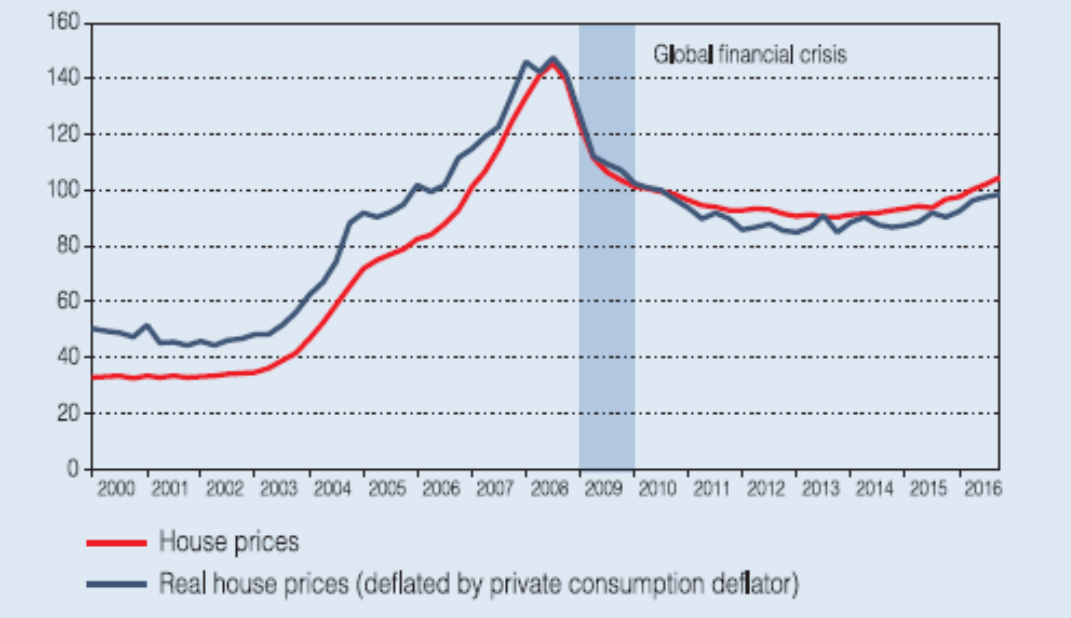
Figure 5. Tax revenues in Bulgaria in real terms, 2007-2024



Source: NAMRB, own calculations

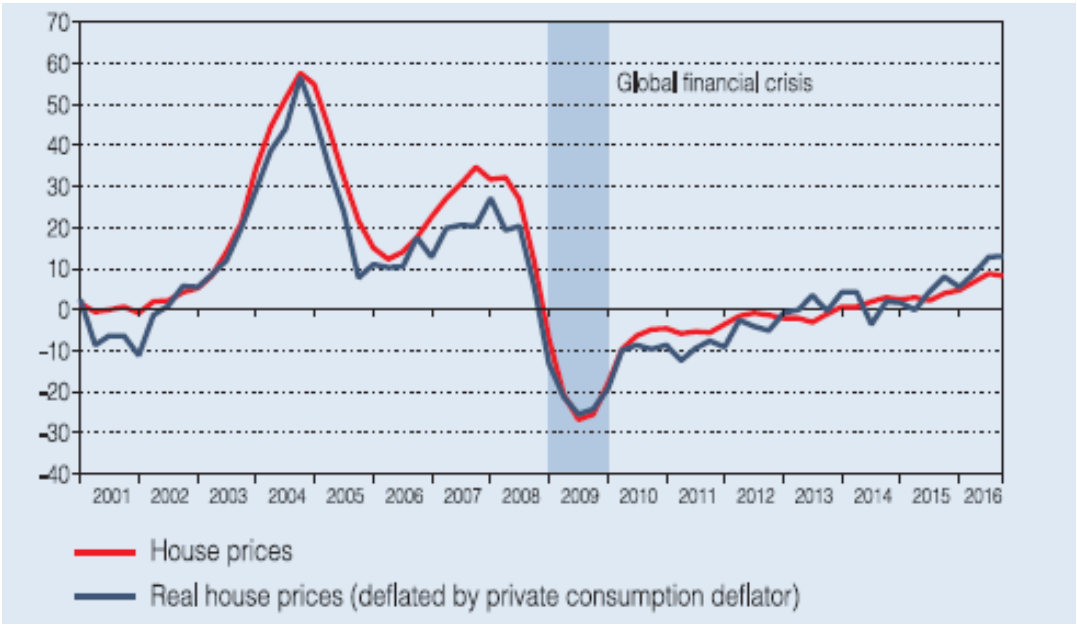
The global financial crisis had a more pronounced negative effect on municipal tax revenues than on state tax revenues – in 2009 municipal tax revenues declined by almost 19% compared to 11,2% decline for the state taxes. The decline of state and municipal taxes continued in 2010, however the state tax revenues recovered faster and in 2011 they reached the pre-crisis level. The state taxes include personal incomes tax, corporate incomes tax, VAT, customs and excise duties, etc. Most of these taxes are automatic stabilizers in the public finance system thus are more sensitive to changes in the economic cycle. The municipal tax revenues recovered in 2012 which was mostly due to the recovery of the real estate tax and the two newly introduced taxes. The revenues from tax on the real estate transactions reached their pre-crisis levels in real terms just in 2021.

Figure 5. Nominal and real house prices in Bulgaria, 2000-2016 (2010=100)



Source: Dynamics of House Prices in Bulgaria between 2000 and 2016, BNB

Figure 6. Annual growth of house prices in Bulgaria, 2000-2016 (% on annual basis)

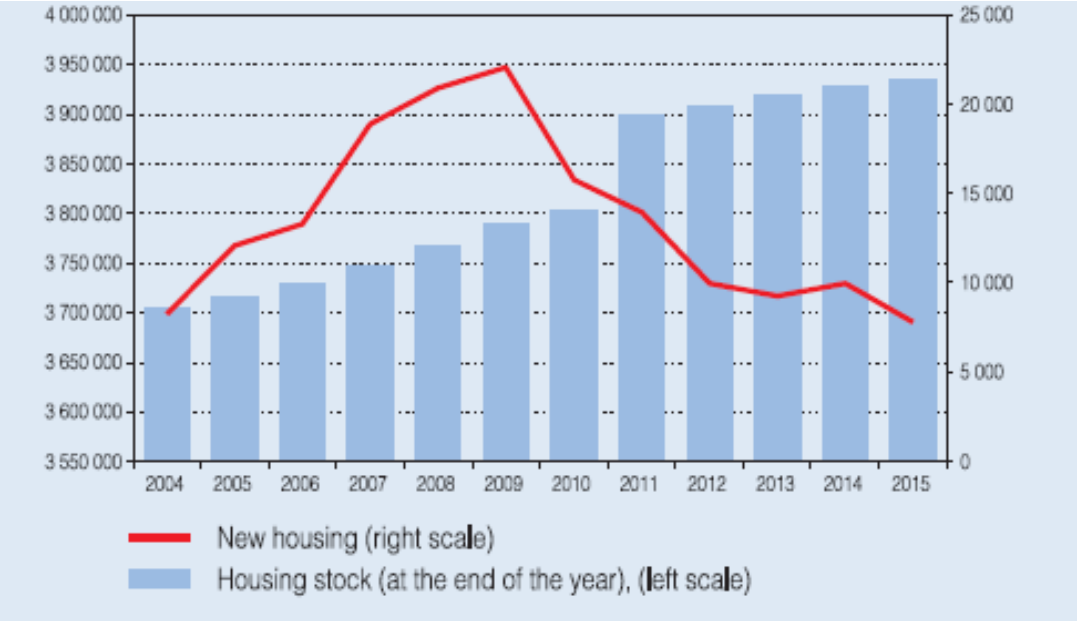


Source: Dynamics of House Prices in Bulgaria between 2000 and 2016, BNB

The connection of the major municipal taxes to the real estate prices is what made them so vulnerable to the negative effects from the global financial crisis and made their recovery very slow. The "Dynamics of House Prices in Bulgaria between 2000 and 2016 study" of the Bulgarian National Bank (BNB) indicated a rapid increase of the real estate prices in Bulgaria in the period after 2003 as a result of dropping interest rates for housing credits. This produced peak of the housing market in 2008 followed by a burst of the bubble in the next years and a long period of price recovery. This is the main factor underlying the low values of the revenues from the *tax on the real estate transactions* and can be classified as somewhat of a "mini Bulgarian scenario" of the global financial crisis.

The other major municipal tax – *the real estate tax* is directly related to the housing stock at the territory of the relevant municipalities. The BNB study indicates sharp decline in new housing stock after 2008 leading to slow increase in the next years of the existent housing stock, which is tax calculation basis.

Figure 7. Housing stock (number of existing housing) and new housing in Bulgaria, 2004-2015

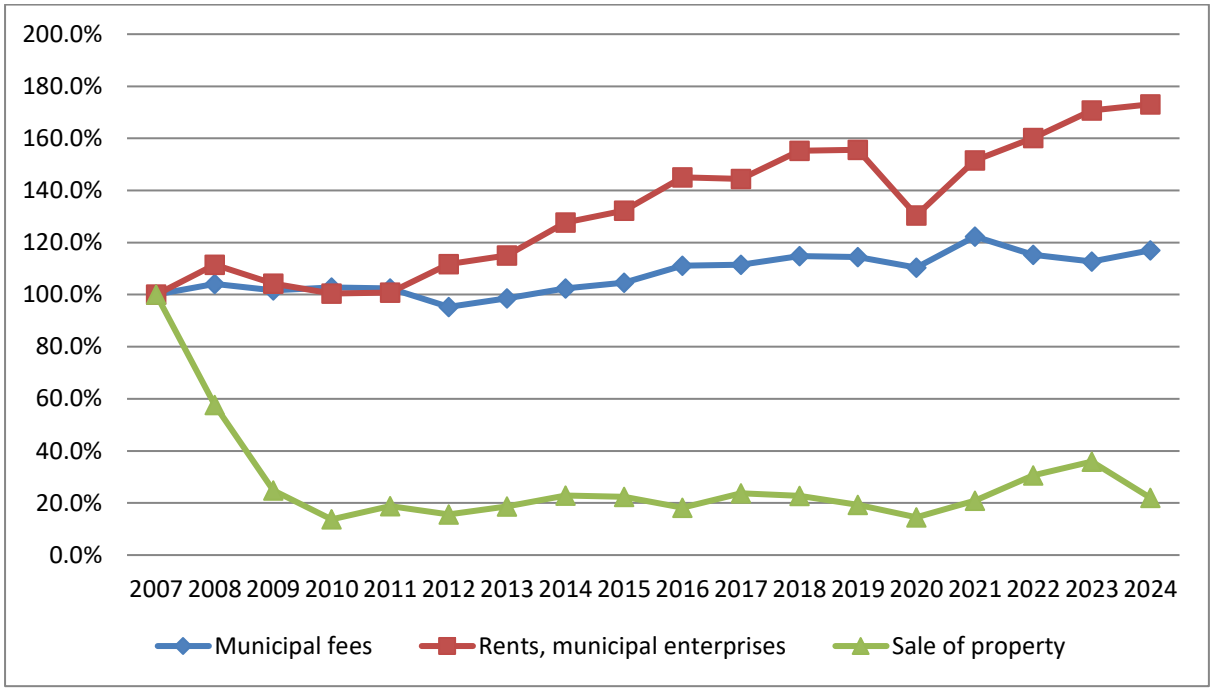


Source: Dynamics of House Prices in Bulgaria between 2000 and 2016, BNB

The non-tax revenues are the other major component of the municipal own source revenues forming 64% of them prior to the global financial crisis. These include: municipal fees (earmarked and related to the provision of certain services – waste fee, administrative and technical fees, etc.), revenues from municipal property (sale and rent, revenues from municipal enterprises, dividends, etc.), revenues from concessions, donations, etc., as in 2008 the major non-tax revenue groups were the municipal fees and the sale of municipal property with 57,7% and 27,5% shares respectively in 2008.

The municipal non-tax revenues declined dramatically after 2008 mainly due to the burst of the real estate market bubble – a situation similar to the decline in the revenues from the tax on real estate transactions. Even after the end of the crisis, these revenues never recovered to the 2008 levels due to the limited property stock of the municipalities.

Figure 8. Municipal non-tax revenues in Bulgaria in real terms, 2007-2024 (%, 2007=100)



Source: NAMRB, own calculations

The revenues from municipal fees did not experience the negative impact of the global financial crisis and the COVID-19 crisis as they are determined based on the costs for the provision of local public services. The revenues from rents and municipal enterprises formed 16% of municipal non-tax revenues in 2008. They recovered until 2012 and started to grow steadily and declined by 4% only in 2020.

5. Conclusions

The origin and typology of crises define to a great extent the severity and duration of their impacts on municipal finance. Financial shocks have deep and continuous negative effects on municipal revenues and expenditures, while non-financial crises are better handled by local governments.

Municipal own source revenues in Bulgaria are much more sensitive and vulnerable to financial crises and are prone to greater declines and longer recovery periods compared to the state budget revenues. They have limited growth potential which is particularly visible in crisis periods. The issue of transferring greater revenue powers to the municipalities in terms of tax sharing of personal incomes and corporate taxes is periodically put for discussion on the political agenda, however no serious steps have been made. The limited own revenue base of the municipalities means less powers and discretion and higher dependency on central government transfers and inevitable centralization.

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Kalina Petrova[1]

REGIONAL RESILIENCE AND ECONOMIC ADAPTATION: CHALLENGES AND OPPORTUNITIES OF THE NEW NUTS-2 TERRITORIAL DIVISION OF BULGARIA

***Abstract**: This research article examines regional resilience and economic adaptation in the context of Bulgaria's new Nomenclature of Territorial Units for Statistics, level 2 territorial division, scheduled to take effect in 2027. The analysis focuses on the Northern, Eastern, Southern, and Capital regions and their role in promoting adaptive and sustainable development. The aim is to assess the impact of the new division on regional development and to identify challenges to its effective implementation within the cohesion policy of the European Union. Key tasks include analyzing socio-economic characteristics, comparing with the current division, identifying institutional, financial, and governance challenges, and formulating recommendations to enhance regional resilience. The methodology combines statistical and comparative analysis of key indicators with a review of national and European Union strategic documents. Expected results indicate that the new territorial division provides a foundation for more effective regional planning and cohesion policy implementation, while its success depends on strengthened institutional capacity, improved coordination across governance levels, and active participation of local communities.*

***Keywords**: regional development; territorial division; cohesion policy*

JEL: *R58; R11; O18*

1. Introduction

Regional development in Bulgaria has changed significantly following the transition from socialism and EU integration. The new NUTS-2 division, planned for implementation in 2027, aims to achieve a more balanced population distribution and sustainable regional development. The current structure does not meet population requirements, leading to imbalances and inefficient resource allocation. The main question is how the reform will affect regional development and what challenges and opportunities it will create.

2. State of the problem

Five of six existing regions lag in GDP per capita and investment, while the Southwestern region concentrates economic activity (Martin, 2012; Bristow & Healy, 2018; Pike et al., 2010). EU cohesion policy promotes economic and social cohesion, but in Bulgaria, its effectiveness at NUTS-2 level has been mixed due to weak institutional capacity and limited alignment with local needs (European Commission, 2021; Crucitti et al., 2021; Todorov, 2021). The current model reinforces a monocentric structure centered on Sofia, whereas the EU promotes polycentric development (Barca, 2009). Four of six regions rank among the twenty most socially vulnerable in the EU. The reform aims to create functional regions, improving governance, integrated project implementation, and investment efficiency.

3. Methodology

The study combines quantitative analysis of socio-economic indicators with qualitative review of strategic documents and expert interviews (Stoyanova, 2023; Crucitti et al., 2021; Ministry of Transport and Communications, 2024). Data sources include NSI, Eurostat, regional reports, and national/EU strategies. Limitations include dynamic regional changes and incomplete data for new NUTS-2 regions.

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4. Results

The existing NUTS-2 regions do not meet Eurostat's minimum population requirements. Disparities in population density hinder the effective implementation of regional policies and the absorption of EU funds. The objectives of the new regionalisation are to:

- Achieve a more balanced distribution of population;
- Improve the efficiency of regional policies;
- Enhance the resilience of the regions.

4.1. Existing Regionalisation

The current NUTS-2 territorial configuration reproduces persistent and deepening regional disparities across demographic, economic, and social indicators (Ilieva, 2013; Stoyanova, 2023) (see Table 1). The majority of regions consistently lag behind European development standards, raising questions about the effectiveness of the current configuration as an instrument of cohesion policy.

Table 1. Demographic and Economic Indicators of the Existing NUTS-2 Regions in Bulgaria

INDICATORS	Population (1 January) (number) 2024	Population (under the convergence hypothesis)2 2050	GDP per inhabitant (percentage of EU average) 2023	GDP per inhabitant (percentage of EU average in Purchasing Power Standard) 2023
Severozapaden (BG31)	664 024	391242	25.65%	42%
Severen tsentralen (BG32)	680 359	431926	26.50%	44 %
Severoiztochen (BG33)	826 134	639802	30.14%	50 %
Yugoiztochen (BG34)	951 167	747072	32.90%	54%
Yugozapaden (BG41)	2 019 167	1813184	61.83%	102%
Yuzhen tsentralen (BG42)	1 304 630	1065193	24.92%	41%
Bulgaria	6 445 481	5088419	10319 Euro /Average/	
EU 27 /Average/			38100 Euro =100%	

Source: Author's elaboration based on data from NSI and Eurostat, https://ec.europa.eu/eurostat/cache/visualisations/my-region/create-factsheet/, extracted October 2025.

Key Observations:

- Low population by region: Population numbers are declining, and by 2025 two additional regions are projected to fall below Eurostat's NUTS-2 population thresholds.
- Low GDP per capita: All currently existing regions, with the exception of the Southwestern region, have GDP per capita below the European average.
- Regional inequality: The South-Central region records the lowest GDP per capita in purchasing power standards (PPS), ranking 243rd out of 244 regions, at 41% of the EU average.

[2] Option I (under the convergence hypothesis): This option is defined as realistic and is aligned with the European Union's regulatory requirements for the demographic and socio-economic development of the member states.

Conclusions on the Current NUTS-2 Regionalisation in Bulgaria

- Demographic Concentration and Peripheralisation (Indicator: Population)

The analysis highlights a pronounced demographic imbalance, with the population strongly concentrated in the Southwestern region (Sofia city and adjacent territories), while the northern and inland regions experience sustained depopulation. The Northwestern, North-Central, and Northeastern regions occupy the lowest positions both nationally and within the EU regional ranking, reflecting systemic losses in human capital and ongoing migration pressure toward the capital.

- Economic Polarisation and Concentration of Added Value (Indicator: GDP per Capita)

A pronounced economic polarisation is evident between the capital and the rest of the country: the Southwestern region is the only one reaching and exceeding the EU average (102%), ranking 83rd out of 244 regions. This indicates that the country's economic weight is heavily concentrated in Sofia city and its surrounding periphery. The remaining five regions fall into the category of "less developed" and are significantly below the 75% threshold set by Regulation 1303/2013, automatically classifying them as regions in need of enhanced support under EU cohesion policy. Critically low levels of economic productivity are observed in Northern and Central Bulgaria: South-Central (41%), Northwestern (42%), and North-Central (44%) regions rank among the least developed regions in the entire EU, occupying positions in the bottom decile of the ranking (239–243 out of 244). This confirms the presence of structural underdevelopment rather than a cyclical economic downturn. Slightly better—but still below European standards performance is observed in the regions with access to the sea. The Northeastern (50%) and Southeastern (54%) regions show moderately higher values but remain far below the EU average and are also classified as "less developed." The presence of seaports and cross-border logistical links only partially improves relative indicators and does not compensate for the absence of large-scale industrial cores, which exist exclusively in the Southwestern region.

Summary Analytical Conclusion

The current NUTS-2 regionalisation reproduces persistent economic and demographic disparities (Todorov, 2021), concentrating economic activity and human capital primarily in the Southwestern region (around the capital), while the remaining regions are characterised by low economic productivity and demographic erosion. Population decline, weak productivity, and high poverty levels across most regions underscore the need for a new territorial model that ensures a more equitable distribution of investments, promotes polycentric development (Barca, 2009), and enhances regional resilience and economic adaptation capacity.

4.2. Analysis of the New Regionalisation

The new regionalisation is not merely a technical or administrative revision but a tool for economic and social transformation (Crucitti et al., 2021; Stoyanova, 2023), driven by the need to overcome the monocentric development model, strengthen regional connectivity, expand the territorial base for growth, and enhance the effectiveness of cohesion policy after 2027.

It reduces population imbalances, as all regions now meet Eurostat's criteria (ESPON, 2020) (800,000–3,000,000 inhabitants) (see Table 2). Sofia, the capital, is established as a separate region, improving the balance among the remaining regions and facilitating the identification of socially vulnerable groups for more effective planning of social interventions.

Table 2. Demographic and Economic Indicators of the New NUTS-2 Regions in Bulgaria

INDICATORS	Population (1 January) (number) 2024	Population (under the convergence hypothesis) 2050	GDP per inhabitant (percentage of EU average) 2023	GDP per inhabitant (percentage of EU average in PPS) 2023
Capital Region, including Sofia Province (Sofia Municipality)	1295931	1256513	83%	137%
Southern Region, including the provinces of Sofia, Pernik, Kyustendil, Blagoevgrad, Pazardzhik, Smolyan, Plovdiv, Stara Zagora, Haskovo, and Kardzhali	2330400	1915434	28%	47%
Eastern Region, including the provinces of Dobrich, Varna, Shumen, Burgas, Sliven, and Yambol	1395654	898535	28%	46%
Northern Region, including the provinces of Vidin, Montana, Vratsa, Lovech, Pleven, Gabrovo, Veliko Tarnovo, Targovishte, Ruse, Razgrad, and Silistra	1423496	1017937	27%	44%
Bulgaria	6 445 481	5088419	10319 Euro /Average/	
EU 27 /Average/			38100 Euro=100%	

Source: *Author's elaboration based on NSI data, extracted October 2025.*

According to the data in Table 2, three of the four newly established regions fall into the "less developed" category under the EU Common Provisions Regulation, as their GDP per capita is below 75% of the EU average in purchasing power standards (PPS), whereas the Capital Region is classified as "more developed." This classification would allow for targeted cohesion funding and more effective prioritisation of resources (Table 3).

Table 3. Key Indicators for the Newly Established Regions in Bulgaria (2023)

Region	Category	Reason
Northern	Less Developed	Low GDP per capita, population decline, low productivity
Eastern	Less Developed	Strong sectoral growth (tourism/port transport) but low productivity in inland areas
Southern	Less Developed	High industrial concentration in Plovdiv and Stara Zagora, but weak peripheral areas
Capital	More Developed	Level significantly above 100% of the EU average, "metropolisation" effect

Source: *Author's elaboration based on NSI data, extracted October 2025.*

The less developed regions will be entitled to and have access to:

- Higher levels of co-financing (up to 85% grant component);
- More programs for employment, education, infrastructure, and social services;

- Opportunities for Integrated Territorial Investments (ITI) and Community-Led Local Development (CLLD);
- Priority in the Regional Development Programs for 2027–2034.

Conclusions and Expected Effects of the New NUTS-2 Regionalisation in Bulgaria

- Demographic Effects

The new regionalisation ensures a balanced distribution of the population across the four new regions, with all meeting Eurostat requirements. This establishes a fairer basis for the implementation of regional policies and cohesion programs. It also guarantees long-term demographic sustainability of the regions, projected up to 2050.

- Economic Effects

A more balanced distribution of economic activity across the regions can enhance the efficiency of resource allocation and stimulate investment and local entrepreneurship (Mutafov, Marinov, 2025). This highlights the need to restart the decentralization process and support local activities. Development also involves enabling communities to manage and control their own interconnections. The capacity of each element within the local system—innovative, productive, managerial, and organizational—as well as its links with other systems and the external environment, is crucial. Capacity building, social participation, and the provision of adequate institutions for training and development through central policy are essential, yet any support is effective only when the efforts and incentives of all participants are aligned as a unified regional system.

5. Conclusions

The new NUTS-2 territorial division is expected to provide opportunities to enhance regional resilience and economic adaptation in Bulgaria. However, successful implementation requires:

- Strategic planning and coordination of regional policies in accordance with regional economic profiles – blue economy and tourism in the Eastern Region, agro-industry and organic farming in the Northern Region, industrial and innovation hubs in the Southern Region;
- Strengthening institutional capacity: Investments in human resources and regional administrative structures;
- Improving policy coordination: Establishing mechanisms for alignment between national, regional, and local policies;
- Increasing stakeholder engagement: Active involvement of local communities and the private sector;
- Monitoring and evaluation: Developing systems to assess policy impacts and adapt as necessary.

Future research should monitor long-term effects and compare Bulgaria’s experience with other EU Member States for best practices.

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Nedelin Markov[1]

MODERN ASPECTS OF REGIONAL POLICY IN THE CONTEXT OF DEVELOPMENT OF SMALL SETTLEMENTS

***Abstract**: Small settlements in Bulgaria remain in the shadow of national and international mechanisms for smoothing regional disparities. In Bulgaria, regional policy is mainly focused on regional and municipal centers, while the problematic peripheral urbanized areas around them remain undervalued. This leads to an accumulation of complex problems and challenges that leave behind significant socio-economic consequences. The purpose of the report is to present a collective survey aimed at identifying the problems of small settlements in the Stara Zagora district and, on this basis, to derive some views on optimizing the instruments of regional policy in Bulgaria.*

***Keywords**: small settlements, regional policy, regional development*

JEL: R11

1. Introduction

Regional and local development is one of the main problems of our modern state. The restraining influence is not so much the level of socio-economic development, but its regional distribution. Significant disparities in economic development, combined with the deterioration of the quality of human resources in small settlements, are the cause of the manifestation of large-scale demographic processes that lead to the loss of potential.

2. Description of the problem

It is already known that European regions show sharp differences in economic indicators such as per capita income, employment and demography (Iamarino et al, 2010). The state of the regional economy has a strong impact on the development of regions. According to some authors, the development of regional economies is influenced and has an impact on a wide range of spheres of economic and social life. World scientists focus on institutions, industrial organization, transactions and technological changes, as well as educational systems. Each of these spheres notes the importance of the region. No one has yet developed a completely convincing explanation for the revival of regional economies. (Storper, 1995). In addition to the search for economic interconnections at the regional level, it is necessary to carry out horizontal segmentation in order to assess the individual impacts on territorial systems, demographic processes, etc. Peripheral zones, which also include a large part of the settlements, are the subject of increased interest due to the diversity of problems reported there. Many authors note the worrying demographic trends. Other authors report that rapid urbanization has directly or indirectly caused a series of problems, such as the decline of the rural population (Wang et al, 2021). The concept of "integrated rural development" represents a promising strategy for addressing the multifaceted challenges prevalent in rural communities. (Binswanger-Mkhize, 2010). It should be constantly recalled that regional development is also affected by the administrative management of regions, as well as the balance of powers and responsibilities between different levels of public administration. Many authors study the impact of decentralization processes. Studies on the impact of decentralization generally ignore the fact that the economic returns from the transfer of powers and resources to subnational levels of government depend largely on the quality of decentralized governance. (Rodríguez-Pose et al, 2022).

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3. Methods

To achieve the objectives of the study, a survey was conducted during the months of July and August 2025. The survey is structured into 9 categories of questions. In the process of the study, 198 questionnaires were sent to mayors of settlements. Preliminary expectations are that due to personal reluctance to participate, the full amount of the questionnaires sent will not be returned, and that due to technical reasons, at least 5% of the survey volume will not reach the respondents.

4. Results

The results of the respondent recall are presented in Table 1.

Table 1. Respondents' recall in the survey

№	Municipality	Failure of the survey due to technical reasons in the amount of up to 5% (number of respondents)	Respondent response rate (in %)
1	Stara Zagora	2,5	46,32
2	Kazanlak	0,95	72,02
3	Chirpan	0,9	52,63
4	Bratya Daskalovi	1,1	86,12
5	Radnevo	1,15	36,61
6	Galabovo	0,55	47,85
7	Pavel banya	0,60	35,09
8	Magliz	0,70	45,11
9	Opan	0,60	35,09
10	Gurkovo	0,50	10,53
11	Nikolaevo	0,15	35,09
Average recall rate (%)			**45,68**

Source: Author's presentation based on the results obtained from the study

The results of the table prove the preliminary expectation that due to objective reasons (administrative subordination and fears of guilt association) the respondents will not demonstrate high responsiveness and participation in the survey. The average participation rate is 45.68%. The lowest rate was registered in the municipality of Gurkovo – 10.53%. Table 2 presents the structure of the questions and the questions in them. It is necessary to note that the assessment of the respondents is in numerical form with a scale from 1 to 5.

For all nine categories, an average score is derived based on the score of each of the component questions. Individual questions in the categories do not prioritize.

Of interest are the answers to category 2 "Education". There, the average score for the statement "Residents of the settlement have access to a variety of educational services

(kindergarten, school, university, etc.)" is 2.89. This is somewhat surprising since the district has a significant educational network in terms of its scale, but its territorial distribution in the settlements creates the subjective feeling of the presence of deficits in this regard.

Table 2. Formulation of the questions and statements in the survey

Category 1 "Demography"	1.1 Depopulation trends are observed in the settlement 1.2 The population in the settlement is predominantly over working age
Category 2 "Education"	2.1 Residents of the settlement have access to a variety of educational services (kindergarten, school, university, etc.)
	2.2 There are persons under 18 years of age in the settlement who are outside the education system
Category 3 "Utilities"	3.1 The settlement has access to a rhythmic supply of electricity
	3.2 The settlement is supplied with drinking water without long interruptions
	3.3 The settlement has the technical ability to connect to the Internet if the residents so desire
	3.4 The settlement has access to postal and telephone services, including mobile phones
Category 4 "Healthcare"	4.1 Access to a general practitioner is ensured in the locality
	4.2 Access to a dentist is provided in the settlement
	4.3 The settlement has fast and timely access to emergency assistance
	4.4 Residents of the settlement have access to a point of sale for medicines and medical supplies
Category 5 "Poverty and social support"	5.1 The locality provides social support for vulnerable groups, people in poverty or at risk of poverty
	5.2 The settlement provides support for elderly and lonely people /food, medical care and medicines, access to public services, etc./
Category 6 "Public order and security"	6.1 The level of domestic crime in the settlement is low
	6.2 The response time of police officers is fast and adequate
	6.3 Police officers carry out crime prevention activities
Category 7 "Public transport and roads"	7.1 The settlement has access to convenient and regular public transport.
	7.2 The roads in the settlement is in normal condition
	7.3 The roads to the municipal center and neighboring settlements is in normal condition
Category 8 "Local Economy"	8.1 In the settlement /or near it/ economic activities are carried out that provide employment and income for the local population
	8.2 In the settlement /or near it/ there is untapped business potential that is different from agricultural activities /for example, tourism, production of products and articles for final consumption - food, souvenirs, etc./
Category 9 "Administrative reforms and decentralization"	9.1 How do you assess the comprehensive development of your locality?
	9.2 How do you view the possibility of giving more powers to mayors of settlements?
	9.3 If you answered yes to the above question, would you suggest in which sectors it is most appropriate for this to happen: 9.3.1 Administrative services 9.3.2 Public order and security 9.3.3 Utilities 9.3.4 Social care, healthcare and education 9.3.6 Independent participation (or in association with other settlements) in regional development projects without the participation of the municipal center
	9.4 How do you assess the possibility of having your own financial resources under the financial control of the municipal administration?
	9.5 How do you assess the possibility of keeping local tax revenues from your locality at the disposal of the mayoral administration?
	9.6 How do you assess the possibility of receiving a subsidy from the municipal budget based on established formulas and indicators /population, territory, local specific characteristics, etc./

Source: Survey's design

The answers to the questions from Category 3 "Utilities" indicate the absence of significant problems and restrictions in the supply of electricity, water, postal and other communication services. The average score for the district in this category is 4.40.

The lowest score is given by respondents in category 4 "Healthcare". In this category, the average score is 2.55. The low score is not to be underestimated, since the availability of primary medical services is related to the existential existence of local communities.

Regarding category 5 "Poverty and social support", the average score is 3.38. The result shows that there is no established saturated network of social support and protection in small settlements.

Respondents feel relatively protected by the state and its institutions in the field of public order and security. The average score for category 6 "Public order and security" is 3.99.

The assessment of access to transport services and infrastructure is rather satisfactory. The average score for category 7 "Public transport and road network" is 3.44.

The assessment of respondents for local economic potential is low. The average score for category 8 "Local economy" is only 2.78. When asked whether there is potential in the settlement (or in its vicinity) for the development of economic activities other than agricultural activities, the score is only 2.47.

The questionnaire contains a question that aims to somewhat verify how objective the respondents are in their assessments by category. The question is general and is defined as follows: How do you assess the complex development of your settlement? Interestingly, the score is relatively low and is 2.70. The explanation may be that the respondents have overestimated some of their assessments in the previous assessment categories or that there are additional factors that concern local development and that are not covered by the previous questions. However, a test was performed for the presence of a linear relationship between some of the thematic questions and the general question. The data are presented in Table 3.

Table 3. Main output data from a linear regression analysis test

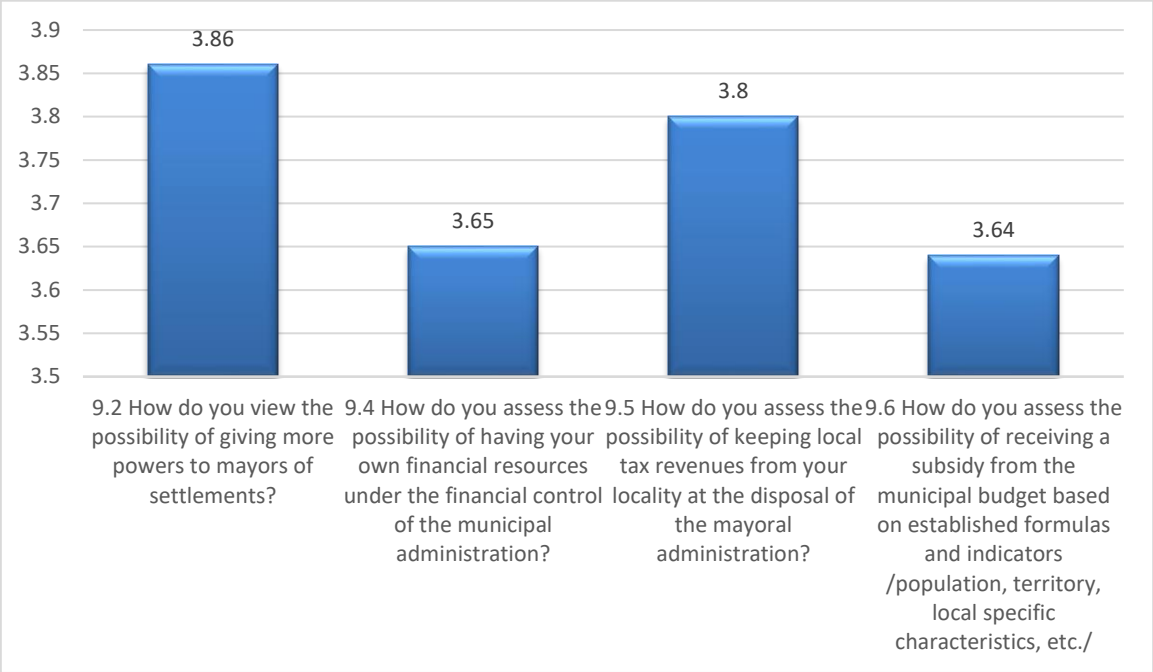
Category regressor on answers to a question about the comprehensive assessment of local development	***R***	***R^2***	***Sig.F***	***Coef X***
Category 2 "Education"	0.3219	0.1040	0.001	0.39
Category 3 "Utilities"	0.4882	0.2384	0.000	0.66
Category 4 "Healthcare"	0.5238	0.2744	0.000	0.62
Category 5 "Poverty and social support"	0.4437	0.1969	0.000	0.47
Category 6 "Public order and security	0.2938	0.0863	0.000	0.39
Category 7 "Public transport and roads"	0.0538	0.0029	0.6121	0.03
Category 8 "Local Economy"	0.5691	0.3239	0.000	0.63

Source: Statistical processing EXCEL, Data Analysis

From the data in Table 3 it is evident that there is no assessment area that has a strong impact on the answers to the summary question. However, several categories can be identified that moderately influence the subjective complex assessment, and which also affect larger groups of respondents.

The last part of the survey is focused on the personal views of the respondents on how local government could be optimized so that it is of greater benefit to the local community. The data are presented in Figure 1.

Figure 1. Answers to questions related to increasing the powers and financial autonomy of local government. (Scale from 1 to 5)

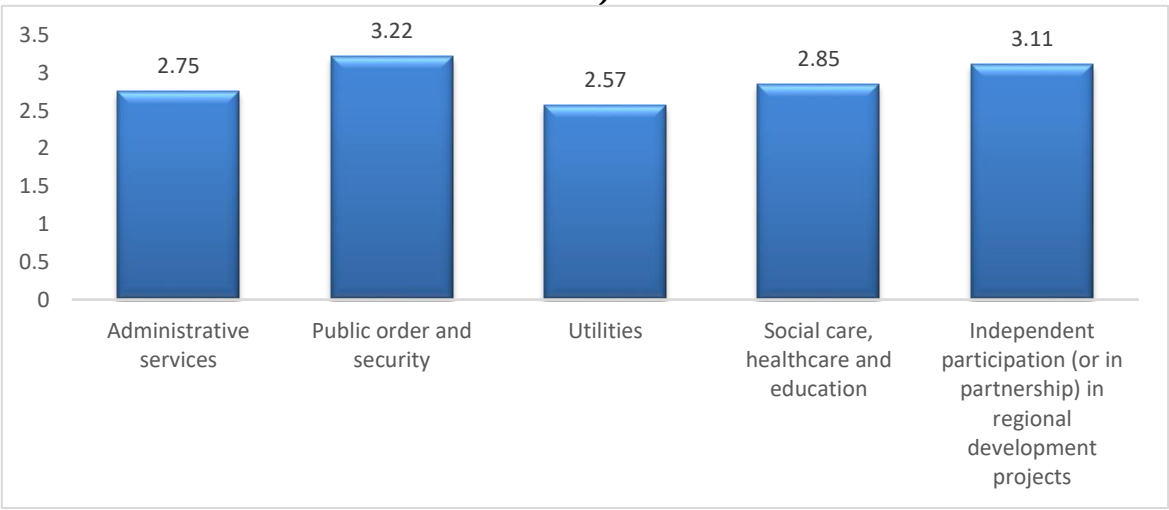


Source: Author's presentation based on the results obtained from the study

Fig. 1 shows that respondents are moderate in their views on increasing their powers. They give the highest ratings for the need to increase their administrative powers (3.86), as well as to have greater autonomy in using their own sources of income (from local taxes and fees) in the settlement.

Regarding administrative powers, the mayors of the settlements give different answers. The ratings are presented in Figure 2.

Figure 2. Answers to questions related to increasing administrative powers(Scale from 1 to5)



Source: Author's presentation based on the results obtained from the study

Fig. 2 shows that the views of the mayors of the settlements are aimed at increasing their powers mainly in the field of public order and security, as well as in the opportunities for independent participation in regional development projects without the need for the administrative guidance

of the municipal administration. The lowest attitudes are towards burdening the mayors with additional administrative services.

5. Conclusions

Although the scale of the response does not imply scientific representativeness of the study, several main conclusions could be drawn based on the presented results:

1. Priority attention should be paid to the areas of education, healthcare and social support. The low scores of the respondents are a good indication that the physical existence and educational growth in small settlements could be a serious limiting factor in local development;
2. It is urgently necessary to implement policies aimed at developing non-agricultural economic activities. Perhaps it is time to focus efforts on the search for horizontal local policies. Here, an important place would be occupied by the toolkit of European funding, which could be organized following the example of the completed Rural Development Program, but with new definitions for zoning and impact instruments.
3. The wishes of the mayors should be taken into account and more powers should be given in the organization and administration of project funding. There are many examples where small settlements are indirectly beneficiaries of financial assistance. Many of them report successful practices for stimulating local development.
4. Financial decentralization needs to reach the lowest levels of local government.
5. The large share of non-response is a phenomenon that requires special attention. There is an unproven hypothesis that one of the reasons for refusal to participate is the assumption of punishment from the administrative center if the problems are openly mentioned.

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Maria Kotseva-Tikova[1]

PROGRESS TOWARDS SUSTAINABLE DEVELOPMENT

***Abstract**: The report studies the results of the implementation of the Sustainable Development Goals globally. The assessments in the reports of the United Nations and Eurostat are compared, and Bulgaria's progress is analyzed. Special attention is paid to Goal 12 Sustainable Consumption and Production and its relationship with achieving sustainability through integration of green with circular economy. Through cluster analysis, the progress achieved by individual countries in the UN assessment of 2025 is analyzed, and the main patterns are summerized.*

***Keywords**: sustainable development; sustainable development goals; green and circular economy*

***JEL:** Q01*

1. Introduction

Sustainable development became a grand strategy for the world community with the Brundtland Report of the World Commission on Environment and Development in 1987. It is a function of concerns about the excessive use of natural resources, global warming, and the lack of social justice. The term itself provokes contradictive interpretations – from ambiguity about the meaning to the adoption of specific models of sustainability (Kotseva-Tikova, 2022, 2023, Kotseva-Tikova, Mochurova, 2025, Kotseva-Tikova, Mochurova, Branzova, 2017). The implementation of the ideas behind this terminology gives rise to different practices at micro and macro levels. At macro level, strategies and global goals are discussed, indicators are created to measure progress towards a state that can be defined as sustainable. The United Nations (UN) develops goals and indicators at the global level, through which to determine the sustainability of the development of individual countries, and each country adopts a policy to implement the individual goals.

At micro level, standards and principles are being introduced to create an understanding and acceptance of sustainability as part of corporate culture and development. Some large enterprises recognize principles of corporate responsibility and sustainability and include them in their reports. Auditing companies are developing practices for auditing these aspects of companies' activities as well. To have a more significant implication national policy is needed to create a favorable institutional environment and effectively functioning institutions (Bakardjieva, 2022).

The extent to which macro and micro strategies achieve results in terms of moving towards sustainability, as measured by specific indicators, is sometimes questionable. There is a degree of suspicion about the benefits of certain policies, and reporting on the achievement of environmental and social goals is often seen as masking business practices (Murray, Skene, Haynes, 2015).

This study aims to compare the progress made towards the UN Sustainable Development Goals globally and to identify Bulgaria's position by identifying its strengths and weaknesses. The index score from the UN report is used to rank all assessed countries in the world. Through cluster analysis, countries are grouped and Bulgaria's positioning is evaluated. The similarities and differences in the UN and Eurostat 2025 assessment reports are identified.

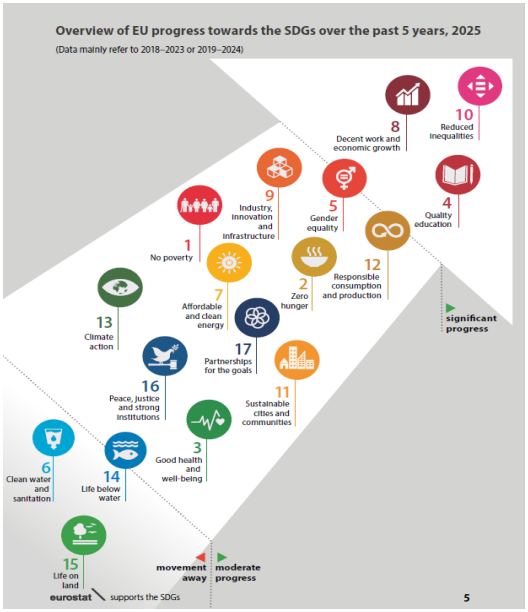
2. State of the Problem

The UN is committed to the process of sustainable development and supports the search for equality and balance between the three spheres: economic, environmental, and social. The organization introduces 17 Sustainable Development Goals (SDG) to measure sustainable

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development through indicators for each goal and assesses countries around the world. The European Commission also prioritizes sustainable development and assesses progress in implementing the global goals regularly to highlight progress and to identify gaps in certain areas. The Eurostat report from 2025 presents the progress of the union in achieving most of the goals, with significant progress recorded in: Goal 10 Reduced Inequalities, Goal 8 Decent Work and Economic Growth and Goal 4 Quality education (Fig. 1.)

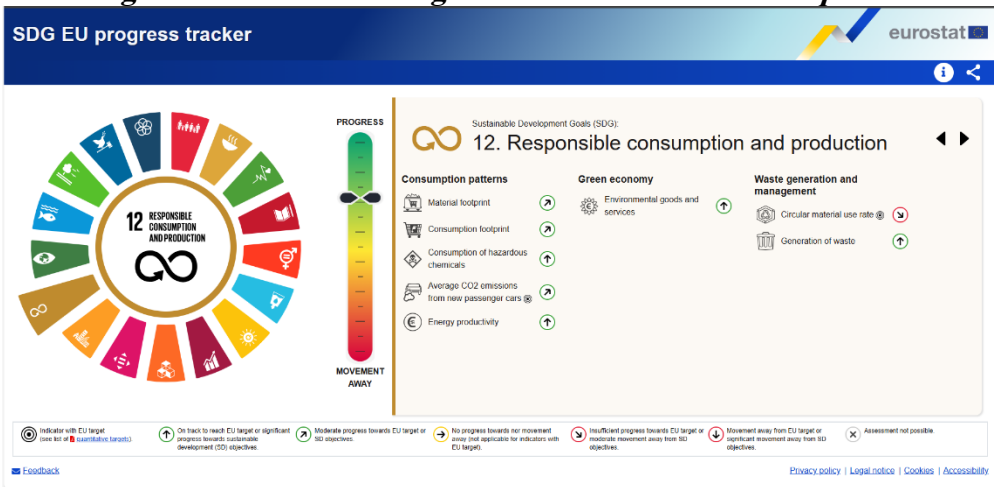
Figure 1. EU Progress Towards Sustainable Development Goals



Source: Eurostat, 2025. Sustainable development in the European Union. Monitoring report on progress towards the SDGs in an EU context 2025 edition

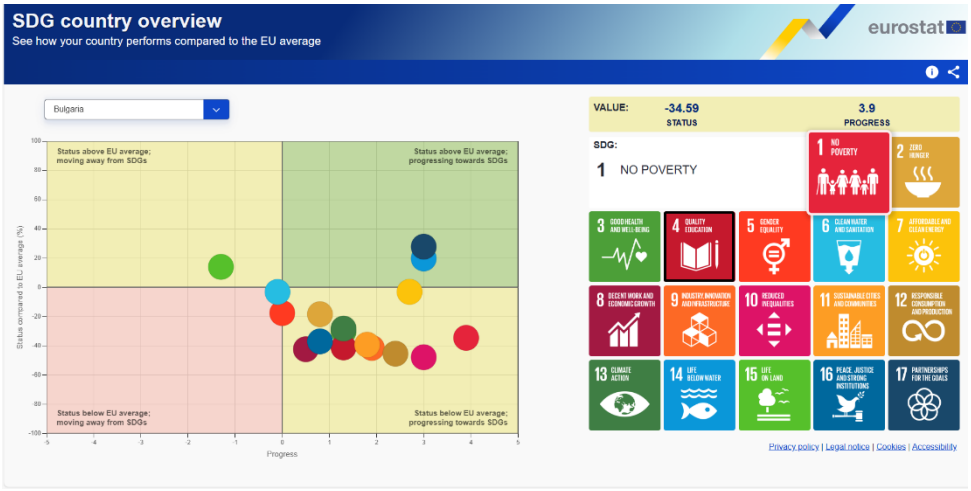
The gap between the targets is observed in: Goal 6 Clean Water and Sanitation and Goal 15 Life on Land. Among the seventeen goals, Goal 12 Responsible Consumption and production measures the achievement of circularity in the use of raw materials, as well as the implementation of green initiatives, i.e. it summarizes the achievements in two areas significant for development. The EU notes significant progress in Goal 12 (Fig. 2). The direction of most indicators is for moderate improvement, with circular use moving away from the sustainable development goals, which emphasizes the need for full integration of circular models in industrial production and in the household sector.

Figure 2. EU Progress Towards Achieving Aim 12 Sustainable Consumption and Production



Source: Eurostat, https://ec.europa.eu/eurostat/cache/visualisations/sdg-eu-progress-tracker/

Figure 3. Progress of Bulgaria towards Sustainable Development Goals



Source: Eurostat, https://ec.europa.eu/eurostat/cache/visualisations/sdg-country-overview/#

Eurostat data for 2025 illustrate Bulgaria's progress in implementing each of the seventeen Sustainable Development Goals (Fig. 3). The only goal where there is a gap is Goal 15 Life on Land. There is no progress on two goals: Goal 6 Clean Water and Sanitation and Goal 5 Gender Equality. The rest show positive development with two goals where progress is above the EU average: Goal 17 Partnerships for the Goals and Goal 14 Life Below Water.

The UN, with its 2025 assessment, presents the global progress towards achieving the 17 SDGs and provides an assessment of individual countries. Bulgaria is positioned in 41st place. It manages to achieve Goal 1 No Poverty and maintain what has been achieved, as well as Goal 15 Life on Land, but with a moderate improvement, which differs from the Eurostat assessment (Fig. 4).

Figure 4. Progress of Bulgaria



Source: UN, 2025 Sustainable Development Report, https://dashboards.sdgindex.org/profiles/bulgaria

Goal 10 Reduced Inequalities has been achieved with significant challenges and decreasing implementation, which is in line with the Eurostat assessment. Significant or moderate improvement has been registered for the remaining 14 goals, as goal 12 Responsible Consumption and Production and goal 14 Life Below Water have not been achieved. In the Eurostat assessment, Bulgaria has made progress on goal 12, but it is weaker compared to the European average. Higher progress is achieved with goal 10 Reduced Inequalities while the European average results are lower. Goal 12 is strongly linked to the implementation of circular strategies and the application of green technologies. The assessment shows that this goal faces serious problems and its implementation is stagnating. Bulgaria is positioned in 41st place out of 167 countries and improves its position since 2015. The country is in last place among the 27 member states.

3. Methodology

In the present research the results of the SDG progress in 2025 in the UN and the Eurostat reports are presented. Through a comparative analysis the achievements and the lagging of Bulgaria are highlighted with the accent upon the necessity to strengthen the combination of green and circular activities, which is measured in Goal 12 Responsible Consumption and Production.

The comparison is upgraded with a cluster analysis to describe the sustainable development position, which serves as sign for the future sustainable policy development in each sector and activity. Based on the UN SDG index for 2025, cluster analysis is applied using the SPSS statistical data processing program. Through it, all 167 assessed countries are distributed into 4 cluster groups. The first cluster group includes 65 of the best performing countries and Bulgaria is included in it, the second group includes 32 countries, the third group consists of 60, which includes countries ranked from 65 to 125, and the last group is small, including 10 countries that have achieved minimal results in sustainable development goals. Goal 12 Responsible Consumption and Production is central for the analysis because it combines green and circular activities, which is beneficial for the significant sustainable progress. The impact of the circular economy is upon 10 SDG, while the green economy directly influences upon 12 aims.

The research analyzes the first cluster group because all EU member states are included and allows for conclusions for the necessity for new approaches. For the 27 EU states a cluster analysis is applied too, which divides the states into two groups. That allows further investigation of the EU sustainable development policy and its results in the different parts of the union.

4. Research Results

The application of a cluster analysis to the UN SDG assessment distributes all the 167 evaluated states in four groups. The first cluster includes all 27 EU Member States, all European countries, and the most developed countries from the other continents. 39 of those participating in cluster 1 do not meet goal 12, with 32 showing stagnation or deterioration. Even countries that achieve high results experience difficulties with responsible consumption and production, i.e. more action is needed to realize the goal and use the opportunities of circular models. Goal 12 has not been achieved by 52 of the assessed countries in the world, with most of them falling into cluster 1. This goal has been achieved by countries in the Sub-Saharan region and by those with low incomes, i.e. the high level of development and income is not tied to the criteria for responsible consumption and production and confirms the hypothesis that prioritizing economic development comes at the expense of disrupting the environmental balance. A similar relationship can be identified in Goal 13 Climate Action – 21 countries from Cluster 1 do not achieve the goal, including 12 EU Member States. Another goal that is not achieved by those included in this cluster is Goal 2 No Hunger (39 countries, including 17 EU Member States). Bulgaria is rated higher for these two goals, namely with significant challenges.

Cluster analysis is also applied to the EU Member States, which are divided into two groups according to the SDG index (table 1.). Cluster 1 includes the 10 countries with the best result, and cluster 2 includes the remaining 17 countries with a lower result, where Bulgaria is also positioned.

Table 1. EU Member States Cluster Distribution according to the UN Index of Sustainable Development from 2025

Case Number	State	Cluster	Distance
1	Finland	1	3,31
2	Swiss	1	2,01
3	Denmark	1	1,61
4	Germany	1	0,01
5	France	1	0,59
6	Austria	1	0,69
7	Norway	1	0,99
8	Croatia	1	1,29
9	Poland	1	1,59
10	Czech Republic	1	1,79
11	Slovenia	2	1,341
12	Lithuania	2	1,341
13	Spain	2	1,141
14	Iceland	2	0,941
15	Slovakia	2	0,941
16	Estonia	2	0,941
17	Belgium	2	0,841
18	Portugal	2	0,741
19	Hungary	2	0,541
20	Italy	2	0,441
21	Niederland	2	0,141
22	Malta	2	0,559
23	Greece	2	0,759
24	Litva	2	1,059
25	Ireland	2	1,259
26	Romania	2	2,159
27	Bulgaria	2	3,559

Source: own calculations based on UN SDG index

Twenty-four EU Member States are experiencing difficulties in achieving Goal 12. Only Croatia, Hungary and Romania are in the group of countries experiencing significant difficulties, with their progress being towards deterioration or stagnation, i.e. their slightly better positioning compared to the other 24 Member States is not associated with improvements in the direction. EU Member States are committed to economic development and subsequently focus on measures that improve the environmental and social dimensions of development. The

circular economy is a tool for achieving development, combining efficiency in production and consumption by considering in advance the effects of individual activities and programming approaches for business and consumption. Technological modernization and innovative methods for realizing positive effects play an important role.

5. Conclusions

Bulgaria is developing in the direction in which the other member states are moving in terms of sustainable development goals, with the problem of inequality persisting in contrast to the average performance of the EU. The country has registered the achievement of only two goals that are different from those typical of the EU average, i.e. it has a different type of development than the EU average and the same problems in terms of life under water. The country has improved its positioning over the years, managing to join the group of the best performers in the world, albeit with the lowest result among the EU member states, i.e. it is slowly moving in the direction in which the strongest countries in the EU are developing intensively. A common characteristic of the EU is the problems facing the implementation of goal 12, which goal is strongly influenced by the binding of the circular economy and green technologies. Circularity means a practical approach to resources and production and predictability of processes from the design stage of the production activity to the end of the product's life, combined with responsibility for the re-use of resources. It ensures not only the decarbonization of the economy, but also increased resource efficiency, the potential for technological modernization and job creation, as well as reduced dependence on imported resources.

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Iliya Pironkov, Petya Biolcheva, Miglena Molhova-Vladova [1]

ARTIFICIAL INTELLIGENCE AS A CATALYST FOR SUSTAINABLE REGIONAL DEVELOPMENT IN INDUSTRY 5.0: FROM RESOURCE EFFICIENCY TO REGIONAL COMPETITIVENESS

***Abstract**: This paper examines the role of artificial intelligence as a catalyst for sustainable regional development in the context of Industry 5.0, with a special focus on the digitalization of the public sector and the transformation of regional policies. It outlines three key areas: 1) methodologies for digitalization and efficiency in the public sector, 2) the role of the human as an expert and active factor in creating innovations, and 3) the relationship between regional policies, sustainability and the transition to Industry 5.0. On this basis, a conceptual methodological framework is proposed for integrating AI-infrastructure to improve resource efficiency, digitalize the public sector and develop more flexible management practices in the context of Industry 5.0, which requires synergy between technology, ethical human-centricity and environmental and economic sustainability.*

***Keywords**: Public sector, Transformation of regions, Sustainability*

JEL: *Q53, Q56, Q58*

1. Introduction

Sustainable use of resources, the development of urbanization and balanced territorial distribution are all priorities of the public sector. The topic related to the development of the sector is fundamental for economic and social policy, especially when it comes to the catalytic function of artificial intelligence in it. Regional development is also a topic discussed in the context of Industry 5.0. (I.5.0), which presents a comprehensive paradigm for efficiency, sustainability and human well-being. Several main objectives of the public sector in I.5.0 are known. First of all, human-centricity and social justice, emphasizing the well-being of citizens at the center of digital transformation and the fair distribution of technological benefits (Jabeen, at al. 2023). In addition, emphasis is placed on sustainability and environmental responsibility, aiming at the adoption of circular models of production, waste and resource use. The role of the public sector consists in the implementation of climate adaptation policies and green technologies (Jabeen, at al. 2023). Next, sustainable and smart cities, requiring the development of smart municipalities and cities through smart technologies. The public sector must guarantee connectivity, mobility and access to services in the regions (Jabeen, at al. 2023). Another direction is innovation and digital transformation with a human face, aiming for synergy between people and technology, in which the public sector invests in training, digital skills and adaptive working models (Ali at al. 2025). Last but not least, sustainable economic growth and new jobs, aiming to create quality jobs using human potential in combination with technology. The public sector must support entrepreneurship, social innovation and local economy (Jabeen, at al. 2023). The achievement of all these goals is accompanied by the application of various intelligent tools, which makes the place of AI so significant for their implementation. In this context, this paper focuses on the research question of how to increase sustainable regional development using AI, so as to achieve regional competitiveness and approach the goals of I. 5.0. In order to arrive at an answer, the following paragraphs sequentially examine: first, the state of the problem relating to AI-based methodologies applied in the public sector; then follows a methodological part, revealing the context of developing the author's methodology;

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in the results, the methodological framework itself for integrating artificial intelligence (AI) into the regional and public sector can be seen.

2. Problem Status

Government sector adoption of AI is a multifaceted socio-technical change, requiring comprehensive methodologies for research and systematic frameworks for administration. This literature review studies the key methodologies used to research adoption of AI and the prominent conceptual models introduced to form it, taking a critical look at their contributions and gaps in conceptualizing this multifaceted phenomenon.

Studies utilize various methodologies that provide different types of insights. At macro-level, surveys at scale and landscaping studies are prevalent. The European Commission's AI Watch initiative and the OECD framework give comparable, generalized information on adoption preparation and trends at the country level (Misuraca & Van Noordt, 2020; OECD, 2021). In a similar way, Misuraca & Van Noordt (2022) deploy policy surveys and reviews to develop typing of AI applications. This method is invaluable in benchmarking and discerning high-level patterns yet can simplify complex adoption processes along linear stage lines and retain policy intentions at the expense of realities on the ground. Aguilera Castillo (2023) modifies a panel data econometric framework to test the labor-saving hypothesis on AI as a labor-saving technology with robust, causal evidence on macroeconomic impacts. Nevertheless, such quantitative methods cannot explain the organizational process dynamics underlying them.

Unpacking micro and meso-level realities, qualitative case studies are commonly employed. Sun & Medaglia (2019) and Busuioc (2021) deploy this approach to uncover complex implementation challenges ranging from data infrastructure problems to gaps in accountability. Vatamanu, & Tofan (2025) also utilize case study analysis to expose key susceptibilities such as algorithmic discrimination and skills shortages. This approach has rich, contextual Learnings but non-statistical generalizability.

Policy and legal analysis, as demonstrated by Engstrom et al. (2020), systematically scans legislation and professional codes of ethics to identify the statutory regulatory landscape. High-level policy and daily practice are not necessarily directly demonstrated by this method, though, due to the "translation gap." To counteract these divides in approach, mixed-method methods are maturing. Misuraca & Van Noordt (2023), for instance, combine landscaping with detailed analysis to connect broad trends with specific effects, with a richer evidence base as a result.

3. Methodological Framework

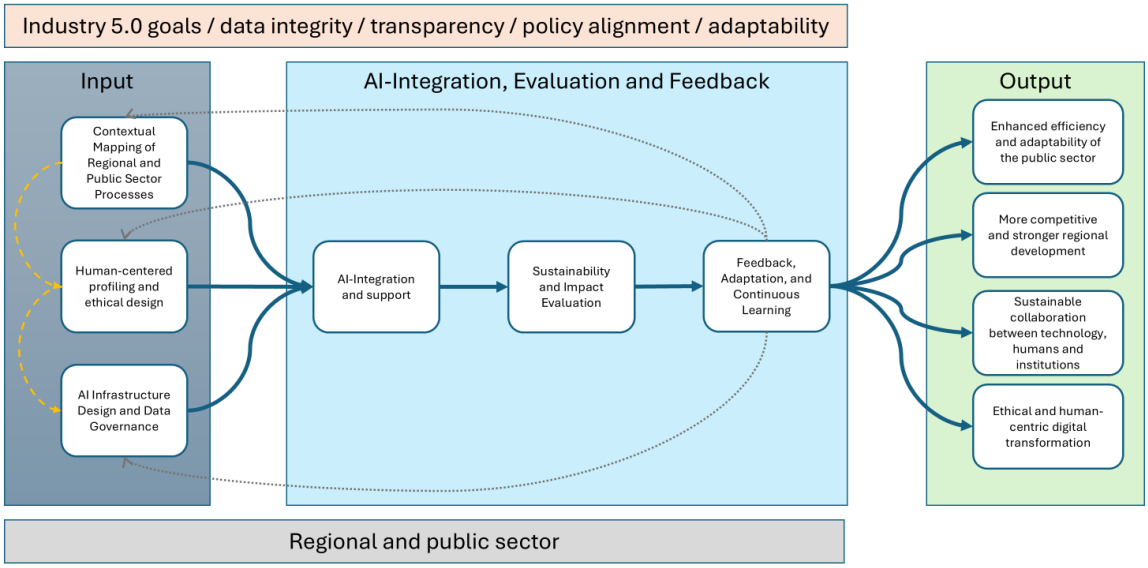
A proposed AI methodological framework for regional development should define and shape the AI infrastructure, taking into account ethical standards, technical readiness, and regional policies as well. The major goal of the conceptual methodological framework is suggest a model of several steps, which establish a pathway for the responsible use of AI as a catalyst for regional growth, while empowering human experts and ensuring that the quality of public services is maintained or further enhanced. To achieve this goal, the framework is based on a set of core principles that ensure its alignment with the fundamental values of Industry 5.0. These principles are sustainability, human-centircity resilience, and ethical governance and as mentioned above they provide the basis upon which the methodological stages of the model are built.

Based on the main principles of the framework, the following section describes the main stages of its development and implementation. A step-by-step approach is needed to ensure that the integration of AI infrastructure into the public sector and regional development strategies is systematic, transparent, and aligned with the objectives of Industry 5.0.

4. Results

For a better understanding of the methodological framework for integrating AI into the regional and public sector, presented in this paper, Fig. 1 is presented.

Figure 1. Methodological framework for integrating AI into the regional and public sector



Source: The figure is the author's

Contextual Mapping of Regional and Public Sector Processes

Whether implementing an AI system or assigning a human to a role in the public sector, a clear understanding of the operational context is essential for effective performance. Therefore, it is crucially important that the integration of AI-technologies within the public sector should align with its context and policies. The contextual mapping is fundamentally important, because it aims to ensure that the AI-technology would have a complete contextual understanding of the environment when implemented and it would identify the organisational goals and problems. Next to that this step within the AI integration process allows the organisation to identify, if the data infrastructure and enterprise architecture design is reliable and suitable for such an integration. This is especially true for public administrations, where in some cases the systems could be complex, outdated or incompatible with the interoperability requirements of AI-driven solutions. In the proposed conceptual framework this first step is very important, because it provides the basic insights that inform stage 2, ensuring that the design of the AI framework is based on empirical data and remains consistent with broader regional policy objectives.

Human-centered profiling and ethical design

The so-called human-centered profiling aims to view human experts not as a particular standard formal role within a process, but it is actually a method to analyse the real-time workloads, prior experience and personal expertise. By integrating proven based data on individual preferences, working style, cognitive load, stress levels and responses, AI can simultaneously fulfil the structural requirements of the process and meet the unique characteristics of the expert. This multidimensional perspective ensures that AI places the focus on the human expert by boosting its creativity and assuring its well-being while optimizing the organizational process. Such a type of human-centered design within process optimization could also improve the opinion about AI-adoption among human experts, reduce their scepticism about it and decrease institutional imbalances.

While the AI driven human-centered profiling could drastically improve the knowledge about the organizational goals und human needs, it should meet and embed some important ethical norms and standards like transparency, data protection and fairness. In addition, an ethical alignment at this stage of the framework aims to guarantee compliance with key legal and regulatory obligations such as the EU AI Act. So, it could be stated that this stage thus provides the necessary basis for aligning AI decisions with both organizational goals and societal values, thereby ensuring the human-centered orientation central to Industry 5.0.

AI Infrastructure Design and Data Governance

Depending on the first two steps of this conceptual framework and the information collected and provided by them, the third step aims to pave the way for sustainable development of an AI-infrastructure within the respective public organization. The purpose of this stage is not merely the adoption of standardized technological solutions, but more the development of a trustworthy, resilient and explainable AI ecosystem, which builds the technological backbone of this framework. Such an AI-infrastructure should incorporate efficient and advanced mechanisms for data-flow analysis, ensure interoperability of the systems and include strong principles about transparent data governance. Next to that, it should take into account the provided insights from steps 1 and 2 of this framework, which have to provide a foundation for policy and strategy integration while adhering to ethical standards of data protection and accountability. By doing so, Stage 3 enables the creation of an AI-infrastructure that not only supports organizational efficiency but also aligns with the broader objectives of Industry 5.0—human-centricity, sustainability and resilience.

AI-Integration and support

Following the establishment of a resilient and trustworthy AI-infrastructure in the previous stage, stage 4 aims to translate the developed infrastructural capacities into practical, accessible, and human-centric AI applications that support daily operations, decision-making, and creativity in the public sector. It is also the step, where simulations and tests of the future AI applications could be executed and based on their result, it could be analysed, if the requirements of the previous stages were met. In Stage 4, AI design choices (dashboards, decision-support tools, etc.) can translate policy ambitions (e.g., curricular economy, etc.) into important digital tools for governance and for regional development. Next to that the specific models of collaboration between AI and human have to be designed, e.g. the four levels of proximity between AI and humans in a work setting from Sowa K., et. al. (2021). Depending on the AI design, some organisations may also integrate the so-called AI push-pull model. This model specifically aims to design the AI-human collaboration and how this collaboration should look like.

- Pull: Experts actively request AI support.
- Push: AI proactively provides insights, detects anomalies, or relieves workload stress.

Sustainability and Impact Evaluation

In stage 5 the organization can evaluate the results of stages 1, 2 and 3 of this framework as well to assess the AI's contribution to efficiency, creativity, stress reduction, and regional resilience (both economic and environmental). This step is very important, because based on direct analysis it ensures that AI doesn't just work technically, but actually adds value to the regional development while achieving the goals of Industry 5.0 and following the regional policies and strategies of the public sector. If certain objectives aren't met (e.g. insufficient mapping in stage 1, non-ethical human-profiling at stage 2, etc.) this step paves the way for course corrections, setting the stage for step 6.

Feedback, Adaptation, and Continuous Learning

The final step of this conceptual framework focuses on continuously evaluating those results, summarizing the insights gained, and using this feedback to implement necessary adjustments in the relevant preceding steps. This facilitates ongoing learning and improvement of AI technology and design itself and it represents an effective method for adapting the AI on the ever-changing public/social strategies, governance policies and ethical standards. Within this conceptual model, AI adaptation involves refining the data and processes from the preceding steps of the framework. Furthermore, through this continuous learning process, AI can identify emerging patterns, challenges, and opportunities. By adapting the previous steps accordingly, AI ensures alignment with Industry 5.0 objectives and actively supports sustainable regional development.

5. Conclusions

The proposed methodology is seen as a conceptual framework that shows a possible path for the responsible use of AI in public sector. The focus is on the role of AI as a catalyst for regional growth that strengthens human expertise while ensuring and improving the quality of public services. As this is a conceptual model, empirical testing based on appropriate data is needed to assess its effectiveness, practical applicability, and transferability to different contexts. Future research should use case studies and comparative analyses to refine the proposed steps and demonstrate their actual impact.

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Anton Peychev[1]

HOW AGGREGATED INDICATORS AND DATA GAPS DISTORT THE ANALYSIS OF WASTE AND THE CIRCULAR ECONOMY

Abstract: *This paper explores the reliability of the "EU average" as a reference value for assessing performance in waste management and the circular economy. It highlights the dominant contribution of larger economies to aggregated indicators and the distortions that arise when interpreting these figures for smaller member states. A critical review is conducted of the available statistical data on waste and related indicators of circular material use. The study identifies key gaps in the statistical framework, including the lack of comparable data between generated and recycled waste across economic subsectors and the inconsistent reporting frequency of core indicators. Furthermore, the analysis demonstrates the dependence of circular economy metrics on the economic structure of individual countries, which makes cross-country comparisons potentially misleading with regard to actual progress toward circularity.*

Keywords*: circular economy, waste management, statistical indicators*

JEL: *Q26, Q27, Q28*

1. Introduction

Circular economy policies in the European Union have emerged and evolved primarily on the foundation of waste management. This becomes evident from a close examination of the development of EU legislation in this sector and from the key messages expressed in the Union's strategic documents over the past decades. The fundamental objectives of the circular economy are precisely the reduction of waste generation and the reintegration of waste into the economy as secondary raw materials. The strong link with waste management is also reflected in the EU Circular Economy Monitoring Framework, where the majority of indicators are directly or indirectly derived from waste data. From an analytical perspective, these indicators should be particularly suitable, since waste management in the EU is, at least in principle, governed by harmonized reporting requirements, providing a broad basis for evaluating the outcomes of implemented policies. In practice, however, there are numerous inconsistencies in the data reported by Member States, temporal changes in reporting obligations, and methodological deficiencies in the construction of key indicators and in the way data are presented by Eurostat.

2. State of the problem

The EU Circular Economy Monitoring Framework (2018), adopted in the implementation of the EU Action Plan for the Circular Economy (2015), is based on a set of indicators that describe waste generation and treatment, the rate of recycling, the reuse of materials, and aspects of resource productivity. These indicators are of key importance: they provide a common reference point for measuring progress at the EU level and serve as a benchmark against which Member States compare their own achievements and convergence with the established targets. In this sense, the "EU average" should, in principle, constitute a reliable reference value.

However, several characteristics of the available statistics limit their full applicability. The periodicity and completeness of the data are inconsistent across Member States and datasets:

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key series on generated and treated waste are published at varying frequencies, with gaps in certain years and with a lack of disaggregation by economic subsectors.

Methodological differences also exist in the accounting of specific waste streams, alongside changes over time in the requirements for measuring recycling rates, which affect the comparability of historical data. Aggregated indicators combine economies of different scales and structures, which means that the resulting values tend to reflect primarily the characteristics of the largest countries.

Therefore, the use of EU average indicators as a starting point for analysis and comparison should be approached with caution. This applies even more strongly to per capita indicators, given the demographic disparities among Member States.

Some of the core indicators in the Circular Economy Monitoring Framework, in fact, reveal significant limitations and may even be misleading, while there are numerous opportunities for a much more accurate representation of progress toward a circular economy using the existing data. These, however, have not yet been fully explored due to the current way key time series are structured and presented.

3. Methodological approach

The study examines key indicators from the EU Circular Economy Monitoring Framework, which are derived from waste-related data.

The following Eurostat databases were used:

- env_wasgen – Total waste generated from all economic activities
- env_wastrt – Waste treated from all economic activities
- env_wasmun – Municipal waste
- env_wastrdmp – Transboundary shipment of waste within the EU and to third countries
- cei_cie010 – Circular material use rate
- nama10_a10 – Gross domestic product (GDP) and gross value added (GVA)

Descriptive and comparative methods were applied in the analysis. The calculations of shares of waste generated from all economic activities and from manufacturing – including by sector – were performed after excluding major mineral waste, in accordance with the Eurostat classification.

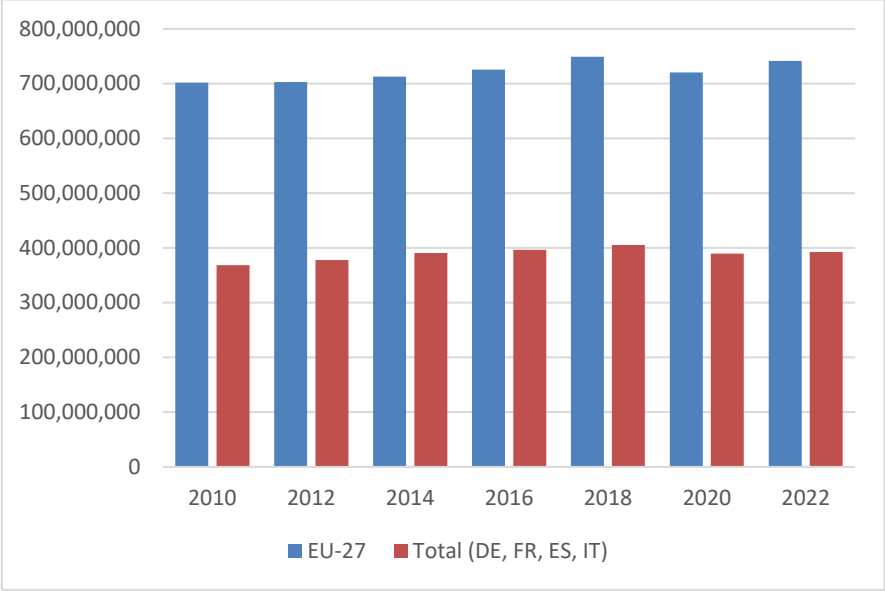
The study also examined the methodologies for data collection and reporting as defined by European legislation, including their amendments.

4. Research results

In most Eurostat waste datasets, the four largest economies – Germany, France, Italy, and Spain – account for roughly half of the total quantities, thereby shaping to a significant extent the corresponding EU average indicators (Figure 1). At the same time, their trends are often not synchronized: the dynamics of Germany's data frequently align closely with the EU-27 average, while deviations are largely defined by the other three countries.

At this stage, the env_wasgen database does not provide a sufficient basis to draw conclusions about the direct impact of circular economy policies on the data. These data are published only for even-numbered years, show no clearly defined trend up to 2022, and data for 2024 are not yet available. Despite their central role in the monitoring framework, the indicators "total waste per capita" and "waste per unit of GDP," derived from these data, can serve only as very rough cross-country comparisons rather than as a means of tracking policy effects.

Figure 1. Total waste generated from all economic activities (tonnes)



Source: Eurostat, env_wasgen

Examining waste reduction as a key indicator of the effects of circular economy policies, it is observed that Germany has recorded a steady decline since 2016, including a decrease of about 3 Mt in both 2020 and 2022, whereas France, Italy, and Spain show fluctuations: a sharp and expected drop in 2020 followed by a compensatory increase in 2022.

In 2022, apart from Germany, only a limited number of Member States reported a decrease compared to 2020; in most countries, waste generation increased. This supports the conclusion that the dynamics of waste generation are closely linked to economic structure and sectoral specificities, rather than following a uniform "European" pattern. Bulgaria shows no consistent trend but recorded the largest absolute increase in the EU in 2022 - 6 Mt - followed by Poland (4.3 Mt) and Hungary (4.1 Mt). At the same time, it is noteworthy that countries with waste volumes similar to Bulgaria's often generate a significantly higher GDP.

This database has the potential to yield far more policy-relevant indicators if the focus were placed specifically on waste from manufacturing, which would better illustrate the actual transition toward a circular economy within production processes through the dynamics of material flows. These represent on average around 20% of total waste in the EU, but their share varies considerably - from 3.4% in Malta to over 48% in Finland - clearly reflecting the structure of each economy. Translated into policy terms, the differing weights of manufacturing, agricultural or construction sectors determine distinct opportunities for intervention and improvement, as well as different time dynamics in recording their potential effects. This, combined with the dominance of large economies in shaping the EU average, remains entirely obscured by the current use of aggregated indicators based on waste from all economic activities.

Even within manufacturing waste, around 45% of the total EU volume is generated by the "big four." However, these data offer considerably greater analytical potential. In almost all cases, waste volumes declined in 2020, but by 2022, ten countries reported a decrease - most notably Belgium, where quantities fell by more than half, and Latvia, where they dropped by 65%. In Germany, the change was minimal (–0.07%), whereas in the other three large economies, volumes increased by roughly 6%. Such sharp fluctuations over a short period cannot reasonably be attributed to policy effects but rather reflect structural changes or temporary

variations in production sectors. This again demonstrates the absence of a uniform European profile, in contrast to the presumed general trend toward reduction (Table 1).

Table 1. Generated waste from manufacturing, selected countries (tonnes)

Country	2018	2020	2022	change 2020/2018	change 2022/2020
EU-27	158 380 000	149 430 000	148 670 000	-5,65%	-0,51%
Belgium	13 704 475	11 773 789	5 870 655	-14,09%	-100,55%
Bulgaria	1 608 644	3 326 598	3 630 980	106,80%	8,38%
Germany	21 298 850	20 328 528	20 314 410	-4,56%	-0,07%
Estonia	332 685	2 255 814	2 081 629	578,06%	-8,37%
Spain	9 579 925	9 186 264	9 995 167	-4,11%	8,09%
France	16 893 926	14 433 434	15 091 299	-14,56%	4,36%
Italy	21 162 153	20 073 439	21 454 331	-5,14%	6,44%
Latvia	311 688	435 525	263 215	39,73%	-65,46%
Hungary	1 978 675	1 849 585	3 608 084	-6,52%	48,74%

Source: Eurostat, env_wasgen

The European Strategy for Plastics in a Circular Economy (2018) placed this material at the center of both political and economic debate for the first time, emphasizing the structural problem of limited interaction between the manufacturing and recycling sectors. It highlighted the disproportionately small share of recycled plastic in total material demand across key industries. At the same time, the EU Circular Economy Monitoring Framework focuses exclusively on plastic packaging through indicators on its generation and recycling. A much more meaningful analytical approach, however, would be to examine these data in the context of overall production.

In 2022, the total amount of plastic waste in the manufacturing sector exceeded 4.5 Mt, nearly 1 Mt more than in 2008. This represents over one-fifth of all plastic waste generated in the EU. In the same year, nine Member States reported a decrease, including Belgium, where the reduction was more than twofold. In contrast, Bulgaria recorded an increase of more than 40%, and Finland around 30%. Additional insights emerge when examining the subsectoral structure. For example, in *"Manufacture of food, beverages and tobacco products,"* Italy generates twice as much waste as Germany, nearly three times more in the *textile industry*, but similar quantities in *"Manufacture of chemical, pharmaceutical and plastic products"*. It is evident, however, that these subsectors are presented in overly aggregated form. Moreover, Eurostat does not provide information on their GVA, which would allow for comparable assessments of waste generation relative to economic output.

The data collection methods also vary significantly across countries. For instance, in Bulgaria, data on waste generated by economic operators are collected through sampling based on self-reported survey forms filled out by enterprises, which creates a risk of incomplete or inaccurate reporting and an even less reliable basis for cross-country comparison.

Data on recycled waste - covering all economic activities - should form the basis for some of the most important indicators of progress toward a circular economy. However, unlike *env_wasgen*, the env_wastrt database provides information only by waste type, not by sector. This means it is impossible to assess, for example, the extent to which plastic waste from manufacturing is recycled compared with that from construction or agriculture - and even less so by subsector - which would be essential for a realistic assessment of progress toward

circularity. Calculating an overall recycling rate of total waste thus remains an overly aggregated approach with limited analytical value.

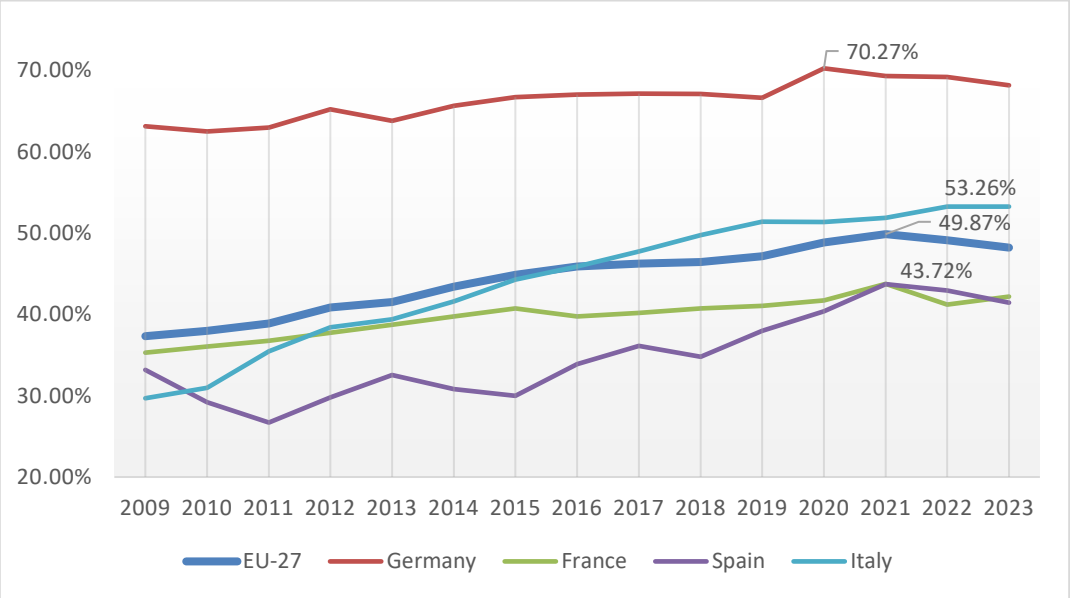
Illustrating this with plastic waste, in 2022 Germany reported a recycling rate of over 72% (2.28 Mt), France less than 13% (317 kt), while Italy and Spain 35% and 62%, respectively.

Municipal waste holds a central place in European policies. Within the Circular Economy Monitoring Framework, it appears through two main indicators: *municipal waste per capita* and *municipal waste recycling rate*. EU municipal waste reached its lowest level in 2013 (211.5 Mt), peaked in 2021 (238.2 Mt), and slightly declined by 2023 (229.1 Mt). The recycling rate rose from 37.3% in 2009 to 49.9% in 2021, before falling slightly to 48.2% in 2023. This shows that the EU remains far from achieving even the 50% target set for 2020, a result largely driven by France and Spain. Together with Germany and Italy, they accounted for approximately 62% of municipal waste generation and 69% of municipal waste recycling in the period 2009–2023.

Municipal waste data most strongly reflect the methodological differences in national statistics. The decline in reported recycling volumes after 2021 in several countries likely reflects the application of the new European methodology for reporting (Commission Implementing Decision (EU) 2019/1004), under which impurities and non-target materials are now deducted at the point of final recycling (Figure 2). This adjustment leads to a statistical decrease even when actual collection and processing practices have not changed significantly.

At the same time, widespread criticism regarding compliance with environmental standards in third countries has raised concerns about the role of exported waste that is reported as recycled. This issue is reflected in the adoption of the new Regulation on the shipment of waste (2024), which introduces strict limitations on exports to non-OECD countries. During the period under review, at the EU level, waste exports to third countries remained high and relatively stable, reaching almost 34.5 Mt in 2023 - approximately 10% of all waste generated from economic activities. At the same time, seven Member States accounted for around 68% of the total exports of waste outside the EU. The top four - the Netherlands, Belgium, Germany, and Italy - have traditionally demonstrated high recycling rates, both for municipal waste and overall.

Figure 2. Municipal waste recycling rate in EU-27 and selected countries



Source: Eurostat, env_wasmun

A key indicator for measuring progress toward a circular economy is the circular material use rate (CMU). Although it does not directly measure waste flows, it is strongly correlated with many of the other waste-related indicators. The data show that at the EU-27 level, the CMU reached 11.8% in 2023, a modest increase compared with 9.1% in 2009. As with waste statistics, the differences between countries are substantial, revealing the absence of a clear reference value in practice. A total of nine Member States report values above the EU average, with the Netherlands (30.6%) and Italy (20.8%) achieving the highest results. By contrast, Germany (13.9%) and Spain (8.5%) most likely exert the strongest influence on shaping the EU average.

Moreover, the methodology underpinning the CMU indicator defines its denominator as domestic material consumption, which is directly dependent on the extraction of primary raw materials. In practical terms, this means that economies with a large extractive sector will show a relatively low CMU value, even if their recycling systems are efficient and provide a high share of secondary materials reintroduced into production.

5. Conclusions

The article demonstrates that the formation of the "EU average" indicators used to assess performance in waste management, and the circular economy involves a number of methodological inconsistencies among Member States, as data collection methods vary nationally. The analysis confirms the dominant role of large economies in shaping aggregated indicators, which leads to distortions in the interpretation of results for smaller countries. This implies that EU average indicators should be used with caution as a reference point for analysis and comparison.

Furthermore, methodological discrepancies and data gaps for certain years and countries indicate that the process of data collection in the field of waste management remains at an early stage and requires further refinement. Until these improvements are achieved, it will not be possible to rely on fully robust and comparable data suitable for sound analysis and evidence-based policy making.

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Daniel Petrov[1]

SPATIAL ECONOMIES OF ENERGY COMMUNITIES: HOW URBAN DENSITY OF COLLECTIVE SELF-CONSUMPTION REDUCES SOLAR CURTAILMENT AND ENHANCES GRID FLEXIBILITY IN THE EU

***Abstract**: This study investigates whether the spatial density of collective self-consumption energy communities in EU urban areas is positively correlated with enhanced grid flexibility and reduced solar PV curtailment. Using a mixed-methods approach, the research combines GIS-based spatial density mapping, statistical correlation and regression analysis, and qualitative policy review across 15 representative European cities. Results show that higher CSEC density is significantly associated with lower curtailment rates and higher flexibility scores. Cities like Ghent and Vienna exhibited the most favorable performance, supported by digital infrastructure and enabling policy frameworks. Multivariate regression confirmed CSEC density as a key predictor, independent of population or rooftop PV levels. The findings emphasize that spatial clustering of energy communities generates systemic grid benefits and should be prioritized in EU energy policy. The study concludes with strategic recommendations for spatial planning, DSO collaboration, data governance, and regulatory reform to accelerate the role of CSECs in Europe's clean energy transition.*

***Key words**: Collective Self-Consumption (CSEC), Urban Energy Communities, Grid Flexibility Solar PV Curtailment, Spatial Energy Planning*

JEL: *Q48; R14; Q55*

1. Introduction

The European Union (EU) is a global leader in renewable energy, advancing the European Green Deal, Fit for 55, and REPowerEU to cut greenhouse gas emissions by 55% by 2030 and reach climate neutrality by 2050 (Wang and Lin, 2025). Central to these goals is the rapid expansion of solar photovoltaic (PV) energy, particularly in urban areas, though this growth exposes technical challenges such as PV curtailment - the forced reduction of solar output due to grid congestion (Branchetti, Petrovich, Gessa, and D'Agosta, 2025). Curtailment lowers efficiency and undermines investment confidence, especially among decentralized prosumers. To address these inefficiencies, collective self-consumption energy communities (CSECs) - cooperatives that produce, share, and consume local renewable energy have emerged as a key solution under the Clean Energy for All Europeans package (Daglis, Ipsakis, and Tsagarakis, 2025). Their real impact on grid flexibility and curtailment, however, remains underexplored, particularly in complex urban settings where dense infrastructure and variable demand coexist. Since urban areas account for over 75% of EU energy use and 70% of CO_2 emissions (Domac, 2026), they provide ideal conditions for CSECs through spatial clustering and distributed grid balancing.

Despite increasing policy attention, little empirical evidence exists on whether CSEC density reduces curtailment or enhances flexibility. Most studies focus on simulations or isolated case analyses, leaving a gap in real-world understanding. This study addresses that gap by hypothesizing that higher urban CSEC density - measured as operational communities per km² is linked to improved grid performance. Digitalization and predictive analytics reinforce this view: networked communities using predictive load balancing reduce grid strain (Branchetti, Petrovich, Gessa, and D'Agosta, 2025), while digitally integrated CSECs achieve 20% lower curtailment (Buyreu Alias, 2025). Smart inverters, home energy management systems

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(HEMS), and blockchain-based trading now allow real-time synchronization with grid conditions. Policy harmonization under RED III has accelerated CSEC deployment, with Spain, Germany, and the Netherlands leading through incentives and simplified permits, and cities like Vienna and Amsterdam modeling community energy savings and emissions cuts (Ionescu, 2025; Daglis, Ipsakis, and Tsagarakis, 2025). Yet legal and administrative fragmentation—ownership, metering, and data-sharing rules-persists. Spatial planning also plays a crucial role: Tomczyk and Łapniewska (2025) found that CSEC adoption in Poland increases where municipalities co-invest and grid infrastructure is strong; Calcagno, Trombadore, and Pierucci (2025) showed optimized building-integrated photovoltaics in Florence reduce curtailment; and Liu (2025) described hybrid energy communities in Denmark and the Netherlands that combine PV, storage, and heat to improve flexibility. CSECs are thus evolving from simple generation units into flexible, demand-responsive actors embedded in the urban fabric. Still, spatially resolved empirical evidence on how density affects grid outcomes remains limited. This study addresses that gap through a GIS-based, statistical, and regulatory analysis, linking CSEC clustering with reduced curtailment and enhanced flexibility to inform evidence-based urban energy planning and EU decarbonization policy.

2. Methodology

The study employs a mixed-methods approach that integrates geospatial analysis, statistical modeling, and qualitative policy review to examine whether the spatial density of CSECs in EU cities correlates with greater grid flexibility and reduced PV curtailment. Fifteen representative cities were selected based on diversity in grid topology, regulatory maturity, and availability of open-source spatial energy data. These include Vienna, Amsterdam, Milan, Warsaw, Lisbon, Berlin, and Ghent, chosen to represent different patterns of CSEC development and urban energy governance. Geographic and operational data on energy communities were collected from national regulatory authorities such as BNetzA in Germany and ERSE in Portugal, from municipal transparency portals like the Amsterdam Energy Atlas and Open Data Vienna, and from Horizon 2020 and Horizon Europe project deliverables. Each CSEC was geocoded and assigned metadata, including installed PV capacity, commissioning year, number of participating buildings or households, and its grid connection point. All datasets were normalized and rasterized in QGIS at a uniform spatial resolution of 1 km² to ensure comparability across all selected cities.

To quantify curtailment at the local level, this study defines the curtailment rate CR for each zone using the following equation:

$$CR = \frac{E_{generated} - E_{injected}}{E_{generated}} \quad (1)$$

where: $E_{generated}$ is the total PV electricity generated by a given CSEC, and $E_{injected}$ is the amount successfully exported to the grid. These values are sourced from DSO-level grid monitoring data, aggregated annually, and, where necessary, interpolated using load distribution models and substation injection curves.

Local grid flexibility is measured through a composite index that includes:

- the number of local demand-response (DR) activations,
- the total flexible load activated (in MW), and
- the number of dispatchable community storage systems per zone.

These components are normalized into a composite $Flexibility\ score$ (F_{score}), ranging from 0 to 1.

To assess spatial clustering of CSECs, kernel density estimation (KDE) is applied. The non-parametric KDE function used is:

$$\hat{f}(x) = \frac{1}{nh}\sum_{i=1}^{n} K\left(\frac{x-x_i}{h}\right) \quad (2)$$

where: x_i denotes the spatial coordinates of each CSEC, h is the kernel bandwidth (set at 1.5 km), K is the Gaussian kernel function, and n is the number of CSECs in the dataset. KDE surfaces are exported as raster layers and overlaid with curtailment and flexibility data, enabling zone-level classification into low, medium, and high-density quantiles.

In the third phase, statistical analysis is employed to test the hypothesis that higher CSEC density is significantly correlated with reduced curtailment and increased flexibility. Pearson's correlation coefficient r is calculated as:

$$r = \frac{\sum(X_i-\bar{X})(Y_i-\bar{Y})}{\sqrt{\sum(X_i-\bar{X})^2.\sum(Y_i-\bar{Y})^2}} \quad (3)$$

where: X_i represents CSEC density and Y_i represents either curtailment rate or flexibility score. Where data violate normality assumptions (Shapiro-Wilk test), Spearman's rank correlation coefficient ρ is used.

To explore causality and isolate the effects of CSEC density, a multivariate linear regression is implemented for both dependent variables (curtailment and flexibility). The model is specified as:

$$Y = \beta_0 + \beta_1 D_{SCEC} + \beta_2 PV_{share} + \beta_3 Pop_{density} + \beta_4 Storage_{MW} + \beta_5 Buliding_{age} + \varepsilon \quad (4)$$

where: Y is either curtailment rate or flexibility score, D_{SCEC} is the spatial density of CSECs (per km²), PV_{share} is rooftop PV penetration, $Pop_{density}$ is population per km², $Storage_{MW}$ is battery capacity, $Buliding_{age}$ is average building vintage, ε is the error term.

All models are tested for heteroskedasticity using the Breusch-Pagan test and for multicollinearity using Variance Inflation Factors (VIF). The statistical analysis is conducted using Stata 17 for regression diagnostics and SPSS 29 for bivariate correlations and distribution testing. Statistical significance is set at $\alpha = 0{,}05$ and all confidence intervals are reported at the 95% level.

In the final phase, a qualitative content analysis contextualizes the spatial results. Over 60 policy documents are reviewed, including RED II and RED III transpositions, municipal ordinances, grid access rules, and national energy strategies (2018–2025). Using NVivo, documents are coded under themes such as Community support schemes, Grid access rights, Dynamic tariffs, Flexibility market access, and Technical interconnection standards. Axial coding and memo-writing link qualitative insights with spatial and statistical findings. All community data are anonymized and aggregated to prevent reidentification, ensuring full compliance with the EU General Data Protection Regulation (GDPR). Geospatial layers, regression models, and scripts are archived in a FAIR-compliant open repository under a CC-BY license.

3. Results and Discussion

The research provides strong evidence that higher spatial density of CSECs in EU cities is linked to lower PV curtailment and greater grid flexibility. Across fifteen analyzed cities - Vienna, Amsterdam, Milan, Lisbon, Berlin, Warsaw, and Ghent, clear spatial patterns show that higher CSEC density corresponds with better energy performance. Average densities

ranged from 1.3 communities per km² in Warsaw to 3.5 in Ghent, with lower curtailment rates in denser cities: Ghent (1.8%) and Vienna (2.1%) outperformed Milan (4.7%) and Warsaw (5.1%). Flexibility scores followed the same pattern, with Ghent (0.84), Lisbon (0.81), and Vienna (0.75) achieving the highest results.

Table 1. Descriptive Statistics by City

City	Avg CSEC Density (per km²)	Avg Curtailment (%)	Flexibility Score (0–1)
Vienna	3.2	2.1	0.75
Amsterdam	2.8	2.8	0.68
Milan	1.5	4.7	0.54
Lisbon	2.4	3.2	0.81
Berlin	1.9	3.5	0.63
Warsaw	1.3	5.1	0.52
Ghent	3.5	1.8	0.84

Source: Author's elaboration

Statistical analysis confirms these patterns, showing a strong negative correlation between CSEC density and PV curtailment ($r = -0.63$, $p < 0.001$) and a strong positive correlation with grid flexibility ($r = +0.71$, $p < 0.001$). Spearman's coefficients confirm these results for non-normal data. Additional links include positive correlation with demand response activations ($r = +0.55$, $p = 0.002$) and negative correlation with peak-load curtailment ($r = -0.48$, $p = 0.006$), reinforcing that clustered energy communities enhance grid performance.

Table 2. Correlation Results

Tested Relationship	Pearson r	Spearman ρ	p-value	Statistical Significance
CSEC density vs. PV curtailment	-0.63	-0.59	<0.001	Yes
CSEC density vs. Grid flexibility	+0.71	+0.68	<0.001	Yes
CSEC density vs. DR activations	+0.55	+0.50	0.002	Yes
CSEC density vs. Peak-hour curtailment	-0.48	-0.44	0.006	Yes
CSEC density vs. Grid complaint frequency	-0.42	-0.39	0.010	Yes
CSEC density vs. Storage capacity (MWh/km²)	+0.60	+0.58	<0.001	Yes

Source: Author's elaboration

To verify these relationships and isolate the impact of spatial density, a multivariate linear regression was applied using PV curtailment and grid flexibility as dependent variables. Independent variables included CSEC density, rooftop PV penetration, population density, storage capacity, and building age. Results show that CSEC density had significant effects ($\beta = -0.42$ for curtailment, $p = 0.004$; $\beta = +0.46$ for flexibility, $p = 0.002$), confirming its strong predictive role. Other variables - PV penetration and storage capacity -were only marginally significant, while population density and building age showed no effect, indicating that the benefits stem mainly from the spatial clustering of shared-energy communities.

Table 3. Regression Coefficients

Independent Variable	Beta (Curtailment Model)	Beta (Flexibility Model)	p-value (Curtailment)	p-value (Flexibility)
CSEC Density	-0.42	+0.46	0.004	0.002
PV Penetration	+0.12	+0.08	0.091	0.116
Population Density	+0.06	+0.11	0.157	0.082
Storage Capacity	-0.18	+0.29	0.021	0.009
Avg Building Age	+0.05	-0.07	0.235	0.174

Source: Author's elaboration

This study shows that the spatial organization of energy communities - not merely their presence is key to technical performance. Unlike earlier research centered on social or economic effects, it provides empirical evidence of grid-level outcomes at the urban scale. Ghent and Vienna performed best thanks to open data and streamlined permitting, while Milan and Warsaw lagged due to administrative and digital barriers. The results emphasize that spatial clustering of CSECs through shared rooftops and networked neighborhoods enhances distributed generation and participation in flexibility markets. Despite limitations in spatial resolution and proxy indicators, the consistent link between clustering, reduced curtailment, and improved flexibility confirms the value of community-based spatial energy planning in EU decarbonization.

4. Conclusion

This study provides strong evidence that the spatial clustering of CSECs reduces solar PV curtailment and enhances grid flexibility in EU cities, offering key insights for the Green Deal, Fit for 55, and RePowerEU. Current EU legislation (RED II and RED III) recognizes energy communities but lacks spatial criteria; therefore, the European Commission should integrate spatial density targets into National Energy and Climate Plans and promote CSECs in areas with high solar potential or grid stress. Urban planning should adopt a community-scale approach, embedding CSECs into master plans and zoning codes, as seen in Berlin and Vienna's "energy community corridors." DSOs play a pivotal role and should receive performance-based incentives, apply spatially differentiated tariffs, and expand regulatory sandboxes to test flexibility and peer-to-peer trading models. Improved data governance is essential standardized, anonymized grid data and GDPR-compliant smart meter sharing should be mandated, supported by an EU-wide Community Energy Data Standard and Horizon Europe funding for real-time optimization tools. Public funding from the Just Transition Fund, Social Climate Fund, and green banks should prioritize spatially clustered, high-performing communities, including social housing projects. Policymakers should monitor progress through a CSEC Spatial Density Index managed by the EEA or Eurostat. To overcome limited municipal and cooperative capacity, Member States should fund training in spatial modeling and digital energy management. Finally, DSOs should include clustering forecasts in Distribution System Development Plans, recognizing community-driven flexibility as a grid deferral asset and fostering co-investment under a shared value model to advance Europe's decentralized, decarbonized energy transition.

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Елица Димова / Elitsa Dimova [1]

УСТОЙЧИВОСТТА В КОНТЕКСТА НА ДИГИТАЛИЗАЦИЯТА В ЕС – РЕТРОСПЕКЦИЯ И ПРОБЛЕМИ

Резюме: *Устойчивостта като модел за бъдещото развитие на цивилизацията предполага икономическа стабилност, социална грижа и гарантирано личностно развитие. Целите на тази устойчивост са свързани със съхранението на всички видове ресурси в дългосрочен план. Но в последните петдесет години по-модерната идеология за управление на глобалното информационно общество, дигитализацията и създаването на инфраструктурата на цифровото общество, измести фокуса в друга посока. В този смисъл устойчивостта започна да се разглежда и в контекста на дигитализацията. Доколкото тя води до икономически ползи нейните елементи – за екологичното, гарантирано градско и регионално развитие, се предефинират и фокусират върху много по-големи изисквания към човешкия капитал. Това създава условия за социална нестабилност.*

Ключови думи: *Европейски съюз, дигитализация, информационно общество, единен цифров пазар, цифровизация*

JEL: *D71, D80, D83, F15, J51, L96, N74, O15*

SUSTAINABILITY IN THE CONTEXT OF DIGITALIZATION IN THE EU – RETROSPECT AND CHALLENGES

Abstract: *Sustainability as a model for the future development of civilization implies economic stability, social care and guaranteed personal development.. The goals of this sustainability are related to the preservation of all types of resources in the long term. But in the last fifty years, the more modern ideology of managing the global information society, the creation of the infrastructure of the digital society, have shifted the focus in another direction. In this sense, sustainability has also begun to be considered in the context of digitalization. To the extent that it leads to economic benefits, its elements - for the ecological, guaranteed urban and regional development, are redefined and focused on much greater requirements for human capital. This creates conditions for social instability.*

Key words: *European Union, digitalization, information society, digital single market*

JEL: *D71; D80; D83; F15; J51; L96; N7; O15*

1. Увод

Устойчивостта след първоначалната ѝ дефиниция, която включва предимно екологични и регионални въпроси, все повече разширява своя обхват. Устойчивостта по дефиниция включва дигитализацията чрез някои сегменти като изграждането на умни градове, достъпност на всички социални групи до интернет, социалните мрежи и мобилните оператори.

2. Състояние на проблема

Програмата за дигитализация в Европейския съюз (ЕС) е част от информационната политика в развитието на информационното и мрежово общество. От класическите автори, които са ги изследвали (Франк Уебстър, Даниел Бел, Алвин Тофлър и др.), става ясно, че няма единна концепция както за появата, така и за развитието му. Подходите

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могат да се сведат обобщено до икономически и културен. Единият се позовава на постиндустриалното общество като икономически стадий и обществена стратификация (Даниел Бел, Ерик Хобсбаум, Франсис Фукуяма), а другият набляга на факторите от образователно и културно естество. Основата обаче е новото ниво на технологично развитие, което води до устойчиви изменения във всички сфери на живота. Що се отнася до институционалната рамка на информационната и комуникационна политика на ЕС тя възниква късно – едва през 80-те години на XX век и съчетава различни нива на законодателни промени. Една част от които са свързани с въвеждане на дигитализацията и цифровото общество.

3. Методологични подходи

Анализът на информационното общество и предпоставките за развитие на Информационната политика на Европейския съюз (ЕС), както и особеностите й, могат да разкрият и естеството на приложенията, ефектите и деформациите. Самото информационно общество, явление, което се появи в най-пряка връзка с управлението и контрола на транснационалните корпорации (ТНК), се смята от първите му идеолози за панацея при решаване на обществените проблеми. Информационни потоци са предпоставка за интернационализиране на икономика, по-специално финансовите услуги и мрежи, които свързват по същество разпръснати дейности. Основните изводи са:

1. Информацията е от огромно значение за управлението и контрола на транснационалните корпорации.
2. Появява се ядро, което дирижира комуникационните процеси.
3. Появяват се понятията, свързани с устойчивостта, глобален регионализъм (известен като glocalisation), и „електронна интеграция“.

В рамките на ЕС публикуваната от Европейската комисия през 1987 г. „Зелена книга за развитието на общия пазар на телекомуникационни услуги и телекомуникационни уреди“ поставя началото на процеса на либерализация на сектора на телекомуникациите. Този процес продължи с постепенното създаване на правна рамка за телекомуникациите, включваща пет главни директиви: „рамка“, „достъп“, „разрешаване“, „универсална услуга“, „личен живот и електронни комуникации“.

От 1980 до 1992 г. информационният обем, пренасян чрез фиброоптични кабели, се увеличи с 18 % (Филева, П., 2003, с.110). Тази комбинация позволи да се създаде компютърно-опосредствана комуникация. Така средата, която би трябвало да бъде устойчива е в нова позиция на необходима нова защита, заради изключителната динамика на промяната.

Трансформациите в медиите вследствие на конвергенцията с технологиите

Медийният бизнес е специфична част от възхода на индустриалния капитал. Традиционните медии префокусират вниманието си към интересите му и това ги прави зависими, което се отразява на доверието на публиките. Една от основните причини за това е доказаната медийна субординация спрямо представителите на официалната власт. Медийната комуникационна среда се изкривява все повече в посока към комерсиализация и обвързаност с невидими ядра. Като Петко Тодоров изброява няколко основни признака – концентрация и глобализация, които са характерни и за българските медии. (Тодоров, П., 2011) Новите медии играят компенсаторна роля като размиват етническата и националната идентичност чрез създаването на социална резистентност

към еднаквостта. Други функции на новите медии са конвергенцията и диверсификацията.

Европейският съюз приема, че терминът „конвергенция" няма съвсем точна дефиниция, но най-общо се изразява като:

- събирането заедно на потребителски устройства като телефона, телевизора и персоналния компютър. Двата елемента на доставката са мрежовата платформа и „потребителската среда". Конвергенцията е на три нива – технологии и мрежови платформи, алианси и сливания в индустрията, както и пазарите и услугите. (Green Paper on the Convergence of the Telecommunications.,1997, p.1)

Интерактивността е друг белег, който превърна Интернет в нова медия. Според Роджър Фидлър новите медии са трансформирани форми на традиционните, които се приспособяват към икономическата среда като диверсифицират дейността си в мрежата. (Фидлър, Р., 2005). Развитието на технологиите и формирането на нови социални явления в компютърно-опосредстваните комуникации, и създаването на медийно съдържание вървят паралелно (Маринов, В., 2012, с.14-30). Потребителските модели се изучават и имплантират постепенно в Изкуствен интелект. В свой документ от втората половина 90-те години – „Зелената книга за конвергенцията в секторите на телекомуникациите, медиите и информационните технологии и последиците за регулацията" разглежда информационно-медийната конвергенция. Тя налага да се преосмисли част от методологията за измерване на аудиторията за промяна (осъществява „редизайн") на дигиталната икономика, което води до ограничения в собствеността на медиите и дори – до преосмисляне на етиката и естетиката в медиите. Дейвид Доминго разглежда четири аспекта на конвергенцията – интегрирано производство, професионалисти с умения в различни области, разпространение на основата на многоплатформени технологии и активна аудитория (Domingo, D. et al, 2011). Според Марк Дюз „конвергенцията най-общо се разглежда в термини като нарастващо кооперирание и сътрудничество между по-рано разделени редакции и други части на модерната медийна компания"(Deuze, M., 2004).

Социалните мрежи и устойчивото развитие, дигитална трансформация и проблемни зони

През последните петдесет години държавите-членки прехвърлят своя суверенитет към европейските институции и към механизмите на междуправителственото вземане на решения. Поради това излезе и документът „Седем стратегии за информационното общество"(Brüggemann, M., 2005, p.6.). Промяната на парадигмата относно същността на информацията е свързана с развитието на информационното общество. Поради това режимът на изключения при достъпа до информация трябва да бъде ревизиран. Мрежата се превръща в заместител на прозрачната среда, създадена с политическата воля на европейските институции.

След 2000 г. на практика ЕС предефинира устойчивото развитие и го разглежда като елемент на информационното общество. В Лисабонската стратегия информационното общество се определя като „качествено нова структура, организация и обществени отношения, основани на глобалния достъп до информационни и комуникационни мрежи и услуги, без национални и географски или други ограничения за обмен на информация, научни, духовни и други постижения". (The Treaty of Lisbon, 13 December 2007.) Свързването в мрежа на различни услуги е част от политиката на ЕС за устойчив икономически растеж, генериращ и социална сигурност. Затова, търсейки възможност да навакса изоставането в международната конкуренция в интернет сектора и в

мрежовото общество ЕС си постави за цел електронно правителство, електронно обучение и електронно здравеопазване (eGovernment, eLearning, eHealth).

През 2009 г. Комисията преразгледа пакета за телекомуникациите, като прие директивите „По-добро регулиране“ и „Права на гражданите“ и въведе Орган на европейските регулатори в областта на електронните съобщения (ОЕРЕС). В инициативата 2010 г. Европейската комисия определи три основни приоритета. Първият приоритет е създаване на общо европейско информационно пространство, което предлага достъпни, сигурни и бързи комуникации, цифрови услуги, богато и разнообразно съдържание. От юридическа гледна точка анализът на инициативата води до общия извод, че в периода 2006-2010г. Европейската комисия осъществи съществено обновяване в съдържанието на целите и задачите на информационното общество. В следващия етап стратегията „Европа 2020” – „Съюз за иновации”, „Младежта в движение· и „Програма в областта на цифровите технологии” целеше да запълни нуждата от нови идеи и политики в областта на глобалното информационно общество и цифровата икономика. Чрез финансовата рамка 2014 – 2020 г. се осигури финансиране и модернизиране на висшето образование чрез прилагането на три основни механизма: „Образование Европа” – единна програма за образованието, обучението и младежта, „Хоризонт 2020” – рамкова програма за изследване и иновации, която обхваща цялото финансиране на ЕС, и Инструменти на политиката за сближаване – Европейски фонд за регионално развитие и Европейски социален фонд. През 2018 г. Директива (ЕС) 2018/1808 изменя и актуализира Директивата 2010/13/ЕС за аудиовизуалните медийни услуги с цел постигането на единен цифров пазар.

ЕС особено след Ковид19 обяви нова програма за дигитализация и въвеждането на цифровото общество придоби нов аспект. Формира се т.нар. политиката „Цифрово десетилетие 2030“, която установява годишен цикъл и рамка за управление, което означава годишен механизъм за планиране в държавите членки. Механизмът за сътрудничество се състои от: структурирана и споделена система за мониторинг, базирана на индекса за цифрова икономика и общество (DESI), за измерване на напредъка към всяка от целите за 2030 г. Третият „Доклад за състоянието на цифровото десетилетие“ беше публикуван през юни 2025 г. като на всеки две години ще се актуализират стратегическите пътни карти за цифровото десетилетие, в които държавите членки очертават приетите или планираните действия за постигане на целите за 2030 г. Създава се и Европейския консорциум за цифрова инфраструктура. Набелязват се т.нар. базови и прогнозни траектории, които очертават как ЕС ще напредва. До 2026 г. ЕС възнамерява да направи равносметка на технологичното, икономическото и общественото развитие, като ще стартира многостранни проекти, за да „постигне цифровите цели и задачи“. Целта е сигурен цифров единен пазар. Приготвен е списък, който включва области за инвестиции като инфраструктура за данни, процесори с ниска мощност, 5G комуникация, високопроизводителни изчисления, сигурна квантова комуникация, публична администрация, блокчейн, центрове за цифрови иновации, цифрови умения и киберсигурност. (European Declaration on Digital Rights and Principles, 2022) Според Третия доклад за състоянието на многонационалните проекти, който беше публикуван през юни 2025 г. се определят цифровите права и принципи. Според т.нар. „цифровите права и принципи“ в Декларацията, предложена от Комисията през януари 2022 г., ангажимента на ЕС е да създаде условия за сигурна, безопасна и устойчива цифрова трансформация, която поставя хората в центъра, в съответствие с основните ценности на ЕС и основните права.

4. Изводи

Социалните мрежи са част от човешката история. „Ядрото" е хоризонтален, но и йерархически център. Въпросът е дали е и политически такъв. Макар че мрежовата форма на обществена организация да е съществувала и в други времена, то днес тя получава невиждани преди това предпоставки за развитие. Глобалните комуникации имат своите положителни и отрицателни страни:

1. Рязко се увеличават субектите в една мрежа и третирането на мрежата като частна корпоративна собственост има и своите негативни ефекти от гледна точка на устойчивостта на обществените отношения,
2. Форсира се икономическо развитие, но процесите са неравномерни в различните сфери и влияят силно върху стабилността на пазара на труда, културната и личностна идентичност.
3. Бързото създаване, използване на определени връзки, както на директно взаимодействие, така и на индиректно, идейно влияние създава нови центрове на власт, които остават анонимни и неконтролирани.
4. Дигиталните ядра с ИИ концентрират огромни възможности за решаване на проблемите, а чрез експертни системи на ИИ за бърза реакция при различни бедствия и трудни за решаване административни и държавни ситуации. Но също така не изключват възможността за грешки.
5. Налага радикална трансформация на държавната структура, опирала се по-рано на ограничеността на комуникациите на определена територия. От гледна точка на устойчивостта и киберсигурността това представлява сериозен риск
6. Трансформираната в условията на глобализацията държава може да даде възможност за нов постиндустриален тип догонващо развитие, но има възможност и за прекалено фокусиране върху транснационалните цели и оставяне без внимание на вътрешнополитически и икономически такива.

5. Заключение

Условията, в които се провежда политиката за трансформация и дигитализация за въвеждане на цифровото общество са свързани с определено устройство на държавите и обществените отношения, които се характеризират и изискват устойчивост. Идеята за „градивното разрушение" на тези отношение среща своите опоненти и предизвиква важен диспут генерално за бъдещото развитие на цивилизацията. Що се отнася до ЕС той се стреми да догони икономиките на изпреварващите я държави и съюзи чрез придаване на допълнителен административен капацитет на институциите, и създаване на предпоставки за изграждането на Единни европейски щати чрез цифров пазар. Този процес върви с елементи на голяма икономическа и социална нестабилност. Основен вододел е Ковид19 и загубата на доверие в центровете на власт в целия ЕС. В тази връзка начинът на функциониране на европейските политики също се нуждае от реформи, които да отчитат действителните проблемни зони не само на ТНК, но и на различните прослойки в ЕС, засегнати от въвеждането на цифровото общество.

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DOMESTIC TOURISM AND SUSTAINABLE DEVELOPMENT: A BIBLIOMETRIC ANALYSIS

***Abstract**: The main goal of the present paper is to realize a bibliometric analysis of research about sustainable development of domestic tourism published in one of the leading scientific databases – Scopus. For the graphical representation of the results is used VOSviewer software. The selected papers for analysis are based on preselected keywords and content analysis. They are published between 1999 and 2025 with a clear peak between 2020 and 2025. Most of them are articles. The largest number of publications in the field of sustainable development of domestic tourism are observed in the journal Sustainability (Switzerland). The number of conference papers presenting results on the topic is significantly smaller. The analyzed topic is discussed mainly in the context of Social Sciences. The papers are authored by researchers from 50 countries. Scientists from Indonesia and China are mainly working on the topic.*

***Keywords**: sustainability; domestic tourism; bibliometric analysis*

JEL: *L83, Z32*

1. Introduction

Tourism is one of the priority sectors of the Bulgarian economy. Its importance is proven by its contribution to the gross domestic product, exports and foreign exchange earnings, etc. It is a key sector in the economic and social development of any country, especially in the context of global environmental challenges (Luvsandavaajav & Narantuya, 2021). Domestic tourism is characterized by temporary travel outside the permanent home for various purposes - recreation, culture, sports, etc., but within the tourist's country. It generates income and jobs in various sectors of the economy such as hotels, restaurants, transport and entertainment. It is a key factor for sustainable development, as it reduces dependence on external tourism (Canh & Thanh, 2020) and supports the balance between the protection of natural resources and economic growth within the country.

Sustainable development is key element of the modern world (Khan et al., 2022) and is a long-term topic (Dwyer, 2023). In tourism, it is a concept that integrates economic, social and environmental dimensions in the development of this sector, striving to achieve a balance between the needs of present and future generations (UNEP and UN Tourism, 2005). It is aimed at the long-term preservation of the capacity and quality of tourist destinations (Khizar et al., 2023). This approach involves managing tourism resources in a way that minimizes certain negative effects on nature and culture, while ensuring social justice and economic sustainability (Mancheva-Ali, 2025).

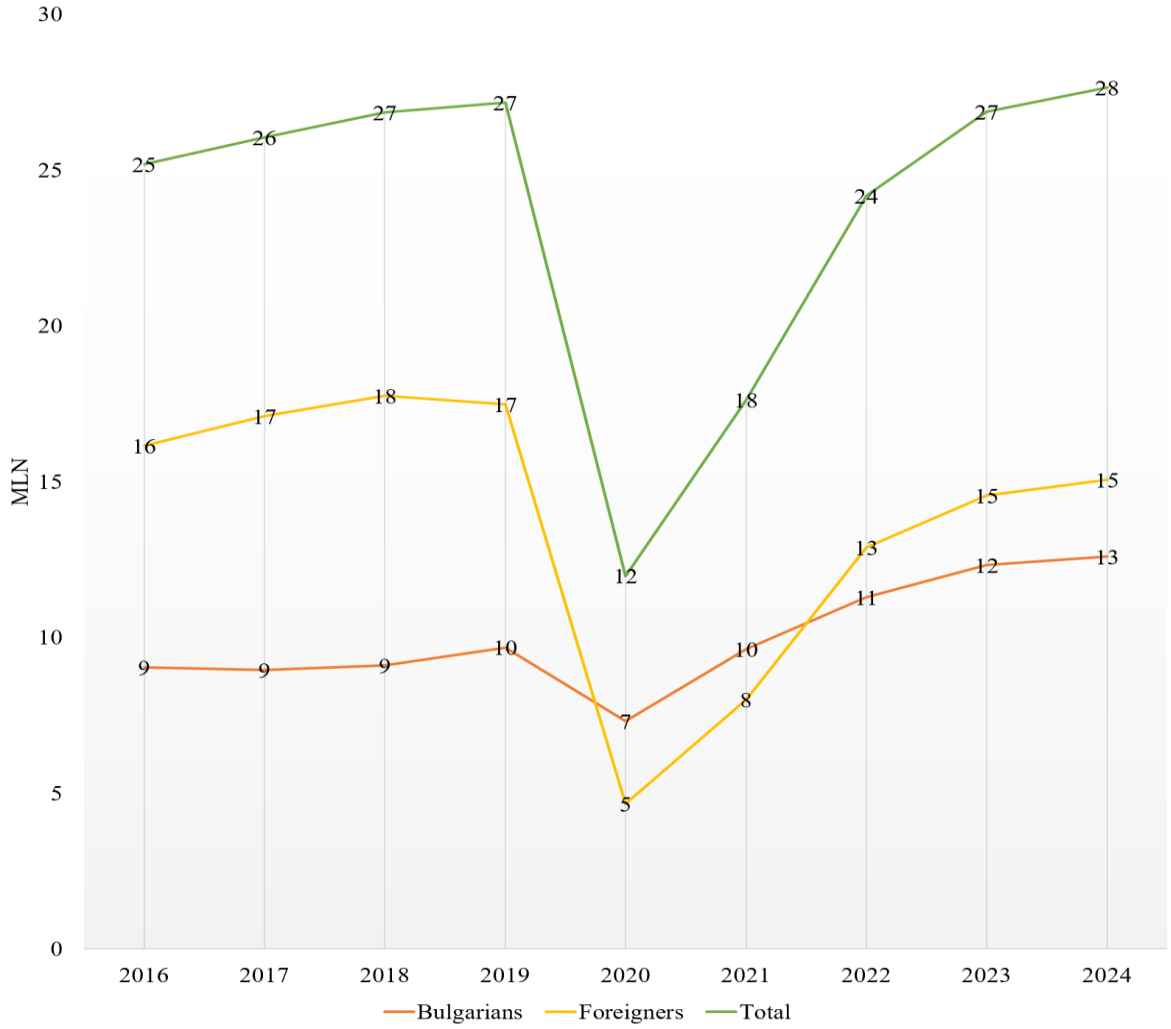
The present article aims to conduct a literature review of the role of domestic tourism in the context of sustainable development. For this purpose, bibliometric analysis is selected as main method which helps to process a large database (Donthu et al., 2021). The use of bibliometric methods allows for the identification of leading concepts and sources. It highlights what publications there are in Scopus as one of the leading scientific databases, the primary authors who contribute to this topic, which sources they are published in, which are the interactions between authors, based on their affiliation with the research institution and country, which are the most cited publications, the scientific fields that examine the concepts studied, etc.

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2. Domestic leisure tourism as a factor for sustainable tourism development

Domestic leisure tourism includes travel of citizens within their own country for recreation purposes with at least one overnight stay. It is one of the tourism forms that contributes to the sustainable development of the tourism industry as a whole. Proof of this is the stabilizing impact of tourism in Bulgaria that it had during the COVID-19 pandemic in the period 2020-2024. During this time, a number of travel restrictions were imposed at the national and international level (Sharma et al., 2021).

Figure 1. Overnight stays realized by Bulgarian and foreign citizens



Source: Elaborated by the authors based on NSI data

According to National Statistical Institute data represented in Fig. 1 before the pandemic, the number of overnight stays by foreigners exceeds those of Bulgarian citizens, but during the peak period of the health crisis (2020 and 2021), the number of overnight stays by Bulgarians is higher than that of foreigners. Therefore, domestic tourism helps to maintain the capacity of the accommodation establishments in the country, by protecting hoteliers from bankruptcy. It also partially retains qualified labour and has an impact on the sustainability of tourism destinations. On the other hand, at the end of the pandemic and in the first year after it, the total number of overnight stays is higher than before the pandemic, but the number of overnight stays by foreigners is lower than before the crisis, and that of Bulgarians is higher. The conclusion is that domestic tourism in these difficult years for the industry had a stabilizing economic importance.

3. Methodology

For the purposes of the research, the Scopus database is used as one of the largest scientific databases. The selected keywords are "sustainable development" AND "domestic tourism" AND "local tourism". Based on the specified search criteria, 280 publications are retrieved by Scopus search engine. Content analysis is performed to determine their relevance to the chosen topic. 102 papers are selected. A bibliometric analysis is executed by year, authors, subject area, document type, affiliation, country, source and type of access.

VOSviewer is chosen as a software for result mapping. It is free of charge program with all the functionality needed to execute current research (van Eck & Waltman, 2010, 2023) and is a popular instrument in expressing bibliometric search (Tamala et al., 2022). Network visualization was performed using the following analyses:

- co-authorship analysis (relationships between researchers, institutions, or countries based on their co-authored publications);
- citation analysis (how many times a specific article, author, or journal has been cited by other works);
- co-citation analysis (pairs of documents or authors that are cited together by a third document);
- bibliographic coupling analysis (thematic similarities between scientific documents based on the references they share).

The analyses use indicators such as sets of connected items, clusters, links, total link strength (total strength of connections for a single item to all other items in a network), etc.

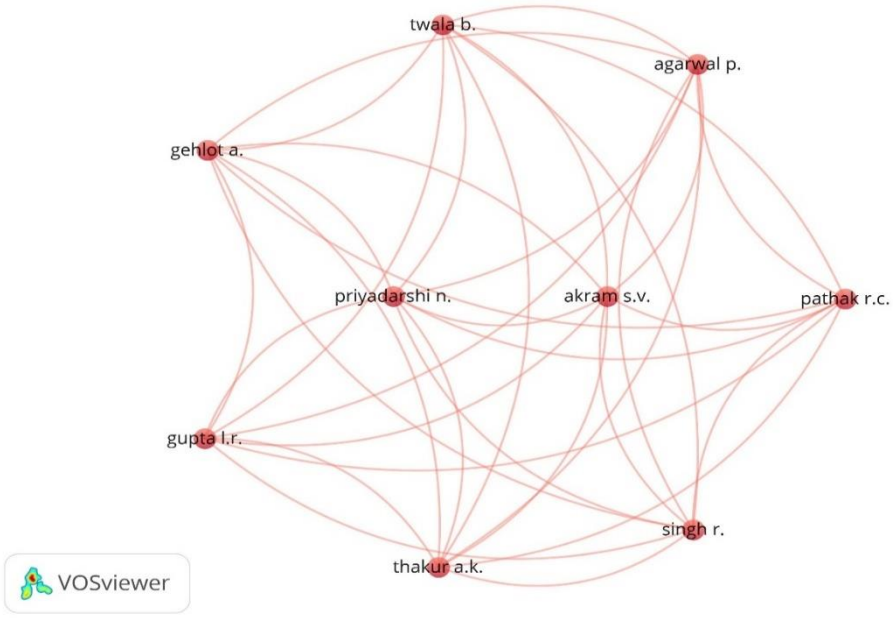
4. Research Results

The selected 102 scientific papers are published between 1999 and 2025 with a noticeable peak in 2020-2025 (total of 78). The highest number of publications is in 2025 (20). Between 2000 and 2008, in 2012 and 2017 there is a gap in articles. The authors that contributed most to the topic are Kevin Fuchs and Showkat Ahmad Shah. The documents are discussed in 15 subject areas, the most popular of which is Social Sciences, containing half of them. The topic is also researched in Environmental Sciences, and Business, Management and Accounting. 67 of the publications are scientific articles, 24 are conference papers, 8 are book chapters and 3 are reviews, published in 69 journals, 19 conference proceedings and 14 in books/book series. Almost half of the articles are All Open Access. The documents are published in 74 sources of which *Sustainability (Switzerland)* is the leader with 9 publications, followed by *Geojournal of Tourism and Geosites* (6). The 321 scholars that contributed to the selected papers represent 238 organizations from 50 countries. Indonesian (12) and Chinese authors (10) are the most active ones.

The co-authorship analysis shows that 9 authors have total link strength of 8 (9 of the authors have collaborated to 8 other authors each). Results are grouped in 99 clusters with 518 links. The largest set of connected items consists of 9 items with 36 links and is shown on Figure 2.

Two countries have the highest total link strength of 6, Russian Federation with 8 documents and USA with 5 documents. Indonesia (12 documents) and China (10 documents) have a total link strength of 3 and 2, respectively. Almost 40% of the countries have a total link strength of 0 and are excluded from the analysis.

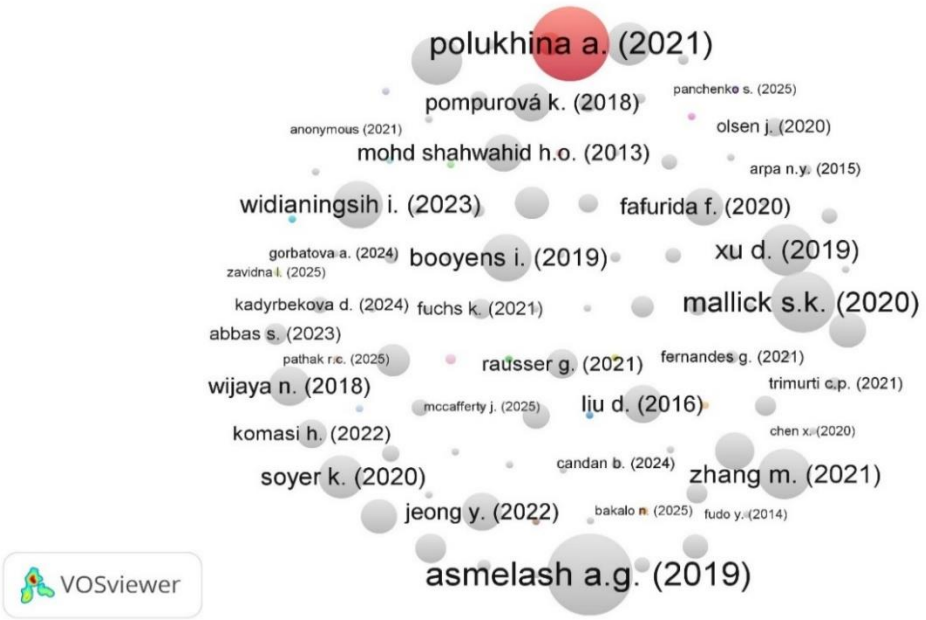
Figure 2. Co-authorship analysis by authors



Source: Own processing in VOSviewer

According to citation analysis the most cited article is The structural relationship between tourist satisfaction and sustainable heritage tourism development in Tigrai, Ethiopia (Asmelash & Kumar, 2019) with 87 citations, followed by The Concept of Sustainable Rural Tourism Development in the Face of COVID-19 Crisis: Evidence from Russia (Polukhina et al., 2021) with 73 citations, and Sustainable ecotourism development using SWOT and QSPM approach: A study on Rameswaram, Tamil Nadu (Mallick et al., 2020) with 51 citations. They have All Open Access status, which makes them easily reachable and suitable for citation. As 33 of the publications are not cited yet, they were excluded from the analysis (Figure 3).

Figure 3. Citation analysis by document



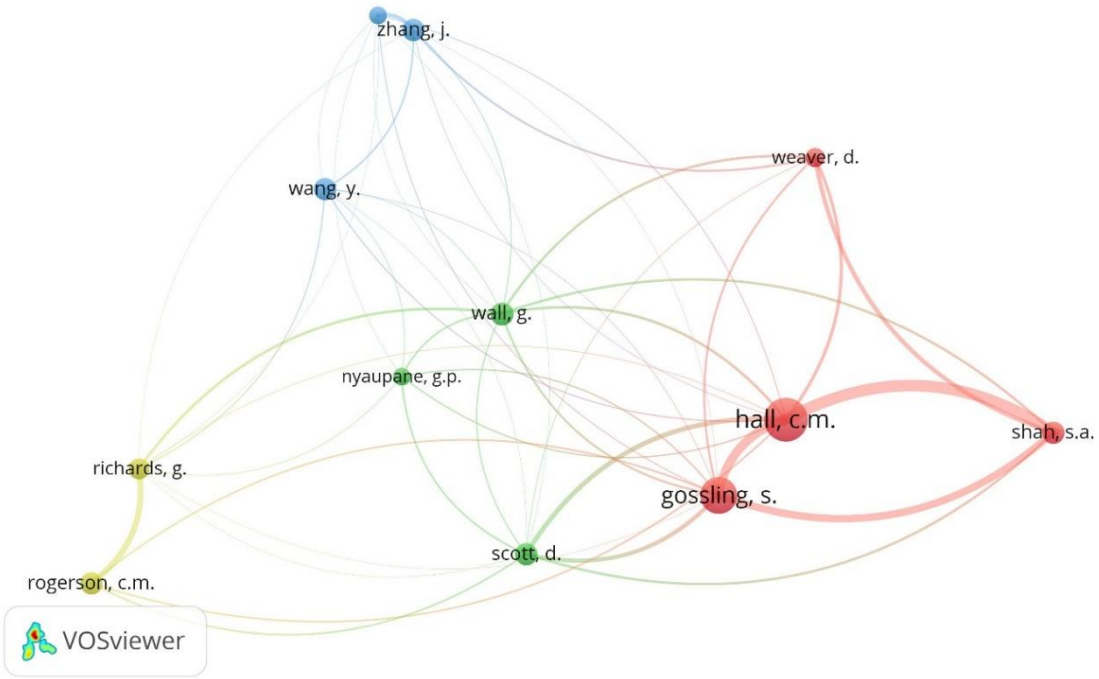
Source: Own processing in VOSviewer

The most cited publication studies the relationship between tourist satisfaction and dimensions of sustainable heritage tourism in a historical region in Ethiopia. The most significant finding of the research shows that environmental sustainability was insignificant predictor of tourist satisfaction in the study area and tourists consider economic, socio-cultural and institutional sustainability as important factors for tourism satisfaction.

Researchers from India are the most cited ones with 172 citations of 7 documents, followed by Indonesia (127 citations, 12 documents) and Russian Federation (112 citations, 8 document). *Sustainability (Switzerland)* is the leading journal with 137 citations of 9 publications, followed by Heliyon with 108 citations of 2 articles.

The co-citation analysis shows that the most cited authors in the selected papers are Colin Michael Hall (29 citations), Stefan Gössling (24 citations) and Showkat Ahmad Shah (13 citations). The results are obtained by setting a minimum of 10 citations per author and 14 of them met the requirement. The authors are combined in 4 clusters with 48 links. The largest one (in red) includes 4 authors (Colin Michael Hall, Stefan Gössling, Showkat Ahmad Shah and David Weaver) (Figure 4).

Figure 4. Co-citation analysis by author

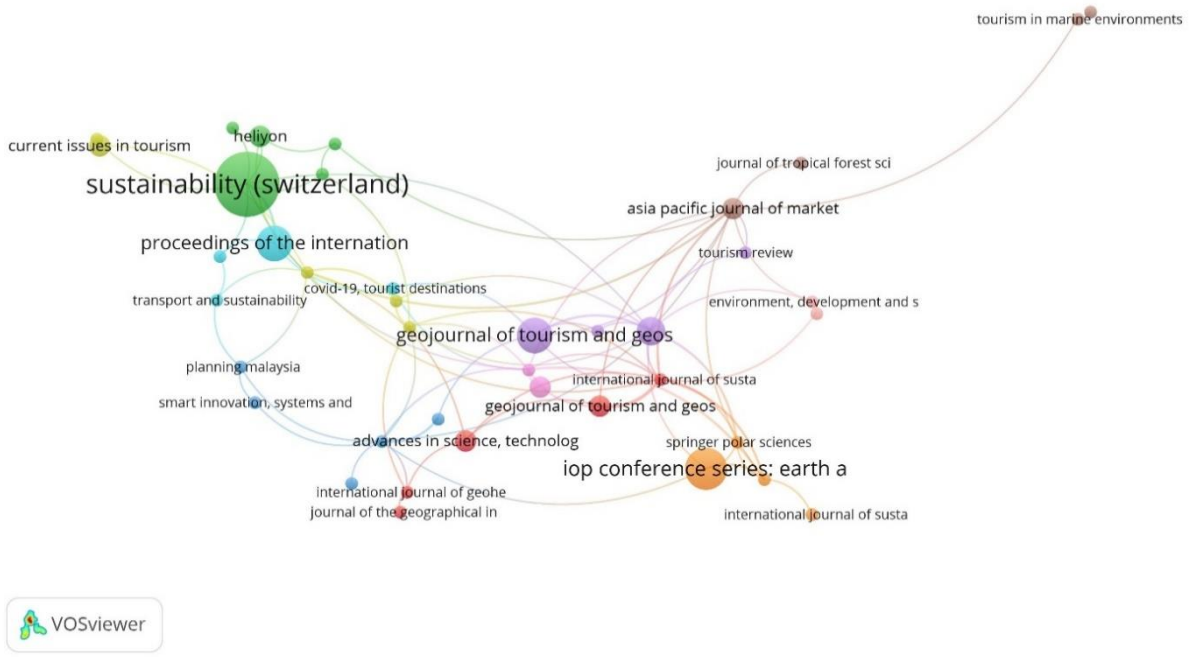


Source: Own processing in VOSviewer

Bibliographic coupling analysis was performed by document and source. The article with the highest total link strength of 16 is *Can consumption of local food contribute to sustainable tourism? Evidence from the perception of domestic tourists* (Wani et al., 2023). It is linked to 16 other documents in the network through shared references, indicating a broad and strong similarity in their content. The journals *International Journal of Sustainable Development and World Ecology* (total link strength of 16), *Asia pacific Journal of Marketing and Logistics* (total link strength of 14) and *Journal of Sustainable Tourism* (total link strength of 12) are the leaders amongst the sources. The strength of the link between two journals is determined by counting how many articles in each of their reference lists are also cited by articles in the other journal.

Half of the sources have a total link strength of 0 and are excluded from the analysis. The others are grouped in 10 clusters containing from 2 to 5 items (Figure 5).

Figure 5. Bibliographic coupling by source



Source: Own processing in VOSviewer

5. Conclusions

Sustainable development and tourism have a relationship that is constantly changing. Sustainable development of tourism should be perceived as an aspiration to strategic planning, ethical and balanced use of tourism resources. It has economic, social and environmental effects that are important when choosing management approaches. The noticeable peak in publications on the topic in the last five years is a clear sign that the scientific community is giving increasing importance to this problem. Modern research continues to expand their scope through new approaches, which emphasizes the need for innovation and global cooperation. The empirical approach and scientific research in the field of social sciences provide the opportunity to find practical solutions to increase the sustainability of tourism as a whole. The current bibliometric analysis shows, however, that research on this topic in Europe is significantly less than that in Asia, which also defines a gap in the scientific literature. In particular, in Bulgaria, research on the relationship between domestic tourism and sustainable development is very limited. Their development is necessary, especially in international scientific databases, in order to establish the place of Bulgarian specialists in the international scientific community in the field of domestic tourism.

Acknowledgement: The study has been conducted within the "Modeling and research of public attitudes of Bulgarian citizens regarding the image of domestic leisure tourism - situational analysis and conceptual framework for overcoming the negatives" project, funded by the Bulgarian National Science Fund, contract No КП06-Н65/6 from 12.12.2022.

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Violeta Doneva-Yankulova[1]

INVESTMENT PATHWAYS IN TOURISM: IPO FINANCING, PUBLIC POLICY AND SUSTAINABLE DESTINATION DEVELOPMENT: EXPLORING THE INTERSECTION OF CAPITAL MARKETS, REGULATORY FRAMEWORKS, AND SUSTAINABILITY IN TOURISM DEVELOPMENT ACROSS CENTRAL AND EASTERN EUROPE

***Abstract**: This research critically examines the evolving relationship between various investment mechanisms, with a particular emphasis on Initial Public Offerings, and their role in sustainable tourism development within Central and Eastern Europe. Bulgaria serves as a primary case study for this investigation. Employing the methodology developed by Leppänen et al., the study meticulously analyses how tourism policy frameworks significantly influence investor behaviours and the overall attractiveness of the tourism sector across diverse scales, encompassing global hospitality corporations and small-scale local enterprises. The mixed-methods approach adopted combines quantitative analysis of IPO performance metrics with qualitative interviews involving key stakeholders, thereby directly responding to scholarly calls for methodological pluralism in tourism finance research. The findings reveal substantial disparities in capital formation between corporate and small-scale tourism ventures, while concurrently identifying emerging synergies between ESG-oriented investment and sustainable destination development. Furthermore, the research conclusively demonstrates that EU membership has considerably enhanced the investment climate within Bulgaria's tourism sector, despite persistent challenges posed by geopolitical instability. This study significantly contributes to the tourism finance literature by establishing a robust theoretical framework for understanding the intricate interplay among capital markets, public policy, and sustainable tourism development, culminating in actionable recommendations for both policymakers and industry practitioners.*

***Keywords**: tourism finance, Initial Public Offerings (IPOs), sustainable tourism, ESG investment, Bulgaria*

JEL: *G24, Z32, Q56, O52, L83*

1. Introduction

Tourism's growing interdependence with global capital markets underscores the strategic role of investment mechanisms in achieving sustainable development. Among these, Initial Public Offerings (IPOs) have emerged as a critical yet underexplored channel for financing tourism enterprises, particularly within the evolving economies of Central and Eastern Europe (CEE) (Leppänen et al., 2023; Marcato et al., 2018). This study investigates how IPO financing supports sustainable tourism by linking market integration, regulatory frameworks, and environmental performance. The increasing capital intensity of tourism—driven by infrastructure modernization, digital transformation, and sustainability imperatives—requires innovative funding approaches. Green IPOs integrate environmental and social objectives into capital-raising processes, aligning corporate growth with the United Nations Sustainable Development Goals. These mechanisms merge ecological protection with financial value creation, enhancing competitiveness in the tourism and hospitality sectors (Iftikhar et al., 2024).

However, CEE tourism firms continue to face structural constraints such as limited liquidity, fragmented regulation, and underdeveloped financial infrastructure, which restrict access to public capital (Štreimikienė & Kyriakopoulos, 2024). Blended-finance models that combine public listings with private partnerships can mitigate these challenges and attract sustainability-oriented investors. Evidence suggests that ESG-aligned financing strengthens firm value,

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investor confidence, and risk management. Transparency through standardized ESG reporting further enhances investor trust and valuation. Despite increasing global momentum toward sustainable finance, CEE contexts remain heterogeneous. Tailored ESG frameworks reflecting regional institutional realities are therefore essential for effective market engagement. Within this environment, IPOs—particularly green variants—serve a dual role: mobilizing expansion capital and signalling corporate sustainability commitment. This research addresses a key gap by analysing how IPO financing mechanisms influence sustainable tourism development in CEE economies. Through a comparative framework grounded in Leppänen et al. (2023), it explores how institutional factors, market integration, and ESG performance jointly determine IPO outcomes, clarifying the potential of public capital markets to support environmentally responsible and financially resilient tourism growth.

2. Theoretical framework

This study integrates interdisciplinary perspectives to explain how financial and sustainability imperatives converge in tourism IPOs. Drawing on the *Resource-Based View*, *Institutional Theory*, and *Stakeholder Theory* (Waligo et al., 2013), it conceptualizes tourism firms as adaptive systems shaped by resource capabilities, institutional pressures, and stakeholder expectations. These paradigms collectively illuminate how access to public capital, institutional alignment, and social legitimacy determine investment attractiveness and resilience within the tourism sector (Leppänen et al., 2023). Recent literature highlights the growing concentration of capital in platform-based models and the expansion of sustainability-oriented investment vehicles, such as green bonds and ESG funds. National social norms concerning climate responsibility increasingly influence financing behaviours, directing capital toward firms that demonstrate environmental stewardship. Consequently, *Environmental, Social, and Governance* (ESG) performance has become a decisive factor shaping financial capacity and investor confidence (Zhou, 2023). Empirical evidence confirms that strong ESG credentials lower capital costs, improve access to finance, and foster stakeholder trust. This evolution supports a shift from traditional profit-maximization toward socially responsible investment (SRI) practices that reward firms aligning governance and operations with sustainability principles. Within tourism and hospitality, *green finance* has emerged as the key conduit linking environmental objectives with capital formation. It encompasses financial instruments—green loans, sustainable bonds, and renewable-energy investments—that simultaneously enhance ecological performance and firm value (Bagh & Iftikhar, 2024). Green-finance mechanisms reduce carbon intensity and improve energy efficiency, while strengthening destination competitiveness and long-term financial stability (Štreimikienė & Kyriakopoulos, 2024). Sustainability thus becomes a strategic asset rather than a compliance obligation, translating into market premiums and resilience to macroeconomic shocks. The positive feedback loop between ESG performance and financial outcomes reinforces the dual role of sustainability as both ethical commitment and economic advantage. Regulatory initiatives such as the *Global Reporting Initiative* and *IFRS S1–S2* now seek to harmonize sustainability reporting, mitigating information asymmetry and enhancing investor confidence. Governments and supranational bodies increasingly mandate transparent reporting, embedding sustainability within risk-management systems and corporate strategy. Firms with high ESG ratings exhibit superior profitability, lower debt-financing costs, and enhanced access to capital. In capital markets, transparency in ESG practices positively affects IPO performance by reducing investor uncertainty and signalling governance quality. The COVID-19 pandemic further underscored the strategic value of social responsibility as a mechanism of crisis resilience. Accordingly, tourism IPOs perform dual functions: they mobilize expansion capital and communicate corporate sustainability orientation. Understanding these mechanisms is crucial for policymakers and managers seeking to optimize capital access and align tourism

development with global sustainability goals. The theoretical synthesis advanced here positions ESG integration and sustainable finance as interdependent levers of competitiveness, demonstrating that firms internalizing environmental and social externalities enhance both profitability and systemic resilience within global tourism capital markets.

3. IPO analysis in the Tourism industry

Methodological approach

This study applies a multi-level analytical framework integrating quantitative and qualitative methods to explore how institutional, strategic, and firm-level factors shape *Initial Public Offerings* (IPOs) in the tourism sector (Leppänen et al., 2023). The framework enables a comprehensive understanding of how capital-market dynamics intersect with sustainability imperatives within tourism enterprises. Following the comparative approach of the quantitative analysis is based on a dataset of 87 tourism-related IPOs issued between 2013 and 2023. Variables included IPO size, offer price, first-day and one-year returns, earnings multiples, and *Environmental, Social and Governance* (ESG) ratings. Data were sourced from Bloomberg, Thomson Reuters Eikon, company filings, and industry reports. Complementary qualitative research was conducted through 42 semi-structured interviews with investment professionals, policymakers, executives, and sustainability experts, following protocols by. Interviews addressed investment criteria, regulatory influences, and ESG integration. Transcripts were coded through thematic analysis to reveal shared patterns and divergences. Eight case studies were developed to reflect the diversity of tourism capitalization models, including global hotel chains, digital platforms, tour operators, and small and medium-sized enterprises. Each case traced financing history, IPO processes, post-listing performance, and sustainability integration. The analytical process followed three phases: (1) descriptive mapping of IPO characteristics; (2) comparative assessment across segments and regions; and (3) integrative synthesis linking IPO outcomes with policy frameworks and ESG performance (Leppänen et al., 2023). This triangulated mixed-methods design ensures contextual depth and analytical robustness in examining tourism investment mechanisms.

Comparative analysis of tourism IPOs

The analysis of tourism IPOs from 2013–2023 reveals marked variations in performance across time periods, segments, and regions (Table 1).

Table 1. Tourism IPO Performance metrics by period

Performance Indicator	Pre-pandemic	Pandemic / post-pandemic	% Change
Average IPO Size (USD m)	423.6	687.2	+62.2
First-day Return (%)	18.4	32.7	+77.7
1-year Return (%)	22.6	–5.8	–125.7
P/E Ratio at IPO	24.3	38.6	+58.8
ESG Disclosure Rate (%)	42.5	78.3	+84.2

Source: Author's analysis based on Bloomberg and Thomson Reuters Eikon data.

The findings confirm cyclical investor enthusiasm and short-term overperformance typical for tourism listings. Post-pandemic one-year returns declined sharply, indicating vulnerability to market volatility. Rising valuation multiples reflect investor optimism and expectations of

sectoral recovery (Marcato et al., 2018). Moreover, ESG disclosure rates almost doubled, signalling an intensifying focus on sustainability credentials.

Segmental analysis (Table 2) further highlights structural heterogeneity among tourism firms.

Table 2. Tourism IPO performance by segment

Segment	No. of IPOs	Average Size (USD m)	Avg. 1-yr Return (%)	Avg. ESG Score
Accommodation	34	312.5	8.7	62.4
Online Platforms	18	1 245.3	15.2	58.7
Tour Operators	12	186.4	–3.6	51.2
Transportation	15	428.9	4.3	47.8
Attractions & Experiences	8	173.2	12.8	65.3

Source: Author's analysis based on Bloomberg and Thomson Reuters Eikon data.

Online platforms dominate in capitalization and growth potential. Traditional tour operators underperform, facing persistent structural constraints. The *Attractions & Experiences* segment records the highest ESG scores, aligning with the trend toward authentic, sustainability-driven tourism experiences. Geographically, IPOs originating from the *Central and Eastern Europe (CEE)* region account for only 5.7% of global issue value, underscoring the need for institutional strengthening and liquidity enhancement. Strengthened regulatory frameworks, transparent ESG standards, and capital-market integration could significantly expand the region's access to sustainable investment.. The post-pandemic decade demonstrates a shift toward ESG-driven investment behaviour, confirming the convergence of financial innovation and environmental accountability in global tourism finance.

4. Discussion and Implications

Theoretical implications

This study advances theoretical understanding of how capital-market mechanisms, particularly Initial Public Offerings (IPOs), shape sustainable tourism development. Findings confirm that public equity markets not only facilitate financial expansion but also embed sustainability principles in corporate governance (Leppänen et al., 2023). This supports Institutional Theory, which emphasizes how regulatory environments guide investment behaviour. The incorporation of Environmental, Social and Governance (ESG) metrics into IPO valuation demonstrates that investors increasingly view sustainability as a proxy for long-term financial stability (Zhou, 2023). Within the Resource-Based View, ESG-driven capabilities emerge as strategic assets that enhance competitiveness. Comparative results between traditional and digital tourism enterprises extend Stakeholder Theory, illustrating that firms prioritizing social and environmental stewardship exhibit stronger post-IPO resilience.

Managerial and policy implications

For tourism enterprises—especially in Central and Eastern Europe (CEE)—IPOs represent a strategic pathway to institutional legitimacy and global investor access (Marcato et al., 2018). Transparent ESG reporting improves capital access and reduces perceived risk. Policymakers should harmonize financial and sustainability regulations to encourage inclusive participation

(Štreimikienė, Kyriakopoulos, 2024). Frameworks such as the EU Green Deal and NextGenerationEU enable alignment of tourism investment with climate and circular-economy objectives (Bagh, Iftikhar, 2024). Governments can accelerate this shift through fiscal incentives, public–private partnerships, and green-bond programs that reduce financing asymmetries. For managers, integrating measurable ESG outcomes—social impact, energy efficiency, and digital transformation—into investor communication enhances valuation and attracts long-term capital (Zhou, 2023).

Limitations and future research directions

Empirical results are constrained by limited data on privately held tourism firms and smaller exchanges. Variations in ESG metrics hinder cross-country comparability. Future research should employ longitudinal analysis of post-IPO sustainability outcomes and conduct comparative studies across CEE, Mediterranean, and Asia-Pacific contexts. Moreover, exploring the role of FinTech and digitalization could elucidate how innovation drives sustainable capital formation (Iftikhar et al., 2024).

5. Conclusion

This paper examined IPOs as a strategic mechanism for sustainable capital formation in the tourism sector, focusing on emerging CEE economies. It demonstrated how public markets can finance large-scale tourism investments in infrastructure, digital transformation, and sustainability. Innovative instruments such as Green IPOs and ESG-linked bonds align financial growth with the United Nations Sustainable Development Goals (UN SDGs), proving that sustainability and profitability are complementary. Policy frameworks like the EU Green Deal and NextGenerationEU have reshaped investor expectations, requiring firms to show measurable environmental and social commitments. For CEE economies with underdeveloped capital markets, IPOs can catalyse modernization and integration if supported by coherent regulation and blended-finance mechanisms. Ultimately, sustainable tourism development depends on the alignment of capital-market instruments with ecological and social responsibility. Leveraging IPOs and green finance can enhance competitiveness while ensuring that tourism evolves as a resilient, inclusive, and forward-looking driver of regional prosperity.

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NATIONAL IDENTITY AND TOURISM POLICY

***Abstract**: The object of study is the tourism destination Bulgaria, in the context of the nine tourism regions. The subject of study is the tourism policy, linked to the vision, mission, slogans and communication messages for Brand Bulgaria. The aim is to prove that in order for the tourism policy to be effective, it is necessary to emphasize not only the mission and vision for Brand Bulgaria, but to focus on the communication policy, part of the marketing mix, and more specifically, finding and implementing appropriate messages to form Brand Bulgaria, in the context of hospitality in four seasons, with an emphasis on the product offering and specificity of the nine tourism regions and the leading locations in them. The thesis developed in this presentation states that Brand Bulgaria, through hospitality in four seasons and prioritizing health, MICE, entertainment and cultural tourism, can be realized by creating and communicating the right messages focused on the specific resources of the country and individual destinations, national distinctive features, as well as product characteristics. Without creating and communicating the right messages for individual locations in the context of the nine tourism regions, tied to a common identity for the Bulgaria brand, it is not possible to reposition and rebrand the country towards a four-season attractive tourist destination for health, MICE, entertainment and cultural tourism.*

***Key words:** national identity, tourism, brand image*

***JEL**: L83*

1. Introduction

This study focuses on Bulgaria's national identity in the context of tourism policy. The object of study is the tourism destination Bulgaria, in the context of the nine tourism regions. The subject of study is the tourism policy, linked to the vision, mission, slogans and communication messages for Brand Bulgaria. The aim is to prove that in order for the tourism policy to be effective, it is necessary to emphasize not only the mission and vision for Brand Bulgaria, but to focus on the communication policy, part of the marketing mix, and more specifically, finding and implementing appropriate messages to form Brand Bulgaria, in the context of hospitality in four seasons, with an emphasis on the product offering and specificity of the nine tourism regions and the leading locations in them. The thesis developed in this presentation states that Brand Bulgaria, through hospitality in four seasons and prioritizing health, MICE, entertainment and cultural tourism, can be realized by creating and communicating the right messages focused on the specific resources of the country and individual destinations, national distinctive features, as well as product characteristics. Without creating and communicating the right messages for individual locations in the context of the nine tourism regions, tied to a common identity for the Bulgaria brand, it is not possible to reposition and rebrand the country towards a four-season attractive tourist destination for health, MICE, entertainment and cultural tourism.

In order to clarify and prove the thesis and goal, three main tasks are set: to formulate the tourism policy, from the point of view of forming Brand Bulgaria; to present the vision and mission for Brand Bulgaria, in order to implement a successful tourism policy; to link the brand with the specifics of the national identity, in order to achieve clearer communication and identification recognizability.

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2. Tourism policy for the formation of Brand Bulgaria

Modern tourism policy is specified through vision, mission, tasks, strategies, tactics and respective and operational management. The mission and vision are decisive in the formation of the brand of a given destination. An essential role in creating the identity of the destination and its recognition is adopted by the national vision, in the context of cultural and historical recognition, part of cultural and historical tourism. Tourism communication plays a very important role in the development of a tourism destination (Sarmiati, et. al., 2022). The specificity of tourism policy is also determined by the resource conditions of the tourism regions and, above all, by the leading natural resources, highlighted and tied to specific dominant tourism products in the destinations, with which companies highlight their competitive characteristics, through which an image of the destination is created, which in turn forms the national and regional communication messages in tourism policy shaping a specific brand or sub-brands.

Destinations offer an amalgamation of tourism products and services, which are consumed under the brand name of the destination, providing tourists with an integrated experience (Pereira, R., et. al., 2012). Brand equity is totality of brand's perception, including the quality of services and products, customer loyalty, financial performance, customer satisfaction and overall admiration of the brand (Saxena, Dhar, 2025).

The historical evolution of tourism policy in Bulgaria outlines the basis for building Brand Bulgaria, as part of the process of national identity and international recognition. In the early stages, the emphasis on the protection of natural resources and the development of balneological and sea tourism set the first elements of the national tourism image. Centralization during the socialist period (1944–1989) built the material infrastructure, but hindered the formation of a market-oriented brand due to limited competition and the lack of individual entrepreneurial vision. With the transition to a market economy after 1990, liberalization began, which created the prerequisites for the emergence of a national tourism identity, but regulatory instability and the lack of a long-term strategy slowed down this process. Accession to the European Union in 2007 acted as a catalyst for modernization and harmonization with Western European standards, which helped to position Bulgaria more purposefully on the international tourism market (Doneva, 2025).

In the modern stage, digitalization and social media are becoming key tools for building a recognizable and sustainable tourism brand. However, the Bulgarian sector lags behind in their strategic implementation, which limits the country's global visibility. The sustainable development and prioritization of some of the specialized types of tourism and their transformation into strategic, with the aim of four-season tourism – health and MICE tourism in all their forms, cultural and entertainment tourism offer opportunities for building a differentiated and authentic image of Bulgaria, based on repositioning of the product offering, with the need for partial rebranding destination Bulgaria, by the head of the 9 created tourism regions, respectively – the Organizations for Management of the Tourism Regions (in the international practice – DMOs) and municipalities.

3. Vision and Mission for Brand Bulgaria

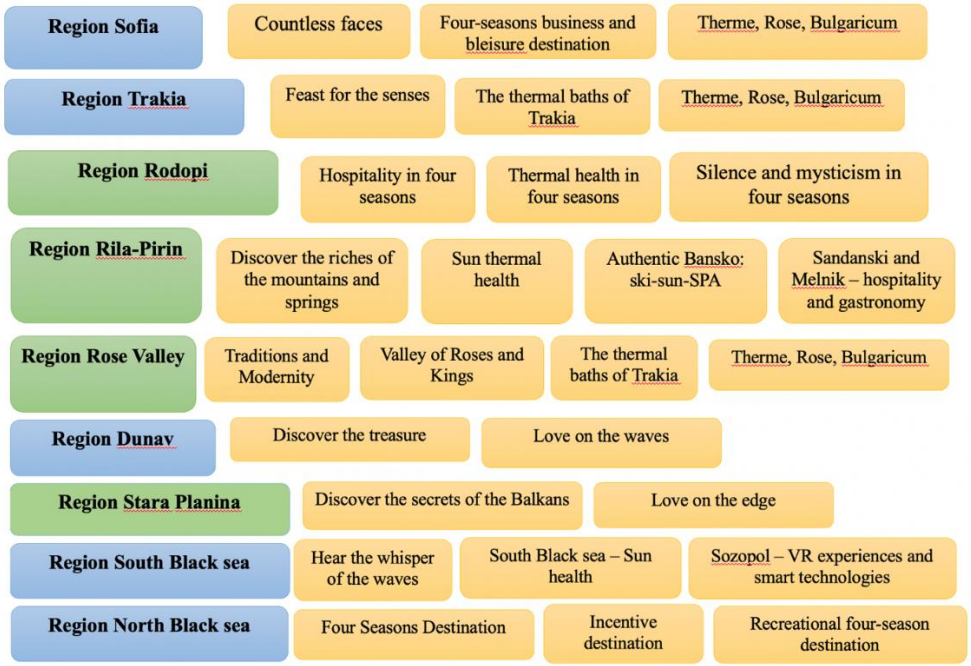
Bulgaria's tourism policy plays a key role in building and establishing Brand Bulgaria as a sustainable and competitive destination on the international market. Its vision is aimed at a balanced development of tourism potential by promoting lesser-known areas and consolidating the image of already established destinations. Such an approach not only supports the economic activity of local communities, but also helps to distribute tourism flows and reduce overconcentration in traditionally popular tourist centres.

The modern tourism vision requires adaptability to global challenges such as pandemics, natural disasters, political and economic crises. The mission of tourism policy, in the context of Brand Bulgaria, reflects current public priorities and global trends in the sector. After the period 2020–2022, special attention is paid to the development and promotion of health, balneology, spa and wellness destinations, which is in line with the European strategic guidelines for strengthening Europe's position as a leading tourist area. The holding of events such as the Conference "Education and Skills in Medical and Wellness Tourism" within the framework of the 68th session of the UNWTO Commission for Europe (Ministry of Tourism, 2023) demonstrates Bulgaria's commitment to these goals.

A number of studies by Bulgarian authors highlight the country's potential for the development of health and medical tourism, as a strategic element of Brand Bulgaria. In a broader context, the mission of tourism policy should reflect the principles of sustainability, cultural diversity and responsible resource management. The formulation of clear communication messages is essential for building the national brand and its sub-brands by tourist regions. In this way, Brand Bulgaria is built as a synthesis between natural potential, cultural heritage and modern quality standards, positioning the country as an attractive and sustainable destination on a European and global scale.

As noted above, the Concept for Tourism Zoning of Bulgaria and the division of the country into 9 tourism regions, according to the main and complementary products, determine the need for the logos and slogans of the nine regions already created by the registered Organizations for Management of the Tourism Regions. In this regard, the mission of a number of researchers, including of the authors of this presentation, including the Bulgarian Telegraph Agency, focuses on the creation of specific messages with which the thematic and four-seasonal communication, through marketing channels, will be carried out, the vision of the product specificity, both of the nine tourism regions and of specific locations in the overall Brand Bulgaria. The authors propose specific messages as a result of empirical research and discussion forums held on the communication messages, tied to the respective slogans or expanding them. They can be visualized through Figure 1, below.

Figure 1. Mission for Brand Bulgaria, through slogans and messages (examples of the nine tourism regions).



Source: Authors' systematization

The presented concept of tourism policy, in the context of forming Brand Bulgaria, through the vision and mission, linked to the slogans and messages of the tourism regions and locations, needs to be linked to the possibility of highlighting our national identity. In this regard, it is necessary to define Brand Bulgaria and the brand as marketing tools, as well as to emphasize the popularization of the cultural and spiritual values of Bulgaria.

4. Brand Bulgaria and national identity

The brand is not just a trade mark or a marketing tool, but a set of tangible and intangible values that form the unique spirit of a nation. Notably, when tourists travel internationally, they may function partly as agents who use their travel experience for the construction of both personal and national identity (Yang, I., et. al., 2020). The "Spirit of Bulgaria", on the other hand, unites natural resources, cultural and historical heritage, spirituality, education and national self-awareness as elements that mutually reinforce the sustainable development of the country. Education has a key role in preserving the cultural and spiritual values of the people. It builds informed and active citizens who know their history and traditions, develop critical thinking and participate in the processes of social development. According to Shterev (2025), it is education that is the foundation on which national identity and cultural continuity between generations are built.

Tourism is considered not only as an economic activity, but also as a tool for promoting the cultural and spiritual values of Bulgaria. National identity and its elements are crucial in the face of globalization and information (Perevsuren, Bor, 2025). National identity represents a country's history, culture, and values. In tourism, it acts as a strong vehicle that influences perception, facilitates cultural exchange, and attracts visitors (Dineva, T., 2025). Creating a tourism destination brand is one of the most pressing issues in modern marketing, requiring an interdisciplinary approach that connects different scientific fields.

The modern tourism industry is developing in an extremely dynamic and competitive environment, which determines the need to create and implement strategic activities and initiatives for coordination between all market participants. The main goal of its strategic development and planning at the macro and meso levels is to achieve innovative results that are original to the needs of specific target markets. The reason for this is objective and is based on the need for a common tourism vision regarding the Bulgaria brand, the development and promotion of priority product profiles that provide year-round income and employment, long-term determination of the social and market impact of tourism on destinations, long-term policy towards different markets, and others.

Global communication connectivity is also announced by the UN Tourism, which links the promotion of sustainable, responsible and globally acceptable tourism development with transport connectivity in a global aspect. As a member of the organization, Bulgaria is also bound by its goals and must contribute to their achievement, while at the same time benefiting from the positive impact they have on the country's development and the opportunities they provide for solving existing problems. Similar forums organized in Bulgaria contribute to this contribution, such as the ones initiated and organized by the national series of forums "Brand Bulgaria – Hospitality in Four Seasons", held in various tourism regions in the country – Sofia, Bansko, Nessebar, Sozopol, Stara Zagora, Sandanski, Rakitovo and Petrich – with the mission of creating a dialogue between academia, business and institutions in support of the sustainable development of tourism.

Through business identification/branding, as one of the tools of external marketing, related to the communication policy of tourist destinations, it can facilitate the successful establishment, management and promotion of the Bulgaria brand – hospitality in four seasons.

5. Conclusion

The results of the conducted research confirm that the construction of a sustainable and recognizable Brand Bulgaria is possible through a systematic approach to the formation and communication of targeted strategic messages.

In fulfilling the tasks set in this article, a systematized understanding of the role of tourism policy as a tool for building and strengthening Brand Bulgaria is achieved. The conducted analysis outlines that the effective positioning of Bulgaria as a four-season tourism destination is achievable by integrating four priority areas – health, MICE, cultural and entertainment tourism – within a unified communication and brand strategy. Achieving this result implies the construction of a coordinated system for identity and communication of Brand Bulgaria, synchronized with the profile of the nine tourism regions. The lack of such a unified strategic approach would limit the opportunities for effective repositioning and rebranding of the country towards a sustainable and competitive four-season tourism destination on the international market.

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Andrey Zahariev[1]

REAL ESTATE TRANSACTIONS AND HOUSEHOLD WEALTH IN BULGARIA – STEPWISE REGRESSION MODEL OF GROWTH FACTORS (2020-2025)

***Abstract**: The real estate sector is closely related to economic growth. With Bulgaria's accession to the Schengen area and the Eurozone, the real estate sector reports a positive price dynamic of 75.6% for the period 1Q'2020-1Q'2025. This logically leads to a sustainable increase in household wealth. To identify trends in real estate transactions, a database with quarterly indices was constructed, through which the factors of price growth can be modelled by regression, which is the goal of the study. Thirty-one factors transformed into indices with a base of 100 at the beginning of 2020 were studied. By applying a stepwise regression model, 26 factors were eliminated and the five factors with the most significant impact on the dependent variable - the general housing price index were determined. In parallel with the "overheating" in the real estate market, the article establishes a negative correlation between the intensity of housing transactions registered with the Registry Agency and the general price index of residential properties purchased by households in Bulgaria.*

***Keywords**: Real estate transactions, household wealth, stepwise regression model, factors of property price growth*

JEL: *D14, L74, R20, R31*

1. Introduction

Households are a major economic agent with a key role in the circulation of cash flows in the national economy. Together with the government and companies, households have an active participation in the real estate market. Households usually invest in the purchase of a primary residence, and if financially possible, in second and subsequent real estate properties. The acquisition of real estate by households creates a major component of household wealth with the corresponding maintenance costs, local taxes and fees, but also the opportunity to create income through rental. However, the growth of real estate prices remains the main measure of the return for households from such an investment. The aim of this study is to identify trends in real estate transactions in Bulgaria through regression modelling of growth factors brought into a database with quarterly indices for the period 1Q'2020-1Q'2025. The data for the selected 31 growth factors are brought into indices with a base of 100 as of 1Q'2020. By applying a stepwise regression model, it is expected to derive a model including factors with the most significant impact on the dependent variable – the general housing price index.

2. Problem status

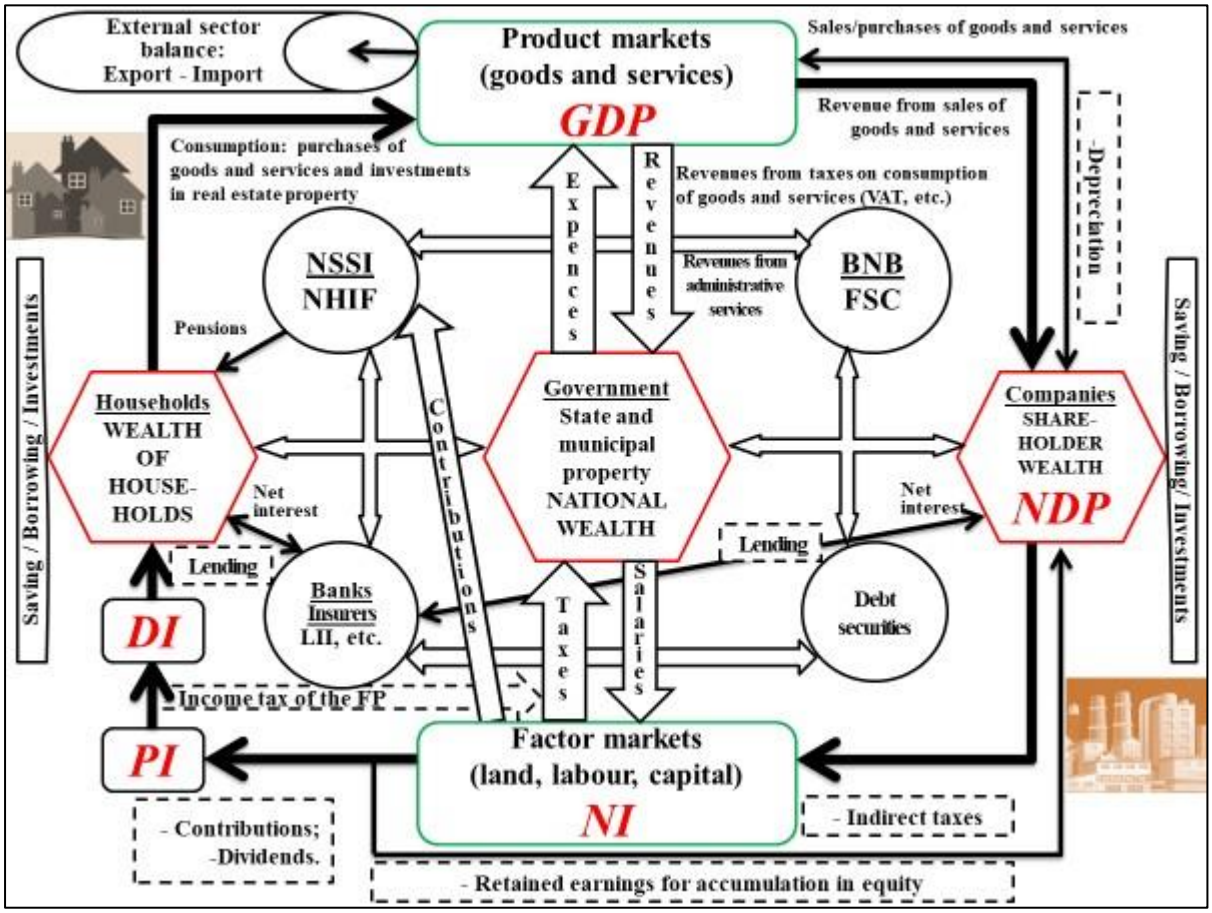
With the GDP growth, public technical infrastructure, the quality of life in urban areas improves, the market valuation of real estate (land, buildings, forests, aquatories for fishing, etc.), as well as the current value of the cultural and historical heritage of a given national territory, increases. These dimensions of GDP, seen as a flow in dynamics, also form national wealth, such as valued tangible and intangible assets created through GDP growth, tied to the respective property rights and other related rights in a given national territory. A 1998 World Bank study defines the inclusion of three components in the scope of national wealth: "natural capital, ... production assets and... human resources" (Kunte, Hamilton, Dixon, & Clemens, 1998). The origin of the components included in the assessment of national wealth can be

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distinguished as firstly, naturally created and inherent in the national territory component of national wealth; and secondly, created by human intervention and through entrepreneurship component of national wealth. All forms of the naturally created national treasure are geographically unique as land, water, rivers, marine waters, deposits of oil, natural gas, minerals, forestry, etc. On the other hand, the variety of examples of the second group components of the national treasure is diverse and often unique: gold, jewellery, jewels, Central bank reserve assets, man-made buildings, public and private technical infrastructure, production assets, intangible assets bearing copyrights, such as patents, know-how, licences, etc., national cultural and historical heritage, all other potential and real assets, and the human capital as well.

Regarding the public law of the State, in certain circumstances, to expropriate the property and wealth of other economic agents may draw the conclusion on the national wealth as a cumulative expression of the wealth possessed by the main economic agents, including: wealth of the government (registered and unregistered property of the state and municipalities as public state property, private state property, public municipal property, private municipal property); shareholder wealth and ownership of companies; and household wealth (see Fig. 1).

Figure 1. The national wealth into the GDP cashflow circle



Legend: NSSI – National Social Security Institute (www.noi.bg/en/); NHIF – National Health Insurance Institute (www.nhif.bg/en); BNB – Bulgarian national bank (www.bnb.bg); LII - Licensed Investment Intermediaries

Source: Own vision by the authors

Wealth and GDP are interdependent economic categories. GDP growth (real and nominal), measured by production and income methods, as well as the related concepts of national

income and national wealth, is a dynamic indicator of the joint productivity of the three economic agents – the government, the firm and households, represented as driving forces in the GDP cash flow cycle in the national economy. The three economic agents are active investors and owners of all the above-mentioned components of wealth, exercising the care of a good steward of this wealth. Wealth creation is also a process that has certain limitations – they depend on both the time factor and the resources that are put in. It is precisely the limited resources that impose new trends in industrial processes, leading to following the principles of the circular economy (Roleders, Oriekhova, & Zaharieva, 2022) and increased care for the environment and nature conservation.

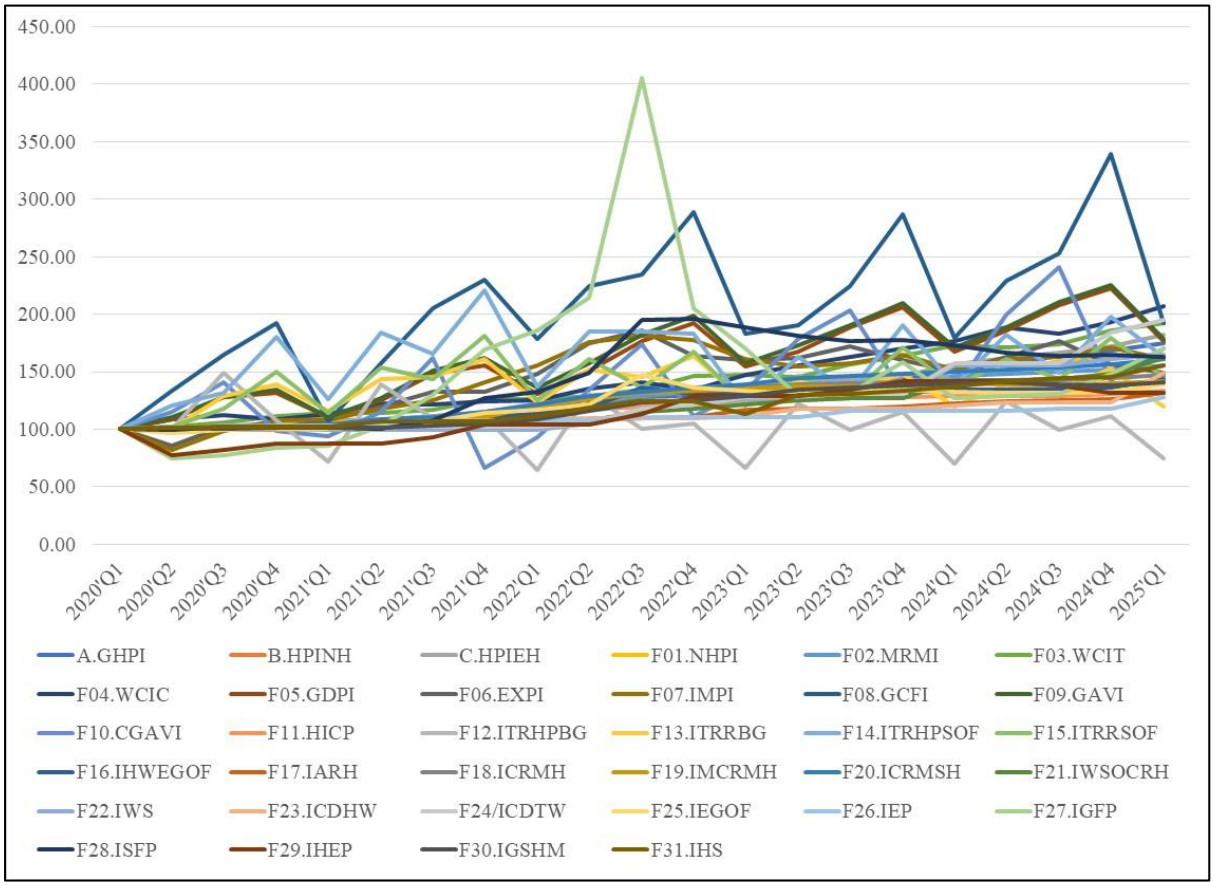
Contemporary research on household wealth covers the influence of various factors on its growth. Some of them focus on credit conditions, government policy and mortgage interest rates (Fortea, Antohi, & Zlati, 2025). Other studies emphasize wealth taxation as a regulator of household investment in real estate purchases and a tool for increasing tax revenues in the environment of multiple crises (Radvan & Chepys, 2025). In countries with intergenerational effects of demographic policies, such as the one-child policy in China, the family is found to be the most resilient economic entity in terms of wealth accumulation and transfer to the next generation (Liu, 2025). In view of Bulgaria's entry into the Eurozone, the results of a representative EU study are indicative, which finds that joining the eurozone reduces the degree of income and wealth inequality, but in turn has no impact on the wealth and income of the poorest 50% of the population (Simionescu, 2025).

3. Methodology and data description

This study uses data from the National Statistical Institute and the Registry Agency of the Republic of Bulgaria. The data are accumulated on a quarterly basis and indexed, with Q1’2020 = 100. The General house price index (A.GHPI, see Table 1) was used as the main dependent variable. The House price index for New homes (B.HPINH) and House price index for Existing homes (C.HPIEH) were used as secondary dependant variables. The stepwise method is used to build the regression model, through which the factors with the strongest impact are selected and, in parallel, those with a negligible impact on the dependent variable are eliminated.

The stepwise regression is characterized by automation of the individual stages, which allows the selection of predictor variables for a regression model by iteratively adding them. The selection for addition is based on criteria, including t-tests or F-tests. Of the three possible selection options (pre-selection, backward elimination and a combination of the above two options), the first option is applied in the study with the addition of variables one by one. The chosen approach provides processing of the collected data with the selection of a multiple regression equation with a moderate number of predictors. A positive feature of stepwise regression is the automated evaluation and addition of new predictors until the criterion for stopping the steps is reached. The first added variable in stepwise regression has the most significant impact (highest beta), followed by a second variable that improves the model, etc. The decision to add a variable is based on a statistical criterion, if the predictor has the smallest p-value or if it leads to the largest increase in R-squared. The stepwise regression process stops when the addition of a variable no longer improves the model according to the selected criteria. From the iteratively built models with 1 to N predictors, a comparative assessment is made between each of them according to the Bayesian information criterion and the generated Durbin-Watson value to establish the presence or absence of autocorrelation.

Figure 2. Data dynamics on index bases 1Q'2020 = 100 (31 predictors)



Source: NSI, Registry Agency, processed by the author

The goal is to reach a model that offers the best ratio between the quality of adaptation to the data and the number of parameters, according to SBC. In this case, the goal is to understand cause-and-effect relationships, select the most important factors influencing the result, and construct a model with fewer variables. For alternative purposes – price forecasting, the application should find an assessment of the model using the Akaike Information Criterion (AIC), which is achieved by minimizing the error when forecasting on new, unknown data. An additional indicator for model evaluation is the Durbin-Watson statistic, where the selected model should fall within the range between 1.5 and 2.5. This will allow to assess whether the error from one observation is correlated with the error from the previous observation, or a check will be made for autocorrelation of residuals in the regression model.

The multiple regression model is of the form:

$$Y = a + b_1 \times P_1 + b_2 \times P_2 + \dots b_n \times P_n, \quad (1)$$

where:

Y is Dependent variable;

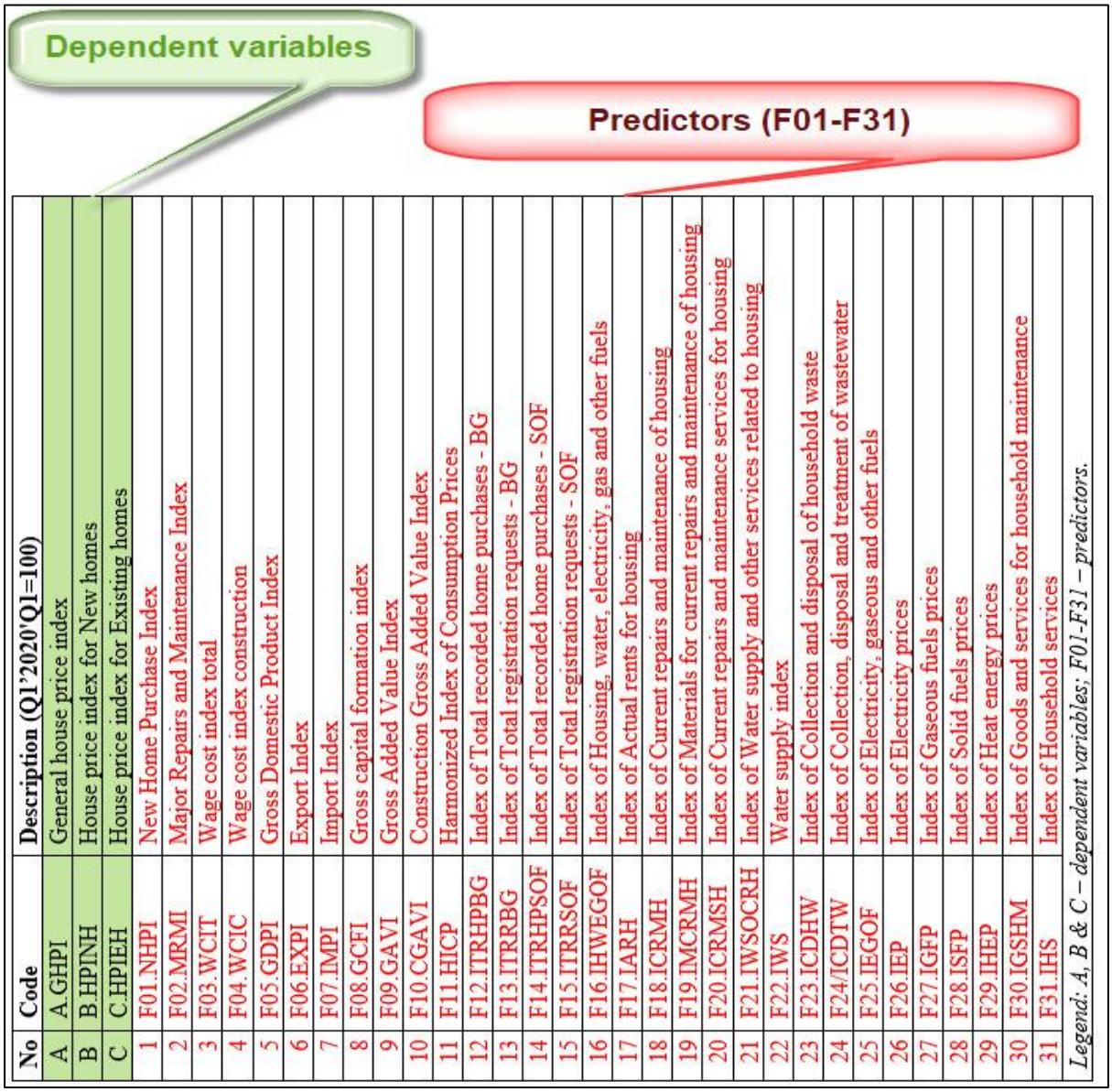
a – Intercept;

b_i - Regression coefficients

P_i - Independent variables/Predictors.

n - Number of predictors.

Figure 3. Dependent variables and selected model predictors



No	Code	Description (Q1'2020'Q1=100)
A	A.GHPI	General house price index
B	B.HPINH	House price index for New homes
C	C.HPIEH	House price index for Existing homes
1	F01.NHPI	New Home Purchase Index
2	F02.MRMI	Major Repairs and Maintenance Index
3	F03.WCIT	Wage cost index total
4	F04.WCIC	Wage cost index construction
5	F05.GDPI	Gross Domestic Product Index
6	F06.EXPI	Export Index
7	F07.IMPI	Import Index
8	F08.GCFI	Gross capital formation index
9	F09.GAVI	Gross Added Value Index
10	F10.CGAVI	Construction Gross Added Value Index
11	F11.HICP	Harmonized Index of Consumption Prices
12	F12.ITRHPBG	Index of Total recorded home purchases - BG
13	F13.ITRRBG	Index of Total registration requests - BG
14	F14.ITRHPSOF	Index of Total recorded home purchases - SOF
15	F15.ITRRSOF	Index of Total registration requests - SOF
16	F16.IHWEGOF	Index of Housing, water, electricity, gas and other fuels
17	F17.IARH	Index of Actual rents for housing
18	F18.ICRMH	Index of Current repairs and maintenance of housing
19	F19.IMCRMH	Index of Materials for current repairs and maintenance of housing
20	F20.ICRMSH	Index of Current repairs and maintenance services for housing
21	F21.IWSOCRH	Index of Water supply and other services related to housing
22	F22.IWS	Water supply index
23	F23.ICDHW	Index of Collection and disposal of household waste
24	F24/ICDTW	Index of Collection, disposal and treatment of wastewater
25	F25.IEGOF	Index of Electricity, gaseous and other fuels
26	F26.IEP	Index of Electricity prices
27	F27.IGFP	Index of Gaseous fuels prices
28	F28.ISFP	Index of Solid fuels prices
29	F29.IHEP	Index of Heat energy prices
30	F30.IGSHM	Index of Goods and services for household maintenance
31	F31.IHS	Index of Household services
Legend: A, B & C – dependent variables; F01-F31 – predictors.		

Source: Author's research

4. Research results

The achieved results from the study and indicators in the model were extracted after processing the data with the econometric product IBM SPSS. Tables 1, 2 and 3, formula 1 (with Unstandardized Coefficients) figure 4 present the main results of the stepwise regression model for analyzing the dynamics of the GHPI in Bulgaria for the period Q1'2020-Q1'2025. The key conclusion is the statistically high significance of all models ($p < 0.001$), which means that they have much better explanatory power compared to the null model. The values of the Residual Sum of Squares indicators demonstrate that with each added predictor, the unexplained variation is greatly reduced. The significance of the influence of the predictors F01.NHPI and F17.IARH is the strongest. The logic of selection and influence of the two predictors is their direct relationship and impact on the result of the dynamics in the purchases of new homes and the rental price for a home. The influence of the predictors F07.IMPI and F24.ICDTW is also strong.

Table 1. Analysis of variation of stepwise regression with dependent variable A.GHPI

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	11162.065	1	11162.065	2777.749	.000[b]
	Residual	76.349	19	4.018		
	Total	11238.415	20			
2	Regression	11211.479	2	5605.740	3746.131	.000[c]
	Residual	26.935	18	1.496		
	Total	11238.415	20			
3	Regression	11224.939	3	3741.646	4720.337	.000[d]
	Residual	13.475	17	.793		
	Total	11238.415	20			
4	Regression	11232.298	4	2808.075	7345.671	.000[e]
	Residual	6.116	16	.382		
	Total	11238.415	20			
5	Regression	11234.679	5	2246.936	9023.474	.000[f]
	Residual	3.735	15	.249		
	Total	11238.415	20			
a. Dependent Variable: A.GHPI						
b. Predictors: (Constant), F01.NHPI						
c. Predictors: (Constant), F01.NHPI, F17.IARH						
d. Predictors: (Constant), F01.NHPI, F17.IARH, F07.IMPI						
e. Predictors: (Constant), F01.NHPI, F17.IARH, F07.IMPI, F24.ICDTW						
f. Predictors: (Constant), F01.NHPI, F17.IARH, F07.IMPI, F24.ICDTW, F11.HICP						

Source: Author's calculations with IBM SPSS

Table 2. Coefficient statistics for stepwise regression with dependent variable A.GHPI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations		
		Beta	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
5	(Constant)	-43.953	4.086		-10.756	0.000	-52.663	-35.243			
	F01.NHPI	0.608	0.035	0.547	17.155	0.000	0.532	0.683	0.997	0.975	0.081
	F17.IARH	0.905	0.127	0.394	7.127	0.000	0.635	1.176	0.986	0.879	0.034
	F07.IMPI	0.096	0.013	0.120	7.504	0.000	0.068	0.123	0.731	0.889	0.035
	F24.ICDTW	0.087	0.018	0.108	4.892	0.000	0.049	0.125	0.959	0.784	0.023
	F11.HICP	-0.247	0.080	-0.133	-3.092	0.007	-0.417	-0.077	0.944	-0.624	-0.015

Source: Author's calculations with IBM SPSS

A.GHPI = -43.953 + 0.608 x F01.NHPI + 0.905 x F17.IARH +

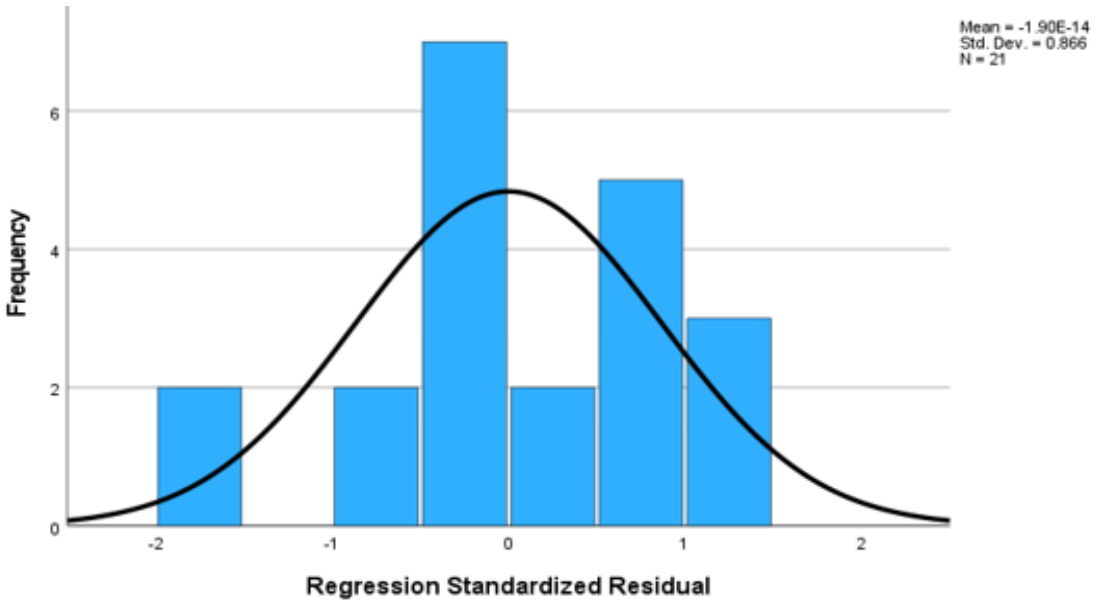
+ 0.096 x F07.IMPI + 0.087·x F24.ICDTW - 0.247 x F11.HICP (2)

Table 3. Summary of the stepwise regression model with dependent variable A.GHPI

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Selection Criteria			PRESS	Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	Akaike Information Criterion	Amemiya Prediction Criterion	Schwarz Bayesian Criterion		
1	.997[a]	.993	.993	2.00459	.993	2777.749	1	19	.000	31.107	.008	33.196		
2	.999[b]	.998	.997	1.22328	.004	33.022	1	18	.000	11.227	.003	14.361		
3	.999[c]	.999	.999	.89032	.001	16.981	1	17	.001	-1.317	.002	2.861		
4	1.000[d]	.999	.999	.61828	.001	19.250	1	16	.000	-15.904	.001	-10.682		
5	1.000[e]	1.000	1.000	.49901	.000	9.563	1	15	.007	-24.261	.001	-17.994	8.520	1.820

Source: Author's calculations with IBM SPSS

Figure 4. Histogram of Dependant variable A.GHPI



Source: Author's visualisation with IBM SPSS

The seemingly paradoxical negative direction of the HICP impact has a logical explanation. In the observed period, the first half bore the impact of the pandemic with high inflation and multiple crises in parallel with low GHPI growth. In the second part of the period, the positive effects of Schengen membership and Eurozone accession accelerated GHPI growth, in conditions of Maastricht inflation compliance.

The standardized residuals are within acceptable limits (between -2 and +2), indicating a lack of significant deviations. Figure 4 confirms that the residuals have a normal distribution. The model with SBC = -17.994 is the best choice among the five stepwise selected models. It offers the best ratio between the quality of fit to the data and the number of parameters. The difference between the best and second best model (7.3) is large enough to be considered statistically significant, further supporting the choice of the model with the lowest SBC value. Applying the method with the same factors but with respect to the two alternative dependent variables results in regression equations with 3 and 5 predictors. In a model for new homes (B.HPINH),

the stepwise regression model includes only 3 predictors (1.) F01.NHPI (New Home Purchase Index); (2.) F27.IGFP (Gaseous fuels prices) and (3.) F07.IMPI (Import Index). The conclusion about replacing the dynamics in rents with the influence of the factor gas prices for heating needs is interesting. The model for existing homes (C.HPIEH) uses the same 5 variables as the general index (A.GHPI). The conclusion is that the old homes are influenced by a wider set of factors than the new homes.

5. Conclusions

The derived model has a high explanatory power at $R^2 = 1.000$ with 100% explained variance, which is confirmed by Adjusted $R^2 = 1.000$ with an assessment of robustness when adding variables. The model is statistically significant - all F-tests report $p < 0.001$, with all coefficients at $p < 0.05$. There are no residual problems in the model. The DW value = 1.82 - which indicates the absence of autocorrelation. The residuals are normally distributed, there is no heteroscedasticity, the forecast error is very low (Std. Error = 0.499), with a mean value of 129.31. A specific result of the stepwise regression model is the exclusion of the influence of predictors F12-F15, which express the dynamics by quarters of the entries of property dispositions and the entries of property purchases in the country and in the capital Sofia. The exclusion of these factors can be explained by the ad valorem nature of the result index and the quantitative nature (number of transactions) of these four predictors.

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РАЗВИТИЕ НА СЕЛСКИТЕ РАЙОНИ В БЪЛГАРИЯ – МИНАЛО, НАСТОЯЩЕ И БЪДЕЩЕ

***Резюме**: Селските райони в България имат стратегическо значение за обществото, икономиката и опазването на природните ресурси. Настоящата статия проследява развитието им в три програмни периода – Програма за развитие на селските райони (ПРСР) 2007–2013, ПРСР 2014–2020 и Стратегическия план по Общата селскостопанска политика (ОСП) 2023–2027. Анализирани са тенденциите в безработицата, брутния вътрешен продукт, демографията и бизнес-активността в градските, междинните и селските региони, и са очертани основните различия между тях. Въз основа на статистически данни на Евростат и програмните документи, текстът прави оценка на ефективността на мерките и предлага насоки за бъдещи действия. Основният извод е, че развитието на селските райони остава предизвикателство, но чрез целенасочени инвестиции, интегрирани политики и укрепване на градско-селските връзки може да се постигне устойчив растеж.*

***Ключови думи**: селски райони, България, развитие, ОСП, демография,*

JEL: *O18, R11, Q15, Q18, R58*

RURAL AREA DEVELOPMENT IN BULGARIA - PAST, PRESENT, FUTURE

***Abstract**: Rural regions in Bulgaria play a strategic role for society, the economy and the environment. This article examines their evolution across three policy periods – the Rural Development Programme (RDP) 2007–2013, RDP 2014–2020 and the Strategic Plan under the Common Agricultural Policy (CAP) 2023–2027. It analyses trends in unemployment, gross domestic product, demography and business dynamics across predominantly urban, intermediate and predominantly rural areas, drawing on Eurostat data and policy documents. The article evaluates the effectiveness of measures and outlines scenarios for the future. The main conclusion is that rural development remains challenging, but targeted investments, integrated policies and stronger urban–rural linkages can foster sustainable growth.*

***Keywords**: rural areas, Bulgaria, development, CAP, demographics*

JEL: *O18, R11, Q15, Q18, R58*

1. Увод

Ролята на селските райони за стабилността и развитието на Европейския съюз е значителна, но често подценявана. Близо 137 милиона души – почти 30 % от населението и над 80 % от територията на ЕС – живеят в селски зони (European Commission, 2021). Тези региони са източник на храна, изчерпаеми природни ресурси и разнообразни екосистемни услуги, а също така предоставят възможности за туризъм и рекреация. Селските райони са особено важни за устойчивия агропродукционен модел и за постигане на стратегиите "Зелен пакт" и "Цифрово десетилетие" на ЕС. Въпреки това глобализацията, урбанизацията и климатичните промени влошават демографската структура, задълбочават икономическата маргинализация и ограничават достъпа до услуги (European Commission, 2021; JRC, 2022). В български контекст селските райони обхващат около 22 % от територията, но населението там намалява и застарява. През 2007–2013 г. безработицата достига 19,2 %, а дългосрочната безработица – 11,3 %, инфраструктурата е недостатъчно развита, а фрагментираното земеползване и

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деградацията на земята ограничават икономическите възможности. Много села са "призрачни" – през 2021 г. 592 села са с под десет жители – и пенсионерите преживяват с минимални доходи (Ivanova, 2013, p. 56). В същото време регионите имат силни страни: богати културни традиции, благоприятен климат и агроекологичен потенциал, което създава основа за развитие и иновации.

2. Състояние на проблема

Териториални неравенства и новите предизвикателства

Различията между градските, междинните и селските райони се задълбочават. Документите на Европейската комисия и анализите на Съвместния изследователски център показват, че отдалечените райони губят население с около 0,5 % годишно, а достъпът до високоскоростен интернет остава ограничен (JRC, 2022). Урбанизацията допълнително засилва отлива на млади хора, което допринася за застаряване, обезлюдяване и липса на квалифицирана работна сила. Селските общности често остават извън общественото внимание и имат ограничено участие в разработването на политики, което задълбочава териториалните неравенства.

Обвързаност и градско-селски връзки

Изследванията на Interreg Europe подчертават взаимозависимостта между градовете и селата – градовете разчитат на селските райони за храна, природни ресурси и рекреация, а селските общности се нуждаят от градските за работа, образование, здравни услуги и достъп до пазари (Interreg Europe, 2024). Укрепването на тези връзки чрез интегрирани териториални инвестиции, споделени инфраструктурни проекти и двупосочна мобилност е ключово за балансираното развитие. Дигиталният преход ще позволи дистанционна работа и иновации, като по този начин смекчи натиска от урбанизацията и улесни двупосочната миграция. В селските райони инвестирането в пътна и цифрова инфраструктура може да подобри значително достъпа до пазари и да насърчи предприемачеството. Същевременно е важно да се обърне внимание на двупосочна миграция, при която хора от градовете избират да се заселват или работят дистанционно в селата, което отчасти вече се наблюдава след пандемията.

Политики за развитие на селските райони в България

След присъединяването към ЕС България прилага поредица програми за развитие на селските райони. Първата Програма (ПРСР 2007–2013) се фокусира върху базовата инфраструктура, конкурентоспособността на земеделието и горите и подобряване на качеството на живот. Финансирането е насочено към модернизиране на стопанствата, обновяване на селските райони, подкрепа за неземеделски дейности и възстановяване на екосистемите. Въпреки инвестирани средства, негативните тенденции – висока безработица, бедност и миграция – остават доминиращи.

Втората програма (ПРСР 2014–2020) надгражда предходната, като поставя акцент върху устойчивото управление на природните ресурси, биологичното земеделие и социалното включване. Бюджетите включват 983 млн. € за възстановяване на екосистемите, 430,6 млн. € за ресурсна ефективност и 815,2 млн. € за социално включване. Мерките включват трансфер на знания, консултантски услуги, инвестиции в материални активи, подкрепа за малкия бизнес, развитие на туризъм и обновяване на селищата. Тези интервенции имат за цел да насърчат модернизацията и да намалят териториалните неравенства.

Настоящият Стратегически план по ОСП 2023–2027 предвижда интервенции като основен доход за устойчивост, преразпределителни плащания, подкрепа за млади фермери, екосхеми и обвързани плащания. Бюджетите са значителни и целят да насочат селските райони към екологизация, иновации и цифровизация. В третата поправка на плана (2025) се прехвърлят 65 млн. € към агроекологични мерки, удвоява се таванът за инфраструктурни проекти до 500 хил. € и се засилва подкрепата за пчеларство и управление на риска (Ministry of Agriculture and Food, 2025).

3. Методология или методологични подходи

Източници на данни

Анализът се основава на официални статистически данни на Евростат за периода 2007–2024 г. и включва четири групи показатели: безработица по възрастови групи, брутен вътрешен продукт (БВП) и БВП на глава от населението, демографска динамика и бизнес демография. Данните за безработицата (urt_lfu3pers) обхващат възрастовите групи 15–74 г., 20–64 г. и 25+ г., разпределени според териториалните типологии. БВП (urt_10r_3gdp) включва номинален БВП, БВП на човек и относителен БВП като процент от средното за ЕС. Демографските показатели (lurt_gind3) измерват нетната миграция, естествения и общия прираст и броя живородени. Бизнес демографията (urt_bd_hgn) анализира броя активни предприятия, създадените и закритите фирми по сектори. Данните са обработени чрез конвертиране на липсващи стойности в пропуски, изчисляване на абсолютни и относителни промени, както и средногодишен темп на растеж (AAGR). Статистическите резултати са съпоставени с времевите хоризонти на ПРСР 2007–2013 (минало), ПРСР 2014–2020 (настояще) и Стратегическия план по ОСП 2023–2027 (бъдеще). Чрез тази кръстосана проверка се проследява дали текущите усилия успяват да адресират наследените проблеми и как новата ОСП може да промени бъдещите тенденции.

Допълнителни източници

Освен Евростат са използвани официални доклади и анализи:

- Дългосрочната визия на ЕС за селските райони (European Commission, 2021), която дефинира значението на селските зони и нуждата от дигитален и зелен преход;
- Политическият доклад на Interreg Europe (Interreg Europe, 2024), който предлага конкретни препоръки за подобряване на градско-селските връзки;
- Докладите на JRC (JRC, 2022; JRC, 2025), които анализират демографските тенденции и взаимните потоци между различните типове региони и прогнозират бъдещето;
- Стратегическите документи на България (Ministry of Agriculture and Food, 2009; Ministry of Agriculture and Food, 2015; Ministry of Agriculture and Food, 2025), които описват приоритетите и бюджета на ПРСР и Стратегическия план. Тези източници осигуряват качествен контекст за статистическите наблюдения и позволяват цялостна интерпретация.

4. Резултати от изследването

Безработица

Данните показват устойчив спад на безработицата във всички райони. За групата 15–74 г. относителното намаление за периода 2007/2010–2024 г. е около 53 % в селските

региони, 52 % в градските и 47 % в междинните. Средногодишният темп на намаление е около –9 % за селските и градските региони и –7,6 % за междинните. За възрастовата група 20–64 г. спадът достига –72 % в градските райони и –64 % в селските, което показва значителен напредък в интеграцията на активното население. При групата 25+ г. намалението е по-умерено (–42 % в градските, –36 % в междинните и –60 % в селските), което подсказва по-бавна реинтеграция на по-възрастните безработни. В абсолютни стойности междинните региони остават с най-голям брой безработни (около 95 хил. души през 2024 г.), но именно това предполага най-голям потенциал за развитие при прилагане на подходящи политики.

Брутен вътрешен продукт

БВП се увеличава значително през периода 2007–2023 г., най-осезаемо в градските региони – от 11,9 на 40,6 млрд. €, или с 241 %. В междинните региони растежът е със 167 % (от 18,3 на 49,1 млрд. €), а в селските – със 128 % (от 2,2 на 5,1 млрд. €). Средногодишният темп на растеж е съответно 7,9 %, 6,3 % и 5,3 %. БВП на човек също расте: към 2023 г. градските региони достигат 31,6 хил. € на човек (83 % от средното за ЕС), междинните – 10,8 хил. €, а селските – 8,2 хил. €. Разликата в доходите между градските и селските региони остава значителна, но относителният темп на конвергенция е сходен (~7 % годишно).

Демографски показатели

Демографските показатели за периода 2007–2023 г. разкриват положителен тренд на миграционния баланс в междинните и селските райони – те постепенно преминават от отрицателна към положителна нетна миграция, особено през пандемичните години, когато множество градски жители се преместват в по-малки населени места. Въпреки това естественият прираст остава отрицателен в селските и междинните региони, докато общият прираст е положителен само в градските центрове. Броят на живородените деца намалява във всички райони, най-силно в селските (–50,6 %), което отразява застаряване и емиграция. Тези резултати се вписват в прогнозите на JRC (2025), че нетната миграция ще компенсира отрицателния естествен прираст само в урбанизираните региони, а селските ще продължат да се обезлюдяват.

Бизнес демография

Данните за бизнес активността (2019–2022 г.) показват леко увеличение на броя активни предприятия (около +2–3 %) във всички типове региони. Създаването на предприятия расте в междинните региони (+3,5 %), остава почти неизменно в градските и намалява в селските. Фалитите и закриванията на фирми обаче се увеличават драматично: +113 % в градските, +58 % в междинните и +59 % в селските региони. Когато този показател се изчисли като дял от активните предприятия, закриването надвишава създаването във всички категории – особено в градските (23 % срещу 10 %). В съвременните икономически условия ликвидацията е процес, пред който са поставени все повече предприятия (Ivanova, 2013, p. 56).

Съпоставяне с европейските изследвания

Резултатите потвърждават няколко широкообхватни тенденции, идентифицирани от JRC и други изследвания. Първо, градските региони съчетават икономически растеж и относително по-ниска безработица, привличайки мигранти и консолидирайки демографската си структура. Това, обаче може да доведе до проблеми в бъдеще, ако се позволи прекалено претоварване на урбанизираните територии. Второ, междинните

региони играят роля на „буфер“: те имат най-голям абсолютен брой безработни, но демографските им показатели се подобряват благодарение на притока на население. Трето, селските региони продължават да се изправят пред значителни предизвикателства като: нисък прираст, висок процент на закриване на предприятия и значителен цифров дефицит.

5. Изводи

Изводите могат да се синтезират в няколко основни посоки, а именно:

- Стабилен спад на безработицата – общият брой безработни намалява устойчиво в трите типологии, като селските и градските региони регистрират най-бързи темпове на спад. Това показва, че икономическото оживление и миграционните потоци допринасят за интеграцията на работната сила.
- Икономическа концентрация с известна конвергенция – икономическият растеж е силно концентриран в градските центрове, но междинните и селските региони отбелязват по-висок относителен растеж и известна конвергенция на доходите.
- Демографски предизвикателства – данните показват, че само градските региони компенсират отрицателния естествен прираст чрез миграция, докато междинните и селските ще продължат да се обезлюдяват.
- Нестабилна бизнес среда и значение на градско-селските връзки и цифровата свързаност – фалитите на предприятията значително надвишава създаването им, особено в градските региони, което изисква внимание към условията за устойчивост на бизнеса и да се проследят възможните за това причини.

6. Препоръки за бъдещи действия

На база на емпиричните резултати и прегледаните политики, е възможно да се посочат препоръки за по-нататъшни потенциални действия. Въвеждането на устойчиви практики ще осигурят дългосрочен растеж и устойчивост както и ще подобрят екологичната отчетност на компаниите(Petrova, 2024, p. 66). Препоръките са съобразени с принципите на териториалната диференциация и насърчават интегриран подход към развитието.

- Сключване на градско-селски споразумения – насърчаване на договори между градове и заобикалящите ги селски райони за устойчиво развитие и иновации. Тези договори следва да използват национални и европейски инструменти, да гарантират участие на широк кръг заинтересовани страни и да укрепват местните вериги на стойност, особено в агро-хранителния сектор.
- Ангажиране и овластяване на гражданите – активното участие на гражданите, бизнеса, академичните среди и неправителствените организации е основа за устойчиво развитие. Публичните власти трябва да създават включващи платформи за съвместно планиране, да надграждат върху съществуващи инициативи и да предоставят стимули за участието на различни групи.
- Подкрепа за малки, конкретни проекти – регионалните власти трябва да започнат с нискобюджетни, но по възможност високоефективни инициативи като местни хранителни вериги, споделени услуги или съвместни екологични проекти, които свързват селските и градските общности и изграждат доверие.

- Насърчаване на обща регионална идентичност и брандинг – разработване на регионални марки и кампании, които подчертават взаимната зависимост и уникалните силни страни на градовете и селата. Добър старт биха били съвместни изследователски проекти, обучителни програми и стимулиране на споделянето на традиционни знания.

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Gergana Slavova[1]

ECONOMIC DEVELOPMENT THROUGH THE IMPLEMENTATION OF A STRATEGY OF LINKED AND UNRELATED DIVERSIFICATION IN AGRICULTURE IN THE NORTH-EAST PLANNING REGION

Abstract: *In recent years, there has been considerable uncertainty in the economic, political, and social business environment. Therefore, in order to be adaptive, agricultural companies in the northeastern planning region are faced with the opportunity to implement various strategies for survival, development, and growth. Some of the most suitable strategies for them are related and unrelated diversification strategies. The main objective of this scientific study is to identify the different types of diversification strategies that farmers in the NEP can apply. To this end, an empirical study was conducted covering large and medium-sized producers in the region of Northeastern Bulgaria. The methods used are: comparative and empirical methods, the interview method, methods of deduction, induction, and extrapolation. The results obtained in the study, the conclusions and recommendations are useful both for people working in the agricultural sector and for the scientific community and managers of agricultural companies.*

keywords: *strategies, diversification, agricultural companies, agricultural business*

JEL code: *O1,Q1,Q13, Q16*

1. Introduction

The development of any company, especially in today's environment, requires good adaptability, flexibility, strategic thinking, planning, and management of all processes. This includes methods for strategic analysis, as well as the right choice of strategies and tactics based on internal and external company analysis. The modern business environment is highly turbulent, uncertain, and dynamic. All this requires agricultural managers to be highly adaptable, strategically oriented, and able to make the right management decisions based on specific strategic methods of analysis and the correct selection of successful growth strategies.

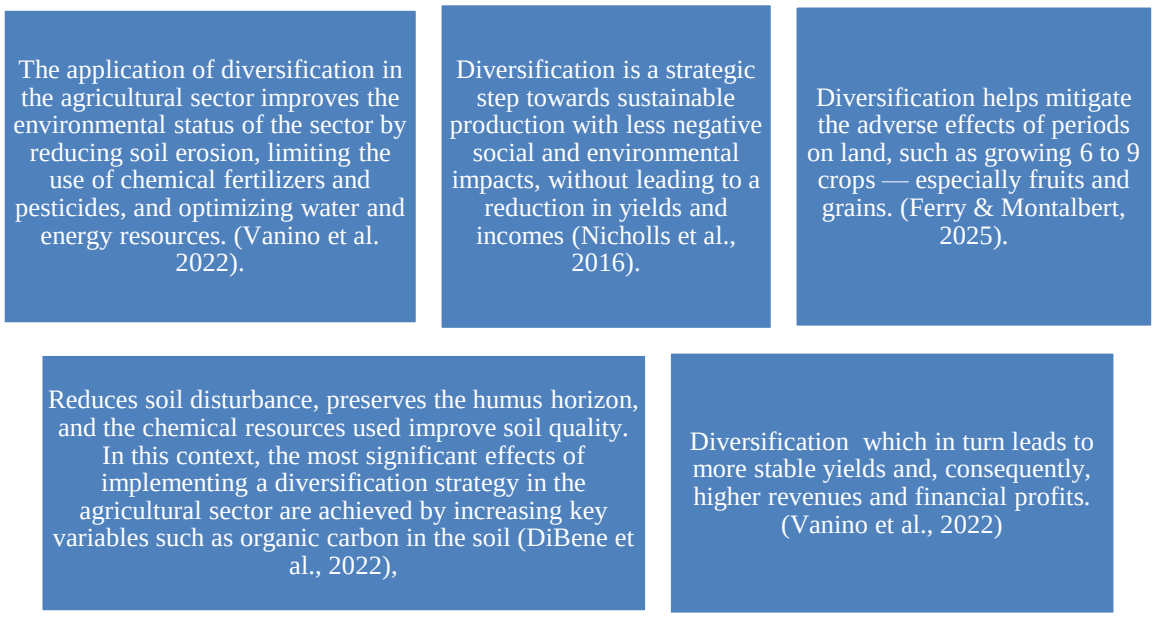
2. State of the problem

From the perspective of human existence, agriculture plays a fundamental and key role in providing food, raw materials and income for society. At the same time, however, the agricultural sector is faced with many challenges. These include: the biological nature of production, direct dependence on natural and climatic factors, as well as climate change. Another important problem is the depletion of natural resources, frequent market fluctuations, a politically unstable environment and socio-economic difficulties associated with the agricultural sector. These include high unemployment in rural areas, an aging population and difficulties in finding highly qualified personnel. The North-Eastern region is not excluded from this socio-economic characteristic. One of the most effective approaches to addressing these problems is the application of various diversification strategies. In general, this is a process of expanding production activities or investments with the aim of increasing sustainability and optimizing the distribution of resources. It is not only a theoretical concept, but also a rational means of reducing risk. There are several main types: related diversification, unrelated diversification, conglomerate, concentric, vertical, horizontal (Slavova, 2015). Moreover, according to a recent study conducted abroad (Ferry & Montalbert, 2025), the implementation of a diversification strategy significantly reduces food insecurity.

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"Specifically, adding one additional crop reduces perceived food insecurity by 6-8% and shortens the period of food shortage by an average of 20-22%. Figure 1 presents the main opinions of economists on the application of diversification in the agricultural sector.

Figure 1. Main theses of economists on the benefits of diversification in the application and in the agricultural sphere of activity



Source: Author's work based on economic literature

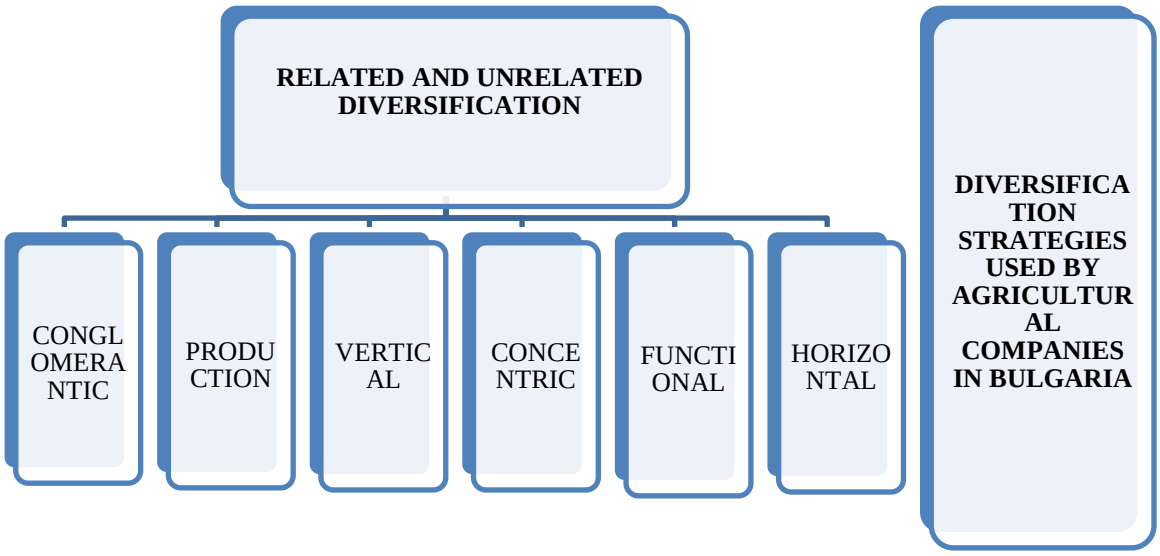
According to other contemporary researchers, the implementation of a diversification strategy in the agricultural sector has an impact on the health of society as a whole by providing a more diverse and nutritious diet, which reduces the risk of malnutrition and poor nutrition from eating only homogeneous foods. (Azupogo et al., 2018) Another extremely important benefit of implementing a related crop diversification strategy is that this process leads to a reduction in food insecurity and mitigates the adverse effects of periods of drought (Ferry, Montalembert, 2025). This means that crop expansion creates resilient systems that can recover more quickly from extreme weather events such as unexpected frosts, hailstorms, and droughts. This reduces the risk of losses and ensures a more stable income and access to a variety of foods. In addition to environmental benefits, diversification can provide more stable yields and incomes, which is essential for the social and economic environment not only of the company and its owners and managers, but also of society. Crop diversification can be part of a solution to poverty reduction (Nzira & Chegere, 2025). A key factor influencing the adoption of a diversification strategy in actual agricultural practice, according to a recent study on the implementation of diversification strategies (Bogado et al. 2024) is access to new technological and technical knowledge, social capital, and farmers' attitudes towards the introduction of the strategy. All these factors are more important, according to Bogado, Estrada-Carmona, Beillouin, Chéron-Bessou, Rapidel, Jones, 2024 than financial, physical, human, and natural capital. (Bogado et al. 2024)

3. Methodological approaches

In order to establish the actual implementation of the diversification strategy and its real subtypes in practice, our empirical study was based on 15 in-depth, pre-structured interviews with some of the largest representatives of the agricultural business in the Northeast Planning

Region of Bulgaria who have established themselves in the agricultural and processing market. All interviewed business representatives, in parallel with their agricultural activities, also develop non-agricultural activities in the direction of processing oilseeds for the cosmetics industry, the pharmaceutical industry, as well as the processing of many other agricultural products of plant and animal origin for the processing industry, including the food, canning, pharmaceutical, cosmetic, light industry, and other sectors, including the development of tourism and commercial activities, import and export. During the interview, we were mainly interested in what activities they develop, what difficulties and obstacles they encounter in their development, and which subtypes of the diversification strategy they apply. For this purpose, they were presented with the main subtypes of strategies shown in Figure 2 in this article. All the main types and subtypes of diversification strategies were explained to the study participants as follows.

Figure 2. Main types of diversification applied in the agricultural sector in Bulgaria



Source: author's work based on a textbook by the author Gergana Slavova, Management in Agricultural Business, 2015

The results obtained from the interviews are extremely interesting and are based on pre-structured questions included in the interviews, which were further expanded during the conversation in order to cover specific important issues from the real practice of the respective agricultural business organizations. The good thing about this empirical study is that each of the 15 respondents has a diverse main activity and develops different areas that complement their main agricultural activity. What unites all the respondents surveyed is that each of the 15 separately analyzed agricultural entrepreneurs has achieved a closed production cycle.

4. Research results

For the purposes of our research, 15 in-depth, pre-structured interviews were conducted, which were expanded during the course of the study to cover specific problem areas for the individual companies, our respondents. The interviews covered some of the largest, most interesting, and representative companies in the agricultural sector in the analyzed region, which have diversified their agricultural activities towards the development of their agricultural activities in other processing sectors that have been successfully developed in the northeastern region of

Bulgaria. All respondents, in parallel with their agricultural business, are also developing non-agricultural activities in the food sector, processing, industry, pharmaceuticals, cosmetics, light industry, and other processing sectors, including the development of tourism and commercial activities, import and export. The results obtained from the pre-structured interview questions largely confirmed our initial expectations based on the information gathered through analysis of secondary data from the northeast region (Table 1), However, they also added new, important details to the profile of agricultural producers and agribusiness entrepreneurs from the northeast planning region with regard to the implementation of a diversification strategy and its main subtypes based on agricultural, processing, or complementary activities in the region.

Each of the fourteen respondents from the agricultural sector has a different field of activity and different areas that complement their agricultural activity, but what they all have in common is that they have managed to achieve a closed production cycle and apply a circular economy model.

Table 1. Profile of agricultural entrepreneurs from the Northeastern Planning Region in Bulgaria profile sample

Respondent	**Location**	**Subject of activity in the agricultural sector**	**Processing activity carried out by the agricultural holding**	**Type of diversification strategy applied**
R 1	Shumen	Lavandulo,Production	Cosmetics,Pharmacy, Household chemicals	Related diversification horizontal and vertical diversification
R 2	Kotlenci village	Cattle breeding Fodder production Grain production	Food and beverage sector	All forms of diversification without conglomerate
R 3	Bulgarevo village	Snail farm	Restaurant business Gastronomic tourism	Related diversification horizontal and vertical diversification
R 4	General Toshevo	Grain production and essential oil plants	Cosmetics Pharmaceuticals	Related, unrelated, and conglomerate diversification
R 5	Devnya, Targovishte	Grain production and essential oil plants	Production of briquettes and corn oil.	Related diversification horizontal and vertical diversification
R 6	Varna Province	Plant growing - oil crops, Vegetable production	Canning and processing	Related diversification, product diversification
R 7	Dobrich Province	Wheat for seed production - first reproduction, barley, corn, sunflower, rapeseed	Food and beverage industry.	Related, functional, and production diversification
R 8	Varna Province	Oil crops,Cereals, Fruit growing	Trade in plant protection products, mineral fertilizers, and seeds	All forms of diversification
R 9	Pet Mogili village	Grain production	Production of pellets from waste wheat/straw and alfalfa	Related diversification horizontal and vertical diversification

R 10	Blaskovo village	Grape and wine production	Wine tourism elite horses, and boutique wines	All forms of diversification
R11	village of Prilep	Beekeeping	tourist infrastructure Cosmetics,Pharmaceuticals	All forms of diversification without conglomerate
R 12	Krapets village	Agricultural producer Grain crops, oilseeds	Guest house, rural tourism development	Conglomerate diversification
R13	Ovcharovo village	Viticulture and wine production	Winery and hotel part, wine tourism	All forms of diversification
R 14	Kovachevets village	Cattle breeding and milk production	Production of dairy and local products	Related diversification horizontal and vertical diversification
R 15	Shumen village	Wheat, Sunflower and beekeeping	Production of honey and honey-derived products	All forms of diversification

Source: Author's work based on empirical research

A large proportion of the agricultural entrepreneurs analyzed were registered as agricultural producers because of the benefits offered by this form of registration, which is typical for the agricultural sector. The main advantage for them is that they can choose the areas in which to develop, do not pay tax, and do not use cash registers when selling their products. According to the results we can report from the interviews, it is very interesting that the size of the arable land is seen as a key motive for expanding the farm's activities and implementing a growth strategy, in particular one of the subtypes of diversification strategies. This has also been proven in other economic studies (Meraner, 2015). According to these economists, larger agricultural organizations will have greater potential due to the use of much larger agricultural resources. In the target sample of this empirical study, 8 of the 15 respondents interviewed are small or medium-sized (cultivating up to 3,500 decares of agricultural land), which shows that large scale does not always play the important role that economic researchers attribute to it. The following figures present some of the main results of the study.

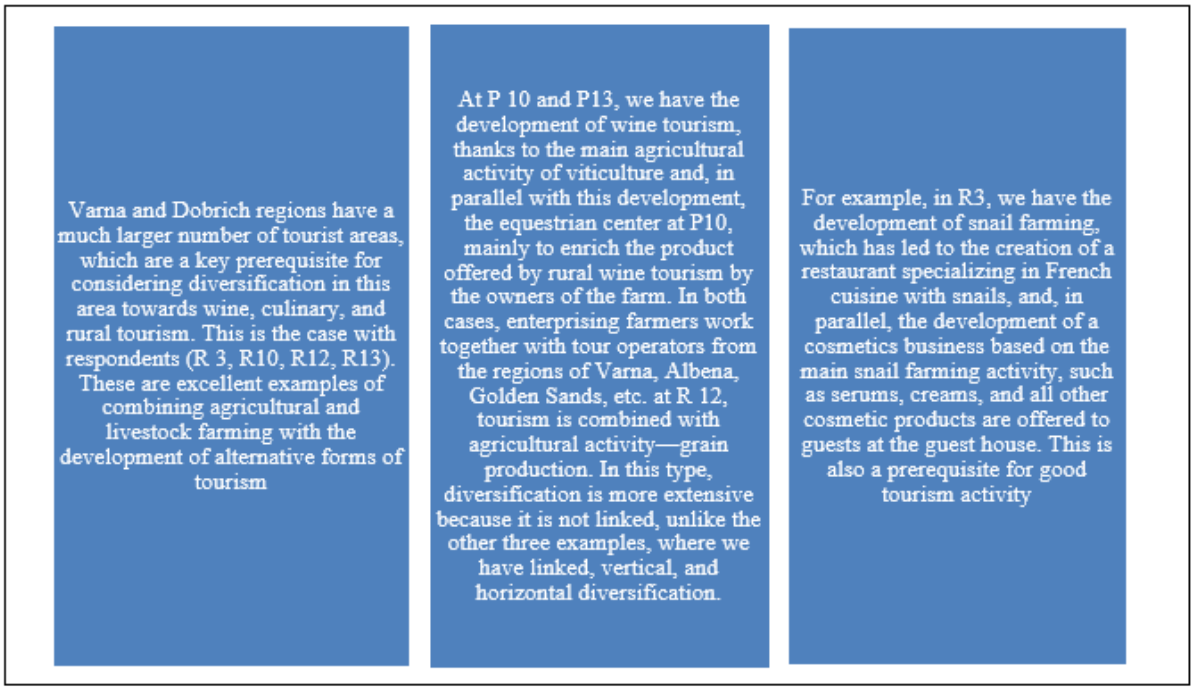
Figure 3. Advantages of the studycovering agricultural producers in the Northeastern region

Despite the uneven number of respondents from the four regions, we can speak of a representative sample, as all respondents analyzed meet the condition of being engaged in agricultural activity and applying growth strategies with a clearly defined diversification strategy and its specific subtypes. One of the strengths of this empirical study is the diversity of our respondents' production and entrepreneurial profiles, depending on the various activities they perform, whether related or unrelated to their main agricultural activity

This gives us grounds to validate the study and draw some basic conclusions and guidelines. In this article, we will examine the geographical location of the interviewed respondents as one of the factors influencing diversification. Shumen, Dobrich, and Varna have better-developed infrastructure and larger urbanized areas compared to the municipality of Targovishte.

Source: author's work

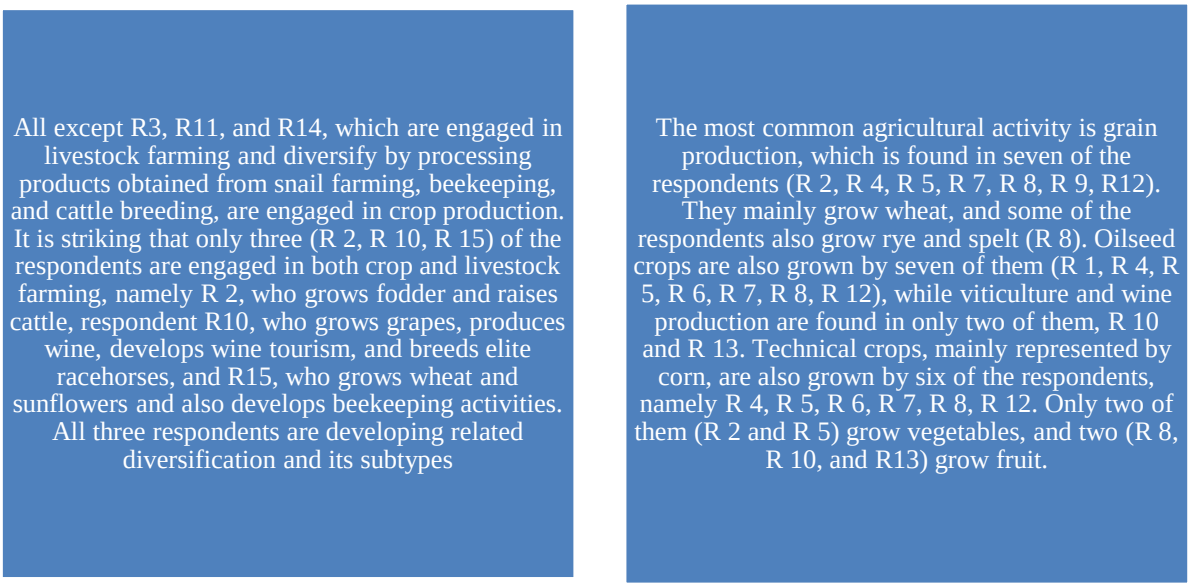
Figure 4. Results related to tourism development of tourism entrepreneurs



Source: author's work

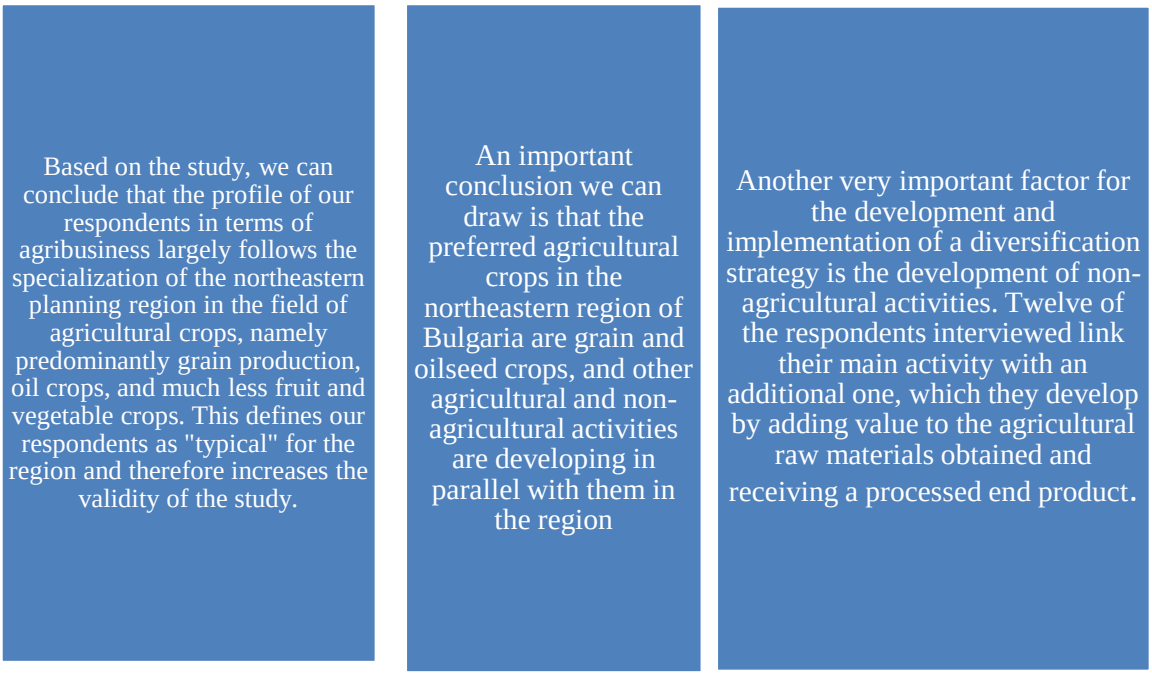
Another key factor for diversification is the development of agricultural activity and the desire to add value to agricultural production by diversifying in the direction of related diversification, horizontal or vertical, and in rarer cases, functional and concentric.

Figure 5. Development of crop, livestock and processing activities



Source: author's work

Figure 6. Summarizing results of the study



Source: author's work

Sometimes the approach of subsidizing institutions needs to be adjusted in order to reach its actual target users (Morris et al., 2017).The implementation of a diversification strategy leads to many social, environmental, and, above all, economic effects. In this analysis, we can honestly say that the better economic results achieved, such as higher income, revenues, and profits, are the result of higher investment and operating costs made in advance. Despite the increased operating costs, however, all respondents report an increase in total revenue and, respectively, in the profit for the farm as a whole. This confirms the most popular benefit of implementing a diversification strategy: economic viability of the farm, increased revenue, and new sources of income (Bartolini et al., 2014).

5. Conclusions

Based on the empirical research conducted, we can conclude that all fifteen respondents interviewed believe that their business has become more competitive and offers them more opportunities to sell their finished processed products to end customers thanks to the diversification strategies they have implemented. All of the diversification strategies implemented, without exception, confirm an increase in profitability and employment in their companies, but our respondents also share that they experience difficulties in recruiting staff for a number of reasons typical of the socio-economic development of the North-East planning region – migration of young people from rural areas of the country, depopulation and leaving behind minority groups with lower levels of education and low motivation to work, low skill levels, deteriorating demographic indicators, and low levels of education among the population in rural areas. When asked which of the two activities (agricultural or non-agricultural) was more difficult to find staff for, half of the respondents indicated non-agricultural, while the other half indicated both.

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Veselin Krustev[1]

SUSTAINABILITY OF BULGARIAN FIELD CROPS FARMS IN THE CONTEXT OF THE EUROPEAN DEVELOPMENT FRAMEWORK

Abstract: *In the Common Agricultural Policy, which has been implemented for almost two decades, contradictory trends have been observed, both in Bulgaria and in the other Member States, which is especially relevant for small farms, which are mainly located in the so-called "new" Member States, and in a large part of the Mediterranean countries. This study offers a holistic approach to assessing the farm sustainability, based on key indicators suitable for evaluating a relatively large research scale and showing the direction of sustainable development of farms, and on the other hand estimating efficiency of the implemented policies in the sector, which occupies an increasingly significant share of the utilized agricultural area in the European Union. Results of six economic size classes are obtained by both methods to form a Composite Sustainability Index and data is provided by the Farm Accountancy Data Network. The results proof how the majority of Bulgarian farms of various sizes in the field crops sector lag behind the sustainability of the average statistical agricultural production unit at the European Union level, but when it comes to an assessment linked to the scale of production (payment per area), this is not relevant for the enterprises with the largest area.*

Keywords*: farm sustainability; economic size classes; relative comparative assessment; data envelopment analysis – benefit of the doubt, composite index*

JEL: *D04; N84; Q01; Q12; Q56*

1. Introduction

Modern policies of the European union (EU) concerning the direct payments lay down on the farm typology and according to the European Commission (EC), there are eight essential types of farming and six economic size classes (EC, 2009; Hyblova, Skalicky, 2018), all of which need to be further investigated in sustainability terms. Those specialized in field crops (FC) are the object of this study as a focus of the implemented policy. Their main benefit of the measures of Common Agricultural Policy (CAP) is managed by the area payments. An exception due to a fixed single payment for small farms is figured out in Bulgarian regulation (MAF, 2008) while present support schemes are directly based on farm sustainability (MA, 2023). Following the new policy of the European Commission (EC), also the concept of database used in the observation - Farm Accountancy Data Network (FADN) is being transformed into a sustainability (FSDN) dataset (EC, 2024) pursuing more detailed indicators dedicated to farms sustainability monitoring system ideologized at the Rio de Janeiro Conference (UN, 1992).

The current study aims to reveal who the real beneficiary of CAP tools between the different economic size classes (ESC) of arable farming systems is and how the farm sustainability is influenced in dynamics and a long-term period (2007 – 2022) during the application of two different policy frameworks. The study hypothesis is CAP area payments provide a significant support to the sustainability of the largest FC units, as does their scale of production.

2. State of the Issue

The core values of the CAP include high efficiency and competitiveness and that require the farm transformation. After Bulgaria`s admission to the EU, most farms failed to pass through the process, which led to area concentration into fewer decision-making units (DMUs) while their production scale increased. As a result, sector`s competition and dynamics raised and

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moreover, yields` quality and quantity were improved (Nestorov, Branzova, 2022, p.169) at expense of the added value per unit area compared to other more intensified farm industries.

The EU membership also satisfies the needs of scientists, policy-makers and stakeholders of data abundance. However, data availability for a long-term analysis of farm sustainability is still scarce. Summarized by Chopin et al. (2021) cross sectioning a vast majority of 119 studies within half a dozen decades time scope, the percentage of investigations dedicated to a longer period is only 11.

Many cases are experiencing a lack of relevant indicators. Such is the one of Kalinowska et al. (2022), where four databases are involved to set variables, very similar to those in this study as quantity and structure. However, the Polish team established a system to evaluate most the sustainability aspects for a relatively long period (2011-2018). The only missing state, claimed by Bachev (2016) as a crucial measurement – farms` adaptability and efficiency to the governance. Such a process requires efforts to be made by many parties covering a significant part of the value chain by vertical – trading agents` attitude, the ability to reduce the transaction costs, to match the institutional frame.

This study tries to meet that challenging requirement by including CAP efficiency on performance, social and detrimental production factors on micro level.

3. Methodological Approach

Despite the farms' heterogeneity, the used sample is quiet diversified, the production technology in terms of mechanization is quiet similar as well as the production factors usage.

"Benefit of Doubt" approach as an adaptation of Data Envelopment Analysis (DEA-BoD) for ranking the units` performance is provided by the Organization of Economic Co-operation and Development (Nardo et al., 2008) as a proper tool aiming to estimate sustainable development of EU by MS and the efficiency of the policy pursued (Cherchye, Kuosmanen, 2006).

The other approach for farm sustainability calculations are made through the Relative Comparative Assessment (RCA) proposed and approved by Ivanov (2022).

The Composite Sustainability Index based on those methods, both combining an equal number of economic, ecological, and social objectives (15 in total), are previously approved and presented by the author (Krustev, 2023). The current study uses as a benchmark the synthetic mean EU farm (completely diversified) and applies the methodology at a sectoral level.

However, in order to adapt the used methods for plant production DMUs, some changes need to be made. Ecological pillar involves the share of green payments out of the total (%) instead of animal density in both methods. DEA-BoD modeling included the cash flow and services to the rural society (sum of provided services and rental payments, in €) at a cost of the internal production consumption. Specific for DEA complex indicators is that by including more indicators (15) than usual (5), the model become more complex, leading to concentration of scores in the gap between the lowest and highest points reflecting in higher values (Berg, 2010)

Most of indicators used are inflation related. However, inflation rates are not kept into account due to a methodology complication by different databases usage and furthermore, the possibility of distorting the results by multiple impacts.

4. Results and Discussions

A shortcoming (or a balancing advantage) of the applied methodology is the results accumulation coming out of those different methods. DEA is comparing the results to the best

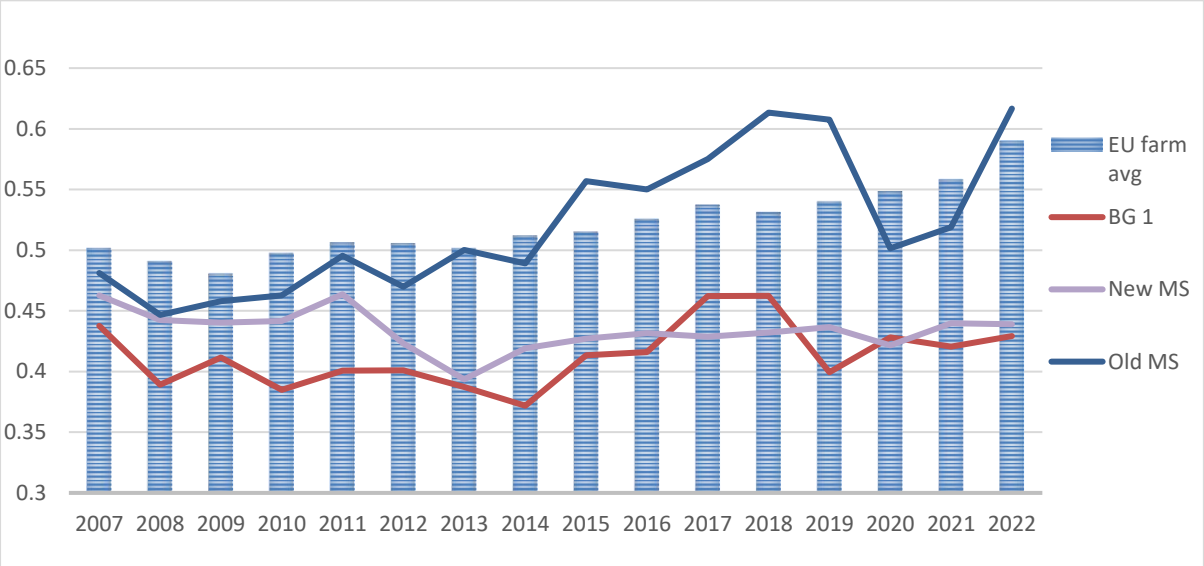
production frontier (1) of the sample, while RCA uses the scale center (0.5) to disperse the normalized values.

So the obtained results of the benchmark indicate how CAP implementation efficiency push up the Composite Sustainability Index (Fig. 1 – 6) referring the farming on EU level as a whole. Thanks to the social pillar, that performance raised after 2018 to a completely new level so a comparison to the other varieties of farms needs a further inspection.

First Size Class – up to 8 000 € Standard Output (SO)

The smallest Bulgarian FC units (BG) act poorer than those of the New MS (NMS) but share a common sustainability development trend which lose value until the end of first inspected CAP period (2013/2014) followed by slight recovery (Fig. 1). Despite the inflation relation of social variables, income support does not reflect to Bulgarian small-scale farms while the NMS experience equable raise until 2014.

Figure 5. Composite Sustainability Index ESC 1



Source: Author`s calculation, FADN.

The Old MS (also known as PIGS countries represent ESC 1) experience several moments of short-term drops following mid-term improvements to 2020 – the moment when CAP could not reform.

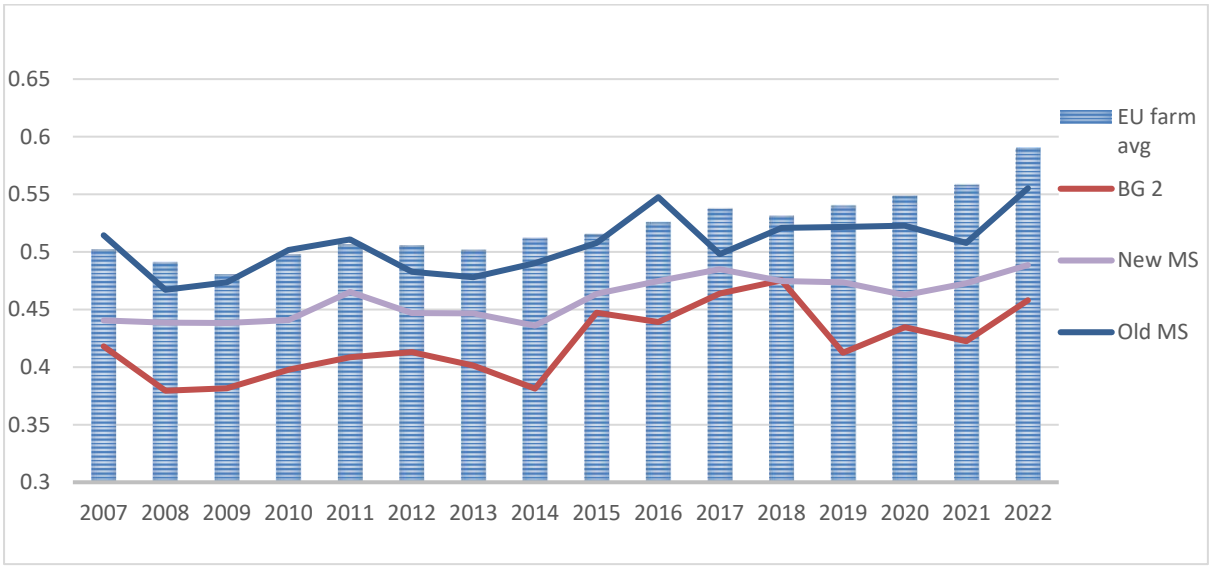
That crisis provoked by default of social and environment policy coincides with the health system crisis. Tiny farmers might be vulnerable to the share of direct sales, caused by supply chain unease so their customers might suffer deficits of high nutrition craft production.

Second Size Class – up to 25 000 € SO

This class also presents small market farms and the performance of Bulgarians is not so different compared to the previous ESC except the start of second CAP scheme implementation, just before the peak in 2018 (Fig. 2).

Social policy does not make any change in ESC 2, while indexes seem comparatively stable. That does not mean there are no fluctuations, most of them are impacting Bulgarian and NMS (less sharply) holdings. The economic attitude got worsen four times reflecting into the ecological pillar positively as deteriorated resources usage while the Composite Sustainability Index could not reveal that.

Figure 2. Composite Sustainability Index ESC 2



Source: Author`s calculation, FADN.

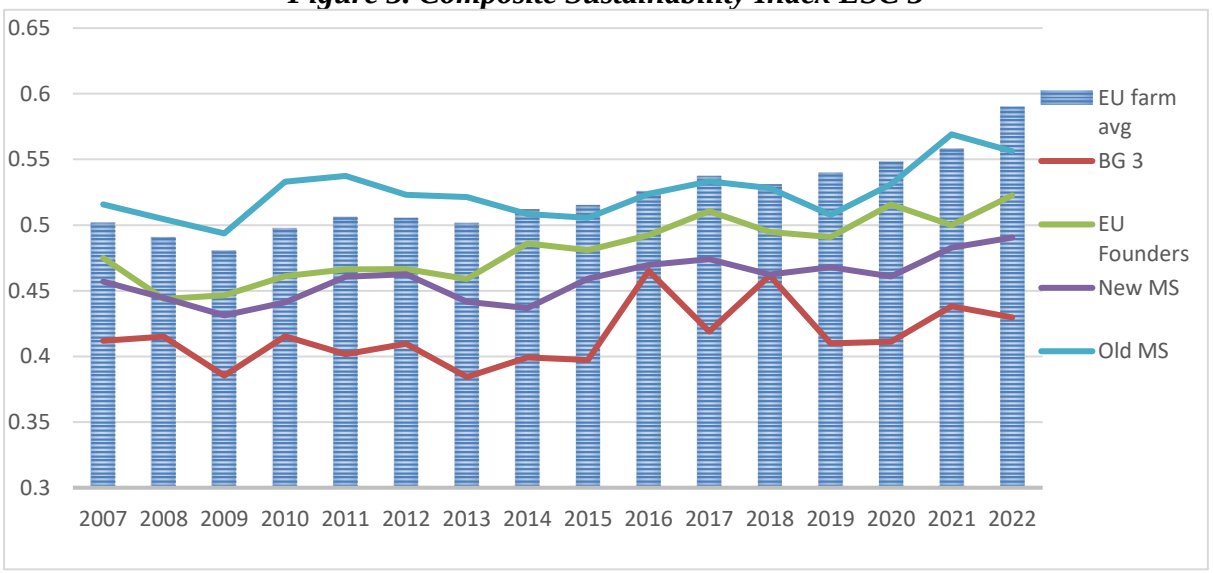
The rate of Old MS (OMS) related to overall EU level based on all the sustainability aspects is mostly influenced by ecological efficiency and social stability.

Third Size Class – up to 50 000 € SO

Lower-medium class puts Italy to EU founding MS (FMS) as presented by sufficient actors whose curve keeps round the EU basis.

All units are supported by stable social aspects promoting the sustainability level, processes intensified in the second CAP program which allows ecological values to rise due to protein crops subsidies and green payments appeared (Fig. 3).

Figure 3. Composite Sustainability Index ESC 3



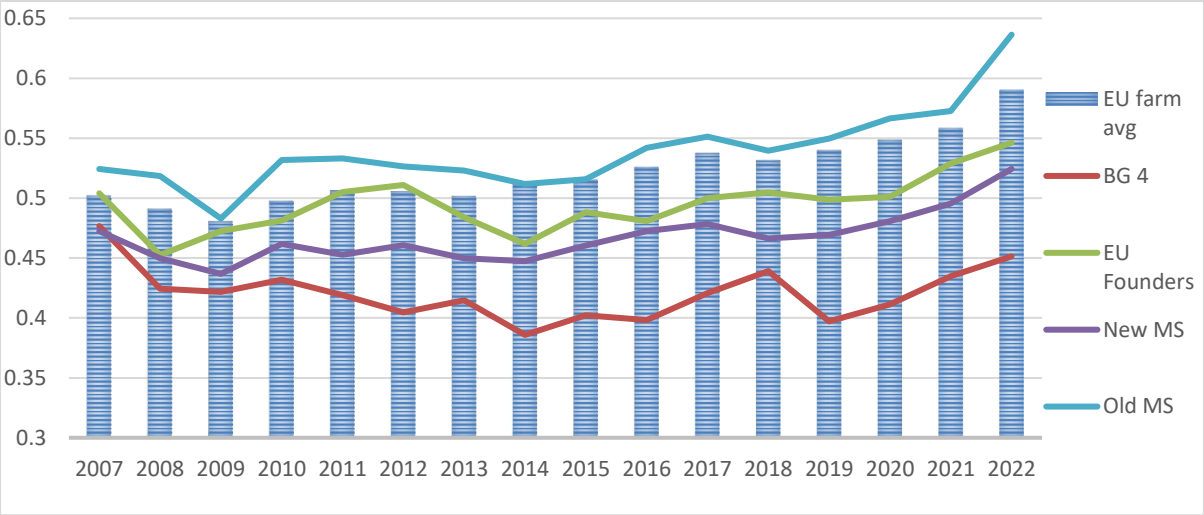
Source: Author`s calculation, FADN.

Bulgarian farms still do not reach the necessary scale to operate more sustainably. All new MS appear to be in a vulnerable position below the scale average.

Forth Size Class – up to 100 000 € SO

Within ESC 4 again the social policy plays a significant role while economically and environmentally farms perform on own power at a very low level of policy support.

Figure 4. Composite Sustainability Index ESC 4



Source: Author`s calculation, FADN.

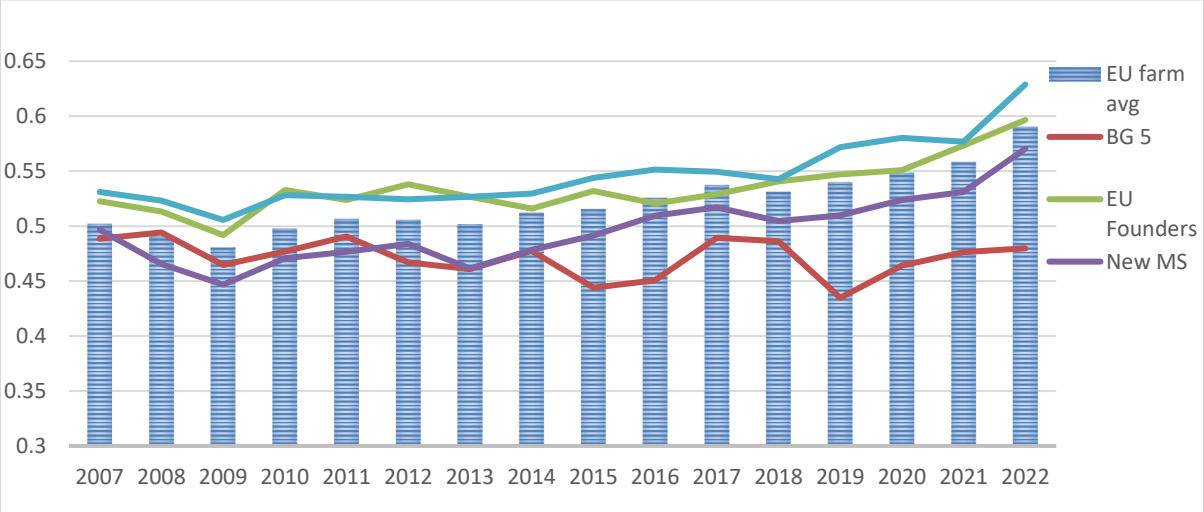
The segregation depicted in Fig. 4 between new and old MS concern all the measured sustainability dimensions.

Bulgarian DMUs` starting point (0.6) of economic pillar is the highest in the class but achieved by the other competitors at the end of observed period, which is combined by Old MS with ecological level increase, most underestimated by FMS.

Fifth Size Class – up to 500 000 € SO

A permanent decrease in economic policy efficiency of BG is reported by DEA-BoD model (affecting also the NMS). However, it leads upward the economic variables and also influence the social pillar in positive direction. The opposite occurrences are describing the instability of BG curve (Fig 5).

Figure 5. Composite Sustainability Index ESC 5



Source: Author`s calculation, FADN.

Ecological policy is becoming more efficient only to OMS and to a certain extend to NMS boosted by the scheme for protein crops support and its relation to green payments share.

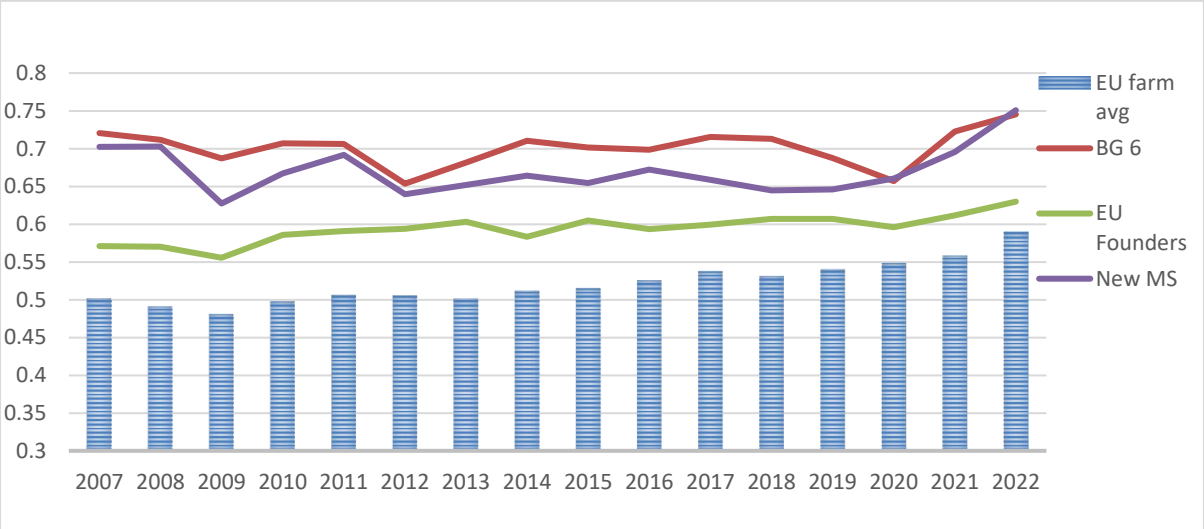
On the other hand, OMS preform very balanced between the sustainability dimensions, which push up the Compound Sustainability Index. Their economic pillar is over the scale mean, while ecological one is a bit below, social – close to reference.

ESC 5 represents the largest farms in most of the OMS (Austria, Finland, Greece and Portugal) which explains why their Index is above the FMS level.

Sixth Size Class – above 500 000 € SO

The Composite Sustainability Index of ESC 6 (Fig. 6) is up-side down compared to the previous ESCs. The reason is hidden in their utilized agricultural area. Its average amount for the period is almost 280 ha into FMS, NMS – 1337 ha, while BG is 1678 ha (EC-FADN, 2024).

Figure 6. Composite Sustainability Index ESC 6



Source: Author`s calculation, FADN.

All the evaluated policy effects (DEA-BoD) have much higher values than the received by farms sustainability improvements (RCA).

An exception is only the economic results of FMS – measured as less efficient while farms economic performance is at the highest stake, a bit over than ESC 5 of the same MS unit. That could mean the policy-makers are investing too much for no consequences.

5. Conclusions

This article presents how the EU Cohesion policy is reflecting to Bulgarian farms in one of the most subsidized sectors but is not able to set which farm is sustainable or not.

Bulgarian farms are demonstrating very sharp fluctuations in all sustainability dimensions that are not noticeable in other DMUs performance.

The largest holdings benefit the most from the area payments and furthermore, their economic power stems from the scale economies and efficiency. In other words, CAP might support the richest entrepreneurs at the expense of those who are able to renew and maintain the rural population and is able vitally to improve the viability of rural areas.

The benchmark of CAP implementation efficiency is significantly complicated and lowered by including the ESCs of FC farms on 15 indicator basis (compared to the basic research form 2023) which verifies the study`s hypothesis.

There is serious possibility all the increases measured at the end of studied period to be affected by boosted inflation during the health crisis.

Despite all the presented farm sustainability dimensions, there is another one - severely important (not an object of the article) – the trend of farm number. Excluding the Czech Republic and single regions in France, Germany and Spain (largest MS), the amount of the farms in EU is crucially declining, both as a share (Bulgaria and Hungary) and as a total number (Romania and Italy), possibly leading to depopulation of rural areas.

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Bozhura Fidanska[1]

SCENARIOS FOR THE DEVELOPMENT OF AGRICULTURAL HOLDINGS IN AREAS FACING NATURAL CONSTRAINTS UNTIL 2030

***Abstract**: In recent decades, especially since the second half of the twentieth century, farms in mountainous areas have undergone a process of socio-economic and environmental transformations as a result of accelerated integration into national and international social-economic systems. Consequently, these farms have had to adapt to broader socio-economic dynamics, including the full integration of rural economies into a globalised market economy; expansion and deployment of communication technologies; gradual protection of the environment; an increasing revision of agricultural policy support; emergence of new requirements and interests for rural areas such as tourism, landscape maintenance, protection of biodiversity and cultural heritage, and growth of an economy based on the provision of diverse services. This study aims to design, using statistical data from 2007 to 2020, a multi-scenario simulation framework for the development of farms in mountain areas. It applies a widely recognised scenario-based methodological approach. The study establishes the logical relationship between the functioning of production systems in mountain regions and the sustainable development of agricultural holdings in these areas. Three scenarios are constructed: a baseline, a moderate, and a pessimistic scenario. The results highlight the significant challenges confronting farms in mountainous regions while also revealing opportunities to adapt development policies and strategies. Targeted measures aimed at stimulating sustainable practices, diversifying activities, and improving infrastructure can mitigate negative trends and enhance the long-term viability of farms in these territories.*

***Keywords:** agricultural holdings, disadvantaged areas, scenarios for the development of agricultural holdings.*

***JEL**: Q*

1. Introduction

Mountainous areas cover approximately one-quarter of the world's land surface and are home to about one in ten of its inhabitants, 40 per cent of whom live in developing or transition economies. In Bulgaria, mountainous regions occupy about 30 per cent of the country's territory, while the mountain population represents around 15–20 per cent of the national total. These figures reflect the reality that mountainous regions typically have a lower population density due to geographical and climatic constraints, which make living conditions more difficult and limit access to economic opportunities compared to other regions. Agriculture in mountainous regions is generally small-scale and characterised by difficult-to-access terrain at higher altitudes, which restricts agricultural possibilities. Production is largely decentralised and fragmented, with high production costs, limited labour resources, and a low rate of land utilisation (Rijswijk et al., 2021).

The aim of the study is to analyze and evaluate the different types of scenarios for the development of farms in mountain areas using a scenario-based methodology allows for the consideration of various possible futures for such farms, taking into account multiple factors including climate change, economic conditions, technological progress, policy shifts, and social trends. Possible scenarios are therefore built upon different combinations of these variables.

The development of mountain agriculture in Bulgaria by 2030 can be outlined through three alternative scenarios.

- Sustainable and Innovative Agriculture:
- Mountain areas transform into sustainable agricultural hubs that combine traditional practices with technological innovation. Key drivers include investment in resource-efficient technologies (e.g. smart irrigation, drones), policy support for organic farming,

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flexible subsidies for smallholders, and the expansion of agritourism. These measures enhance productivity, preserve natural resources, and improve farmers' living standards, while organic products and cultural tourism strengthen rural economies and social cohesion.

- Technological Progress: Digitalization and Modernization:
- Agricultural transformation is led by digital innovation. Farms adopt smart management platforms, IoT systems, and automation through drones, robots, and sensors. Improved connectivity and advanced methods such as hydroponics and vertical farming increase efficiency and attract younger farmers. The result is a high-tech agricultural model with reduced labor demand and sustainable resource use.
- Pessimistic Scenario: Agricultural Decline and Rural Depopulation:
- Adverse conditions such as climate change, low profitability, and youth migration lead to declining production and ageing populations. Farm abandonment and depopulation weaken rural economies, hinder tourism, and accelerate environmental degradation through soil erosion and resource mismanagement.
- Ecological Scenario: Progressive Development of Local Small Farms:

This scenario envisions the transformation of mountain agriculture through the strengthening of small, locally oriented farms that maintain ecological balance and produce high-value niche products. These holdings emphasize environmental stewardship, cultural preservation, and short supply chains that connect producers directly with consumers and rural tourism.

These scenarios collectively illustrate alternative development pathways for Bulgaria's mountain agriculture, shaped by policy, technology, and socio-economic dynamics.

2. Problem status

This study identifies and analyzes three potential scenarios for the development of agricultural holdings in mountainous areas. These scenarios are inherently predictive, with their likelihood contingent upon a range of external environmental, economic, and social factors. Each scenario reflects a different trajectory of development: one assumes a continuation of current practices, another anticipates significant adaptation and modernization, and the third considers a potential decline in agricultural activity due to external pressures. By exploring these possibilities, the study aims to provide a framework for strategic planning and policy-making in mountainous agriculture.

3. Methodology

The methodology for forecasting the number and spatial distribution of farms in Bulgaria by 2030 is grounded in the Territorial Share Shift Analysis (TSSA), a proportional extrapolation approach derived from the Shift Share Analysis (SSA) framework. TSSA quantifies the territorial redistribution of agricultural activity by assessing the impact of national and regional dynamics on local-level changes between 2010 and 2020. The approach assumes a linear relationship between local and national changes, enabling the derivation of forward-looking estimates through proportional extrapolation.

The fundamental forecasting equation is:

$$\Delta local_{t+1} = Local_t * (1+R) \quad \textbf{(1)}$$

where: $$R = (Local_t - Local_{t-1}) / Local_{t-1} \quad (2)$$

denotes the proportional extrapolation coefficient, reflecting the rate of change in the number of holdings across consecutive periods.

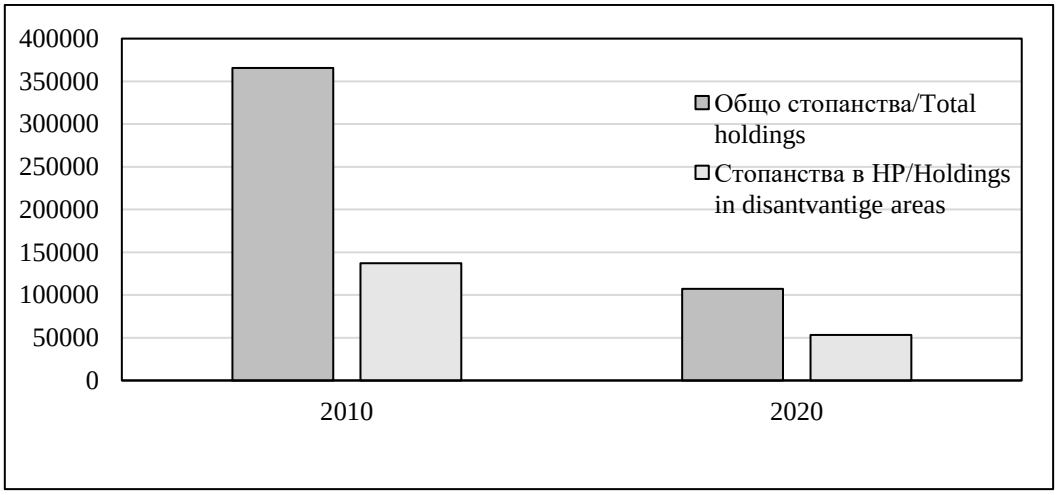
The methodology comprises three key stages: (1) computation of farm number variations at municipal and regional levels; (2) estimation of the proportional extrapolation coefficient RRR; and (3) projection of future farm numbers under baseline, optimistic, and pessimistic scenarios. The probability of each scenario is subsequently evaluated through covariance and variation analysis.

Overall, TSSA offers a rigorous, territorially differentiated quantitative framework for modeling and forecasting structural transformations in Bulgarian agriculture towards 2030.

4. Results of the study

The number of farms in the mountainous disadvantaged areas is decreasing, which follows from the development of the number of farms in the country as a whole. There is a slower rate of decrease between the two censuses of agricultural holdings in mountain areas. In the period 2010-2020, the number of farms in regions decreased by about 34%, while the reduction of farms in the country as a whole was 65%. (Figure 1.).

Figure 1. Comparative analysis of the number of farms in the country - in total and in disadvantage areas



Source: Agrostatistics Department, MAF, Eurostat.

This amendment finds its explanation in a number of circumstances related to migration processes – the movement of the population towards the cities in order to find sources of livelihood. Deteriorating infrastructure in disadvantaged areas (lack of road infrastructure, telecommunications and internet access) greatly increases the outflow from agriculture. Also, the lack of access to social services such as healthcare, education and leisure activities express the unattractiveness of disadvantaged areas among the country's young population.

The number of holdings in mountain areas using the proportional extrapolation method used is projected to decrease in the future period until 2030. This is not a surprising or unnatural result, given the existing demographic and economic trends in these regions. In general, the proportional extrapolation method replicates in a nonlinear relationship the historical trends which were taken into account in the actual measurement of the change of farms at the level of municipalities in the period between 2010 and 2020.

Under the baseline scenario, the number of farms in mountain areas could decrease to around 15,105 by 2030. This represents a decrease of about 21% compared to the number of farms in 2020. It is important to note that this decline is smaller than was reported in the previous period between censuses. In the optimistic scenario, a decrease is also predicted, albeit less

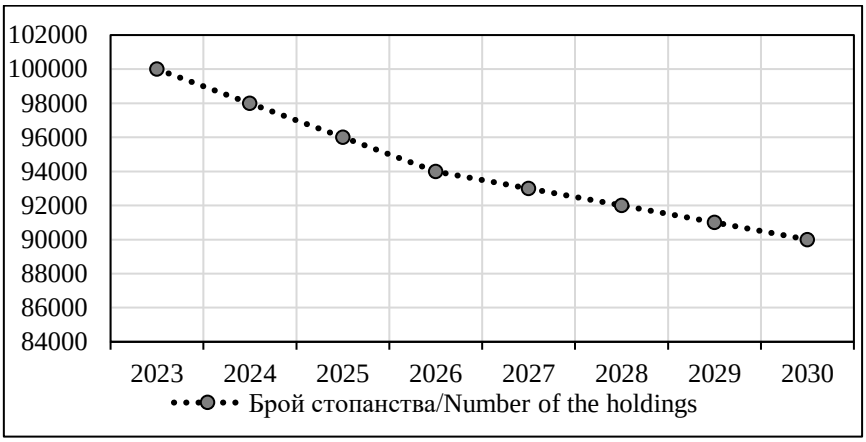
pronounced – the number of farms may reach 31,160, which is a decrease of 13% compared to 2020. This decrease, even in an optimistic scenario, can be explained by the strong influence of national and macro factors. Although these negative factors are assumed to weaken in an optimistic outlook, they continue to have a negative effect on the number of holdings, reflected by a proportional extrapolation factor (-0.33).

The pessimistic scenario, on the other hand, predicts a significant decline. The number of farms in mountainous areas may fall to 13,017, which is 47% less than in 2020.

The probability of occurrence of each scenario depends on the level of confidence, which is set to p = 0.90 (90%). This means that in 10% of cases, the result may deviate from the intended limits. The confidence interval of results in the three scenarios is calculated at ±3 943 holdings.

On the basis of the calculations made are presented (Figure 2, 3 and 4) the expected development of key indicators in mountain areas by 2030.

Figure 2. Estimated number of agricultural holdings in the mountainous regions by 2030.

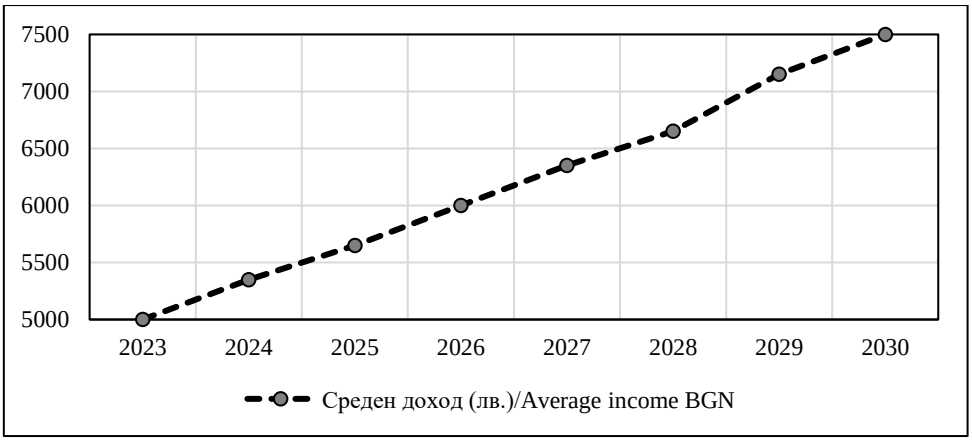


Source: own calculations.

Scenario 1: Sustainable growth (optimistic scenario)

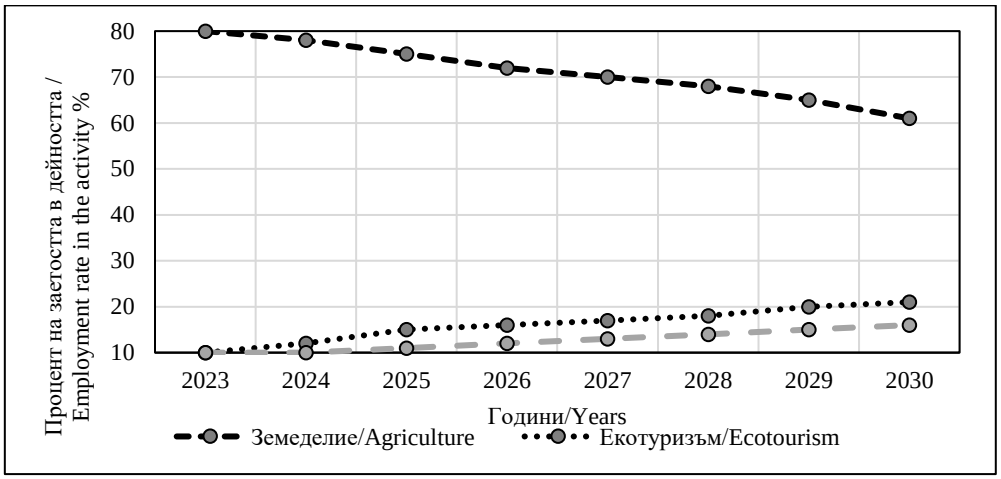
The main characteristics of this scenario are related to the fact that the number of holdings is decreasing more slowly than the projected value, thanks to targeted support policies. Average income is growing faster, stimulated by innovation and access to new markets. The diversification of activities is very pronounced – ecotourism and organic farming are gaining popularity.

Figure 3. Estimated average income of farms by years in the mountainous regions



Source: own calculations.

Figure 4. Estimated diversification of farms' activities in the mountainous regions 2023-2030



Source: own calculations.

The reasons that may warrant the implementation of this scenario are two effective implementation of rural development programs and improving infrastructure and access to markets. As a result, the stabilization of the local economy and the retention of the population in these areas are achieved.

Scenario 2: Gradual degradation (pessimistic scenario)

This scenario is characterized by the following characteristics: The number of farms decreases sharply, due to lack of investment and ongoing depopulation. The average income per farm remains low or grows slowly. Diversification is weak – a small share of ecotourism and other alternative activities.

The main reasons that can explain the realization of this scenario are due to the lack of sufficient state support and infrastructure projects and the weak adaptation to climate change.

The results that would be expected from the implementation of this scenario are significant decline in economic activity and an increase in abandoned territories.

Scenario 3: Innovative transformation (baseline scenario)

The main features of this scenario are concentrated in the fact that the number of holdings decreases moderately, but those that remain are modernized. The average income is increasing thanks to technology and the implementation of sustainable practices. The diversification of activities is balanced – the share of alternative activities is increasing, but traditional agriculture remains dominant.

The reasons that may determine the realization of this scenario are mainly concentrated in the partial effectiveness of the support programs. Gradual adaptation to changing conditions.

The main and distinctive result that can be achieved with the implementation of this scenario is the preservation of socio-economic stability in the mountainous areas.

5. Conclusions

Using a scenario method, we can conclude that the development of farms in mountainous areas depends on various factors, such as technology, climatic conditions, economic policies and social trends. Each of the proposed scenarios has a different potential for success depending on

how these factors are implemented, with positive scenarios focusing on sustainable development, innovation and preserving local identity, while negative scenarios focusing on depopulation and inefficiency.

Based on the analysis, it can be concluded that by 2030 it can be expected:

- Strengthening small and medium-sized farms: The implementation of targeted policies and programmes is expected to increase the economic viability of small and medium-sized farms in mountain areas. This includes investments in modernisation, training and market access.
- Diversification of activities: Promoting alternative forms of employment such as ecotourism, organic farming and handicrafts will contribute to the sustainable development of these regions.
- Infrastructure development: Improving transport and digital infrastructure will facilitate access to markets and services, thus supporting the local economy.

These results reflect the significant challenges facing farms in mountain areas, but also provide an opportunity to adapt development policies and strategies. Targeted efforts to stimulate sustainable practices, diversify activities and improve infrastructure can mitigate negative effects and support the viability of farms in these areas.

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Monika Kabadzhova, Anton Blagoev[1]

IDENTIFYING TRENDS AND PROBLEMS IN IMPLEMENTATION OF AGRO-ECOLOGICAL PRACTICES AND INNOVATIONS BY FARM MANAGERS

***Abstract**: The study combines different methodological approaches to track trends in the implementation of agroecological practices, identify barriers, assess their specificities and impact, and outline directions for development. To achieve this, some tasks have been set, including reviewing the literature on the topic, identifying the leading trends in the implementation of agroecological practices and innovations, and the main problems and barriers to their adoption on farms. The study aims to identify the leading trends in the implementation of agroecological practices on farms. It was found that the line for the development of agroecological practices and innovations is as important as the important stages for farm management.*

***Keywords**: agroecology, practices, innovations, trends, risk*

***JEL:** Q10; Q15*

1. Introduction

European agriculture goes towards agroecology, supported by the CAP reform 2023–2027 (European Commission, 2022). The pressure on soils is significant as water erosion affecting about one quarter of soils in the EU and causing substantial economic damages (Panagos et al., 2024). Some studies were found that the provision of agroecological public goods is in the interest of stakeholders and has a positive effect on landscape conservation, biodiversity and the increase of tourism interest (Sarov, Elenov, 2023). Moreover, the application of precision farming leads to improved efficiency and sustainability (Petrov, 2025; Slavova, 2021).

The aim of study is to identify the leading trends in implementation of agroecological practices in farms. On this basis, the main challenges and problems to the adoption of agroecological practices and innovations was determined, as well directions for further development of agroecological practices in farms was outlined.

2. Research the problem

Sustainable development is key to balanced growth, resource conservation and well-being in rural areas and requires coordination between the state, farmers and society, supported by modern technologies (Ivanova, 2024). The economic role of agricultural sector in the EU remains relatively stable. The share of agriculture in GDP is around 1.3% in 2024. However, expectations for sector are increasing, such as producing more with fewer resources under greater climate variability and stricter reporting requirements. It was found that further motivates implementation of monitoring, reporting and verification systems and digital workflows (Eurostat, 2025). Also, adapting to agroecological approaches brings benefits for productivity, income and climate adaptation (Kirechev, 2022), while subsidies often remain area-based (Turlakova, 2018). In Bulgaria, cereals dominate, with increased vulnerability to drought and erosion. In that context the CAP Strategic Plan 2023–2027 foresees eco-schemes and investments, including aid for expansion of irrigation (European Commission, 2025). It was found that uncertainty of support and regulatory changes were significant barriers,

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although farmers plan to continue eco-innovation (Todorova, 2022). Agricultural sector remains important for GDP and highly exposed to climate risks (World Bank Group, 2021). In other research was focus on policy restructuring with investments, ecosystem restoration, agroforestry, markets for ecosystem services and knowledge and innovation systems along the farm-to-fork chain (Kirechev, 2019).

3. Methodology

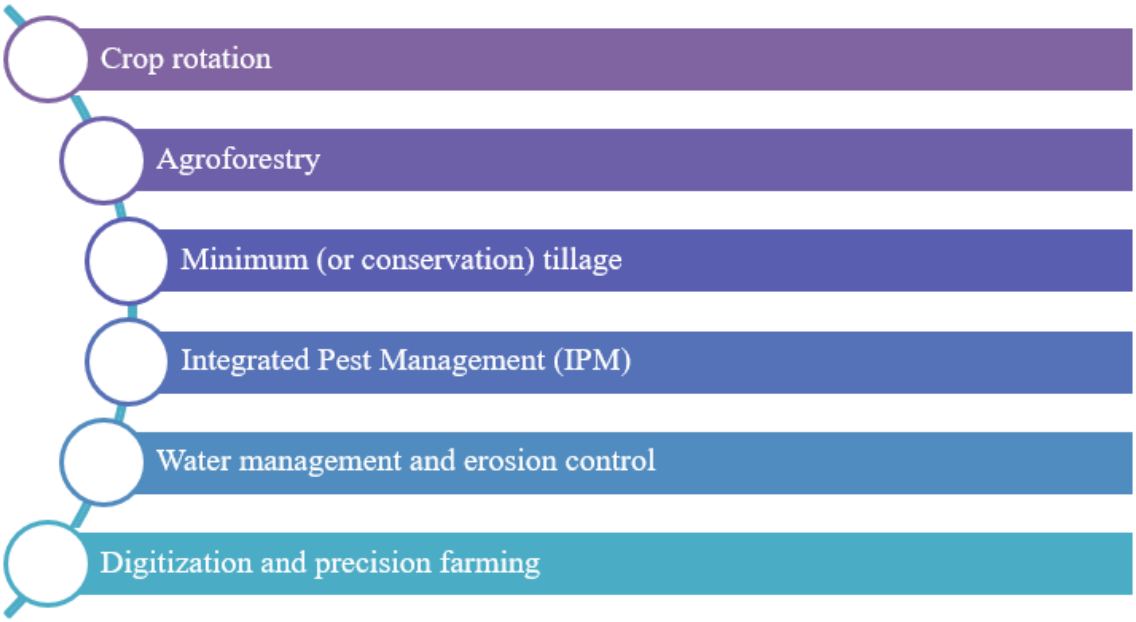
The methodology was integrated into four tasks that provide a single analytical flow: 1) Identifying the leading trends in implementation of agroecological practices on farms; 2) Identifying the main problems and barriers to agroecological practices and innovations on farms; 3) Outlining the specifics of agroecological practices and innovations used in the agricultural sector and their impact on it; 4) Establishing directions for development of agroecological practices on farms.

4. Results of research

Over the past decade, agroecological practices have become a key instrument for the sustainable restructuring of agriculture. They reflect the pursuit of integration between production efficiency, preservation of natural resources, and technological progress. The analysis of leading trends reveals a shift from traditional and reactive management models to adaptive systems based on data, innovation, and long-term sustainability.

Among the main directions of development, several key trends stand out, reflecting the adaptation of agricultural systems to both ecological and economic challenges (Figure 1).

Figure 1. Main types of agroecological practices applied on farms



Source: Author's study

The analysis identifies several leading trends in the implementation of agroecological practices and innovations across European agriculture, reflecting the transition toward data-driven, resource-efficient, and climate-resilient systems.

The first trend concerns the establishing of crop rotation as a main principle of agroecological production and soil regeneration. In Germany and France, more than 70% of farms apply crop

rotation institutionalised under the Common Agricultural Policy (Eurostat, 2023). In Bulgaria, about half of the farms practice crop rotation, mainly in simplified cereal-based systems, though the inclusion of legumes and cover crops was steadily increasing (Eurostat data), enhancing nitrogen fixation and soil structure.

The second trend highlights the growing role of agroforestry as an integrated approach that combines agricultural productivity with ecological restoration. Italy and Spain lead in the adoption of agroforestry systems (7–9% of agricultural land), according to Eurostat data, largely due to traditional models such as *dehesa* and *silvoarable*. In France and Germany, agroforestry is supported through national and EU programmes promoting buffer zones and afforestation, whereas Bulgaria coverage remains limited (around 2% of farmland; Eurostat, 2023), mainly in the form of shelterbelts and pilot initiatives.

The third trend relates to the expansion of minimum (conservation) tillage as a central component of sustainable agriculture. Spain (32%) and Germany (28%) report the highest adoption rates (Tur Cardona et al., 2025), integrating the practice with precision agriculture and soil monitoring technologies. In Bulgaria, around 17% of arable land is managed under minimum tillage (Eurostat data), mainly on large grain-producing farms, thereby reducing erosion and improving soil health.

Another key trend is the development of Integrated Pest Management (IPM), which has become the standard framework for phytosanitary risk management in the EU. Germany and France lead with over 75% adoption (Eurostat, 2023), while Spain and Italy have advanced through the implementation of biological pest control in fruit and vegetable production. In Bulgaria, IPM was applied in about 50–55% of farms (European Commission, 2023), primarily within larger production structures.

A related trend concerns water resource management and soil erosion control, both crucial under increasing climate uncertainty. Spain and Italy maintain the highest share of irrigated land (20–22%) (Eurostat, 2023), while France and Germany, with lower irrigation levels (4–6%), compensate through cover cropping and mulching. In Bulgaria, irrigation covers only about 1.8% of agricultural land (Eurostat data), emphasising the need for investment in infrastructure and incentives for water-retention practices.

Finally, digitalisation and precision agriculture have emerged as strategic drivers of agroecological transformation. In Germany and France, 35–40% of farms use GPS and soil or climate sensors (Tur Cardona et al., 2025), while in Bulgaria, around 12% of farms have adopted digital technologies (Eurostat data). Although the share remains modest, it continues to grow steadily, supported by EU innovation and modernisation programmes.

Building upon the identified trends, the analysis focuses on three key dimensions that define the current state and future direction of agroecological transformation in the agricultural sector: identifying existing barriers, outlining the specific impacts of implemented practices, and formulating strategic directions for their further development. Regarding the identification of key problems and barriers, the analysis reveals major challenges related to limited access to financing and technology, insufficient specialised knowledge and advisory support, and weak institutional coordination in implementing agroecological practices. Regarding outlining the specific characteristics and impacts, the applied agroecological practices demonstrate a direct effect on improving soil fertility, biodiversity, and water balance, while simultaneously reducing emissions and production costs without compromising the economic sustainability of farms. Regarding formulating directions for development, future development pathways focus on integrating digital technologies, promoting circular and low-carbon production models, and

strengthening training and knowledge exchange between farmers, research institutions, and policymakers.

Table 1. Main types of agroecological practices applied on farms

Indicator / Practice	France	Spain	Germany	Italy	Bulgaria	EU Average
Crop rotation (regularly applied by farms)	72%	68%	83%	74%	49%	70%
Agroforestry (area combining trees and crops)	6%	7%	4%	9%	2%	5–6%
Minimum tillage (% of arable land)	25%	32%	28%	21%	17%	26%
Integrated Pest Management (IPM)	68%	61%	79%	66%	54%	65%
Irrigated land / Water management (% of farmland)	6%	22%	4%	20%	1.8%	8.9%
Digitalisation / Precision agriculture (% of farms)	38%	31%	45%	29%	12%	≈30%
Organic farming (% of agricultural land)	10.4%	10.8%	10.3%	17.4%	2.2%	10.5%
Pesticide sales (% of total EU volume)	23%	18%	14%	14%	~1%	—

Source: Eurostat data, JRC, FAO, EIP-AGRI and ESDAC (2021-2023).

5. Conclusions

The comparison between France, Spain, Germany, Italy, and Bulgaria shows that the development of agroecological practices across the EU is uneven but guided by a common strategic framework. Southern European countries such as Spain and Italy focus their efforts on water management, erosion control, and agroforestry systems, while those in Central and Western Europe, such as Germany and France, prioritise digitalisation, Integrated Pest Management (IPM), and advanced crop rotation systems. Bulgaria remains in an early yet dynamic stage of transition, with a limited application of most practices but a clearly defined potential for growth in minimum tillage, precision agriculture, and integrated pest management.

Sustained progress will depend not only on technological uptake but also on coherent policy implementation, effective knowledge transfer, and farmer engagement. Strengthening data infrastructure, advisory networks, and financial incentives could accelerate the transition, transforming agroecology from an alternative model into a central pillar of competitive and sustainable agriculture in both Bulgaria and the European Union.

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Mihaela Mihailova, Rumena Gandeva[1]

THE CONTRIBUTION OF SMALL FARMERS TO ENSURING FOOD SECURITY IN BULGARIA

***Abstract**: Small farms occupy a leading place in structure of Bulgarian agriculture. This study examines contribution of small farms to national agriculture, based on data from Eurostat. The relative share of small farms in terms of used agricultural area, produced output, specialisation, as well as the distribution of small farms by subgroups, was analysed. This study aims to determine the relative contribution of food produced by small farms to ensuring food security in Bulgaria. A key aspect of this study was to research the role of small farms in ensuring food security, sustainable resource management. The article outlines the challenges facing small farms, such as access to finance and markets, as well as the opportunities for development through policy synergy.*

Keywords:

***Keywords**: food, agri-food security, trends, farm markets*

***JEL:** Q10; Q12; Q18*

1. Introduction

Food security is a central priority of global sustainable development, defined by FAO (2008) as universal access to sufficient, safe, and nutritious food. In light of climate change, geopolitical instability, and economic disruptions, its relevance has grown significantly (Fogel, 2011; Jacková et al., 2017; Rutten, 2013). Agriculture plays a key role in sustaining food systems, with small farms—over 80% of EU holdings (Eurostat, 2023)—contributing through local market integration, adaptability, and rural vitality (European Commission, 2021). Despite limited land and output, they provide diverse, affordable, and high-quality food (FAO, 2014; Lowder et al., 2016). In Bulgaria, agriculture is marked by dualism: large corporate farms dominate production, while small and family farms focus on subsistence and local supply (MZH, 2020). With over 80% of farms classified as small, their role in national food security warrants closer examination. Their contribution is particularly relevant in the context of regional disparities and the need for inclusive rural development. Understanding their function within the broader food system is essential for designing effective and equitable agricultural policies.

2. Research the problem

Small farms, defined as those with less than 5 hectares or annual output below €8,000 (Eurostat, 2023), constitute over 80% of agricultural holdings in Bulgaria (MZH, 2020). Predominantly family-run and resource-limited, they play a vital role in rural sustainability and food systems resilience (Ardakani et al., 2020; Cardillo, Cimino, 2022; Rocha et al., 2012). Globally, such farms represent over 90% of all holdings and are central to local food production (Lowder et al., 2016). EU policies emphasize their importance for diversification, biodiversity, and social cohesion (European Commission, 2021), with national programmes offering targeted support (MZH, 2020). Despite their prevalence, small farms in Bulgaria have limited land and output shares due to production concentration in corporate structures (Eurostat, 2023). Similar vulnerabilities are observed across the EU, where small farms face low competitiveness and risk of decline (Czyżewski, Matuszczak, 2016). Nevertheless, literature highlights their contribution to food security through diversification and local supply chains (Bachev, 2015; Hazell, 2020; Fremmpong et al., 2023; Kapari et al., 2023; Kirechev, 2022). Scholars advocate for policy prioritization of

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small and medium farms to support rural livelihoods and sustainable development (Harizanova-Bartos, Kabadzhova, 2024; Hristov, Behulova-Uzunova, 2023; Yovchevska, 2015).

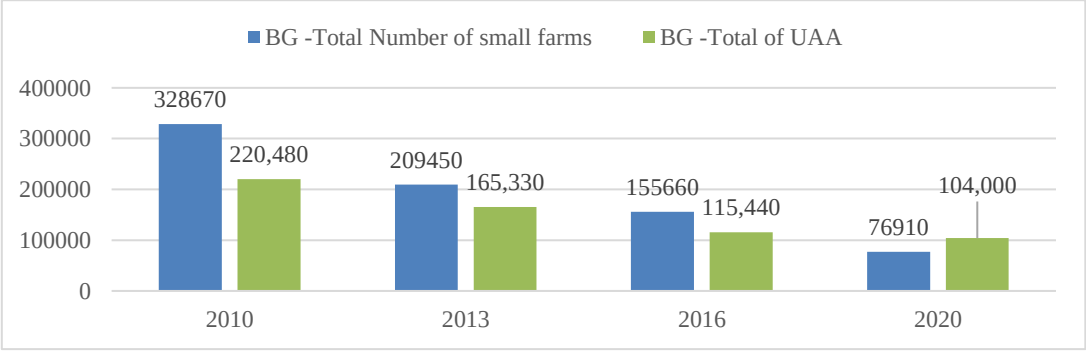
3. Methodology

This study employs a combination of quantitative and qualitative approaches to assess the contribution of small agricultural holdings in Bulgaria to national food security. The analysis is based on official data from Eurostat, the Agricultural Census conducted by the Ministry of Agriculture (2010-2020), and supplementary indicators from international sources such as FAO and the European Commission. These datasets enable comparative analysis between Bulgaria and EU-wide trends and support the identification of structural changes in the agricultural sector. For the purposes of this research, the definition of "small farms" follows the criteria established by the European Union and Bulgarian authorities: farms with less than 5 ha of utilized agricultural area and annual standard output below €8,000. This classification allows small farms to be treated as a distinct analytical segment within national agriculture. The methodological framework consists of the following components: (1)Analysis of the structure of agricultural holdings: Statistical indicators such as the number of small farms, their utilized area, and economic output are examined. A comparative analysis is conducted between Bulgarian data and EU averages to contextualize the national situation. (2)Evaluation of food security through economic output: The study calculates the total output of small farms within each agricultural specialization and compares it to the overall output in the same category. This enables the estimation of the relative contribution of small farms to each specialization. (3) National-level contribution of small farms: Aggregated data across all specializations are used to determine the overall share of small farms in Bulgaria's agricultural production. (4) Contribution by food group: Agricultural specializations are grouped into major food categories (e.g., vegetables, fruits, cereals, dairy/meat, mixed). The share of small farms within each group is calculated to assess their role in the production of essential food items. (5) Share of small farms within each specialization: The proportion of output generated by farms with SO below €8,000 is assessed for each specialization, providing insight into the distribution of small-scale production.

4. Results of research

Between 2010 and 2020, Bulgarian agriculture underwent profound structural transformation, with the number of farms falling from about 328,670 to just over 76,910 number of holdings—a two-thirds reduction within a decade. The steepest losses occurred among very small holdings under 2 hectares, which declined by nearly 80%. Although the total UAA remained stable at around 4.5 million hectares, the share managed by small farms contracted sharply, and farms under 5 hectares lost over one-third of their land.

Figure 1. Small farms structure



Source: Eurostat

The cross we used between small farms with €0-7999 SO and a maximum of 5ha UAA shows that there 8,31% of farms that cover one of the two criteria (either are under €8k SO or are under 5ha) but they don't cover the criteria simultaneously. The number of farms that are in this category is getting lower from 2010-2020. Our general conclusion is that this is as a result of the process of consolidation of farmland and the lower number of existing small farms.

Table 1. UAA for small farms in Bulgaria

	2010			2013			2016			2020		
	Total	>0 ha <2 ha	2<4.9 ha	Total	>0 ha <2 ha	2<4.9 ha	Total	>0 ha <2 ha	2<4.9 ha	Total	>0 ha <2 ha	2<4.9 ha
0 - 7 999 EUR (%)total BG	8,3	97,5	88,3	6,1	96,2	82,1	5,0	95,0	81,0	5,3	94,8	88,3
0 - 7 999 EUR (%)total EU	14,4	93,7	83,1	12,4	93,1	80,9	11,1	93,3	79,9	10,0	91,3	78,3

Source: Eurostat

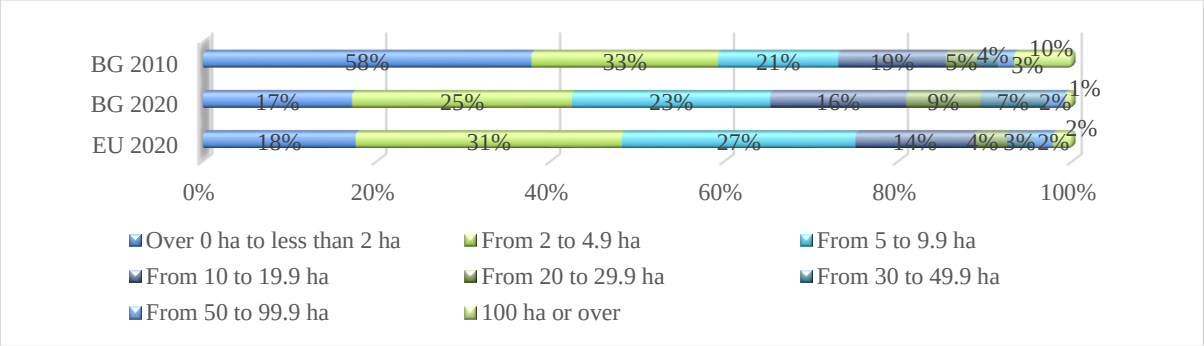
Between 2010 and 2020, Bulgarian agriculture experienced notable consolidation, with small farms (SO<€8,000) declining from 92% to 67% of all holdings. The sharpest reductions occurred among farms with no or minimal land, indicating land abandonment and production concentration in larger units. Despite this trend, Bulgaria still maintains a higher share of small farms than the EU average, reflecting slower structural modernization and the continued prevalence of semi-subsistence farming in marginal regions.

Table 2. Number of farms

	2010				2013			
	Total	**Zero ha**	**>0 ha<2 ha**	**2ha<4.9 ha**	**Total**	**Zero ha**	**>0 ha<2 ha**	**2ha<4.9 ha**
0-7999 EUR (%)total BG	92,0	87,9	98,3	89,3	86,1	79,6	97,2	83,8
0-7999 EUR (%)total EU	73,5	83,7	95,6	84,2	69,7	75,4	95,3	82,3
	2016				**2020**			
	Total	**Zero ha**	**>0 ha<2 ha**	**2ha<4.9 ha**	**Total**	**Zero ha**	**>0 ha<2 ha**	**2ha<4.9 ha**
0-7999 EUR (%)total BG	81,0	80,8	96,6	83,4	67,2	53,3	94,5	89,1

Source: Eurostat

Figure 2. Small-scale farming in the EU (% distribution of farms by farmland area in ha)



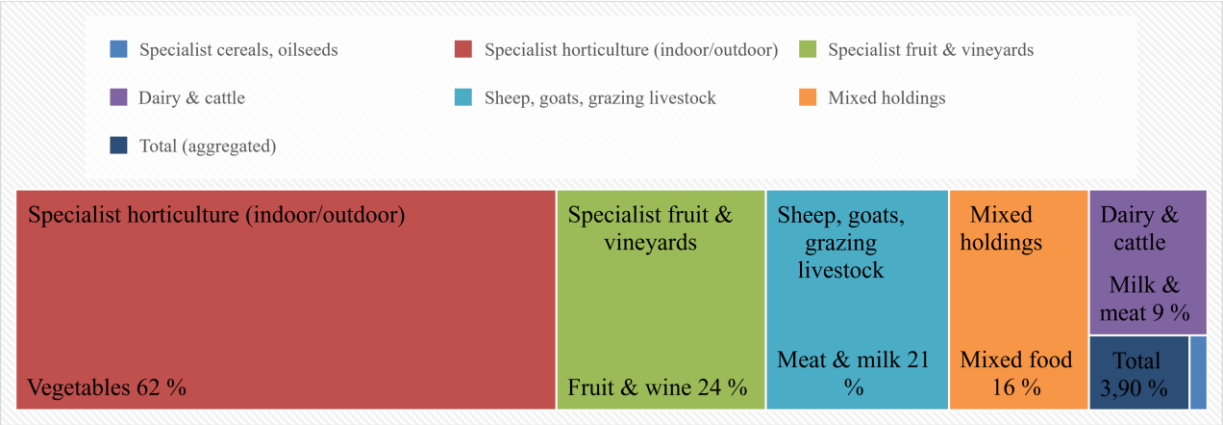
Source: Eurostat

Between 2010 and 2020, Bulgarian agriculture underwent marked structural consolidation. The share of very small farms (<2 ha) dropped from 58% to 17%, while medium-sized holdings (5–20 ha) expanded. Large farms (>100 ha) remained a stable minority (~2%). Compared to the EU-27, Bulgaria exhibits higher land concentration and fewer medium-sized farms. These trends reflect increased efficiency but also a decline in small-scale, labor-intensive production.

Small farms production by specialization

The evolving specialization of Bulgarian small farms between 2010 and 2020 illustrates a pronounced structural dualism within the agricultural sector, characterized by the dominance of a limited number of large-scale commercial enterprises and a broad base of small-scale holdings. Although farms with a SO below €8,000 accounted for merely 4–6% of total agricultural value in 2020, their strategic relevance to national food security remains substantial. These farms are disproportionately represented in labor-intensive and perishable sectors, contributing 62% of vegetable output and 24% of fruit and vineyard production, thereby reinforcing local supply chains and conserving agrobiodiversity. In the livestock sector, small farms generate 20% of sheep and goat production, predominantly in mountainous regions where extensive systems prevail. Their participation in cereal and industrial crop production is minimal, constrained by capital intensity and economies of scale. Spatially, small farms are concentrated in socio-economically disadvantaged and demographically declining regions, where they perform critical ecological and community-supporting functions.

Figure 3. Share of small farms by food specialization (2020) / % of food produced by small farms



Source: Eurostat

The sector exhibits increasing polarization, with capital-intensive enterprises driving productivity growth, while small farms experience marginalization, thereby diminishing their capacity to sustain rural livelihoods and food system resilience. Despite their limited economic output, small farms contribute significantly to food diversity, freshness, and territorial cohesion. The structural composition in 2010 was predominantly mixed, integrating crop and livestock production within semi-subsistence frameworks. By 2020, however, a marked shift toward crop specialization—particularly in cereals, oilseeds, and protein crops—was evident, accompanied by a decline in mixed and livestock-based systems. This trajectory reflects broader patterns of agricultural intensification and the erosion of traditional multifunctional models, underscoring the need for policy interventions that promote diversification, agroecological practices, and localized value chains.

5. Conclusions

Between 2010 and 2020, Bulgarian small farms underwent a structural shift from diversified, semi-subsistence models to specialized, crop-oriented units. While this reflects broader trends of agricultural modernization and market integration, it has reduced the multifunctionality and adaptive capacity of the sector. Despite their declining economic share, small farms remain a cornerstone of national food security. They dominate key food sectors—producing 62% of vegetables, 24% of fruits, and 21% of grazing livestock—and ensure access to fresh, diverse, and locally sourced food, particularly in ecologically sensitive and depopulating regions. Their contribution extends beyond production volume: small farms preserve biodiversity, support rural livelihoods, and stabilize local food systems. The erosion of mixed and livestock-based structures threatens these functions and underscores the need for targeted policy support. In conclusion, small farms are not marginal actors but strategic assets for Bulgaria's food security. Their sustainability depends on measures that promote diversification, agroecological practices, and integration into short supply chains.

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ADAPTABILITY AND SUSTAINABILITY OF ENTERPRISES

АДАПТИВНОСТ И УСТОЙЧИВОСТ НА ПРЕДПРИЯТИЯТА

Adelina Milanova, Pavlinka Naydenova[1]

THE MODERN CORPORATE HUMAN CAPITAL AS A CHALLENGE TO SUSTAINABLE BUSINESS INNOVATION

***Abstract**: The issues regarding innovativeness, innovation attitudes, and behavioral manifestations are broad in scope and generally related to the cultural context of corporate management. Diagnosing this aspect is of essential importance to both management and economic science. This study focuses on the realization of innovation potential in accordance with the innovation attitudes demonstrated by a specific social cohort, engaged in various economic activities within business units in Bulgaria, where relatively high employment of Generation Z representatives is observed. The authors argue that the innovative potential and attitudes can be considered both as a reflection and as a result of the manifestation of the corporate human capital, which is a product of complex and not always linear processes in the economic-historical plan. Addressing this specific component of contemporary corporate human capital is justified by the need to track the status of this emerging segment of society, which is increasingly influencing the identification and analysis of specific attitudes, expectations, and behaviors across business units in Bulgaria. Given the selected focus, the team conducts a longitudinal study as the most appropriate methodology for the specific case. A deeper examination of the traits and dynamics of Generation Z individuals in Bulgaria, particularly as they engage in their preferred occupations, may shift the emphasis within the organizational culture of business units, and that could as well influence the balance between national and organizational cultural dimensions in the Bulgarian economic context.*

***Key words**: corporate human capital; corporate management; innovation; innovation culture; generation Z*

***JEL**: M21; O15; Z*

1. Introduction

In order to respond to the current and under-researched economic processes related to the economic and social role of generation Z and its attitudes, the team decided to focus on its specific orientations, preferences, and expectations regarding the deployment of innovation potential in business structures. Generation Z is a serious management challenge, because it is the first generation that does not literally work for its daily needs and changes the perception of the work process. A number of thinkers, since the time of Auguste Comte, have argued that the change of generations is the engine of social change. More specifically, each successive generation that enters life is the pulse that creates the history of a given society. Socioeconomic anthropology implies a critical understanding of the postulates of the generation theory, which, despite its debatability, has a recognized contribution to research in the fields of economics, marketing, and management.

2. State of the problem

Recent literature has devoted growing attention to the relationship between innovation potential and innovative behavior in the organization (Grant & Berry, 2011; Janssen, 2011). This concept aligns closely with the authors' framing of the issue within a socioanthropological discourse. Identifying a shift toward building an organizational culture that supports innovation and adaptive management is one of the core objectives of the authorial team. These foundational elements directly influence long-term sustainability and foster trends toward renewal and adaptability. McKinsey research (What is Gen Z, 2024) highlights that specific, large-scale events can significantly influence and shape the perspectives of a generation. The American Opportunity Survey, conducted among more than 25,000 Americans, revealed that Gen Z respondents who are employed are more likely to have independent or multiple jobs. They are

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more inclined to report that their compensation falls short of supporting a good quality of life, and they infrequently feel acknowledged or rewarded for their contributions. Of particular interest are recent studies by the Pew Research Center, an American think tank based in Washington, D.C. (Parker & Igielnik, 2020). The identity and behavior of Gen Z are being shaped by the digital age, climate concerns, the changing financial landscape, and the global COVID-19 pandemic. They are known as “digital natives” – the first generation to grow up with the internet. They possess greater pragmatism combined with "sophisticated" idealism and concerns about the future. Gen Z dreams of personal fulfillment in their careers, but they are extremely concerned with their mental health and the possible prerequisites in the economy for its deterioration. They are interested, in their own way, in belonging to an inclusive, supportive community, but at the same time, they are more individualistic, with a stronger sense of personal expression. The Foundation for European Progressive Studies (FEPS) and a youth-focused NGO and research hub based in Brussels, Geneva, Hong Kong, and Nairobi - ThinkYoung have been conducting Europe’s largest policy research focused on youth for 3 years (Gerosa, 2022). A large majority of respondents believe that the EU should stop providing funding to member states that do not respect human rights and democratic rules. Studies on this generation in Bulgaria are relatively insufficient.

In one of the few analyses, conducted by the Bulgarian Industrial Association (BIA) as part of a project funded by the European Social Fund through the Operational Program “Development of Human Resources” (2014–2020), researchers drew the following conclusions (BIA, 2021). Generation Z focuses primarily on global and local socio-economic, environmental, sporting, and cultural events. Changes in the traditional system of upbringing in the family and school have an impact on the attitudes of Generation Z towards the events in their lives and towards the values associated with work and success. They tend to engage in public causes in which they see meaning, as well as volunteer work. Representatives of this generation are not particularly inclined to respect "authorities", but build their own critical thinking and cognitive experience, defending their point of view based on facts, mainly from the global network. Representatives of the generation value mostly creativity and flexibility in management. They value progressive thinking and the willingness to accept new ideas. This generation places strong value on individuality and uniqueness. Its sense of belonging is shaped by participation in interest-based communities, social media followings, environmental movements, and volunteer causes. The primary and most important life goals and aspirations for Generation Z are “happiness,” “independence,” “freedom,” and “love” and they stand for their own way of doing things.

The traditional understanding of the important role of education for success in life is changing (Toteva&Dimova, 2024). Many young people who have invested in a high level of education are disappointed by the difficulties in finding a job in accordance with their educational qualifications. Generation Z works for their own interest, not so much for a career in the traditional sense. Its representatives show commitment and empathy to the organization they work in, but only if they perceive the company cause as meaningful and their work as meaningfully useful. They are not inclined to accept conditions that do not satisfy them. Young professionals in this generation tend to switch jobs relatively easily and display high mobility. However, this frequent job-hopping is often driven less by career advancement and more by feelings of boredom, a lack of engaging workplace experiences, and concerns about mental well-being. Although they are inclined toward innovation and risk-taking, they also exhibit a distinct sensitivity when it comes to establishing and protecting their comfort zones. At the same time, they demonstrate a firm belief in a tolerant approach to mistakes, viewing errors not as failures, but as valuable feedback.

3. Methodology

Given the dynamic progress in the visibility and social inclusion of the study's subject, we consider a longitudinal study with two survey time periods to be the most appropriate methodological approach. The authors' team relies on changes in the viewpoints and conceptual understanding of the specific questions on the part of the respondents. At the same time, in view of the complicated matter, referring to the conservatism of cultural dimensions and, respectively, cultural matrices, there is also an option not to make any significant changes. It would be good to conduct such a study over a period of at least three years, but in view of time constraints, our team has settled on the minimum period of at least one year between the two stages of the longitudinal study. The study focuses on business organizations operating in three key employment sectors where representatives of Generation Z are most heavily concentrated, according to data from the National Statistical Institute: information and communication technology specialists, sales consultants, and business and administrative specialists.

The first stage of the study spans February - June 2024, while the second stage covers the period May - October 2025. In the first stage, there were 122 respondents, respectively 66 people from the first occupation, 37 people from the second occupation, and 19 people from the third occupation. In the second stage, a total of 118 respondents participated. Four individuals from the first occupation, all from the same business organization, did not take part due to long-term absence. Additionally, 7 people from the second occupation and 9 from the third occupation were unavailable. In the remaining business structures, the same individuals who participated in the first stage agreed to take part again. Moreover, 12 more people from the first occupation and 4 from the second occupation, who were not involved in the first stage, joined the study in the second stage. Ultimately, there were 118 respondents in the second stage, with 74 individuals from the first occupation, 34 individuals from the second occupation, and 10 individuals from the third occupation.

Table 1. Gen Z representatives

Information collecting form	**First stage: February – June 2024**		**Second stage: May – October 2025**
Survey among Gen Z representatives:	***122 respondents:***	***11 business Organizations:***	***118 respondents:***
IT specialists	*66 people from the first occupation*	*five business organizations:* *- two small (over 50 people)* *- three medium (up to 250 people)* *or* *- three micro (up to 50 people)*	*74 people from the first occupation*
Sales consultants	*37 people from the second occupation*	*three business organizations:* *- three large (over 250 people)*	*34 people from the second occupation*
Business and administrative specialists	*19 people from the third occupation*	*three business organizations:* *- one medium (up to 250 people)* *- two small (over 50 people)*	*10 people from the third occupation*

Source: Created by the authors

Thus, the total number of respondents for the two stages of the longitudinal study is 240 people. There are no management staff among the surveyed employees, which is explained by their age. The male to female subjects' ratio is balanced, and the team did not identify any definitive

correlations between gender and attitudes toward change based on the survey responses. Regarding the basic passport data, the team placed two important passport components in the questionnaire, namely education and place of obtaining the educational degree, which we are convinced can explain, to a certain extent, possible differences and specific answers /points of view/ that should be taken into account. The weight of this passport characteristic is greatest among representatives of the first occupation, where approximately one third received their education at universities in the Netherlands and the United Kingdom. The universities are ranked relatively high. In the third occupation, there is also a relatively high share of those who received their education at universities outside Bulgaria, namely in France, Spain, and the Netherlands, with the universities also being ranked relatively high. In the second occupation, the situation is more nuanced, with some respondents having lived abroad but completed their education in Bulgaria.

4. Results of the study

Based on the data collected during the first and second stages of the study, it is evident that, despite the short interval between them, a degree of change can be observed in the opinions and perspectives expressed in response to the team's questions. For example, in the second stage, the option for historical determination in innovation attitudes and behaviors remains present, though it appears at a significantly lower rate and cannot be considered predominant. The observed shift in responses to the first question is notable; however, it is difficult to determine whether this change stems from a less in-depth engagement with the issues or from greater assertiveness among members of the younger generation. During the second stage of the study, respondents from the first occupation reinforced the impression that they seek to work in a pleasant and communicative environment, and they do not perceive unnecessary stress factors. They seek and contribute to the construction of a more modern organizational culture, which are definitely more adequate to the desires and aspirations for innovation. At the same time, they increasingly realize that mobility is not only an opportunity to avoid unnecessary tension, stress, and the need for self-affirmation, but also a normal process that leads to positive outcomes for both individuals and organizations. More generally, this type of reasoning and worldview is quite typical of cultures with a high index of individualism and egalitarianism. We suggest that in further studies of the national cultural matrix, one could expect an increase not only in the individualism index, but also a change in the power distance index. Following the second stage of the longitudinal study, findings suggest that while Generation Z in Bulgaria was initially strongly influenced by the family environment, thereby internalizing characteristics of the national cultural code, this influence shifts over time. Through communication, collaboration, and shared values with their peers, these cultural "codes" show a tendency to evolve dynamically, with generational traits increasingly taking precedence over national cultural specifics. This shift indicates a growing capacity among young individuals to adapt to positive change and develop resilience, particularly when supported by an adequate organizational and cultural environment.

5. Conclusions

In summary, the main conclusions reached by the authors' team, based on the conducted longitudinal research for the period of February 2024 – October 2025, are:

1. Economic-historical determinism, which has played a significant role in shaping the national economic genotype of Bulgaria, and, by extension, has strongly influenced various organizational cultures (Kolev, 2017, Milanova & Naydenova, 2013, 2022) is unlikely to remain a dominant factor in the coming years.
2. The innovation attitudes and the realization of innovation potential are being shaped within a new framework, with greater emphasis on the quality of the organizational microclimate within business structures.

3. An important factor will be the construction of an inclusive and supportive community of personal expression, in which innovation is increasingly asserted as an immanent characteristic, but with a corresponding rethinking of the form and profile of the specific organizational culture.
4. Organizational culture, regardless of its specifics, should be primarily oriented towards achieving a balance between professional and personal life. Achieving such a balance will guarantee the deployment of innovation potential.
5. The organizational microclimate should focus on truly open communication and a healthy work environment, which, in turn, implies autonomy and flexibility and contributes to sustainability in business innovation.
6. By engaging in social, environmental, and other causes, whether at the national or broader level, representatives of Generation Z clearly position themselves as global citizens. It is reasonable to argue that this has accelerated dynamics and a corresponding impact on national cultural dimensions themselves.
7. The parameter "Place of education" in the passporting of the respondents definitely plays a significant role in the answers of the respondents of Generation Z. The mentioned parameter has a direct impact on the attitude towards greater mobility, adaptability and asserting points of view. This specific combination contributes in an innovative and distinctive way to the respective business unit's ability to carry out targeted and sustainable innovation activities.

The potential for renewal, attitudes and expectations toward innovation, as well as innovative thinking and behavior, are crucial for a business organization, as they shape its competitive position. The ability to adapt to the changing environment and to successfully manage acquired competencies, experience, and expertise, combined with available resources, builds an organization's capacity to restore resilience through effective change.

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Neviana Krasteva, Tinka Churkova[1]

BUILDING THE EMPLOYER BRAND AS A DRIVER FOR ACHIEVING SUSTAINABILITY

Abstract: *This article explores how the employer brand, combined with sustainable business practices and commitments to Environmental, Social, and Governance principles, becomes a key instrument for organizational development in the current economic and social environment. Through content analysis of 14 Bulgarian companies from various sectors, the study identifies how digital communication, the employer value proposition and adaptation to Generations Y and Z contribute to internal organizational engagement and external reputational trust. The authors argue that strategically developing the employer brand in alignment with sustainability principles has the potential not only to improve human resources effectiveness but also to strengthen the organization's long-term competitive position.*

Keywords: *employer brand; sustainability; EVP; ESG; digital communication*

JEL: *M12; M14; Q01; O15*

1. Introduction

Amid global challenges—climatic, economic, and social—sustainable development has shifted from a peripheral topic to a central strategic priority for businesses. Concepts such as the circular economy, environmental, social and governance (ESG) policies, and social engagement have become integral to corporate governance vocabulary. However, sustainability also demands internal transformation focused on organizational culture and how it is perceived both by employees and society. Herein lies the role of the employer brand—a subtle but powerful mediator between the values a company upholds and the behavior it exhibits. Viewing the employer brand through the lens of sustainable development highlights organizations' ability to create authentic, engaging, and socially responsible images that align with the expectations of the new workforce and consumer generations. This study aims to analyze how EVP (Employer Value Proposition), digital communication, and ESG components integrate into the employer brand to achieve a sustainable identity.

2. Literature Review

Sustainability and Corporate Responsibility

The concept of sustainable development, introduced in the Brundtland Report (UN, 1987), is based on the balance between present needs and the long-term viability of economic, social, and environmental systems. In a corporate context, this requires a strategic orientation that goes beyond short-term profit and includes responsibility toward stakeholders, nature, and society. In today's crisis-laden reality, sustainability is inevitably linked to adaptability—the ability of businesses to reorganize, communicate and respond to changing expectations with rapid yet stable solutions.

Theoretical Foundations of the Employer Brand

The employer brand (Ambler, Barrow, 1996) comprises the functional, economic, and psychological benefits perceived by employees and job candidates. It shapes the identity of an organization as an employer and serves as a channel for communication of its values and social

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responsibility. Amid ESG transformations and stakeholder pressures (employees, customers, investors), the employer brand is increasingly used to promote sustainable initiatives.

From Identity to Value: Key Theories

Key theories include: 1/ Social Identity Theory (Tajfel, Turner, 1979): employees develop self-identification through organizational membership; 2/ Resource-Based View (Barney, 1991): the employer brand is an intangible asset that can create sustainable competitive advantage; 3/ Psychological Contract (Rousseau, 1995): the employer brand articulates expectations of reciprocity, including social and environmental commitments.

The Employer Value Proposition (EVP) as a Carrier of Sustainability

According to Berthon et al. (2005), EVP is at the core of the employer brand. It includes three dimensions: functional (e.g. training and development), economic (e.g. compensation and bonuses) and psychological (e.g. identity, inclusion, purpose). It integrates the practical, economic and emotional aspects of the work experience.

Although, a rising amount of academic research and market data underscores the influence of ESG practices on employer branding, modern EVP increasingly incorporates sustainability as a key element—through environmental practices, social engagement, and ethical standards. Beyond traditional factors such as salary and career advancement, companies now articulate their impact on climate change, diversity, mental health and human rights as core elements of their EVP.

In today's business landscape, the fusion of employer branding and ESG practices is no longer optional but essential. As companies deal with rising stakeholder expectations and increasing demands for transparency, they must rethink how they present themselves to investors, consumers, current and new employees. This alignment between sustainability and employer reputation represents a paradigm shift that not only reshapes the EVP concept but also reinforces long-term competitive advantage.

Companies that embed ESG practices in their EVP are more attractive to modern talent—especially Millennials and Gen Z who prioritize purpose over profit (Deloitte Global Millennial Survey, 2023). This generational shift means that an authentic sustainability narrative can strongly differentiate a company in a saturated labor market.

The hypotheses tested in this study are:

- Hypothesis 1: The employer brand functions as a communication intermediary between strategic ESG commitments and their social legitimization.
- Hypothesis 2: The issue of consumer distrust in Bulgaria toward "sustainable" messages remains significant.

3. Methodology

This study employs a mixed approach including:

- Qualitative analysis of digital content of 14 Bulgarian companies (Krasteva, Churkova, 2025).
- Comparison of best practices from retail, telecommunications, pharmaceuticals, and energy sectors.
- Interpretation of quantitative data from national surveys on consumer and corporate attitudes toward sustainability (2023–2025).

The qualitative analysis focuses on companies from sectors such as trade, telecoms, energy, pharmaceuticals, and hospitality. Corporate websites, social media platforms, PR campaigns, and video content were analyzed. In addition, data from national surveys (Enterprise.bg, 2024; Vutsova et al, 2024) concerning consumer attitudes toward sustainability and corporate strategies were interpreted.

Key indicators include:

- Presence and formulation of ESG commitments;
- Degree of digital activity;
- Target generations (Y, Z);
- Transparency of actions;
- Alignment between messages and evidence;
- Social engagement and innovation in communication.

4. Results

Corporate Practices

The analysis reveals significant differences in the integration between sustainability and the employer brand (Table 1). Companies such as Lidl, dm, Yettel, EVN, and Hyatt demonstrate well-structured strategies in which ESG elements are not only present but measurable and truly communicated.

Table 1. Strategic Practices in Bulgarian Companies

Company	Sustainable Practices in EVP	Communication Channels	Target Generation	ESG Focus Areas
Lidl Bulgaria	Green campaigns, internal training, transparent goals	Website, social media	Generations Y and Z	Ecology, social responsibility
dm Bulgaria	Products with bio-packaging, dual education, “Super Colleague”	Instagram, Facebook, YouTube	Generation Z	Ecology, employee focus
Yettel Bulgaria	Podcasts, digital hygiene, learning initiatives	TikTok, podcast platforms, website	Generation Z	Education, technology
EVN Bulgaria	Internship programs, local initiatives, green energy	Website, LinkedIn	Generation Y	Energy sustainability
Hyatt Regency Sofia	Mental health programs, inclusive culture	Website, LinkedIn, live events	Generations Y and Z	Social inclusion

Source: Authors’ own analysis and compilation

Lidl Bulgaria uses a transparent and measurable approach. It employs digital channels to share specific goals: environmental protection, waste reduction, social responsibility via initiatives

like 'Green Week,' and internal employee training. This integrates the internal and external employer brand and enhances engagement.

dm Bulgaria applies a holistic approach through its "Green Ideas" platform, combining sustainable product practices (organic products, recyclable packaging), social commitments (dual education, internal campaigns such as "Super Colleague"), and active digital communication. The result is a consistent image of a responsible employer with high trust among Gen Z.

Yettel Bulgaria builds its brand around digital ethics and innovation. Content such as "Super Podcast" and "Super People" on social media reflects the company's values and builds dialogue with young candidates. Yettel integrates ESG into its employer brand through topics like digital hygiene, sustainable technologies, and education support.

EVN Bulgaria emphasizes environmental sustainability by using its employer brand to promote green energy, internship programs, and local initiatives. The focus is on long-term engagement with the local region.

Hyatt Regency Sofia illustrates how a global hotel chain can adapt its EVP to local context. Career development programs, inclusive culture, and mental health campaigns reinforce the image of a sustainable, human-centric employer.

These examples show that building an employer brand in the context of sustainability is not a one-time act but a dynamic process requiring alignment between organizational culture, behavior, and communication.

Consumer Attitudes

The analysis of consumer behavior in Bulgaria shows the growing importance of sustainability as a factor in the buying process and building brand loyalty. Data from the Enterprise.bg survey (2024) show that 85% of Bulgarian consumers are interested in sustainable products, confirming the existence of a significant market sensitivity to the social and environmental commitment of companies.

At the same time, 56% of respondents stated a willingness to pay a higher price for sustainably sourced products, which can be seen as evidence of the validity of sustainable EVP as a differentiator.

Despite high levels of interest, trust remains problematic. More than 40% of consumers are concerned about misuse of terms such as 'eco-friendly' and 'sustainable' without real evidence of action (Vutsova et al, 2024). This supports the need for more transparent communication and the use of certification systems and factual data in employer branding.

The perception of sustainability also varies according to demographics. Generations Y and Z are more sensitive to ESG issues, giving particular importance to inclusion, equality, flexible working and mental health.

Overall, the analysis of consumer attitudes confirms that building an employer brand based on sustainability not only supports a company's HR strategy, but also influences consumer choice, reputation and market value.

Corporate Barriers

Corporate attitudes towards sustainability in Bulgaria show a growing awareness and positive attitude, especially among larger organizations. According to Vutsova et al. (2024), 83% of companies surveyed understand sustainability mainly in environmental terms - reducing waste, increasing energy efficiency and using environmentally friendly materials.

About 77% of the companies stated that sustainable practices should be legally binding, indicating a trend towards institutionalizing ESG policies. This result reflects a desire for support and clarity from regulators as an instrument to align expectations and prevent greenwashing.

Barriers towards sustainability can derive from resources constraints (lack of financial or human capital) or predominant focus on quarterly business results. Managing separately ESG and employer branding can also lead to inconsistency in practices.

Companies perceive sustainability differently. In retail and food, it is associated with product sustainability and social engagement, while in telecoms and energy, the focus is on digital ethics and eco-efficiency. Attitudes towards employer branding as a channel for communicating sustainability are not yet fully understood and used, especially among SMEs.

In conclusion, corporate attitudes in Bulgaria demonstrate an awareness and desire for sustainability, but systematic efforts, external regulation and exchange of best practices are needed to make employer branding a true catalyst for transformation.

5. Discussion

The Employer Brand as a Carrier of Sustainable Values

The empirical findings confirm the hypothesis that the employer brand functions as a communication intermediary between strategic ESG commitments and their social legitimization. Organizations, integrating sustainability in their EVP, build high levels of employee engagement, reduced turnover, and greater appeal among young generations.

Furthermore, it helps organizations build reputational capital extending beyond the HR function. It enhances customer loyalty and strengthens relationships with regulators and society. According to Gary Davies (2006), brand reputation is formed by consistent experiences, and ESG-infused practices become part of these experiences, perceived by both internal and external audiences.

Adaptation Through Digital Channels

Digital technologies play a key role in shaping and maintaining a sustainable identity. The use of social media, podcasts, videos, and interactive platforms opens possibilities for dialogue with job candidates and consumers. Companies that rely on personal, ethical, and educational content achieve higher brand visibility and consumer trust.

Challenges: Trust and Greenwashing

Through the content analysis, the second hypothesis was supported. The issue of trust in "sustainable" messages remains significant. Some companies use sustainability-related language without actions or measurable proof. This undermines the impact of communication and creates a need for transparency, regulation, and third-party validation (e.g. ESG certification bodies).

Incorporating ESG into employer branding carries reputational risks if not done with integrity. The phenomenon of greenwashing—misleading the public about sustainable practices—can severely backfire, eroding trust among candidates, consumers, and employees.

Enterprise.bg (2024) confirms that in the Bulgarian context, consumers are highly skeptical of vague sustainability claims. Thus, external ESG audits and third-party validations (e.g., BREEAM, GRI, CDP) can serve as trust-building mechanisms. The green EVP, when executed with sincerity, becomes a protective shield for the employer brand in volatile times.

Recommendations

The successful integration of ESG into employer branding depends on robust internal structures, including leadership confirmation, HR and Corporate Social Responsibility (CSR) alliance, authentic communication and visual storytelling, as well as the incorporation of specific metrics in employer branding reports.

6. Conclusion

The study confirms that the strategic building of the employer brand, when aligned with sustainable principles and supported by innovative communication, produces significant benefits—both internally (employee engagement, lower turnover) and externally (market trust, reputation, competitiveness). Sustainability and adaptability should be viewed not as separate but as complementary dimensions of a successful organizational identity. Companies must ensure that their EVP reflects authentic sustainability commitments, communicated with transparency, executed with consistency, and measured with rigor. Only then will employer branding evolve into a true engine of growth, resilience, and trust.

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Antoaneta Ivanova-Bares[1]

INTEGRATING PRINCIPAL-AGENT THEORY AND BUSINESS PROCESS REENGINEERING: AN ANALYTICAL FRAMEWORK FOR MANAGING VIRTUAL TEAMS

***Abstract**: The accelerating digitalization of global business and the growing prevalence of Virtual International Teams (VITs) have transformed organizational design and managerial practice. This paper develops an integrated analytical framework combining Principal–Agent Theory (PAT) and Business Process Reengineering (BPR) to address the key challenges of virtual collaboration—information asymmetry, trust, motivation, and control. While PAT explains behavioral dynamics of delegation, incentives, and accountability, BPR provides structural and technological tools for process optimization and transparency. Through theoretical synthesis and comparative analysis of leading corporations such as IBM, SAP, Google, and Deloitte, the study demonstrates that integrating agency mechanisms with reengineered digital processes enables organizations to balance autonomy with accountability and flexibility with control. The proposed model conceptualizes virtual management as a dual-governance system in which trust, technology, and transparency interact to create adaptive, learning-oriented teams. The research highlights that virtual leadership must evolve from supervision to system design, emphasizing empathy, data fluency, and ethical governance. Beyond its theoretical contribution, the study offers practical guidelines for implementing incentive-compatible digital architectures that foster collaboration, innovation, and resilience in hybrid and global environments. The synthesis of PAT and BPR provides a foundation for developing a broader theory of Collaborative Digital Governance, positioning virtual teamwork as a defining feature of modern enterprises in the Fourth Industrial Revolution.*

***Keywords**: Digital Transformation; Virtual Team Management; Organizational Innovation; Business Process Reengineering; Leadership and Motivation.*

***JEL:** D23, M12, M15, O32, L21, L86, C61, O33.*

1. Introduction

Context and Rationale

Virtual International Teams (VITs) have proliferated due to hyperconnectivity, globalization, and digital acceleration. The COVID-19 pandemic intensified this transition toward hybrid and virtual work, making VITs a dominant organizational form across software, finance, consulting, education, and creative industries (OECD, 2022). Alongside global talent access and cost optimization, managers face challenges such as coordination across distances, cultural diversity, and information asymmetry that undermine motivation and trust (Contreras et al., 2020). A comprehensive analytical framework is therefore required to address these tensions.

Theoretical Background and Problem Statement

Principal–Agent Theory (PAT) explains delegation and control under information asymmetry (Eisenhardt, 1989; Jensen & Meckling, 1976). In virtual contexts, distance and technological mediation both enable monitoring (digital traceability) and hinder contextual understanding (Daft & Lengel, 1986). Business Process Reengineering (BPR) proposes radical process redesign for significant improvements in cost, quality, and speed (Hammer & Champy, 1993). Applied to virtual collaboration, BPR structures workflows, clarifies responsibilities, and integrates technologies for transparency and accountability (Zlatev, 2021). While PAT and BPR are often studied separately, this paper operationalizes them jointly: contracts, incentives, and trust are embedded in reengineered digital processes.

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Research Motivation

Theoretically, classical management models must adapt to intangible, technology-mediated organizations. Practically, firms must balance flexibility and control, building trust without proximity and authority without micromanagement (Maruping et al., 2021). Leadership in such environments evolves from command-and-control to coordination and empowerment (Dulebohn & Hoch, 2017). This study links leadership dynamics to agency mechanisms and situates BPR as the structural backbone of sustainable virtual governance.

Research Objectives and Questions

Objective: To develop an integrated PAT–BPR analytical model for managing virtual teams**.** Research questions:

1. How do agency relationships explain behavioral and structural dynamics in VITs?
2. How can BPR mitigate information asymmetry and strengthen trust?
3. What managerial implications follow from combining PAT and BPR?
4. How do companies apply these mechanisms in practice?

The framework positions incentive alignment and process reengineering as complementary drivers of virtual team effectiveness.

2. Theoretical and Methodological Aspects of the Relationship between Principal–Agent Theory and the Management of Virtual Teams through Reengineering

The Evolution of the Principal–Agent Framework

PAT addresses delegation under asymmetric information and divergent interests between principal and agent (Jensen & Meckling, 1976; Eisenhardt, 1989). Virtual settings amplify asymmetry through spatial distance and cultural heterogeneity (Hofstede, 2011). The managerial challenge lies in balancing autonomy and accountability. Mechanisms include digital monitoring, incentive alignment, and explicit contractual design (Alparslan, 2006). Yet, excessive control can erode intrinsic motivation, requiring a balance between structural governance and psychological empowerment (Herzberg, 1966; Deci & Ryan, 2000).

The Role of Business Process Reengineering in Organizational Transformation

BPR advocates radical redesign of end-to-end processes, breaking silos and automating repetitive tasks (Hammer & Champy, 1993; Angelov, 2008). In virtual organizations, it enables decentralization, collaboration, simplification, and real-time knowledge exchange. PAT offers the behavioral logic (trust, control, incentives) while BPR provides the structural tools (redesign, automation, integration). For instance, Google's OKRs combine measurable goals (agency alignment) with flexible, technology-enabled workflows (Doerr, 2018).

Integrating PAT and BPR in Virtual Team Governance

Integration manifests through:

1. Transparency and real-time data to reduce information asymmetry;
2. Autonomy and empowerment—delegation paired with incentive compatibility;
3. Feedback and continuous improvement—evaluation cycles (PAT) and iterative redesign (BPR).These principles reflect systems thinking (Senge, 1990) and socio-technical design (Trist & Emery, 1973).

Methodological Approach

This is a conceptual–analytical study, using secondary data and corporate case illustrations. The procedure involves theoretical synthesis (PAT, BPR, VITs), comparative analysis (IBM, SAP, Deloitte), and conceptual modeling (mapping agency dynamics onto process architectures). The interpretivist approach provides a basis for future quantitative validation through surveys or process mining (Brynjolfsson & McAfee, 2020).

Managerial Implications

Leadership in virtual contexts must evolve into facilitation of trust and process coherence (Yukins, 2010). Governance should be embedded within digital technologies (metrics, dashboards, accountability tools), balancing formal (contracts, KPIs) and informal mechanisms (values, respect). Empirical evidence from IBM and Deloitte confirms that automation combined with human-centric leadership enhances performance and satisfaction (OECD, 2022).

3. Scientific Novelty and Author's Contribution

Theoretical Innovation

The paper reconceptualizes BPR as a governance instrument and agency relationships as feedback-driven systems of trust embedded in digital infrastructures, thus transforming both theories from descriptive to prescriptive (Eisenhardt, 1989; Hammer & Champy, 1993).

Methodological Contribution

An integrative design merges conceptual modeling, case-based reasoning, and cross-industry synthesis (Dulebohn & Hoch, 2017). The proposed Agency-Based Model of Virtual Team Management aligns incentives, information flow, and process architecture.

Empirical and Practical Contribution. Examples:

IBM (AI transparency), SAP (global workflow standardization), Google (autonomy through OKRs), Deloitte(hybrid reengineering). These demonstrate the framework's applicability.

Originality and Significance

Applying delegation logic (PAT) to process architecture (BPR) yields a comprehensive model for trust, control, and motivation in distributed systems, reframing digital transformation as a reconfiguration of agency relationships (Angelov, 2008; Zlatev, 2021).

4. Strategic Approaches to Managing Virtual Teams through the Principal–Agent Model

Conceptual Foundation

The integrated PAT–BPR approach supports hybrid governance—behavioral alignment plus structural redesign—shifting leadership from supervision to ecosystem design (Maruping et al., 2021).

Key Strategic Dimensions

1. Transparent communication—dashboards and shared repositories (Teams, Slack, Trello). IBM's Cognitive Collaboration uses AI analytics to enhance accountability (OECD, 2022).
2. Incentive-linked performance—OKRs and KPIs align individual and organizational goals (Doerr, 2018).

3. Decentralized decision-making—as in Deloitte's hybrid teams, fostering innovation and efficiency.
4. Cultural integration—SAP applies Hofstede's (2011) framework and standardized workflows to prevent miscommunication.
5. Technological infrastructure—cloud, AI analytics, and blockchain ensure transparency (Brynjolfsson & McAfee, 2020).

Leadership Competencies

Virtual leaders require analytical skill (understanding asymmetry), technological fluency, and cultural empathy (Senge, 1990). IBM's Digital Leadership Academy exemplifies this integration.

Summary

Effective integration yields adaptive, transparent, learning-oriented teams with reduced asymmetry and enhanced innovation.

5. Results of the Study

Overview of Findings

Integration of PAT and BPR provides a strong lens for managing virtual performance. Key patterns: (1) transparency reduces agency problems; (2) incentive alignment must be embedded in digital workflows; (3) cultural intelligence sustains trust (Contreras et al., 2020).

Case Illustrations

IBM – "Watson Orchestrate" uses AI analytics for project evaluation and risk detection.

Google – OKRs align individual and corporate goals through transparent sprints.

SAP – "One SAP" reengineering ensures real-time coordination.

Deloitte – Power BI and Workday dashboards provide visibility and autonomy *(OECD, 2022).*

Table 1. Application of Business Process Reengineering (BPR) in the Management of Virtual Teams

BPR Principles	**Application in Virtual Teams**	**Expected Outcomes**
Process simplification and elimination of redundant steps	Streamlining digital workflows and automating repetitive administrative tasks	Increased efficiency and reduced project completion time
Redesign of work sequences and decentralization of decision-making	Empowering virtual team leaders to make autonomous operational decisions	Improved adaptability and faster response to market changes
Integration of technology into core processes	Implementing collaborative software, cloud-based systems, and AI-assisted project tools	Enhanced transparency, real-time data access, and process optimization
Focus on customer-oriented processes	Aligning virtual team goals with client expectations through feedback systems	Higher customer satisfaction and service personalization
Cross-functional collaboration and knowledge sharing	Creating digital knowledge bases and virtual learning communities	Continuous innovation and improved inter-team communication

Source: Author's elaboration based on Hammer & Champy (1993); Angelov (2008); OECD (2022); Zlatev (2021).

6. Analytical Discussion

Digital Agency Reinterpreted

In the digital economy, asymmetry arises from data complexity, not scarcity (Brynjolfsson & McAfee, 2020). Algorithmic governance improves transparency but can introduce bias (Möhlmann et al., 2021). Ethical oversight is essential.

From Control to Co-Design

Integration shifts from control to collaborative design**:** agents co-create process efficiency. SAP's developer committee**s**exemplify participatory redesign *(*Hammer & Champy, 1993).

Trust as a Resource

Trust and monitoring coexist**:** Google's peer-evaluation system transforms monitoring into peer accountability (Doerr, 2018). Deloitte's hybrid structure codifies transparency and fairness.

Technology and Agency

Algorithms act as agents in decision processes. BPR offers safeguards via algorithmic transparency and audits (Davenport et al., 2022).

Theoretical Implications

1. Convergence of governance and design;
2. Hybrid rationality combining intrinsic and extrinsic motivation;
3. Dynamic equilibrium—ongoing recalibration of trust, control, and autonomy.

7. Limitations and Future Research

Conceptually, the study requires empirical validation (surveys, interviews, simulations). Future research should test the PAT–BPR model across industries and cultures (Hofstede, 2011). Ethical concerns around AI monitoring (Brynjolfsson & McAfee, 2020) and privacy require policy frameworks. Quantitative metrics for trust and longitudinal studies are needed (Zlatev, 2021). A future research agenda should integrate behavioral economics, neuroscience, and AI ethics.

8. Conclusions

Integrating PAT and BPR bridges governance theory and process design, addressing virtual challenges of trust, control, motivation, and efficiency.

PAT provides behavioral insight; BPR offers structural and technological mechanisms (Hammer & Champy, 1993; Eisenhardt, 1989). Together they form a dual-governance system for adaptive digital organizations.

Empirical evidence from Google, IBM, SAP, and Deloitte confirms that combining trust**,** data**,** and design yields measurable improvements in transparency and performance. This synthesis underpins the concept of Collaborative Digital Governance—a paradigm where power, knowledge, and accountability are shared through transparent, ethical systems. Leaders act as system designers**,** agents as co-creators of value.

The emerging equilibrium merges efficiency with empathy, structure with creativity, and control with trust—defining the essence of the modern virtual enterprise.

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Galya Taseva[1]

TRADE CREDIT AND FINANCIAL SUSTAINABILITY OF ENTERPRISES

***Abstract**: The aim of the article is to examine the importance of trade credit for the financial stability of enterprises in Bulgaria and specifically for the risk of falling into a state of liquidity shortage and inability to cover obligations to creditors in different economic conditions. The analysis is based on panel data for 43 non-financial enterprises with different main activities in the field of production and services, which were traded on the Bulgarian Stock Exchange during the period 2018 - 2024. Non-parametric analysis of variance revealed a statistically significant difference between the degree of liquidity and the risk of bankruptcy of companies that are net creditors and net debtors of trade credit. Companies that are net debtors of trade credit are financially more vulnerable. The results of the study show a unidirectional change in trade receivables and payables, with an extremely strong convergence of the average values of receivables and payables to trade counterparties observed since 2022 and even an almost complete equalization of the values in 2024. This is the result of an increasing desire to hedge trade credit risk and the desire of companies to be prepared for upcoming economic shocks.*

***Keywords**: trade credit, liquidity, insolvency risk, financial sustainability*

JEL: *G32, G33, G39*

1. Introduction

Numerous empirical and theoretical studies have been devoted to the benefits and risks of using trade credit. The literature review shows contradictory results on the role of trade credit on the financial stability of enterprises and specifically their liquidity and solvency, especially in crisis conditions. This justifies the need for additional research. The aim of the article is precisely to examine the importance of trade credit for the financial stability of enterprises in Bulgaria and specifically the risk of falling into a state of liquidity shortage and inability to cover obligations to creditors in different economic conditions.

2. Theoretical overview

Numerous studies have shown that firms with low liquidity, which have difficulty accessing bank credit, seek more trade credit from their suppliers than larger firms that are liquid and have lower costs of maintaining liquidity. Large firms, which are more liquid and can easily attract financing, are more likely to lend to their customers who have difficulty accessing financing. This is even more true in times of crisis (Boissay, Gropp, 2007; Cunat, 2003; De Blasio, 2003; Nielson, 1999; Petersen, Rajan, 1997).

In addition, financially distressed firms use more financing from suppliers because they lose access to financing from other sources (Frank, Maksimovic, 2005; Molina, Preve, 2007; Petersen, Rajan, 1994, 1995, 1997; Wilner, 2000). What makes firms willing to finance their financially distressed customers is the implicit stake in their capital and the need to continue the relationship with them. For these reasons, supplier firms are more tolerant as creditors than banks. In addition, banks usually have collateral on their receivables and have priority as creditors in the event of a debtor's bankruptcy. This is why banks more often prefer liquidation procedures in the event of non-payment by customers compared to trade credit lenders (Cole, 2010; Huyghebaert et al., 2007). For all these reasons, financially distressed firms seek more trade credit than bank credit.

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A study by McGuinness et al. (2018) confirms the importance of trade credit for the survival of financially distressed firms in financial crisis conditions. They find a significant liquidity redistribution effect. This effect is expressed in the fact that liquid firms that have a lot of cash or firms that are not financially distressed extend significantly more net trade credit compared to other firms with fewer financial resources.

Baños-Caballero et al. (2023) examine the impact of banking crises on trade credit provided to customers and whether it depends on the degree of creditor protection. They find that trade credit increases in crisis conditions, but the increase is smaller in countries where creditors are well protected. Supplier financing is a substitute source of financial resources when bank lending contracts during crises. The results of the study also show that there are no differences in the granting of trade credit between countries with different degrees of protection of creditors' rights under normal economic conditions. Boissay et al. (2020) emphasize the importance of trade credit in providing liquidity, especially for small firms, during the crisis caused by the Covid-19 pandemic.

Cunat (2003) and Boissay, Gropp (2007) view trade credit as a mechanism by which firms provide a form of liquidity insurance to customers through a continuous flow of credit supplies even when payments are overdue. This is because they have an interest in the survival of their customers and the continuation of trade relationships. Boissay, Gropp (2007) show that defaults on trade credit serve to cope with liquidity shocks. Firms that have difficulty collecting their receivables are more likely to default on their suppliers, which forms chains of overdue payments. According to Boissay, Gropp (2007), all firms, including those with difficult access to finance, provide liquidity insurance to their customers, as they themselves use insurance from their suppliers. This leads to the propagation of liquidity shocks along the trade credit chain.

Butler et al. (2023) draw attention to the benefits of trade credit throughout the economic cycle and especially in times of financial turmoil. According to them, through trade credit, supplier firms provide liquidity, stimulate demand, facilitate the supply of resources, and encourage long-term relationships with customers. Trade credit networks between firms stimulate economic activity and financial stability. However, Butler et al. (2023) also draw attention to the fact that trade credit networks between firms also act in a negative way and can be a generator of instability in the economy, creating cascades of overdue debts.

Trade credit can be a conduit for the transmission of negative shocks in the banking sector to the corporate sector (Costello, 2020). Costello's (2020) study reveals that in the event of an exogenous decline in bank lending, firms pass on the liquidity shock to their customers along the trade chain. The first channel through which the shock spreads to the economy is the contraction in trade credit, and the second channel is the contraction in the total supply of goods and services. Downstream firms suffer a spike in credit risk and a reduction in employment.

Maksimovic, Yook (2022) use data on the financial crisis and recession of 2007–2009 and conclude that trade credit is unlikely to be an effective tool for providing financial resources to firms during crises.

Bureau et al. (2024) demonstrate that trade credit has the potential to amplify the impact of economic shocks on firms' liquidity. Their study is based on daily data on trade credit defaults in France during the COVID-19 crisis. Bureau et al. (2024) find that during the pandemic, a one-standard deviation increase in firms' net trade credit position increases the risk of default by 10 percent. Their findings show that this impact is amplified for downstream firms that are financially constrained and investment is constrained.

Srivastava, Gopalakrishnan (2021) find that in the first quarters of the COVID crisis, firms with poor creditworthiness receive less credit from suppliers than firms in good financial condition. This finding contrasts with previous studies on the role of trade credit in crises. They also find that firms with good relationships with their trading partners attract supplier financing at the beginning of the Covid crisis. According to Srivastava, Gopalakrishnan (2021), supplier financing replaces bank credit only under favorable product market conditions.

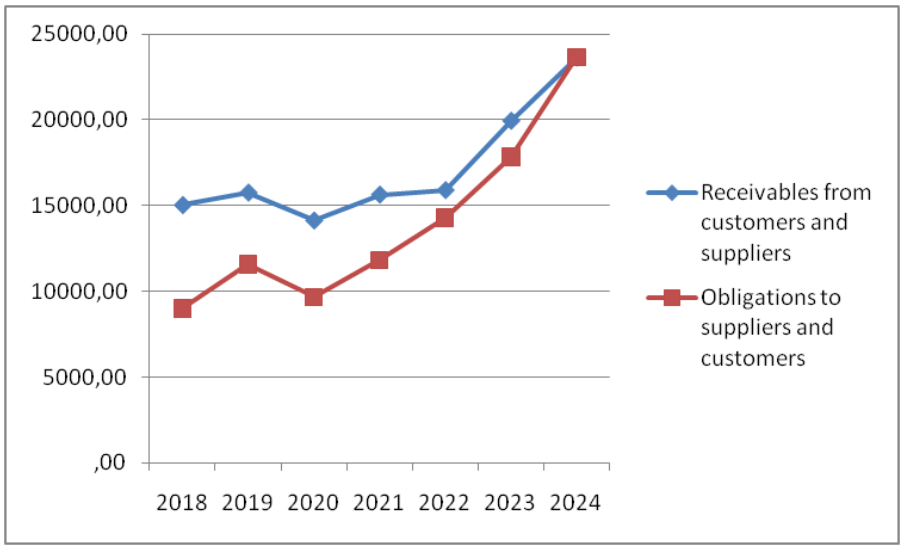
3. Methodology

The analysis in the article is based on panel data for 43 non-financial enterprises with different main activities in the field of production and services, which were traded on the Bulgarian Stock Exchange during the period 2018 - 2024. The research period is divided into three sub-periods - before the crisis, which was caused by the Covid-19 pandemic, during the pandemic and the post-crisis period. This makes it possible to take into account in the analysis the effects of the pandemic, which led to significant disruptions in supply chains and to a rethinking of risk management in trade lending. The research methods used are analysis and synthesis, graphical analysis, non-parametric analysis of variance. The adopted significance level in the study is sig.=0.1.

4. Research results

The data show a positive relationship in the dynamics of trade receivables and payables throughout the entire research period 2018 - 2024. From 2022, the relationship becomes increasingly tight, with the average values of trade receivables and payables almost equalizing in 2024. The following graph shows the dynamics of variable receivables from customers and suppliers and payables to suppliers and customers.

Figure 1. Dynamics of trade receivables and trade payables



Source: Author's calculations

This drive towards full matching of trade receivables and payables reflects a growing perception of risk associated with trade credit and a desire by firms to hedge this risk by matching the value of their trade receivables and payables. After the Covid crisis, firms are seeking to be prepared for new unexpected shocks. During the pandemic, firms have realized that in the event of unexpected shocks leading to disruptions in supply chains, the trade credit channel can be an extremely strong conduit of risk and a multiplier of liquidity difficulties. This is especially true if firms do not maintain a match between receivables and payables to trade counterparties.

The study using a non-parametric analysis of variance with the Kruskal-Wallis test shows a statistically significant difference between the levels of various liquidity indicators of firms that are net creditors and net debtors of trade credit. The liquidity indicators used in the analysis in the article are net working capital, the current liquidity ratio, the quick liquidity ratio, and the ratio of net working capital to total assets.

Table 1. Results of the Kruskal-Wallis test analysis of liquidity indicators of companies net creditors and net debtors on trade credit

		Net working capital	Current liquidity	Quick ratio	Net working capital / Total Assets
2022 - 2024	Chi-Square	3,156	7,809	4,731	6,822
	Asymp. Sig.	0,076	0,005	0,030	0,009
2020 - 2021	Chi-Square	25,144	21,749	21,248	16,564
	Asymp. Sig.	0,000	0,000	0,000	0,000
2018 - 2019	Chi-Square	16,626	17,373	18,369	9,547
	Asymp. Sig.	0,000	0,000	0,000	0,002

Source: Author's calculations

The following table presents the average ranks for the liquidity indicators of net creditors and net debtors. The results show that during all analyzed periods (before the Covid crisis, during the pandemic and after it) companies that are net creditors of trade credit have higher values of all four liquidity indicators compared to companies that are net debtors to their trade counterparties. This is in line with the liquidity theory of trade credit, according to which companies that are more liquid are more likely to sell on deferred payment terms. On the other hand, it confirms the importance of credit for customers in stimulating sales and hence for increasing the level of internally generated funds and liquidity.

Table 2. Average ranks for liquidity indicators of net creditors and net debtors

		2022-2024	2020-2021	2018-2019
		Mean Rank	Mean Rank	Mean Rank
Net working capital	net creditors	69,81	53,64	51,54
	net debtors	57,88	25,52	28,50
Current liquidity	net creditors	72,56	52,93	51,71
	net debtors	53,81	26,77	28,17
Quick ratio	net creditors	70,88	52,82	51,95
	net debtors	56,29	26,97	27,73
Net working capital / Total Assets	net creditors	72,06	51,73	49,59
	net debtors	54,54	28,90	32,13

Source: Author's calculations

In accordance with the above results, the study with non-parametric variance analysis shows a statistically significant difference between the risk of bankruptcy for companies that are net creditors and net debtors on trade credit. The indicators of the risk of insolvency of enterprises are the ratio Cash flow from operating activities / Amount of liabilities, the Grover and Zmijewski models. The results of the Kruskal-Wallis test are presented in the following table.

Table 3. Results of the analysis using the Kruskal-Wallis test of indicators of insolvency risk of companies net creditors and net debtors on trade credit

		Grover	Zmijewski	Cash flow from operating activities / Total liabilities
2022-2024	Chi-Square	6,162	4,606	6,067
	Asymp. Sig.	0,013	0,032	0,014
2020-2021	Chi-Square	15,912	11,105	3,350
	Asymp. Sig.	0,000	0,001	0,067
2018-2019	Chi-Square	9,659	12,106	6,483
	Asymp. Sig.	0,002	0,001	0,011

Source: Author's calculations

In line with financial distress theory, the results of the mean rank analysis show that firms that are net debtors on trade credit are more at risk of defaulting on their obligations to creditors. Firms that are financially distressed and have limited access to alternative sources of financing seek more credit from their suppliers.

Table 4. Average ranks for bankruptcy risk indicators of net creditors and net debtors

		2022-2024	2020-2021	2018-2019
		Mean Rank	Mean Rank	Mean Rank
Grover	net creditors	71,71	51,56	49,63
	net debtors	55,06	29,19	32,07
Zmijewski	net creditors	59,19	36,76	36,64
	net debtors	73,60	55,45	56,30
Cash flow from operating activities / Total liabilities	net creditors	71,66	47,20	48,52
	net debtors	55,13	36,94	34,13

Source: Author's calculations

5. Conclusions

Data on the dynamics of trade receivables and payables show a unidirectional change in both variables during the period under review 2018-2024, with an extremely strong convergence of the average values of receivables and payables to trade counterparties observed since 2022 and even equalization of the values in 2024. This is the result of an increasing desire to hedge trade credit risk. There are numerous statements in the literature about the desire of companies to match receivables from customers and payables to suppliers and the one-way relationship between them. However, such a strong convergence of the values of receivables and payables on trade credit in absolute terms almost to the point of equalization can serve as an early indicator of the companies' perception of possible upcoming economic difficulties, for which

they seek to prepare by minimizing trade credit risk. Recent economic difficulties caused by unexpected shocks, such as the Covid-19 pandemic, make companies more sensitive to possible future risks. There is a link between trade credit and the financial stability of enterprises, and specifically their liquidity and the risk of insolvency. Companies that maintain a greater imbalance between their trade receivables and payables and have larger net trade credit liabilities are at greater risk of falling into a liquidity crisis and insolvency.

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ФИНАНСИРАНЕ И УСТОЙЧИВОСТ НА БЪЛГАРСКИТЕ МСП (2020–2025)

Емпирични резултати от национално изследване и политики при последователни и комбинирани кризи/

***Резюме**: Целта на статията е да анализира достъпа до финансиране и финансовата устойчивост на малките и средните предприятия в България в периода 2020–2025 г., засегнат от последователни кризи – пандемична, енергийна и инфлационна. Изследването се базира на емпирични данни от национално социологическо проучване, идентифицира ключови предизвикателства в осигуряването на финансиране и предлага политики за подкрепа на устойчивото развитие на малките и средните предприятия в условията на кризи. Методологията включва структуриран въпросник за стандартизирани интервюта сред малки и средни предприятия от различни сектори, размери, региони. Резултатите разкриват значителни предизвикателства в достъпа до финансиране на малките и средните предприятия по време на криза, с преобладаваща зависимост от вътрешни източници и банкови кредити, но и затруднения в ликвидността и адаптивността към кризи. Устойчивостта се влияе от фактори като секторна специфика и пазари, с необходимост от диверсификация на източниците на капитал. Изводите подчертават нуждата от интегрирани политики за подобряване на финансовата стабилност, включително препоръки за по-достъпни инструменти и стратегии за справяне с шокове.*

***Ключови думи:** МСП, финансиране, устойчивост, кризи*

***JEL**: O15; G38; J48.*

FINANCING AND RESILIENCE OF BULGARIAN SMES (2020–2025)

Empirical Results from a National Survey and Policy Responses amid Successive and Combined Crises

***Abstract**: The paper aims to analyse access to finance and the financial resilience of SMEs in Bulgaria over 2020–2025, a period affected by successive crises — pandemic, energy, and inflationary. The study is based on empirical data from a national sociological survey of SMEs, identifies key challenges in securing financing, and proposes policies to support the sustainable development of SMEs under crisis conditions. The methodology includes a structured questionnaire for standardised interviews with SMEs across sectors, sizes, and regions. The results reveal substantial challenges in SME access to finance during crises, with predominant reliance on internal sources and bank loans, alongside liquidity strains and constraints on adaptability to shocks. Resilience is influenced by factors such as sectoral specificity and markets, underscoring the need to diversify sources of capital. The conclusions highlight the need for integrated policies to strengthen financial stability, including recommendations for more accessible financial instruments and strategies to deal with shocks.*

***Keywords**: Small and medium-sized enterprises; financing; resilience; crisis;*

***JEL**: O15; G38; J48.*

1. Увод

Периодът 2020–2025 г. постави МСП пред последователни и комбинирани шокове: пандемията COVID-19 с прекъсвания на веригите за доставки, енергиен ценови скок, ускорената инфлация и последвал лихвен шок от рестриктивна монетарна политика.

Целта на настоящата статия е да измери и обясни как шоковете от 2020–2025 г. промениха достъпа до финансиране и финансовата устойчивост на българските МСП.

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Научният принос на статията е, че чрез национално емпирично изследване със стандартизиран инструмент, стратифициран по сектори, размер и региони, извеждаме хетерогенността на реакцията на МСП към кризите, и на тази база извеждаме практически препоръки за политики и мерки, които да повишат устойчивостта им.

Изследователските въпроси са: (1) кои източници на финансиране доминират и как се променя тяхната употреба в кризисни епизоди; (2) кои бариери за осигуряване на финансиране са най-значими; (3) какви различия се наблюдават по размер, сектор и пазарна ориентация.

2. Състояние на проблема

МСП са структурно по-уязвими в кризи заради по-ниската си капитализация, по-силна зависимост от банково финансиране, ограничен достъп до алтернативни източници и по-висок риск от ликвидни шокове при забавени плащания, особено в периоди на последователни кризи като тези от 2020–2025 г. Те са непропорционално засегнати от кризи поради ограниченията в ликвидността и зависимостта от банково финансиране, което се свива в шокови периоди. Опитът от глобалната финансова криза показа, че свиването на кредита и удължените срокове на разплащане бързо изчерпват оборотния капитал на МСП и повишават риска от фалит. Уроците от глобални кризи, като пандемията COVID-19, показват, че МСП са изправени пред шокове и ограничения в оборотния капитал, което води до по-висок риск от фалит в сравнение с големите фирми. „Способността на МСП за заемане с цел изглаждане на временни шокове в ликвидността е ограничена и фалитът им възниква от взаимодействието между това финансово ограничение и колебанията в паричния поток" (Gourinchas et al., 2020) В същото изследване, използвайки данни за МСП от 11 европейски страни, авторите установяват, че без държавна подкрепа по време на COVID-19 кризата, нивото на фалити на МСП би се увеличило с 6,01 процентни пункта, поставяйки под риск 3,1% от заетостта. Важен е изводът, че „при финансови затруднения и при липса на държавна подкрепа, фирмите, фалиращи поради COVID, имат сходна производителност и растеж с фирмите, които оцеляват", което сочи, че кризата елиминира не само предприятия в затруднено положение, но и жизнеспособни предприятия.

3. Методология или методологични подходи

Изследването е базирано на национално допитване сред 308 български МСП, проведено през периода януари-май 2025 г. Данните са събрани чрез стандартизиран въпросник, разпространен чрез хибриден подход. Извадката е квотно-стратифицирана по размер, сектори и региони.

Използваните индикатори и индекси включват: достъпност до финансиране (рангов индекс за важност на източници); индикатори за ликвиден стрес (забавени вземания; обслужване на дълг; парични буфери – композитен индекс).

Иконометрията обхваща логически и регресионни модели, интерпретация и тестове за стабилност и надеждност на резултатите. Данните са обработени в SPSS с валидация за дублиране, логически несъответствия и претегляне по официални данни.

4. Резултати от изследването

Основните източници на финансиране за българските МСП през 2020–2025 г. са доминирани от вътрешни средства. (фиг.1)

Фигура 1. Основни източници на финансиране (първи избор, % от МСП)



Източник: Авторски изчисления по данни от национално анкетно изследване сред МСП, 2025 г.

Вътрешните източници имат предимството на бърза достъпност без изисквания за обезпечение или лихви, което обяснява широката им употреба, особено сред по-малките и млади предприятия с ограничен достъп до външен капитал.

Външните заеми осигуряват оборотен капитал за сезонни нужди и растеж, особено при по-утвърдени МСП, които могат да покрият изискванията на банките. Овърдрафтът и кредитните линии имат по-маргинална първостепенна роля (съответно ~5–6%), но често се ползват като допълващи източници в комбинация с основните кредити.

Друг важен външен източник е търговският кредит от доставчици, който макар рядко да е първи избор (едва 4.9% на първо място), е широко използван като допълнителен механизъм за финансиране – над една трета от предприятията го включват сред до 5-те си важни източника. Търговският кредит действа като ликвиден буфер във веригите на доставки, позволявайки отлагане на плащания и гъвкаво посрещане на краткосрочни нужди. Профилът на предприятията, разчитащи на него, включва отрасли като търговия, строителство и транспорт/логистика. Търговският кредит е особено популярен сред микро- и малките предприятия, които нямат достатъчно обезпечения за банков заем и затова договарят отсрочено плащане към доставчици.

В контраст, капиталовите инструменти имат съвсем ограничена роля сред МСП. Емисията на облигации или акции практически не се среща сред извадката – под 1% от МСП изобщо са посочили такива опции, и нито едно предприятие не ги е класирало на първо място. Също така, външният частен капитал (бизнес ангели, рисков и частен капитал) е с маргинално присъствие – сумарно под 2% споменаване дори като второстепенен източник. Това показва ограниченото развитие на капиталовия пазар за МСП в България и предпочитанията им да не размиват собствеността или да поемат високата цена на такъв капитал.

Анкетата идентифицира сериозни пречки, които затрудняват достъпа на МСП до външно финансиране. На преден план изпъкват цената на кредита и обезпеченията. (Таблица 1).

Несигурната икономическа среда (в условията на пандемия и последващи кризи) допълнително затруднява достъпа до финанси – увеличавайки възприемания риск и предпазливостта на кредиторите.

Някои бариери отразяват структурните слабости на МСП. Малките предприятия се считат за по-рискови, което сочи към дискриминация по размер – самият факт, че са малки, намалява шансовете им за кредит. Свързано с това, 60% признават, че нямат достатъчно активи за обезпечение, а 58% – че дори когато кандидатстват, одобрението отнема твърде дълго време. Административната бюрокрация също тежи сериозно: 62% от анкетираните намират процеса на кандидатстване за прекалено сложен и обременителен.

Таблица 1. Бариери пред финансирането: относителна честота (% от МСП)

Твърдение (бариера)	**ДА**	**НЕ**
Предлаганите лихвени проценти са твърде високи	74%	26%
Банките изискват прекомерно високо обезпечение	72%	28%
Несигурна икономическа среда влияе негативно на достъпа до финансиране	70%	30%
Малките предприятия се считат за по-рискови	64%	36%
Процесът на кандидатстване е твърде бюрократичен	62%	38%
Нямаме достатъчно активи за обезпечение	60%	40%
Одобрението отнема прекалено много време	58%	42%
Недостатъчна печалба или оборот	55%	45%
Липса на финансиране за оборотен капитал	52%	48%
Банките не са склонни да финансират стартиращи предприятия	50%	50%
Липса на специализирани финансови продукти за МСП	42%	58%
Недостатъчни или неподходящи държавни гаранционни програми	41%	59%
Трудности при сравняването на различни финансови продукти	39%	61%
Банките считат нашия сектор за рисков	38%	62%
Липса на разбиране за специфичния бизнес модел	36%	64%
Предприятието е ново и няма достатъчно кредитна история	34%	66%
Недостатъчна информация за наличните финансови възможности	34%	66%
Трудности при финансиране на иновации или НИРД	28%	72%
Високо ниво на задлъжнялост	27%	73%
Не срещам трудности при достъпа до финансиране	14%	86%
Трудности при намиране на финансиране в определена валута	10%	90%
Друго (моля, уточнете)	3%	97%
Не желая да отговоря	1%	99%

Източник: Авторски изчисления по данни от национално анкетно изследване сред МСП, 2025 г.

Други чести затруднения включват недостатъчните финансови резултати – 55% посочват „недостатъчна печалба или оборот", които да убедят финансиращите институции. Около половината срещат липса на финансиране за оборотен капитал (52%) или пък се сблъскват с нежеланието на банките да кредитират стартиращи фирми без история (50%). На по-заден план, но все пак значими за 30–40% от МСП, са фактори като липса на специализирани продукти за МСП, недостатъчни държавни гаранционни програми, трудност при сравняване на различни оферти, липса на разбиране от страна на банките за специфичния бизнес модел, и др. Всъщност едва 14% от анкетираните заявяват, че не срещат никакви трудности при финансирането – т.е. болшинството (86%) имат поне една бариера пред достъпа до капитал.

Различията по размер и сектор са ясно изразени. Микро- и малките предприятия усещат бариерите най-остро – при тях делът на посочилите проблем с обезпеченията е дори по-

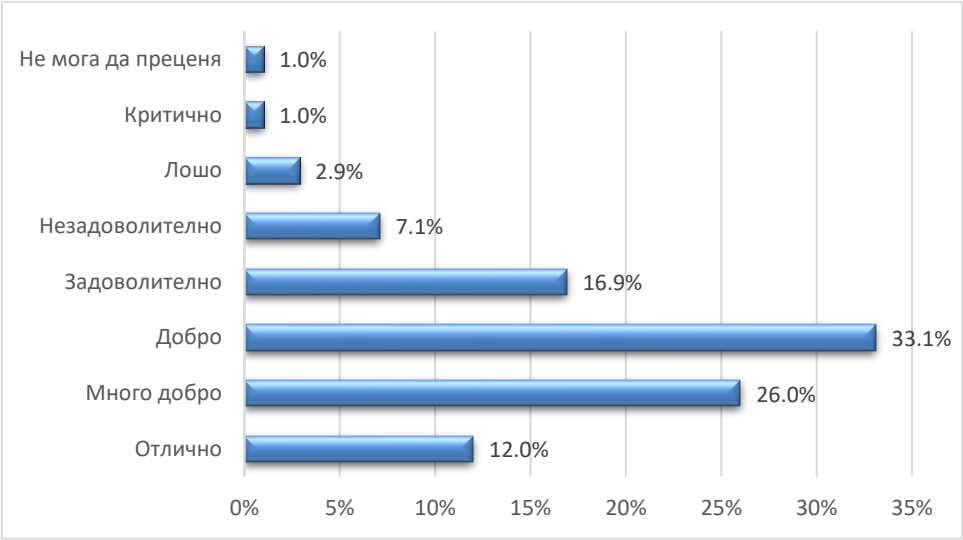
висок (около 72% за прекомерно обезпечение и ~60% за липса на достатъчни активи), което води и до самоизпълняващо се очакване за риск от страна на кредиторите. Тези най-малки предприятия, често без кредитна история, са принудени да разчитат повече на вътрешни средства и търговски кредит вместо на банкови кредити. Средните предприятия от своя страна изтъкват малко по-често ценовите и времеви бариери – 74% от тях се оплакват от високи лихви, 58% от бавно одобрение. Това е логично, тъй като по-големите сделки на средните фирми изискват по-дългосрочни кредити и минават през по-сложен анализ, удължавайки процеса. Въпреки че средните МСП са по-добре позиционирани за външно финансиране (имат повече активи и история), те остават уязвими към административни и ценови пречки, които увеличават разходите им за финансиране.

От гледна точка на сектора, най-засегнати от обезпечителните изисквания са производството и строителството – предприятията в преработващата промишленост и строителния бранш масово отбелязват проблеми с обезпечения и бавни процедури. Тези капиталоемки и енергоемки отрасли традиционно имат нужда от значителни дългосрочни кредити и лизинг за инвестиции, поради което остро усещат недостига на подходящи финансови условия. Обратно, предприятията в услугите и търговията по-често срещат затруднения с оборотния капитал – липсата на гъвкави кредити за запаси и текущи разходи е бариера, която търговците и хотелиерско-ресторантьорския сектор изтъкват. Това съответства и на по-широкото използване на търговски кредит и факторинг в тези сектори като компенсация на липсващото банково финансиране.

В обобщение, достъпът до финансиране на МСП е възпрепятстван от комбинация от висока цена, строги изисквания и вътрешни слабости. Половината от фирмите са "разубедени кредитополучатели" – те или не кандидатстват, или се отказват, предусещайки отказ поради липса на обезпечение или сложни процедури. Тази ситуация насочва малкия бизнес към краткосрочни и вътрешни решения – напр. самофинансиране, овърдрафт, забавяне на плащания – които поддържат ликвидността, но ограничават дългосрочния им растеж.

Финансовото здраве на МСП преди кризата COVID-19 като цяло е било добро, но шокът на пандемията бързо е влошил ликвидността и платежоспособността при много предприятия. Фигура 2 показва самооценката на МСП за финансовото им състояние преди кризата COVID-19.

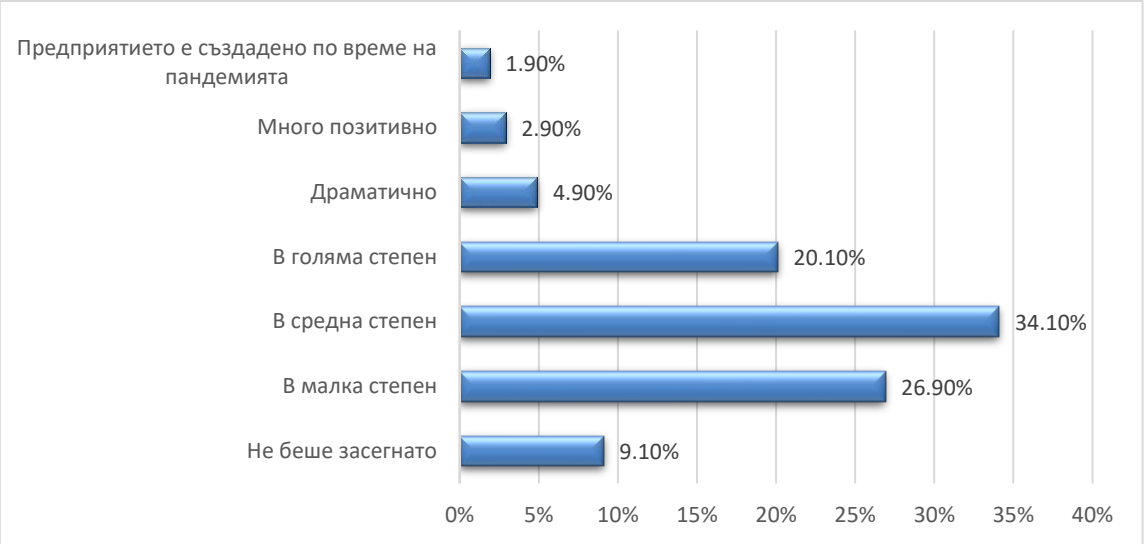
Фигура 2. Предкризисно финансово здраве



Източник: Авторски изчисления по данни от национално анкетно изследване сред МСП, 2025 г.

Тази относително здрава стартова позиция обаче е последвана от силен неблагоприятен шок. (фиг.3)

Фигура 3. Самооценка на степента на засягане от кризата COVID-19 (общо, единичен избор)



Източник: Авторски изчисления по данни от национално анкетно изследване сред МСП, 2025 г.

Тази динамика очертава класическа криза на приходите и ликвидността: първо рязък спад на приходите (докладван от 78–87% от предприятията в зависимост от показателя), последван от затруднения в паричните потоци – над 70% от МСП с влошаване отбелязват временни или сериозни ликвидни проблеми и натрупване на дългове.

Данните позволяват да се изведе типология на предприятията според ликвидния риск. На единия полюс са ~20% от фирмите, които преминават сравнително стабилно през кризата – при 12% пандемията „не се отразява" на финансите им, а други ~8% дори отчитат подобрение. Тези случаи на "острови на устойчивост" се наблюдават нишово в сектори като ИТ и професионални услуги, където фирмите често са имали висока ликвидност и успяват бързо да адаптират продукти или пазари (напр. 55.6% от незасегнатите са разработили нови продукти, 44.4% са намерили нови пазари). Тяхната предкризисна позиция обикновено се характеризира с високи парични резерви и ниска задлъжнялост, които са действали като буфер срещу шока.

В центъра на разпределението е мнозинството, които търпят осезаем удар, но успяват да оцелеят – при тях кризата причинява осезаемо влошаване (умерено или голямо), често съпроводено с временни ликвидни затруднения. Около една трета от всички МСП (34%) съобщават за временен недостиг на парични средства – например забавени вземания или напрежение при обслужване на краткосрочните задължения. Тези проблеми обикновено са преодолени с комбинация от мерки: изразходване на налични парични буфери, преструктуриране на дългове, вътрешно финансиране от собствениците и търсене на допълнително финансиране. Всъщност 72% от предприятията в тази група (с „известно влошаване") отбелязват, че спадът в приходите им е временно компенсиран с вътрешни ресурси, а 70.3% признават за временни ликвидни проблеми, които обаче са овладени.

На другия полюс се намират най-уязвимите ~10–15% от предприятията, които изпадат в остра финансова криза. При 30% от всички МСП се наблюдава „значително влошаване" на състоянието им, като сред тях повечето регистрират сериозни загуби (77%) и остър ликвиден дефицит – 73.9% от фирмите с голямо влошаване признават за сериозни

проблеми с ликвидността и натрупване на дълг. Тези предприятия представляват типичен случай на финансов дистрес, често съпроводен и с други негативни ефекти. Анализът на самооценките разкрива, че те преди кризата вече са били в неблагоприятно положение – много от тях са декларирали намаляващи приходи, загуби или слаба ликвидност. Логично, тези слабости са се усилвали под натиска на кризата, довеждайки до драматично влошаване на финансовата устойчивост.

От гледна точка на платежоспособността, тревожен индикатор е нарастването на междуфирмената задлъжнялост и просрочията. Макар конкретни проценти за забавени вземания да не са пряко дадени в анкетата, косвени данни сочат за каскаден ефект: широко използваният търговски кредит имплицира, че при 78% от анкетираните предприятия деклариещи спад в приходите значителен дял от плащанията по веригата са забавени. Много фирми прибягват до предоговоряне на дълговe, около 54% от анкетираните МСП са преструктурирали или увеличили кредитните си линии в отговор на кризата. Това облекчава временно натиска, но може да показва и начало на свръхзадлъжнялост за някои. Като цяло, показателите за ликвидност и дългосрочна платежоспособност се влошават през 2020–2021 г. за мнозинството предприятия, макар през 2022 г. да се забелязва известно възстановяване след отшумяване на острия пандемичен ефект и прилагането на подкрепящи мерки.

В заключение, кризата откроi два полюсни профила: финансово устойчиви МСП с навременни буфери и адаптивност, и финансово крехки МСП, бързо изпитващи ликвиден недостиг и натрупване на дълговe. Между тях мнозинството се борят с временни затруднения, чийто изход зависи от продължителността на шока и достъпа до ликвидна подкрепа отвън.

5. Изводи

Изследването идентифицира три ключови резултата относно достъпа до финансиране и финансовата устойчивост на МСП в България през 2020–2025 г. Първо, доминиращите източници на финансиране остават собствени средства и банкови кредити, при ограничена роля на алтернативните инструменти. Второ, най-съществените бариери са високите лихви, изискванията за обезпечение и административната тежест, особено за микро- и малките фирми. Трето, значителен дял от предприятията изпитват ликвиден стрес – забавени вземания, намалени буфери и проблеми с обслужване на дълга.

Използвана литература:

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Daniela Ventsislavova Georgieva[1]

MEDIA PUBLICATIONS AS A POTENTIAL TOOL FOR PROMOTING SUSTAINABLE ACCOUNTABILITY AND DISCLOSURE OF R&D AND INNOVATION

***Abstract**: The paper presents the results of media monitoring on topics related to research, development, and innovation in Bulgaria. Public disclosure of complete and reliable data on R&D and innovation activities of enterprises protects stakeholders' interests and can be considered a factor supporting the sustainable economic development of the EU. The results show that most media content is neutral. None it reporting data on R&D and innovation. Publications with positive content are mainly descriptive and promotional, focusing on new products, research projects' results, and international news. The publications with negative sentiments focus on inadequate funding for scientific research, Bulgaria's position in European rankings, and ineffective national policies in the sector.*

***Keywords**: media monitoring, R&D disclosure, reporting*

JEL: *O30; M40*

1. Introduction

Innovations' development is a series of phases and activities, where research and development (R&D) have a significant role in improving the initial idea. Among the most commonly used indicators for evaluating firms' innovation are the level and growth of R&D activity (Chobanova, 2023). Therefore, accurate reporting of these activities is essential for the annual reporting of non-financial enterprises in Bulgaria.

Directive 2013/34/EU introduces requirements for companies to disclose information, aiming to enhance the transparency and reliability of the data in the firms' financial statements. Disclosures should protect the interests of the investors and stakeholders as well as to support the sustainable economic development in the EU. Innovation is perceived as a key factor for a competitive advantage and fostering economic growth. In Bulgaria, there is no clear regulatory framework governing the disclosure of R&D and innovation by non-financial enterprises. Partially required disclosure information is outlined in accounting standards, but it does not cover the entire innovation process. Directive (EU) 2022/2464 on corporate sustainability reporting also does not establish any disclosure obligations in this area. As a result, companies' annual financial statements might contain gaps in the published information that could lead to inaccurate financial analyses and misjudgments of a company's innovation capacity.

Enterprises may disclose information due to various factors, such as legislative requirements, the type of enterprise, the need for an independent financial audit, and the company's internal culture of accountability. The success of innovation depends on both technology and societal readiness (Linton, 2009). The attitudes of information users impact the quality and quantity of publicly disclosed data. Such attitudes can be influenced by individuals' interests in the information and their views on the usefulness of the disclosed data. Media coverage can reveal public attitudes towards reporting and publishing R&D data.

This paper aims to examine the extent of media coverage of R&D reporting as a factor influencing public disclosure of comprehensive and reliable data on the research and development activities of enterprises. The author's thesis is that there is insufficient information

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in the media about the benefits and necessity of reporting complete and reliable R&D data by innovative enterprises in Bulgaria, which could result in a low level of such reporting. The primary focus of the study is on publications in the online media related to R&D and innovation. These publications are analysed through the lens of accountability and how these topics are presented in society, whether in a positive or negative light.

2. State of the Problem

At the macroeconomic level, countries with higher levels of accountability and better management of disclosed data have more investment in science and innovation. This stimulates the development of the innovation ecosystem (Torres et al, 2024). At the micro level, investment in R&D can contribute to creating a positive reputation for enterprises and achieving a sustainable competitive advantage. Factors such as company size, level of public disclosure, and quality of corporate governance can have a positive impact on the financial sustainability of enterprises (Sulimany, 2025). Non-financial reporting is a tool that enables enterprises to present economic, social, and environmental information to investors, government administrations, communities, and other stakeholders, therefore, it should be of interest to all stakeholders (Bakardzhieva, 2020, p. 781). Sharing information on clean innovations benefits society more than firms, due to the positive economic and environmental externalities created by knowledge diffusion (Liu, et al., 2024). Andreou, et al. (2024) note that public information on R&D is restricted due to unclear and subjective criteria in the current standards and a lack of mandatory disclosures. Closing this information gap could prevent mixed messages about the significance of R&D for organisations. Naheed et al. (2024) argue that green innovation data disclosure depends on stakeholder demand. The limited interest in R&D data may cause management to less prioritise such disclosures. This could lead some innovation expenses not to be accounted and hence underestimating the innovation potential of the economy and the business.

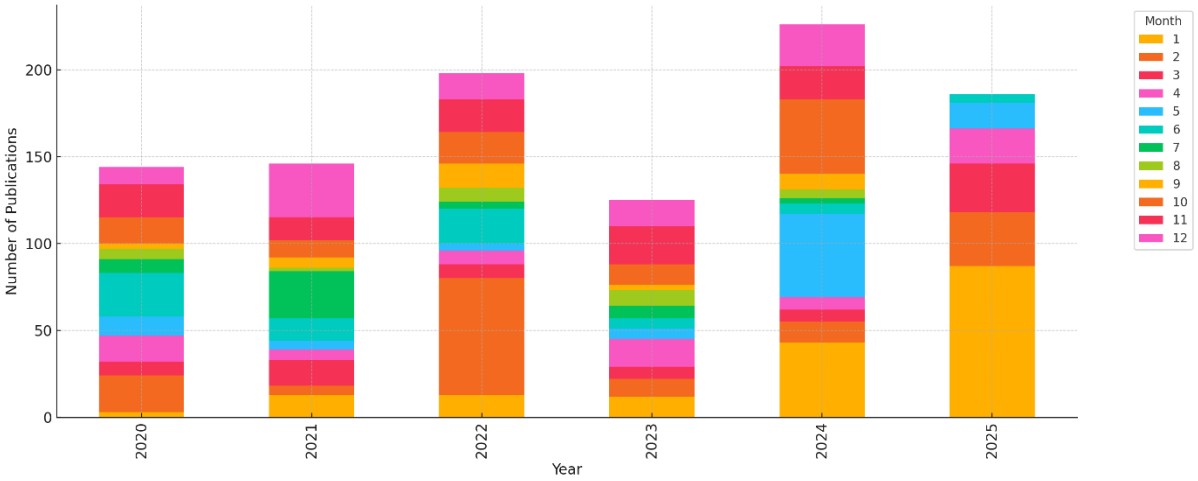
Media monitoring serves as a tool to track public discourse and the popularity of topics related to R&D data disclosure among a broad audience. Such monitoring can assist in shaping the main themes in media coverage that influence the perspectives and attitudes of, on the one hand, managers of innovative enterprises, and, on the other hand, information users, regarding the reporting and publication of R&D and innovation data.

3. Research methodology and media monitoring results

The Sensika platform (SaaS) was used for conducting online media monitoring based on the keywords “R&D” and “R&D reporting”. It covers the period from January 2020 to June 9, 2025 during which 2286 publications were collected and analyzed. The analysis included original titles, excluding reshared content, audio/video content, and titles which are not clear, reducing the count to 1025 (see Figure 1).

In 2020, 144 publications were identified and grouped into five thematic fields. The first group relates to healthcare and the pharmaceutical sector, focusing on vaccine development, the country's COVID-19 healthcare policy and EU initiatives in this field. The second group covers government policies, aid schemes, recovery programmes and measures on the economic impacts of COVID-19. The third group focuses on R&D data from the National Statistical Institute and Eurostat, highlighting Bulgaria's indicators and ranking in the European innovation scoreboard (EIS), as well as innovation funding and public expenditure on R&D. The fourth group gathers publications on global R&D and innovation amid geopolitical issues, like trade wars, restrictions imposed on major IT and technology companies, China, the USA, Huawei, and scientific cooperation with Russia. The fifth group involves microeconomic topics on innovative enterprises, new innovation centres, and support mechanisms through Operational Programmes and projects.

Figure 6. Number of publications by year and month based on media monitoring for keywords "R&D" and "R&D reporting"



Source: based on data from Sensika (SaaS).

In 2021, 146 publications on R&D in online Bulgarian media and publications were analysed, which can be divided into four main themes. One group maintains its thematic focus from the previous year. It covers topics related to R&D and the level of the Bulgarian economy's innovativeness. An assessment is presented based on data from the National Statistical Institute and Eurostat. It highlights the insufficient level of scientific research funding, low investment in science and education, which are considered as barriers to improving Bulgaria's EU rankings. The media also presents data on Bulgaria's position relative to other countries. The second group addresses topics such as human resources in science, highlighting an ageing academic workforce and declining researcher numbers, but also a positive trend in scientific output, with high citations and recognition. The third group of media titles are related to the European Green Deal initiatives, climate change strategies, eco-innovations, and digitalisation for green policies. The fourth group includes publications on project dissemination activities or open calls for proposals.

In 2022, 198 media publications in four main groups were analyzed. Similar to the previous years, one group consist of publications on data from Eurostat, NSI, and other official databases, focusing on R&D expenditure, public sector investments, and Bulgaria's position in the European Innovation Scoreboard. The second group includes publications on Bulgaria's economic competitiveness, presenting issues such as low productivity, limited innovation potential, and administrative burdens. International comparisons showing Bulgaria's lag in innovation within the EU context is also included. The third group of publications addresses issues related to Bulgaria's budgetary policy. It includes information regarding the scientific research funding, as well as the relationship between the academic community and the state regarding budgetary allocation for scientific activities. The fourth group presents data on international innovation policies and geopolitical changes, including the EU, Russia, and China innovation initiatives.

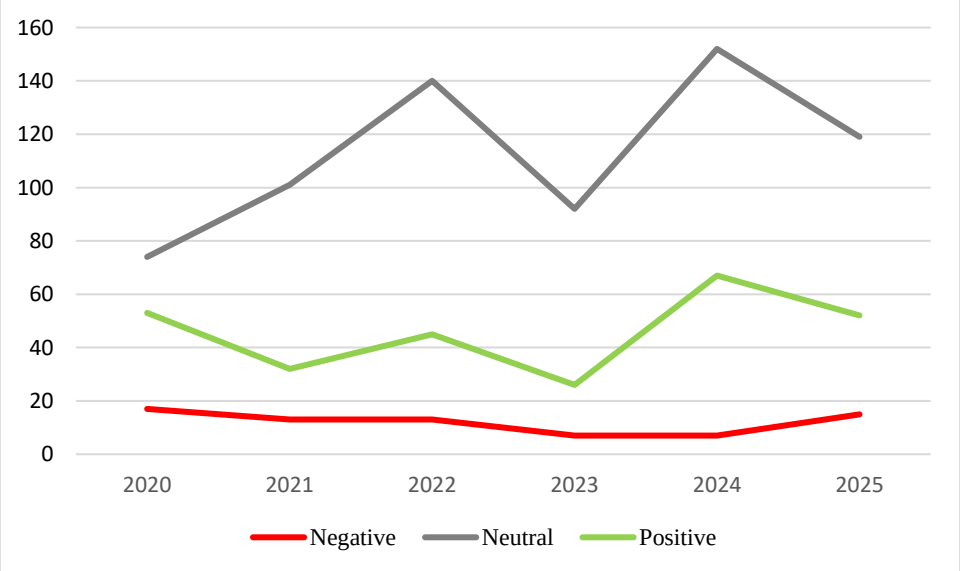
In 2023, 125 publications categorised into four groups were analysed. The first group contains publications of the country's position in the European Innovation Scoreboard. The focus is placed on the low R&D expenditure, limited funding for scientific research, and less opportunities for technological development. It also includes publications on international initiatives in which Bulgaria partially participates. It points out the country's efforts to reach the average EU innovation levels and to improve the research capacity. The second group

focuses on researches about healthcare and the food industry, including new vaccines, biomedicine innovations, and healthy foods. The third group addresses publications on external R&D funding through loans, EU programs, and initiatives, aiming to boost cross-sector competitiveness. The fourth group of publications presents international and global examples and practices related to companies' innovations and R&D outcomes.

In 2024, 226 publications are analysed, grouped into four categories. The first covers funding innovation activities and Bulgaria's EIS ranking as a 'modest innovator, ' presenting data from the National Statistical Institute on R&D expenditure, the labour market, GDP, and government innovation investments. The second group focuses on publications about China's international innovation policy, its technological achievements in digitalisation, automation, high tech, and artificial intelligence (AI). The third group is of initiatives, programmes, and policies on R&D and innovation, including agreements, delegation visits, project proposals, technology transfer, and information from international forums. The fourth highlights information on the AI development, pointing out Bulgaria's lag in AI-related projects.

Up to June 9, 2025, 186 publications were collected and grouped into four themes. The first covers global economic forecasts of US, European, and Asian economies, with data on the market changes, investment strategies, development scenarios, and macroeconomic evaluations. The second - national policies, infrastructure, regional development, projects outcomes, EU funding programs, and public initiatives. The third group focuses on R&D funding, digital tech, and financial innovations. The fourth addresses security, defense, and geopolitics, including military funding, defense innovations (mainly in the USA), cybersecurity, and foreign policy.

Figure 2. Number of neutral, positive and negative sentiments by year based on the media monitoring



Source: based on data from Sensika (SaaS).

Among the collected online publications, the majority (approximately 66%) are neutral in nature. Positive sentiments account for around 27%, while the negative sentiments are 7% (see Figure 2). Neutral publications typically concern adopted strategic documents, calls for applications with project proposals, upcoming events, and data for disseminating information on ongoing projects funded by the national or European budget. The publications with positive sentiments are mainly descriptive, highlighting the company's achievements and innovation outcomes. These texts could be considered as advertisements showcasing the achieved progress

in a specific sector or within a company. The publications with negative sentiments are fewer. They use a more critical tone and focus on issues such as low investments in science, the ineffectiveness of national policies in supporting innovation, and the country's innovation performance in international rankings. Unlike the descriptive style of positive texts, negative publications are shorter and more problem-oriented. They emphasise the governmental institutional weaknesses, the lack of support and the low funding leading to the slow development of the innovation ecosystem.

4. Conclusions

The analysis of media publications that focus on R&D and innovation topics reveals a fragmented and episodic pattern, influenced by current events and political initiatives. R&D topics often focus on presenting macroeconomic data, Bulgaria's positions in international rankings (primarily the European Innovation Scoreboard), and comments on the insufficient funding for scientific research. Peaks in the media interest coincide with significant events such as the COVID-19 pandemic (in 2020), the issuing of some strategic documents and reports (from 2021 to 2023), and the development of artificial intelligence, cybersecurity issues, and military initiatives (during 2024-2025). Topics related to R&D within companies' development, globalisation challenges, knowledge transfer, funding, and regulatory issues are less often addressed by the media. There is a lack of media coverage regarding R&D accountability, tax incentives, and corporate disclosure of information. The absence of systematic monitoring and reporting on R&D and innovation financial data could lead to a low level of awareness among society and business of the importance of transparent, reliable information on the country's macroeconomic indicators. This deficit could hinder the accurate interpretation of the real results and benefits of investments in science and innovation, and could foster public distrust in the effectiveness of scientific activities, thus undervaluing its contribution to economic growth.

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Spartak Keremidchiev[1]

THE AGE OF AGILE FOR RESEARCH ORGANIZATIONS

***Abstract**: The Agile concept has rapidly entered business organizations that create software and apply the principles of project management. The article presents the possibilities for applying this concept in research organizations. To this end, the main characteristics of Agile in business organizations are outlined. Then the peculiarities of the functioning of research organizations and their environment are discussed. Instead of a conclusion, stages and steps of using Agile in research organizations are developed.*

***Keywords**: Agile, research organizations, management*

JEL: *M11*

1. State of the problem

Agile is one of the most modern management concepts, widely discussed and developed in recent years in business organizations. This is because its primary purpose is intrinsically linked to its foundational essence, namely "…to create and respond to change. It is a way of dealing with, and ultimately succeeding in, an uncertain and turbulent environment" (Agile Alliance 2020).

The emergence of disruptive innovations (Christensen, 1997; Aghion et all., 2021), increased political uncertainty, changing competitive landscape, shift to customer focus culture and increasing relevance of data are the main parameters of an uncertain and turbulent environment (World Economic Forum, 2025), which do not seem likely to change anytime soon. In order to be competitive and survive, companies must be able to quickly react to the dynamic environment. Agile, defined by Gren and Lenberg (2019) as "responsiveness to change" is the most suitable tool for this. The spread of Agile is so rapid and large-scale that it gives reason to claim that companies operate in an "The age of Agile" (Denning, 2018a) and in an "Agile world" (Denning, 2018b).

While Agile is entering the business world *en masse*, its application in research organizations and universities is still in its embryonic stage. Evidence of this is the small number of publications on the topic (Vijayalakshmi, et al., 2024; Mironova et al., 2020). For this reason, the question of how Agile methodologies can be applied within research organizations is of considerable interest, given their structural and operational specificities and the need to adapt such management approaches accordingly. The aim of this article is to shed light on the use of Agile in research organizations by outlining the advantages of this concept, examining the distinctive characteristics of research environments and the barriers to Agile adoption, and proposing key benchmarks for the development of an implementation strategy. The structure of the following presentation follows the sequence of these problems.

2. Research Methodology Agile in business organizations

The present study uses a comparative technique to explore the application of Agile in business organizations and the possibilities for its use in research organizations, taking into account their distinctive features and the environment in which they operate.

Agile emerged in the 1990s in project organizations in response to two constantly emerging challenges. The first of these is the constantly stressful deadlines for the implementation of

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various projects. In traditional organizations, the implementation of project stages is strictly sequential, so that a new stage begins when the previous stage is completed. The idea on which Agile is built is that the stages and activities within them begin to be implemented in parallel.

The second challenge is characteristic of software-development companies. In these environments, the pace at which new technologies, programming languages, and technical capabilities emerge is so rapid that strict adherence to predefined work specifications may result, particularly in large projects with long implementation cycles, in the delivery of a product or service that is already technologically outdated. To solve these problems, experiments are initiated that lead to a serious restructuring of the entire organization, and subsequently the very concept of Agile emerges and clarifies.

As the concept develops, the differences between the functioning of Agile and traditional, so-called waterfall companies, where processes are executed one after the other, begin to clearly emerge.

The key differences between these companies can be summarized in eight aspects (Table 1). In addition to the parallel execution of tasks and processes, Agile organizations work in flexible, decentralized and dynamic teams, whose members are in constant contact, the work is performed in small portions in short terms and with high flexibility and in communication with the customer.

Table 1. Key Differences between Agile and Waterfall Companies

Aspect	Agile Companies	Waterfall Companies
Project Management	Iterative, flexible, and adaptive	Linear, structured, and sequential
Decision-Making	Decentralized, teams have autonomy	Centralized, decisions follow a hierarchy
Customer Involvement	Continuous feedback and collaboration	Limited involvement, mostly at the beginning and end
Work Process	Short development cycles (sprints)	Long phases with detailed upfront planning
Risk Management	Lower risk due to continuous adjustments	Higher risk if initial planning is flawed
Innovation	Encourages experimentation and rapid iteration	Follows a predefined plan with minimal deviation
Team Structure	Cross-functional, self-organizing teams	Defined roles with clear hierarchy
Delivery Approach	Frequent small releases	One final release at the end

Source: created by the author.

Gradually, through trial and error, the key elements and attributes of an agile organization become clear, which distinguish them from other organizations:

- Speed
- Customer-centricity
- Teamwork
- Breaking down long-term challenges into short-term iterations
- Experimentation
- Innovation
- Co-creation
- Working across boundaries
- Learning from failure as well as success.

Agile received a strong boost with the development and publication of the principles of the Agile manifesto. This happened in 2001 at a meeting of American software companies to discuss new ways of working and develop a common approach to their customers, which solved existing problems with terms of reference, project deadlines and interaction with customers. The original principles, compiled by 17 software specialists, were as follows: individuals and interactions over processes and tools; Working software over comprehensive documentation; Customer collaboration over contract negotiation; Responding to change over following a plan; That is, while there is value in the items on the right, we value the items on the left more (Beck et al., 2001).

After confirming and further developing these statements, the 12 principles beyond the Agile Manifesto (Box 1) were formulated, which are gaining greater popularity.

Box 1. The 12 Principles behind the Agile Manifesto

Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.

Welcome changing requirements, even late in development.

Agile processes harness change for the customer's competitive advantage. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference for the shorter timescale.

Business people and developers must work together daily throughout the project. Build projects around motivated individuals.

Give them the environment and support they need, and trust them to get the job done.

The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.

Working software is the primary measure of progress.

Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

Continuous attention to technical excellence and good design enhances agility.

Simplicity - the art of maximizing the amount of work not done - is essential.

The best architectures, requirements, and designs emerge from self-organizing teams.

At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

Source: The Agile Alliance.

Based on the purpose and main characteristics of Agile, the following definition can be derived, which is strongly influenced by the definition of Goldman (1994). Agile is a business concept designed to respond to the dynamic and highly competitive business environment. Agile offers the closest follow-up of the changing needs of customers by using the most modern technologies and tools. It represents a fundamentally new flexible and adaptive organization of business processes in the company, which places emphasis on decentralized and empowered teams that plan and implement complex products and services in stages in short terms.

Since Agile is characterized by flexibility, dynamism, and adaptation to changes using the latest technologies, the question of its applicability logically arises. Obviously, sectors that have a long, continuous, and relatively constant production cycle and that are less digitized, such as

construction, metallurgy, steelmaking, the chemical industry, and the like, are not suitable for the application of this new business concept.

3. Agile in research organizations

The arrival of Agile does not mean that this concept will automatically enter research organizations. The lack of a market environment in which these organizations operate makes them more conservative, resistant to change, and often highly bureaucratic. The significant differences that exist between research and business organizations must be taken into account when designing and implementing the Agile concept in them (Table 2). Research organizations often work on long-term scientific programs that aim to create new knowledge for not always clear users/clients, have a government subsidy and strive to gain academic recognition by publishing the results achieved. This closedness and autonomy of scientific organizations create conditions for organizing highly hierarchical structures and bureaucratic processes that fight with all their efforts against the introduction of changes and are for preserving the status quo.

In a study of the enabling and restraining forces in adapting to Agile, Budapest Business School quantitatively assesses their impact (Heidrich, Chandler, 2015). The restraining forces have a slight advantage and are rated with 34 points, while the driving forces receive 33 points. The leading drivers of change are the stakeholders who participate in the decision-making process, reputation through achieving long-term goals, understanding the integrity of the system through a matrix structure. In contrast to them, the main restraining forces are the limited mindset within the own faculty, the vertical hierarchy and communication, and the presence of 5 subcultures.

Table 2. Key differences between academic and business organizations

Criterion	Research Organizations	Business Organizations
Goals	Long-term scientific research, knowledge generation	Fast delivery of products/services, profit maximization
Structure	Often hierarchical, bureaucratic	Flexible, market-oriented
Processes	Long research cycles, methodical work	Short iterations (sprints), fast results
Funding	Government, project-based funding	Private capital, sales, investments
Management style	Collective decision-making, consensus	Agile methodologies: Scrum, Kanban, Lean
Main focus	Knowledge generation and dissemination	Product and service development for clients
Motivation & Rewards	Academic recognition, publications	Revenue, bonuses, market growth
Change speed	Slow adaptation to new trends	Quick response to market environment

Source: created by the author.

Despite the difficulties and barriers, there are already successful practices of using Agile or elements of the concept in leading research organizations such as CERN, NASA, Fraunhofer Institutes, MIT Media Lab and many others. For example, in NASA in 2023, a Community of

Practice (CoP) was established as an initiative to implement and disseminate Agile values, principles and practices in the organization (Silva-Martinez, Desharnais, 2024). This structure is engaged in training and popularization of Agile, assessment of existing practices and problems facing Agile. A series of webinars has been developed, dedicated to topics such as: "CoP Kick-off & NASA Agile Teams Study Results", "Lessons Learned in Implementing Agile in the DoD Acquisition Environment", "Value-Driven Product Delivery via Agile Mindset" and others.

4. Instead of Conclusions

The age of agile has already come, and it is a matter of management insight to elaborate and apply this concept. The scale and depth of change in research organizations will be significant, which requires the development of a medium-term strategy with distinctive stages.

The strategy should set a clear vision and goals to achieve. It should contain strategic initiatives to overcome existing barriers and holding forces. The first initiatives should be aimed at reorganizing the work through pilot projects in small teams with specific parameters and deadlines. In parallel, training should be organized and conducted for promoting Agile thinking among the academic community, in order to create conditions for successful work in pilot projects, and subsequently to culture change in organizations.

It is necessary to quickly introduce digitalization and technological transformation into the work of pilot projects and teams by implementing modern means of communication and project management, as well as cloud platforms and digital tools.

After a successful pilot implementation of Agile tools, its application should become large-scale and encompass both research and management and administrative work in research organizations. In this regard, initiatives should provide for gradually reducing bureaucracy and better integrating agile into the academic model.

Similar to business sectors, Agile should not be applied in all research organizations. Organizations engaged in fundamental research, as well as sectors with a long experimental cycle such as clinical trials, should be excluded from its scope. In these, Agile can be applied after serious adaptation, mainly in the area of customer relations, digitalization of work and active communication within teams.

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Росица Чобанова / Rossitsa Chobanova[1]

ИКОНОМИЧЕСКО РАЗВИТИЕ, ОСНОВАНО НА НОВО ЗНАНИЕ И ПРОВЕЖДАНИ ПОЛИТИКИ

***Резюме**: Статията дискутира съвременното икономическо развитие, основано на създаването, усвояването и използването на нови знания, както и водените политики. Като се прилага Хегеловия теоретико-методологичен подход при изследване на развитието, основано на знания се доказва необходимостта от промяна в модела на икономическата политика за иновации на примера на България. Предлага се държавата да формира и координира стратегията за основано на знания развитие, като стимулирането на обновяването на предприятията да не е само чрез предлагането - насочване на публични средства за обновяване към бизнес сектора, но и чрез подпомагане на търсенето - вътрешно и външно, на нови продукти и услуги, чието производство е национално базирано и /или включено в глобални и регионални вериги на доставки.*

***Ключови думи**: икономическо развитие, знания, иновации,, НИРД, държавна политика*

***JEL:O**1;O3,O38*

NEW KNOWLEDGE BASED ON ECONOMIC DEVELOPMENT AND POLICIES

***Abstract**: The article discusses contemporary knowledge driven economic development based on the creation, absorption and use of new knowledge, as well as the policies pursued. By applying Hegel's theoretical and methodological approach to economic development, the need for a change in the model of Governmental policy for innovation is proven on the example of Bulgaria. It is proposed that the state forms and coordinates the strategy for knowledge-based development, stimulating the renewal of enterprises not only through the supply - directing public funds for renewal to the business sector, but also by supporting the demand – domestic and foreign for new products and services, the production of which is nationally based and / or included in global and regional supply chains.*

***Keywords**: economic development; knowledge, innovation, R&D, government policy*

***JEL:** O1; O3; O38*

1. Увод

Икономическото развитие, основано на създаване, усвояване и прилагане на нови знания, както и свързаните с него политики са сред най-дискутираните от икономическата колегия теми. Значението и актуалността на тези дискусии се определя от ускоряване на глобалните промени в използваните технологии и съпътстващите промени в националните икономики. Ускоряването на тези процеси формира преход към нов стадий на икономическо развитие, което налага определяне на нови национални и фирмени политики, съпровождано от бурно развитие на икономическите науки. В практико-приложен план проблемът за развитието чрез използване на нови знания е свързан с постигане целта на Лисабонската стратегия.

Във връзка с това развитието на националната икономика чрез създаване, усвояване и прилагане на нови знания се характеризира от гледна точка на постигане на поставените стратегически цели на ЕС като цяло и тези на България като неин член, определя се

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равнището и използването на човешки, финансови и други ресурси, търсенето и предлагането на национално базирани резултати от НИРД. Изясняването на съдържанието на основните понятия е важно условие за правилни анализи, сравнения и обобщения. Във връзка с това най-напред се дефинира основния понятийно-категориален апарат, който включва развитие, иновации, икономическа политика, стратегия на развитие, цеопл на политиката. След това се характеризира състоянието на политиката за развитие на икономика на знанието чрез неговата цел в ЕС и България в частност. Във връзка с това се представя методологията на изследването. Прави се обобщена оценка на човешките, финансовите ресурси и резултатите от прилагането на нови знания в предприятията, специален акцент се поставя върху взаимодействията между предприятията в процеса сътрудничество и конкуренция (co-competition, cooperation and competition).

2. Състояние на проблема

За определяне на ресурсите, целите и постижения на провежданата политика на развитие чрез създаване, усвояване и използване на нови знания най-напред ще уточним съдържанието на основните използвани понятия. На тази база ще коментираме състоянието и равнището на изпълнение на поставените цели от Европейския съюз – ЕС, както и на България, като неин член.

Уточняване на понятията

В литературата когато става дума за развитие, то често се свързва с икономическия растеж. Тук ги разграничаваме. Икономическият растеж се свързва с факторите, докато икономическото развитие се свързва с ресурсите и резултатите от използването им.

Под развитие се разбира процес на промени, който протича неравномерно. Периодите със сравнително устойчиви значения на критериите за характеристиката им определяме като стадии, а тези с бързи промени – периоди на преход, в какъвто се намираме в настоящия момент. Тези промени, съгласно Хегел, се отнасят до целите и ресурсите, до движещите сили – механизми и инструменти, необходими за постигането на новите цели на обществото.

Развитието, основано на създаване, усвояване и използване на нови знания се определя като иновационно. По своята същност понятието „иновация“ означава промяна, въвеждане на новости и това е общото при определянето му в научната литература. В зависимост от обекта, чието обновяване се наблюдава икономическото развитие се свързва с въвеждането на нови дейности, на нови продукти, на нови процеси, създаване на нова организация и получаване на нови резултати.

Политиките за развитие чрез създаване, усвояване и прилагане на нови знания са подчинени на постигане на определена цел, като се реализират с помощта на различни модели, адекватни на преобладаващия модел на иновационен процес за даден период. Исторически, от средата на миналото столетие, под въздействието на информационните и комуникационните технологии (ИКТ) тези модели най-напред са от линеен тип – съответно „science push“ и „demand pull“. След това се преминава към модел на взаимодействие между фазите на иновационния процес и към национална иновационна система, а през XXI век – към вътрешнофирмена и извънфирмена иновационни мрежи, които стават елементи на глобалните и на националните иновативни вериги на доставка.

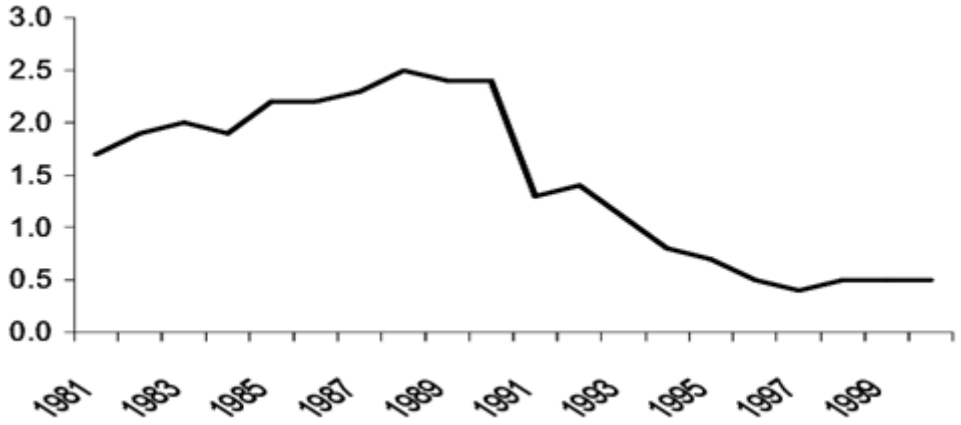
Стратегическата цел на развитие на ЕС, основано на нови знания

Стратегическата цел на развитието на ЕС, приета в Лисабон, (ЕС, 23-24 март 2000 г.) със срок до 2010 г. е ЕС да стане най-конкурентната и динамична, основана на използване на знанието икономика, способна на устойчив растеж с повече и по-добри работни места и социално единство. Европейският съюз си поставя цел най-напред към 2010, след това към 2020, а сега и към 2030 г. интензитетът на научните изследвания да достигне е 3% разходи за НИРД от брутния вътрешен продукт. Бизнесът се очаква да допринесе 2% НИРД интензивност.

Стратегическа цел на основано на нови знания развитие на България

През 2000 г. – годината на приемане на Лисабонската стратегия, към страните - кандидатки за членство в Евросъюза се направиха две основни препоръки. На първо място стратегическата цел за развитие на страната на основата на нови знания бе свързана с постигане НИРД интензивност на икономическото развитие на равнище - 1.5%, като ролята на бизнеса е да допринесе от 1% от БВП за тази интензивност.

Фигура 1. НИРД интензивност на българската икономика през периода 1981 г. - 1999 г.



Бележка: НИРД интензивност-разходи за НИРД към БВП

Източник: НСИ- годишници

Ниската НИРД интензивност на националното стопанство в условия на ускорена технологична промяна и глобализация на икономическите процеси, заедно с пречка пред развитието му. Въпреки очакванията, промените от 1989 г. се съпровождат от рязък спад на НИРД интензивността на българската икономика. (вж. Фиг.1). Равнището ѝ от 2,16 % в началото на периода пада до 0.5%. Това равнище се поддържа и до днес, въпреки че с пълноправното членство в Европейския съюз, съпроводено от финансиране на оперативна програма за конкурентоспособност се постави занижена цел от 1.5% НИРД интензивност.

В България поставените цели, въпреки скромния напредък и постигане на равнище от 0.75% през 2018 г., не са реализирани и до днес. Европейската политика за повишаване на равнището на общата НИРД интензивност от 2% на 3% също не е реализирана.

Вторият въпрос, който се поставя във връзка с политиката на развитие на националното стопанство, определена като изискване във връзка с подготовка на приемането в ЕС към 2000 г., предполага идентифициране на областите на интегриране на националните научни изследователски политики с европейските, и които биха допринесли за постигане на стратегическите цели на ЕС.

На практика приоритетно бе поставена задачата за промени в условията, които се създават от институционалните фактори: икономически, финансови и образователни за ускоряване на иновационния процес в националната иновационна система. Глобализацията оказва силно въздействие върху националните иновациони системи, особено на по-малки и по-слаби икономики като Българската. Този модел става отворен и неприложим за страната. Несъответствието на модела на действителността води до значително изоставане в икономическото развитие.

3. Методология

При характеристика на икономическото развитие, основано на нови знания се използват официални вторични данни. Прилагат се исторически и нормативен подходи. Оценките се извършват на база сравнение между съвременни и минали периоди, между показатели, позиционирани като показатели на търсенето и предлагането (данни по Ръководството от Осло EUROSTAT, 2018) или на база сравнение между страни за един период (вкл. Бенчмаркинг) по Иновационното табло и Европейския иновационен индекс (EIS, 2025), включващи и други бази данни, освен от наблюденията на иновациите.

Критерий за оценката е състояние в миналото, дефинирана цел, постигнато равнище на равновесие между търсене и предлагане, средно претеглено европейско равнище, структурен анализ (основно според размерността на предприятията).

Новостите, в резултат на развитието на основа на прилагане на нови знания се отчитат като икономическа дейност, свързана с промяна; внедрен нов или значително подобрен продукт; процес на превръщане на идея за решаване на нов проблем в успешно реализиран на пазара продукт; обновена вследствие на промяна организация; резултат от промяна на равнище фирма и на национално/световно стопанство.

Резултатите от иновационните дейности в предприятията имат различни форми и измерения, които (особено тези в натурална форма) е трудно да се обобщят на национално равнище. Като измерител на иновациите в предприятията и на национално равнище се възприема НИРД интензивността, която измерва разходите за научно-изследователска и развойна дейност като процент от годишната продукция и БВП. Т.е. оценяват се не самите иновационни резултати, а усилията за постигането им.

4. Резултати от изследването

С цел определяне на причините за непостигане на поставените цели, по - нататък се характеризират основни ресурси за икономическо развитие, основано на създаване, усвояване и използване на нови знания., тяхното използване и резултати от прилагане.

Човешки ресурси за създаване, усвояване на нови знания

Човешкият ресурс за обновяване е най-важния ресурс на развитието. В България той се концентрира в сектора на предприятията, предимно в големите – с 500 и повече заети. Персоналът, зает с НИРД в ЕПЗ (еквивалент на пълна заетост) в бизнес сектора (сектора на предприятията) са повече от половината от всички заети с НИРД в страната (52%). След него са сектор държавно управление, висше образование и нетърговските организации.

Най-голям е делът на заетите с НИРД в предприятията от преработващата промишленост, създаването и разпространението на информация и творчески продукти, далекосъобщения, професионални дейности и научни изследвания. Най-голям дял са

заетите с осъществяване на НИРД в предприятията в областта на техническите, естествените, медицинските и здравните науки.

Финансови ресурси за създаване, усвояване на нови знания

За годините на преход секторът на предприятията от 20% усвоява над 70% от разходите за НИРД. С други думи, най-голям дял инвестиции за НИРД – 73% от всички разходи за НИРД в страната, се осъществява в сектора на предприятията. Тези разходи са основно за изследвания в областта на техническите науки, следвани от медицинските и здравните науки. За наблюдавания период се откроява ясна тенденция разходите за изследвания в тези науки да се увеличават в общия обем разходи за НИРД.

Според видовете разходи за НИРД преобладават текущите разходи както общо, така и по сектори. По-всяка вероятност това означава, че осъществяваните иновации са с по-малка степен на новост, или че разходите за НИРД са основно за заплати. Дейностите, за които се правят най-големи инвестиции за НИРД в предприятията са професионалните, научните и техническите дейности, свързани с инвестиции в клинични опити от чуждестранни дружества, и производството. Въпреки това инвестициите в НИРД в производствения сектор в страната са на най-ниско равнище в ЕС.

Развитие, основано на знания чрез взаимодействие с други предприятия

Добрите практики в предприятията във водещите страни от ЕС се характеризират с интензивно иновационно сътрудничество. Предприятията са отворени за сътрудничество с партньори от чужбина. Изследователите са включени в добре изградени иновационни мрежи на международно ниво. Качеството на резултатите от научните изследвания е много високо. Компаниите в тези страни имат по-гъвкави иновационни възможности, тъй като участват в иновационни партньорства с други фирми и организации от публичния сектор. Изследователските системи там също са насочени към задоволяване на търсенето от компаниите, аргументирани от частното съфинансиране на публичните изследвания.

В България се забелязва друга тенденция. Делът на предприятията с иновационно сътрудничество от общия брой иновационно активни предприятия намалява от 20,9% на 15,9 %. Най-съществено намаление на иновационното сътрудничество се наблюдава в предприятията с над 250 наети.

Резултати от прилагането на нови знания в предприятията

Прилагането на нови знания в предприянията има много и разнообразни резултати. Тук ще се спрем на водещите, определени в Ръководството от Осло, 2018. Сред водещите показатели за оценка на развитието на предприятията е делът на оборота, реализиран от нови или усъвършенствани продукти, нови за предприятието, но не и за пазара, от общия оборот на предприятията в индустрията (с изключение на строителството). За наблюдавания период той, макар и слабо, бележи увеличение – от прот общия оборот на предприятията в индустрията се задържа на същото равнище през 2018 г.- от 2,7 на 2,8 %. Предприятията с над 250 наети са с най-голям дял на оборота, реализиран от нови или усъвършенствани продукти, нови за пазара – 3,8 % от общия оборот на предприятията в индустрията.

Делът на предприятията, реализирали нови или усъвършенствани продукти, нови за пазара, от общия брой на предприятията бележи тенденция на увеличение от 8,3 на 9,5% от 2016 г. до 2018 г. Най-голям е делът на предприятията с наети над 250 души сред

реализиралите нови за пазара нови или усъвършенствани продукти. Техният дял бележи тенденция на намаляване.

5. Изводи

Горното дава основание да се формулират следните изводи и препоръки:

На първо място, страната разполага с ограничени ресурси за развитие, основано на нови знания. Те се използват неефективно. България е последна по производителност на труда- с 9,7% от средно европейското равнище за 2025 г.

На второ място, намаляват стимулите за развитие чрез платежоспособно търсене на резултати от национално базирано производство на нови знания. Проучвания в Института за икономически изследвания при БАН показват, че това е свързано с бускорената глобализация и съответното по-качествено и по-ефективно глобално предлагане на нови знания, с глобализацията в търсенето на нови знания, с политиките на отворен достъп до резултати от фундаментални изследвания.

Наблюдава се непрекъсната тенденция на намаляване на търсенето и предлагането на нови национално базирани знания в страната. Това, от своя страна, означава и съответна загуба на устойчивост, жизнеспособност и конкурентоспособност на икономиката в условия на ускорена глобализация. Не се реализира очакваното увеличение на равнището на БВП, на производителност на труда, на ефективност на използване на ресурсите в страната.

Налице е потребност от формиране на нова национална и фирмена политика, подчинена на Лисабонската стратегическа цел. Налага се интегриране на ресурсите от нови знания във всички сектори като държавата поеме отговорността за формиране и координиране на политика за развитие на основа на знанието, адекватно на новия стадий на икономическо развитие. Новата политика следва да е насочена към на подпомагане на търсенето – вътрешно и външно, на национално базирани новости, от една страна, и за вплитането на националните изследователски и производствени мрежи с тези на другите европейски страни.

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Plamen D. Tchipev[1]

SPECIFICS OF COOPERATIVE BUSINESS MODELS IN RELATION TO EXISTING CORPORATE GOVERNANCE MECHANISMS

Abstract: *The active development of cooperatives requires the study of the practices specific to the cooperative business model. Their management bodies should manage the cooperative and at the same time act in accordance with the values and principles of the International Cooperative Alliance, actively engage and maintain close relations with their members and encourage the active participation of members in its management. The present study highlights the specifics of the cooperative business model, as a first step towards the evaluation of corporate governance (CG) in cooperatives.*

Key words: *cooperative business models; corporate governance of cooperatives; LVK "Gamza".*

JEL: *J54; P13; Q13.*

1. Introduction

Cooperatives are organizations with social and economic functions that have proven themselves many times over their long history of existence. Nowadays, new tasks and goals have been set before them. The UN has designated 2025 as the International Year of Cooperatives precisely in confirmation of the increased importance of cooperatives in the modern economy and the increased attention of research communities to their problems. Bulgaria is a great confirmation of these trends. On the one hand, we have gained vast practical experience in the development of the cooperative movement, which arose at the end of the 19th century. With nearly 135 years of history to date and over 3000 registered cooperatives, and in agriculture alone they are over 700, (Bachvarova, 2025). On the other hand, the discussion around the country's accession to the Eurozone and the related efforts of the state authorities to control inflationary processes sharply highlighted the need for wider penetration of cooperatives among individual producers in order to better represent them and protect their interests in relation to big business. The intertwining of social and economic functions in modern cooperatives requires a more detailed insight into the specifics of the business model they develop. These specifics are the subject of this article, as a first step in the study of corporate governance in them.

2. Importance of cooperatives in Bulgaria at the present stage

Cooperatives perform key economic and social functions that make them an important part of economic life. In conditions of sharply rising inflation in retail prices, producers of agricultural products - fresh and processed - sharply raised the issue of their inequality with the large retail chains, which dictate to them purchase prices and terms of sale. To the traditional complaints of dairy farmers have been added fruit and vegetable producers, and more recently bread producers. In this regard, the experience of developed market economies categorically points to the most widespread and effective mechanism for grouping small producers in the sale of their products through cooperation. In this way, they help small individual producers, artisans or consumers to achieve economies of scale and be competitive with large corporate retail chains. In addition, cooperation helps to incorporate some additional finishing processes into the value chain such as processing, packaging, marketing and transport, retail trade and the provision of some services to member producers.

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These types of cooperatives contribute to the sustainability of the structures themselves. By taking advantage of solidarity and cooperation, they help to overcome the temporary difficulties of the individual producer, stabilize and develop the region or specialization in a given production, thus supporting regional development, as their objectives go beyond the pure economic gain. They create and maintain jobs in local communities, contribute to better land use and often support the production of traditional crops and breeds, thus preserving local heritage and biodiversity. Specific to Bulgaria, with its rich tradition of communal culture centres, cooperatives often have a broader influence on the socio-cultural development in municipalities, and hence on demographic problems.

3. Peculiarities of the business model in cooperatives and the need for a good corporate governance

Cooperative business models differ fundamentally from traditional corporations due to their belonging to the social economy. Their specifics stem from the seven fundamental principles developed by the International Cooperative Alliance (ICA) and enshrined in national legislation, such as the Bulgarian Cooperatives Act (ICA, 2015). These principles form their value framework and management philosophy. First of all is the democratic management, which gives equal voting rights ("one member – one vote") to all members, regardless of the size of their shareholding, and encourages their active participation in the government. Another important element is the economic participation of members, where the focus is not on capital gains, but on the fair distribution of results, which are used to develop the cooperative, support members in proportion to their transactions, and for the prosperity of the community. Membership is voluntary and open to all who can use the services of the cooperative and are ready to take on the responsibilities of membership, without discrimination. Autonomy and independence are key, as cooperatives are self-governing organizations controlled by their members, which protects them from external pressure. The principle of education, training and information oblige cooperatives to invest in the development of their members, managers and employees in order to contribute effectively to the development of the organization. Finally, cooperation between cooperatives through local, national and international structures and care for the community underline the desire to build a sustainable and solidarity-based economic model.

Although they are part of the social economy, cooperatives function as business structures with their own specifics. They do not have the legal status of merchants, although they are registered in the Commercial Register, carry out commercial transactions and pay taxes. At the same time, the Bulgarian Cooperatives Act provides that there is no requirement for minimum capital for their establishment. but for a minimum number of founders (seven natural persons), being subject to control by the cooperative unions of which they are members, carried out on the model of the state financial inspection, which brings them closer to non-profit associations (Zakon, 1999).

Their management is entirely of an insider type and is tied to the membership, and is carried out by the General Assembly, the Management Board, the Controling Board and the Chairman. There is a clear distinction between the Management Board (MB), which has operational functions, and the Control Council (CC), whose role is to control the activities of the Management Board and protect the interests of the members, and the members of one cannot be members of the other board. The Chairman of the cooperative is also Chairman and representative of the management board.

The structure of the management bodies is also quite different from the corporate one: as a rule, they lack independent members with external expertise to offer an objective view. The number

of members and the duration of their mandates are determined too loosely by the General Assembly, which, combined with the often small number of members of the cooperative, leads to the permanent fixation of certain persons in managerial positions.

In financial terms, they form and distribute profits but are obliged by law to allocate funds to funds such as "Reserve" and "Investments", which is a mechanism to guarantee their long-term stability, like public companies. An important feature is also the role of cooperative unions, in which membership is voluntary, but strongly encouraged. Those unions have certain rights, including providing methodological assistance, exercising financial control and even requesting liquidation in case of legal violations, which limits the full autonomy of cooperatives and integrates them into a larger system of mutual assistance and supervision.

The issue of good corporate governance in cooperatives is essential, and its absence can lead to serious consequences, as the case of LVK "Gamza" shows. Founded in 1909 as the first and largest winery cooperative in Bulgaria, it was restored in 1991 with the assets of Vinprom Suhindol (BGN 18 million). At that time, it had 6000 members and managed 150 000 decares of vineyards. In the period 1995-1998, it went through numerous transformations, mergers, acquisitions and formation of cooperative enterprises. Even after the general collapse in the wine industry after 1997, in 1999 the cooperative produced 40-45m bottles per year and processes 50m kg of grapes. In its good years, it exported over 35m liters of wine, and plans were announced for planting new 25 000 decares of vineyards, (Arhiv Pari, 2003).

A sharp deterioration has been observed since 1998, when the cooperative developed a lasting dependence on credits. By the end of 2000, its liabilities amounted to EUR 51m BGN, including over 8m BGN to suppliers and farmers for purchased grapes, and an investigation has been initiated against its former chairman for damages in the amount of 9 million leva. A financial audit of the Central Cooperative Union (CCU) found that as of 2000 "there is essentially no cooperative in Suhindol", and the activities and property were transferred to capital structures, later united in a joint-stock holding with a capital of EUR 100m BGN distributed in 7 joint-stock co's. The cooperative held a blocking quota of 34% in the holding, and 50% of this quota was owned by the family of the chairman of the cooperative (Arhiv Pari, 2003). This was followed by the swap of debt to Central Cooperative Bank (CCB), the takeover of the management by Chimimport (TIM) and a long liquidation process and disputed bankruptcy, which left thousands of member cooperatives with impaired shares. This case illustrates the real risks of concentration of power, lack of effective control and abuses that can destroy even the largest and most significant cooperative structures.

4. Potential areas of revealing of CG issues

As we have seen, the dual nature between the economic and social function of the cooperative greatly modifies the business model on which it operates. This requires a rather careful assessment of the possible contradictions in the goals of its members, an assessment of potential conflicts of interest and the possibilities for overcoming them, i.e. the problems of its corporate governance.

From the point of view of corporate governance, there are several specific problem areas in cooperatives that are not identical to those in public companies. Due to the principle of "one member - one vote", there is no classic conflict between majority and minority owners. The main potential conflict is between the members (owners) and managers, but it has been heavily modified, since the rulers are also members of the cooperative and should share the common goals, (Maricic & al., 2018). However, specific tensions may occur. For example, in labour agricultural cooperatives, a conflict may arise between members who have contributed land or fixed assets, but are not involved in the activity, and those who are actively engaged as workers.

In larger structures, there may be a conflict between the governing and rank-and-file members over the planning horizons (short-term benefits versus long-term investments) and the balance between the social and economic objectives of the organization.

Another feature of the main field of issues related to the cooperative - the relations between the management bodies and the owners is the blurring of the boundaries between managing and ordinary members of the cooperative. The vast number of cooperatives with limited number of members and the lack of a strict regulation for the number and duration of management mandates are a prerequisite for the creation of vested interests among the managing members, which is actually a standard problem of corporate governance in public companies.

The fact that the chairman of the cooperative is also the chairman of the management board creates a concentration of functions and potential risk. The absence of a mandate regulation may lead to the validation of the same persons for long periods. There is also a lack of clear regulation on remuneration and objective selection criteria. Other key problems that exist are the clear delineation of powers between the governing bodies, the lack of objective criteria for the selection of the members of these bodies and adequate policies for their remuneration.

In cooperatives, equal treatment of members is enshrined as a fundamental principle and, if strictly enforced, should provide better protection to members than in corporations. At the same time, the existing legal framework does not offer specific mechanisms to prevent abuse. However, the General Assembly of Cooperatives can expel a member or remove him from office in cases of serious violations.

A serious problem is the transparency and anouncement of information essential to the activity. There are practically no clear and mandatory regulations on the channels, frequency and type of information disseminated to members. On the other hand, cooperatives are subject to financial audits in accordance with the Accountancy Act[2], which, together with the possibility provided in the Cooperatives Act for each member to request a financial audit, is a good guarantee for transparency of the activity. Of course, the audit is after the fact, and the problem of access to information is much more complicated. Members do not always have timely and accessible data to make informed decisions on key issues such as mergers, liquidations or large investments.

Last but not least is the issue of conflict of interest. Although the 2007 Amendments of Cooperatives Act contain legal rules that limit the ability of the members of the Management Board and the Chairman to carry out competitive activities, these rules can be circumvented with the permission of the General Meeting. The regulation of transactions with related parties also remains too fragmented and does not provide sufficient guarantees against abuses in which decisions benefit the managers or their relatives at the expense of the cooperative as a whole.

5. Discussion and conclusion

The specifics of the business model in cooperatives require a specific approach to assessing corporate governance, as standard tools are inapplicable or heavily modified. The two main corporate control mechanisms used in the market economy, such as the stock market and market capitalization, do not work. This is because shares in the cooperatives are personified and are not subject to free trading. Thus, the cooperative cannot obtain a market value, which in turn serves as an objective measure of success.

The second principled model of corporate control through banks is possible, but also heavily modified. Indeed, banks have good internal information on the state and management of the

[2] The conditions in the Law are: large, middle or small enterprises with a book value of assets of BGN 4 million, net sales revenues of BGN 8 million or an average number of employees of 50 people.

cooperative in terms of securing the loans granted. However, their motives to interfere effectively in the affairs of the cooperative are very limited. There are several reasons for this – on the one hand, they cannot participate in any of the governing bodies legally. Thus, they do not control any part of the votes in decision-making, they cannot influence the election or change of the respective managers. On the other hand, the amount of indebtedness is usually not large, as well as the volume of the cooperatives' activities itself, which directs their control to the particular loan rather than to the overall efficiency of the cooperative (Maricic et al., 2018).

On the other hand, a very strong role in the business model of cooperatives is acquired by other interested parties, the so-called stakeholders (the local community, the municipality, regional unions). Due to the social nature of cooperatives, their role is very strengthened and their trust is a key intangible asset. The specific role of the cooperative principles here has the full opportunity to become the main mechanism for corporate governance, if their implementation is enshrined in law. The requirements to allocate funds for the development of the members of the cooperative, for the development of the municipality, for taking into account the collective interest and solidarity in its activities, etc. can potentially compensate for the lack of other, more stock market mechanisms. Just as an illustration, we will mention that the formed common indivisible fund from a part of the profits, which actually exists in many cases, can be placed under the control of a wider circle of holders of other interests related to the cooperative.

It is potentially possible to give the control board more features that bring it closer to the characteristics of the supervisory boards, with the possibility of developing development strategies, proposals for the election of members for the management boards, etc. It may also be useful for him to admit independent representatives as members, who are representatives of the community, of cooperative unions, municipalities or mayoralties on the territory of which the cooperative's activity is developed.

Of course, all changes in corporate governance must be very carefully refined and consistent with the specifics of the cooperative business model.

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КОРПОРАТИВНА УСТОЙЧИВОСТ СЪС СОЦИАЛНИ ИЗМЕРЕНИЯ

Резюме: *Корпоративната устойчивост през последните години е в центъра на дискусия както в академичните институции, така и в изследователски центрове и неправителствени организации. Социалните аспекти на корпоративната устойчивост са научна област, все още недостатъчно изследвана в контекста на европейската социална таксономия. Целта на статията е да систематизира актуална икономическа литература и да направи оценка на приноса на българските нефинансови предприятия за постигане на устойчивост и адаптивност в контекста на Целите на устойчиво развитие. Обобщени са статистически данни, предоставени от Национален статистически институт, относно постигнатите резултати на българските предприятия.*

Ключови думи*: корпоративна устойчивост; социална устойчивост; отговорно поведение; предприятия; България*
JEL*: J21, J 31,M 14, M21, M51*

CORPORATE SUSTAINABILITY WITH SOCIAL DIMENSION

Abstract: *Corporate sustainability in recent years has been at the center of discussion both in academia and in research centers and non-governmental organization. Social aspects of corporate sustainability are an area still insufficiently explored in the context of European social taxonomy. The goal of article is to systematize current economic literature and to assess the contribution of Bulgarian non- financial enterprises to achieving sustainability and adaptability in the context of Sustainable Development Goals. Statistical data provided by the National Statistical Institute on the results achieved by Bulgarian enterprises are summarized.*

Keywords*: corporate sustainability; social sustainability; responsible conduct; Bulgaria*
JEL: *J21, J31, M 14, M21, M51*

1. Увод

Корпоративната устойчивост е фокус в изследователските програми на най-авторитетните международни институции като ООН, ОИСР, Глобален договор и Европейската комисия. Основната причина за това е голямото значение на стабилността и адаптивността на бизнеса за укрепване на националната и европейска устойчивост в условията на глобални рискове и уязвимости.

Не на второстепенно място по значимост е и социалната устойчивост на бизнеса, която също е приоритетна област на изучаване от академичните изследователи.

Корпоративната устойчивост и отговорност е недостатъчно изследвано академично направление с голяма теоретико-методологична и приложна значимост. Основната научна цел на настоящата публикация е оценка на прогреса на предприятията при постигането на устойчивост и възможностите за тяхната динамична адаптивност при съпоставяне на рисковете, новите възможности и гъвкави алтернативни решения с фокус Целите на устойчиво развитие. Заложената научна идея отчита интересите на голяма група заинтересовани страни- инвеститори, акционери, заети, синдикати. Анализът на

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корпоративната устойчивост със социални измерения е актуален в контекста на генериране на икономически растеж и заетост.

На аналогична проблематика са посветени публикации на Европейска комисия, Европейски парламент, Организация за икономическо сътрудничество и развитие, очертаващи контурите на европейското бъдеще.

2. Състояние на проблема

Теоретико-методологичните аспекти към изследвания проблем изискват научна аргументация на корпоративната устойчивост със социални измерения с цел изграждане на концептуална рамка, утвърдена в икономическата литература. Авторът използва термина „Корпоративна устойчивост и отговорност", предложен и утвърден от Европейската комисия в направление „Вътрешен пазар, промишленост, предприемачество и малки и средни предприятия", сектор „Устойчивост".

В икономическата литература се използват и симетрични по значимост термини като устойчив бизнес, отговорен бизнес, отговорно поведение и др.

Европейският социален фонд след задълбочена дискусия със заинтересованите институти утвърди Европейска устойчива рамка за корпоративна отговорност и основните инструменти за измерване. Нейните ключови послания са насочени към начините за трансформиране на предприятията в устойчиви организации, определяне на основните критерии за идентифициране на предприятията с отговорно поведение и необходимостта от увеличаване на корпоративните инвестиции в устойчивост. (van Marrewijk, Hardjono,2003)

В утвърдената европейска дефиниция за корпоративна устойчивост и отговорност се очертават общите цели на „устойчивостта" и „отговорността" за компаниите при техните бизнес-операции и взаимоотношения със заинтересованите страни. Открояват се обаче и известни различия, поради обстоятелството, че ядро на „корпоративната отговорност" са диалога със заинтересованите страни, оповестяването на добри корпоративни практики, дарителство и адекватно отношение към местната общност. (Matten , Moon, 2020)

В този смисъл „корпоративната отговорност" е гъвкав инструмент за легитимиране на компаниите и укрепване на тяхната репутация. Получаването на социален лиценз посредством отговорно фирмено поведение се възприема като символ на споделеност и съучастие на бизнеса към проблемите на обществото и околната среда. (Петрова, 2021)

Корпоративната устойчивост си поставя значително по-високи цели, насочени към повишаване на акционерната стойност на компаниите, прилагане на устойчиво корпоративно управление, екологичен мениджмънт, европейски стандарти за устойчивост.

Корпоративната устойчивост и отговорност не са антагонистично позиционирани, а напротив функционират еднопосочно, преследват еднакви цели, прилагат симетричен инструментариум за оценка.

Концепцията за „корпоративната устойчивост и отговорност" е от нова генерация с насоченост към успешна корпоративна трансформация в насока към укрепване на стабилността и адаптивността на предприятията. Целта е надскачане на законовите изисквания и нормативни актове и активно въздействие на предприятията върху социалната и околна среда не като задължение, а като морален дълг.

Корпоративната устойчивост е качествено нова степен на отговорно поведение на компаниите. Тя е актуализиран формат, включващ разширени изисквания относно публичната отчетност и финансовото и нефинансово разкриване на компаниите, както и съобразяване с изискванията на европейските стандарти за устойчивост.

В немската академична литература дискусията в областта на корпоративната устойчивост е изключително активна. Според Fischer основните причини са натискът върху кампаниите да дадат своя принос към устойчивото развитие чрез интегриране на подходящи корпоративни стратегии, гарантиране на повишени дивиденти за акционерите, загриженост от въздействието на фирмените дейности върху климатичните промени, натиска от страна на финансовия сектор, претенциите на външните стейхолдери като доставчици и клиенти за устойчиви контракти и вериги на доставки. (Fischer et al., 2023)

В резултат от изложеното представителите на немската школа дефинират устойчивия корпоративен мениджмънт като ядро на корпоративната устойчивост и предлагат логото „ Мислене сега от бъдещето“. (Bungard ,Schmidtpeter, 2022)

Представителите на испанската академична школа използват термина „корпоративна социална отговорност и устойчивост“ с фокус съблюдаването на човешките права. (Meseguer at al.,2021) В резултат на библиометричен анализ те достигат до извода, че социалното измерение е основен стълб на устойчивостта, свързан с изпълнението на Целите на устойчиво развитие.

Научен принос в публикацията на Valance е очертаването на три последователни етапа на социална устойчивост на компаниите- стартова, нововъзникваща устойчивост, трансформираща се и напреднала устойчивост. (Valance at al., 2011) Първият етап е стартова степен на социална устойчивост, докато третият етап включва комплексни компоненти на социалната устойчивост с насоки към разкриване на корпоративна информация, преход към въглеродно неутрални компании, съблюдаване на етични норми.

Гарант за корпоративната устойчивост и отговорност е ефективното корпоративно управление и комплексното прилагане на неговите основни принципи. В Раздел V „Разкриване на информация и прозрачност“ на Принципите на корпоративно управление, прокламирани от G20/ OECD се отделя важно място на социалната устойчивост с цел управлението на външни рискове, като например здравни кризи, прекъсване веригите на доставки и геополитическо напрежение. Корпоративното управление е инструмент за преодоляване на кризите ex ante с цел дружествата да съумеят да съхранят своята жизнеспособност при кризисни ситуации, както и ex post да реагират своевременно при настъпили негативни събития.

В контекста на Принципите на корпоративно управление „отговорното бизнес поведение има за цел да подпомогне дружествата да идентифицират и реагират на екологични и социални рискове, произтичащи от техните операции и вериги на доставки“ (G20/OECD,2023).

В Раздел VI Оповестяване на информация, свързана с устойчивостта се подчертава равностойното значение на финансовата и нефинансовата информация за привличането на нови инвеститори, акумулирането на нов финансов ресурс и генерирането на нови работни места.

В резултат от изложеното може да се обобщи, че устойчивото корпоративно управление е инструмент за постигане на корпоративна устойчивост и отговорност.

3. Методология

Приложената методология е резултат от комплексен преглед на публикации и изследвания. Построена е системна рамка за отчитане на корпоративната устойчивост и отговорност, която се основава на Social Scoreboard (Galdoczi at al.), Социалната таксономия на Eurosif (Eurosif, 2021), индикаторите за социална устойчивост на Европейски синдикален институт (McGuinn at al., 2020), Ръководството за показателите на отчетност на предприятията на приноса им към достигане на ЦУР. (UN, UNCTAD,2021) Приложената метрика е в пълно съответствие с изискванията на европейския социален Scoreboard (Eurostat).

В Глобалния доклад за корпоративна устойчивост за 2024 г., представен от ОИСР, се посочва, че 43 970 листвани на борсата компании разкриват информация, свързана с устойчивостта през 2023 г., което възлиза на 86% от глобалната пазарна капитализация на международните финансови пазари. 98% от европейските дружества прилагат устойчиви стандарти за отчетност в корпоративната си практика. (OECD, 2024)

Приложената методология предполага систематизиране, обработка и анализ на статистическа информация, получена от НСИ и Евростат, с обхват нефинансовите предприятия в България по сектори и размерна структура. Групите предприятия в зависимост от големината им са систематизирани - микро предприятия до 9 заети (М1), малки предприятия със заети 10-49 (М2), средни предприятия със заети 50-249 (СП) и големи предприятия с над 250 заети (ГП).

Приоритетно са обхванати индустриалните сектори като сектор В-Добивна промишленост, сектор С- Преработваща промишленост, сектор Д – Производство и разпределение на електрическа и топлинна енергия и на газообразни горива, сектор Е- Доставяне на води, канализационни услуги, управление на отпадъци и възстановяване.

Приложената методология позволява оценка на социалната устойчивост на българските нефинансови предприятия.

4. Резултати от изследването

Актуалните данни на Бизнес статистиката дават възможност за представяне на българските и европейски предприятия съобразно тяхната размерна структура и структурата на заетите в тях лица в процент към всички предприятия.

Таблица 1. Структура на нефинансовите предприятия и заетите лица в нефинансовите предприятия по големина в %

	М1	М2	СП	ГП
Размерна структура на предприятията в България – 2023 г.	93,4	5,4	1,0	0,2
Размерна структура на предприятията в ЕС- 2021 г.	94,1	4,9	0,8	0,2
Предприятия по брой заети в България- 2023 г.	32,9	21,8	19,9	25,4
Предприятия по брой заети в ЕС- 2021 г.	30,1	18,9	15,4	35,6

Източник: Изчисления на автора по данни на НСИ и Евростат

Размерната структура на предприятията в България показва, че относителният дял на М1 и М2 е най-висок- съответно 93,4% и 5,4%. Най-малък е относителният дял на големите предприятия- 0,2%. Относителният дял на средните предприятия е 1%. Това означава, че М1 и М2 представляват 98,8% от всички български предприятия.

Данните от европейската бизнес статистика показват, че размерната структура на българските предприятия е сходна с европейската. В нея също преобладават М1 и М2 с

относителни дялове 94,1% и 4,9%, което представлява 99% от европейските предприятия. Европейските големи предприятия със заетост над 250 д. също имат минимален относителен дял 0,2 %, а делът на средните предприятия е 0,8%.

Въпреки че относителният дял на големите предприятия е минимален, в тях са ангажирани 25,4% от заетите в България, респективно 35,6% от заетите в европейските предприятия.

В българските микро- и малки предприятия упражняват своя труд 54,7%, а в европейските- 49% от заетите.

Демографията на българските предприятия при база регистрираните през 2018 г. фирми разкрива следните специфики.

Таблица 2. Оцелели предприятия при база 2018 г. в %

	Оцелели предприятия, спрямо регистрираните през 2018 г.
2018 г.	100 %
2019	86,4%
2020	69,2 %
2021	58,1 %
2022	51,9 %

Източник: Изчисления на автора по данни на НСИ и Евростат

Редуцираният относителен дял на оцелелите предприятия през 2021 - 2022 години се дължи на Ковид кризата и нейното негативно въздействие върху бизнес сектора.

Ключовият социален индикатор Средногодишна заплата на наетите лица по икономически дейности показва следния тренд за периода 2020-2023 г.

Таблица 3. Средногодишна заплата на наетите лица общо и по икономически дейности в лв.

	2020	2023
общо	16687	24485
Сектор В	23086	33602
Сектор С	14439	20870
Сектор Д	26134	38358
Сектор Е	13363	18123

Източник: НСИ

Статистическите данни показват, че средногодишната заплата на наетите лица за всички икономически дейности е нараснала с около 46% през 2023 г. в сравнение с 2020 г. За същия четиригодишен период от време средногодишната заплата в сектор В е нараснала с не по-малко от 45%, в сектор С- с 44%, а в сектор Д- с 47%, а в сектор Е- с 36%.

За целия период от време най-висока е средногодишната заплата в сектор Д- 38358 лв. през 2023 г., а най-ниска 18123 лв. е в сектор Е- 18123 лв. На второ и трето място респективно са секторите В и С със средногодишна работна заплата за 2023 г. – 33602 лв. и 20870 лв.

Социален индикатор с голямо значение за корпоративната социална устойчивост са разходите на работодателите за едно нает лица. За периода 2020-2023 тяхната динамика е положителна.

Таблица 4 Разходи на работодател за едно наето лице по сектори в лв.

	2020	2023
Общо	20380	29738
Сектор В	32131	45661
Сектор С	17593	25737
Сектор Д	37658	54454
Сектор Е	16798	23228

Източник: НСИ

Общите разходи на работодателите за 1 наето лице са нараснали с 46 % за периода 2020-2023 г. С най-висок процент 46% са увеличили разходите за едно наето лице работодателите в сектор С, но е важно да се отбележи ниската стартова база, характерна за сектора. С 45 % са повишени разходите на работодателите за един работник в сектор Д, а с 42%- в сектор В. В сектор Е се отбелязва растеж с 38,2% през 2023 в сравнение с 2020 г.

Структурата за труд на работодателите за 2023 т. показва, че във всички индустриални сектори преобладават разходите за работна заплата (82,34%), следвани от социалните и здравни осигуровки за сметка на работодателите (13,95%), допълнителните социални разходи и надбавки (2,13%), обезщетенията (1,57%) и данък върху социалните разходи (0,01%). (НСИ)

Въпреки ограничения обхват на наблюдаваните индикатори, представени в публикацията, ясно проличава положителния тренд на българските предприятия в насока към утвърждаване на тяхната корпоративна устойчивост със социални измерения.

5. Изводи:

1. Систематизирана е икономическа литература и е дефиниран термина „корпоративна устойчивост и отговорност".
2. Корпоративната устойчивост със социални измерения е идентифицирана като социален код на стабилността на българските предприятия с европейска перспектива
3. Въз основа на наблюдението на социални индикатори динамиката на корпоративната социална устойчивост на българските индустриални предприятия се оценява като позитивна.

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Katerina Vojcheska - Nikodinoska[1]

THE IMPACT OF ESG INTEGRATION ON FIRMS' FINANCIAL PERFORMANCE AND CORPORATE VALUE

***Abstract**: This research examines how environmental, social and governance integration affects firms' financial performance and corporate value in Bulgarian enterprises. The research examines mechanisms through which ESG affects profitability, cost of capital and valuation. The analysis incorporates evidence from the literature highlighting the positive financial outcomes of sustainability-oriented strategies. Particular attention is given to the European Union taxonomy for sustainable activities, the Corporate Sustainability Reporting Directive, and the International Sustainability Standards Board framework. The contribution of this paper lies in presenting empirical evidence on the relationship between sustainability integration and firm-level profitability, market valuation and capital costs in emerging European economies, using Bulgaria as a representative case study. The findings confirm that firms with higher ESG integration demonstrate stronger profitability, valuation, and lower capital costs.*

***Keywords:** ESG integration, financial sustainability, corporate value, sustainable investing, regulatory framework*

***JEL Classification:** G32; M14; Q56; O16*

1. Introduction

The integration of Environmental, Social, and Governance (ESG) principles into corporate strategy has evolved from a peripheral concern to central imperative in contemporary finance. European Union regulations - particularly the EU Taxonomy Regulation (2020/852), Corporate Sustainability Reporting Directive (CSRD), and Sustainable Finance Disclosure Regulation (SFDR) - have fundamentally transformed institutional landscapes, mandating comprehensive ESG disclosure and establishing science-based criteria for sustainable economic activities. Despite substantial research in developed markets, significant gaps remain in understanding ESG dynamics in emerging European economies. Bulgaria provides compelling context as an EU member state subject to comprehensive sustainability regulation yet characterized by developing institutional infrastructure. This study addresses three fundamental questions. First, how does ESG integration affect accounting-based performance (ROA, ROE) and market-based valuation (Tobin's Q)? Second, does ESG performance influence firms' cost of capital through risk reduction and signalling mechanisms? Third, through what transmission channels—stakeholder relationships, resource-based capabilities, market signalling, or risk management—does ESG affect financial outcomes?

2. Literature Review and Theoretical Framework

ESG Integration and Financial Performance

Meta-analytic evidence reveals predominantly positive associations between ESG factors and corporate financial performance. Friede et al. (2015) aggregate approximately 2,200 studies published 1970–2014. Recent meta-analyses confirm these findings.Research on cost of capital effects proves particularly relevant. El Ghoul et al. (2011) found firms with better CSR scores enjoy significantly lower cost of equity capital. Ng and Rezaee (2015) demonstrated that comprehensive sustainability performance reduces both cost of equity and debt, providing empirical foundation for ESG-WACC relationships. Khan et al. (2016) distinguished between

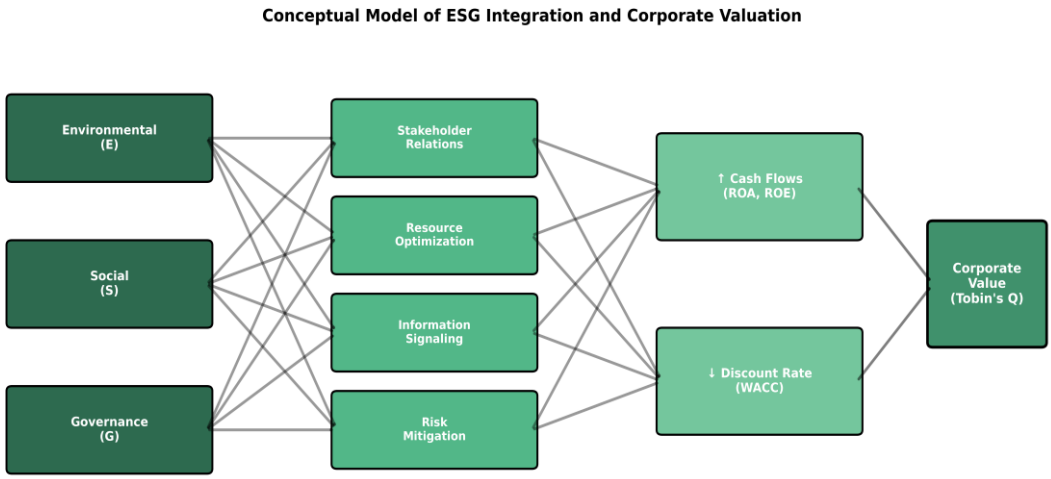
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material and immaterial ESG issues, demonstrating that firms performing well on material sustainability issues significantly outperform peers. Tutar et al. (2025) demonstrated environmental ESG factors show stable positive effects on ROA, ROE, and Tobin's Q.

Theoretical Foundations and Conceptual Model

Stakeholder theory (Freeman, 1984) posits that firms must balance multiple constituencies' interests rather than exclusively maximising shareholder value. Firms integrating ESG considerations develop stronger relationships with key stakeholders, generating benefits including employee productivity, customer loyalty, supplier stability, and reduced regulatory scrutiny. The resource-based view (Barney, 1991) argues that sustainable competitive advantage derives from valuable, rare, and inimitable resources. In ESG contexts, sustainability-related capabilities represent firm-specific assets competitors cannot easily replicate. Signalling theory (Spence, 1973) suggests ESG ratings and disclosures function as signals because they are costly to produce and maintain, making them credible indicators of firm quality. Firms investing in ESG performance signal superior management quality and strategic foresight to capital providers, reducing information asymmetry and lowering cost of capital. Risk management perspectives posit that effective sustainability practices reduce various forms of corporate risk. Firms with strong ESG performance develop capabilities for identifying and managing regulatory, environmental, supply chain, and reputational risks more effectively. Synthesising these theoretical perspectives, we develop a conceptual model depicted in Figure 1. The model identifies four primary transmission channels through which ESG integration affects financial performance: the stakeholder channel operating through enhanced relationships; the resource-based capability channel through sustainability competencies; the signalling channel by reducing information asymmetry; and the risk management channel through superior risk mitigation.

Figure 1. Conceptual Model of ESG Integration and Corporate Valuation



Source: Author's elaboration based on CFA Institute (2021); Silvola & Landau (2021)

Based on this conceptual model, we formulate three primary hypotheses. H1 posits that ESG integration demonstrates a positive association with accounting-based financial performance (ROA and ROE). H2 proposes that ESG integration exhibits a positive relationship with

market-based valuation (Tobin's Q). H3 hypothesizes that higher ESG performance is associated with lower cost of capital(ESG-adjusted WACC).

3. Data and Methodology

Sample, Data Sources and ESG Index Construction

The empirical analysis employs aggregated financial and sustainability indicators for Bulgarian non-financial enterprises covering the period 2019–2023. The dataset encompasses approximately 280 observations across major economic sectors, representing the full population of Bulgarian enterprises reporting annual financial statements.

A composite ESG index is constructed to measure firms' sustainability performance across environmental, social, and governance dimensions following methodological frameworks established in academic literature (Friede et al., 2015). The Environmental dimension incorporates indicators including carbon emissions, energy efficiency, renewable energy, water consumption, waste management, and environmental systems. The Social dimension encompasses employee satisfaction and turnover, workplace safety records, training and development, diversity and inclusion, community engagement, and supply chain labor. The Governance dimension includes board independence and diversity, executive compensation, shareholder rights, audit quality, transparency and disclosure, and anti-corruption. Individual indicators are normalized to 0-100 scales using min-max normalization within each year. The composite ESG index combines the three subdimensions with equal weights (33.3% each) assigned to avoid imposing arbitrary hierarchies across ESG pillars.

Dependent Variables and Empirical Model Specification

The analysis employs three primary dependent variables capturing different dimensions of financial performance. Return on Assets (ROA) measures accounting profitability as net income divided by total assets. Return on Equity (ROE) measures profitability from shareholders' perspective as net income divided by total equity. Tobin's Q approximates market valuation relative to asset replacement cost, calculated as market value of equity plus book value of debt divided by total assets. The study employs an ESG-adjusted WACC framework that explicitly incorporates sustainability considerations into cost of capital estimation. Control variables include firm size, leverage, growth opportunities, profitability, liquidity, and year fixed effects. The baseline empirical model employs panel regression with firm and year fixed effects:

$$FP_it = \alpha + \beta_1 ESG_it + \beta_2 Controls_it + \mu_i + \lambda_t + \varepsilon_it \quad (1)$$

where:
FP_{it}– financial performance of firm *i* in year *t* (measured by ROA, ROE, or Tobin's Q);
ESG_{it}– composite ESG index for firm *i* in year *t*;
$Controls_{it}$– vector of firm-level control variables including size, leverage, growth, profitability, and liquidity;
μ_i– firm fixed effects capturing time-invariant heterogeneity;
λ_t– year fixed effects capturing macroeconomic and regulatory shocks;
ε_{it}– idiosyncratic error term.

To reduce potential endogeneity, ESG variables are lagged by one period, and robustness tests employ system-GMM and instrumental-variable estimations using industry-level ESG intensity as an instrument. All models are estimated using ordinary least squares (OLS) with robust standard errors clustered at the firm level.

Transmission Channels Analysis

To examine mechanisms through which ESG affects financial performance, we conduct transmission channel analysis examining mediating pathways identified in the theoretical framework. Table 1 systematizes theoretical mechanisms linking ESG integration to financial performance, identifying specific transmission channels and their expected financial impacts.

Table 1. Theoretical and Financial Transmission Channels Linking ESG to Corporate Value

Theoretical Framework	Transmission Channel	Expected Financial Impact
Stakeholder Theory	Enhanced employee productivity, customer loyalty, supplier stability	↑ ROA, ↑ ROE through operational efficiency
Resource-Based View	Development of valuable, rare, inimitable ESG capabilities	↑ Tobin's Q through competitive advantage
Signalling Theory	Reduced information asymmetry, credible quality signal	↓ WACC through lower perceived risk
Risk Management	Superior identification and mitigation of ESG risks	↓ Volatility, ↓ WACC, enhanced resilience
Sustainable Finance	Access to sustainable finance instruments, EU Taxonomy alignment	↓ WACC, ↑ Capital availability

Source: Author's systematization based on literature review

4. Results and Discussion

Descriptive Statistics and ESG Index Dynamics

Descriptive statistics for the sample reveal substantial variation in both ESG performance and financial metrics. The composite ESG index ranges from 18.4 to 87.3 (mean = 54.2, SD = 16.8), indicating considerable heterogeneity in sustainability practices across Bulgarian enterprises. Financial performance metrics exhibit expected patterns, with ROA averaging 4.8% (SD = 6.2%) and ROE averaging 8.3% (SD = 11.4%). Tobin's Q averages 1.34 (SD = 0.58), suggesting that on average, market valuations exceed asset replacement costs. The ESG-adjusted WACC averages 8.7% (SD = 2.3%), with a range from 4.2% to 15.8%.

Table 2. Descriptive Statistics of Key Variables (2019-2023)

Variable	Mean	Std. Dev.	Min	Max	N
ESG Score (0-100)	54.2	16.8	18.4	87.3	280
ROA (%)	4.8	6.2	-12.3	28.4	280
ROE (%)	8.3	11.4	-18.7	42.1	280
Tobin's Q	1.34	0.58	0.42	3.21	280
WACC (%)	8.7	2.3	4.2	15.8	280
Size (Log Assets)	15.8	2.1	11.2	19.4	280
Leverage (D/A)	0.48	0.22	0.08	0.89	280

Note: N = 280 sectoral observations. Variables calculated from aggregate sectoral data.

Temporal trends reveal upward trajectory in ESG integration over 2019-2023, consistent with EU sustainability disclosure requirements. The trend strengthens after 2021, coinciding with implementation of major regulatory frameworks including the EU Taxonomy and SFDR. Capital-intensive industries demonstrate stronger integration patterns.

ESG Effects on Accounting-Based Performance

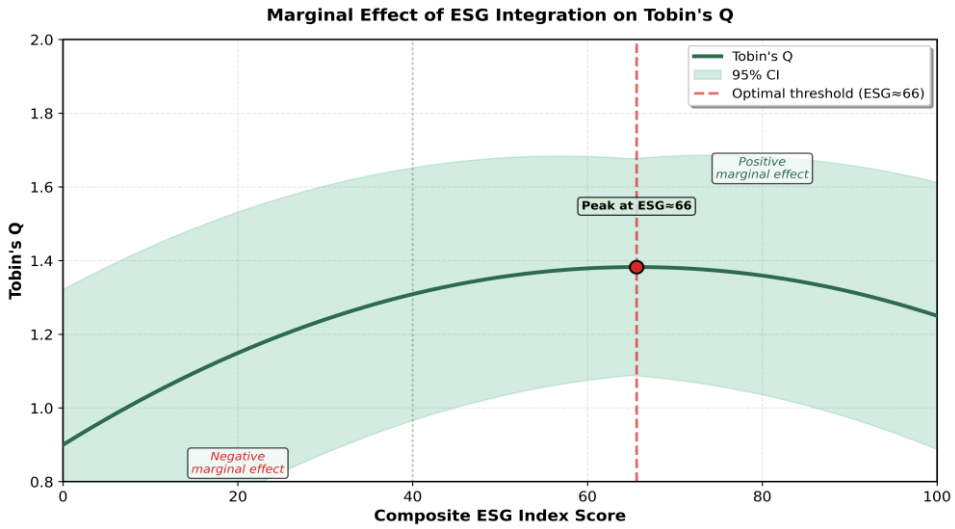
Panel regression results provide strong support for H1. The composite ESG index shows statistically significant positive associations with both ROA and ROE. For ROA, the baseline regression yields $\beta = 0.142$ ($t = 3.87$, $p < 0.001$). A 10-point ESG increase associates with 1.42 percentage higher ROA. Given the sample mean ROA of 4.8%, this represents an economically meaningful 30% relative improvement. The relationship proves robust across multiple specifications, including models with lagged ESG scores ($\beta = 0.136$, $p < 0.01$) and instrumental variable approaches ($\beta = 0.148$, $p < 0.05$).

For ROE, the ESG coefficient is 0.287 ($t = 4.21$, $p < 0.001$), indicating stronger effects on equity returns than asset returns. A 10-point ESG improvement is associated with a 2.87 percentage point ROE increase—approximately 35% relative to the sample mean of 8.3%. The larger magnitude for ROE compared to ROA suggests that ESG benefits accrue disproportionately to equity holders.

ESG Effects on Market Valuation and Cost of Capital

Analysis of ESG effects on Tobin's Q provides strong support for H2. The baseline regression yields $\beta = 0.0189$ ($t = 4.56$, $p < 0.001$), indicating that a 10-point ESG improvement associates with 0.189 increase in Tobin's Q. The relationship proves robust across multiple specifications, with lagged ESG scores yielding $\beta = 0.0165$ ($p < 0.01$). Examining individual ESG dimensions reveals that governance performance shows the strongest association with Tobin's Q ($\beta = 0.0221$, $p < 0.001$), followed by environmental ($\beta = 0.0178$, $p < 0.01$) and social ($\beta = 0.0142$, $p < 0.05$) dimensions. The prominence of governance aligns with signaling theory - strong governance structures credibly signal management quality and strategic foresight to external investors, reducing information asymmetry and enhancing market valuations. Figure 3 illustrates the marginal effect of ESG integration on Tobin's Q, revealing that valuation premiums strengthen as ESG scores increase.

Figure 3. Marginal Effect of ESG Integration on Tobin's Q



Source: Author's calculations from fixed-effects panel regression

Analysis of ESG-adjusted WACC provides compelling support for H3. The baseline regression yields an ESG coefficient of -0.037 ($t = -3.24$, $p < 0.01$), indicating that a 10-point ESG improvement corresponds to a 37-basis point reduction in WACC. For a firm with mean WACC of 8.7%, this represents a 4.3% relative cost of capital reduction.

Decomposing WACC into its equity and debt components reveals that ESG affects both. The cost of equity component shows an ESG coefficient of -0.044 ($p < 0.01$), whilst cost of debt demonstrates a coefficient of -0.028 ($p < 0.05$). Examining individual ESG dimensions reveals that governance performance demonstrates the strongest negative association with cost of equity ($\beta = -0.052$, $p < 0.001$), whilst environmental performance shows the strongest effect on cost of debt ($\beta = -0.038$, $p < 0.01$), potentially reflecting lenders' sensitivity to environmental liabilities and regulatory risks.

5. Conclusions and Policy Implications

We provide evidence on ESG-performance relationships in Bulgarian enterprises (2019–2023), addressing an important gap in sustainable finance literature regarding emerging European markets. Our findings strongly support all three hypotheses, demonstrating that ESG integration exhibits statistically significant and economically meaningful positive associations with accounting-based performance (ROA, ROE), market-based valuation (Tobin's Q), and lower cost of capital (WACC). A 10-point improvement in the composite ESG index corresponds to approximately 1.4 percentage point ROA increase, 2.9 percentage point ROE increase, 0.19-point Tobin's Q increase, and 37-basis point WACC reduction.

Mediation analysis of transmission channels (Table 1) reveals that ESG affects financial performance through multiple complementary pathways. The stakeholder channel mediates approximately 38% of ESG effects on ROA, supporting stakeholder theory. The resource-based capability channel mediates 29% of effects on Tobin's Q, suggesting markets value ESG capabilities as competitive advantage. The signaling channel mediates 41% of cost of capital effects, consistent with information asymmetry reduction. The risk management channel mediates 34% of effects on both Tobin's Q and WACC, supporting risk mitigation theory.

For corporate managers, ESG represents strategic investment rather than mere compliance. Well-implemented sustainability programs generate tangible financial returns justifying required investments. For investors, ESG analysis provides material information relevant for security valuation and portfolio construction. For policymakers, the findings provide evidence that sustainability regulations can align with financial performance. The size heterogeneity in our results suggests that smaller enterprises may require targeted support and potentially differentiated regulatory requirements. Overall, the study extends ESG–finance evidence to an emerging EU market, demonstrating how regulatory convergence under CSRD and ESRS strengthens the alignment between sustainability and financial performance.

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MACROECONOMIC AND SOCIAL DIMENSIONS

МАКРОИКОНОМИЧЕСКИ И СОЦИАЛНИ ИЗМЕРЕНИЯ

Stela Raleva[1]

STRUCTURAL CHANGES AND LABOUR PRODUCTIVITY DYNAMICS IN BULGARIA

Abstract: *The paper studies the structural changes in the Bulgarian economy and their impact on labour productivity growth. It analyses the dynamics of sectoral structures of gross value added and employment and reveals their peculiarities related to differences in labour productivity. It characterises productivity growth rates overall and by economic sector and provides a comment on changes in relative productivity levels. By applying the shift-share methodology and decomposing productivity growth, an assessment is made of its dependence on sectoral shifts and on intra-sectoral changes related to the fundamental factors of growth. Empirical results show that the economy has experienced sustained structural changes with an increasing share of the tertiary sector, which is characterised by the highest level of productivity. Its relative level has been declining, with the gap with industry narrowing and that with agriculture widening. The relocation of workers between economic sectors accounts for between 1/5 and 1/4 of the productivity growth rate, with both structural effects – static and dynamic – being positive only in the services sector.*

Keywords*: structural changes, labour productivity, economic sectors, shift-share analysis.*

JEL: *C13; E01; E24; O13; O14*

1. Introduction

Since the beginning of the transition in the 1990s, the Bulgarian economy has experienced significant structural changes. In a narrower context, they are expressed in a change in the relative importance of the main economic sectors and economic activities. In contrast to the Command-Administrative System, characterised by the leading role of industry, the period after 1990 was marked by the growing contribution of services. The process of "tertiarisation" is typical for the entire subsequent development of the economy, as it proceeds with changing intensity. Changes in real GDP over the same period have been in different directions, and after the initial transformational recession in the 1990s, economic growth rates have been predominantly positive. When breaking down these rates into growth in employment and in average labour productivity (LP), it is shown that changes in productivity are the decisive factor in most of the years.

The aim of this paper is to analyse sectoral changes in the Bulgarian economy in the period 2000-2024, measured by GVA and employment, and to assess the impact of structural and non-structural factors on the dynamics of average LP. The choice of the period under review is consistent with the availability of comparable data on GVA and employment according to ESA 2010, which are not affected by changes in statistical methodology.

2. State of the problem

Structuralist theory postulates that changes in the sectoral structure of the economy are an essential characteristic of economic development, which has a complex and bidirectional relationship with economic growth (Kuznetz, 1966). They are the result of the multiple effects of demand and supply factors, and in particular of changes in consumption, foreign trade, and productivity. Changes in the sectoral structure also affect economic growth and this impact is examined from four main perspectives. The first one is related to expanding growth models by adding a structural variable. The second perspective involves testing for Granger causality,

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while the third is based on applying the input-output model. The fourth approach concerns the decomposition of average LP growth into the impact of structural and non-structural factors.

Adopting the latter approach implies that GVA growth per unit of labour is presented as the sum of three separate effects (McMillan, Rodrik, 2011; Timmer, Vries, 2014). The first is defined as within-sectoral and represents the average growth rate of LP in individual sectors, weighted by the share of employment in the total for the country. It reflects the impact on LP of fundamental factors of growth such as the increase in physical and human capital, the accumulation of knowledge and innovation. The second effect is static or cross-sectoral and is measured as the average changes in the share of employment in the sectors, weighted by LP levels. The third effect is dynamic and shows the result of simultaneous changes in employment and productivity. The second effect is positive when workers are transferred to sectors with higher productivity levels, and the third when this occurs in sectors with growing productivity. Since the third effect also involves a structural element, the sum of it and the second effect gives the total structural influence on LP.

In the Bulgarian economic literature, there are studies of structural changes that are in the context of overall economic development or focus on their determinants (Peykov, 2021; Rangelova, 2013; Totev, 2018). There are also some publications on LP dynamics and its impact on economic growth (Raleva, 2023). However, analyses so far have not tracked the relationship between structural changes and LP in Bulgaria in the examined context. This has also not been done in recent publications concerning CEE countries, which refer to the region as a whole: they either do not include Bulgaria or have a regional rather than sectoral dimension (Dobrzanski, Grabowski, 2019; Kuusk, Staehr, Varblane, 2017).

3. Data and Methodology

Structural changes in the paper are judged by changes in the relative shares of GVA and employment of each of the three main economic sectors in the total for the country. The average LP is calculated as the proportion between GVA at 2020 base and the number of persons employed. The relative LP of each sector is calculated as a ratio to the average LP for the economy.

The contribution of structural and non-structural factors to the dynamics of LP is measured using the methodology of the shift-share analysis, based on the following equation (Fagerberg, 2000):

$$\frac{\Delta LP}{LPo} = \sum_{i=0}^{3} \left(\frac{Sio.\Delta LPi}{LPo} + \frac{LPio.\Delta Si}{LPo} + \frac{\Delta LPi.\Delta Si.}{LPo} \right)$$

where:

LP is the LP for the entire economy,

LPi is the LP of the respective sector,

Si is the share of employment in a sector in total employment,

and the subscript *o* refers to the beginning of the period.

In this equation, the growth rate of LP is represented as consisting of three elements, the first of which represents the within-industry effect, while the second and third show the contributions of the static and dynamic effects, respectively.

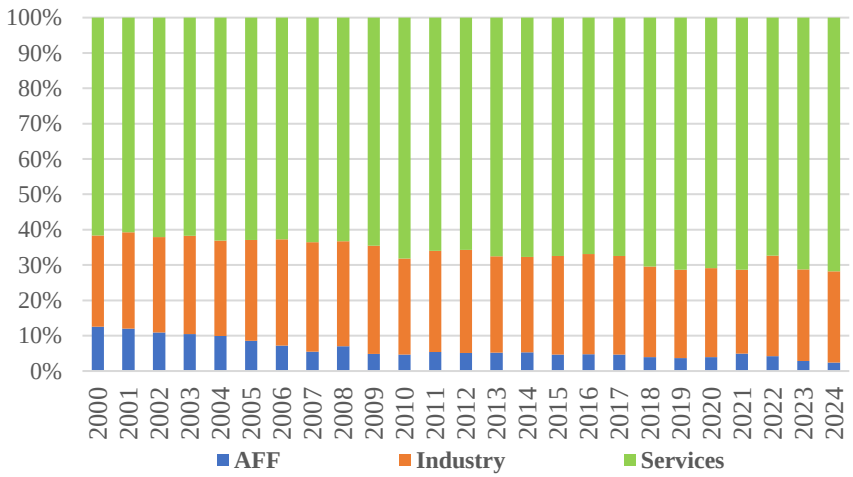
Since the application of the shift-share methodology can lead to very different results depending on the specification of the equations and the choice of the base period, the paper also provides a control assessment using a transformed dynamic version of the above equation (Ramessur, 2021).

It provides specific values for each individual year, with the effects being assessed using average annual values, and measures only the total structural effect obtained as the difference between the average annual LP growth rate and the contribution of its intra-sectoral component.

4. Results

In the period under review, the services sector continued to increase its relative importance in the economy (Fig. 1). This occurs at a high initial base, as in 2000 the relative share of the sector in the country's GVA amounted to 61.6%. In the interval of high economic growth until 2008, this share changed only slightly, with its average value remaining below 63%. Then it increased sharply in two waves. The first wave started during the crisis in 2009 and continued until 2017 when the share of services averaged 2/3. The second one began in 2018 and has continued to the present day, with services accounting for over 70% of GVA. The maximum value reached in 2024 exceeds the initial value by 10.2 p.p., with no indications that structural adjustment is slowing down. The positive dynamics in the tertiary sector was at the expense of an almost equivalent decrease in the share of AFF, whose values in 2000 and 2024 were 12.5% and 2.4%, respectively. Some increase in the contribution of the last sector occurred only around the global crisis of 2007-2009 and the COVID crisis of 2020. The contribution of industry to GVA at the beginning and end of the period is the same – ¼ – and does not show any trend. Initially, it grew and from 2006 to 2010 reached and maintained its maximum values of around 30%. Subsequently, this contribution declined, but remained above 27% until 2017, when it returned to its 2000 level. The only exception is in 2022, when the expansion of industry caused its share to increase by 4.8 p.p.

Figure 1. Dynamics of the sectoral composition of GVA

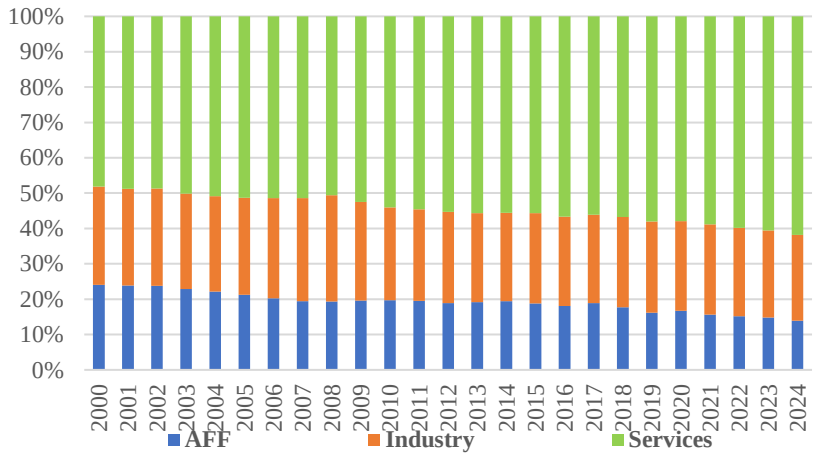


Source: NSI and own calculations.

Changes in the structure of employment are in the same direction, but with different proportions between economic sectors (Fig. 2). The share of services is again predominant and growing, but its values are approximately 10 p.p. lower than those in GVA. In 2000, the proportion of persons employed in this sector was 3.7 p.p. lower than the sum of the proportions of those in industry and in AFF. The contribution of services followed a similar pattern to their contribution to GVA, with some peculiarities observed after 2017. They are expressed in a relatively faster growth, uninterrupted by a decline even in 2022. In 2024, the relative weight of employment in the sector reached its peak value of 61.8%, which is 13.6 p.p. higher than in 2000. The share of employment in AFF fell steadily, but at a slow pace, remaining higher than the sector's share in GVA. In 2000, the weight of employment in AFF was merely 3.7 p.p. lower than that in industry, with the latter sector contributing twice as much to the GVA The

employment share in the agrarian sector decreased rapidly until 2008 and after 2017, remaining relatively stable in the interval between them. In 2024, this weight was 13.9% or 10.2 p.p. lower than in 2000 and 5.9 times higher than the sector's weight in GVA. The share of employment in industry at the end of the period was 3.4 p.p. lower than at the beginning. Higher fluctuations were recorded on the eve of and during the 2009 crisis, followed by a gradual decline, which was typical for 2022 as well. Industry is characterised by the most moderate dynamics of the relative share of employment and by the smallest deviations between it and the sector's relative share in GVA.

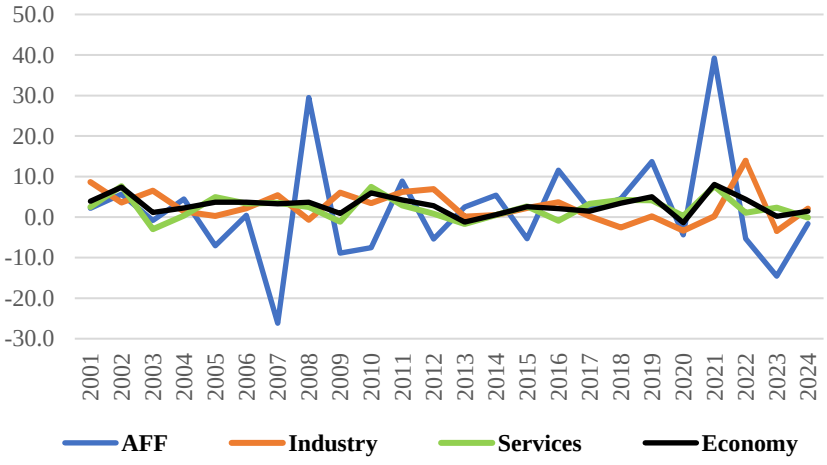
Figure 2. Dynamics of the sectoral composition of employment



Source: NSI and own calculations.

The outlined peculiarities in structural changes, measured by GVA and employment, correspond to specifics in the growth rates and the relative levels of LP in individual sectors. Changes in productivity for the economy as a whole are relatively moderate, with growth of 5% and above in only the initial three years, 2019 and 2021 (Fig. 3). There were only two years with a decrease – 2013 and 2020, with the latter preceding the peak growth for the period of 8.1%. The average annual LP growth rate for the economy as a whole is 2.9% and is mainly related to the dynamics of GVA, with relatively conservative behaviour of employment.

Figure 3. Growth rates of LP

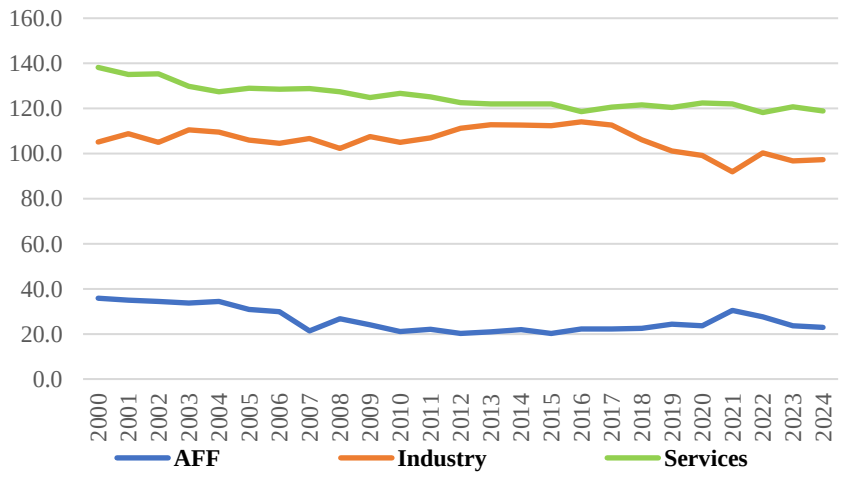


Source: Eurostat and own calculations.

The greatest instability in the LP among the economic sectors is observed in AFF. Its growth in 2008 and 2021 was 29.5% and 39.2%, respectively, with the first year's growth coming immediately after the period's maximum drop of 26.2%. Since 2022, LP in the sector has been decreasing, with a double-digit rate in 2023. Nevertheless, the average annual growth for the period is positive and lags behind the average annual growth for the economy by 1.1 p.p. The average annual increase in LP in industry is close to that of the economy and exceeds the respective increase in services by 0.4 p.p. The highest increase of 13.9% was recorded in 2022, with a more significant excess over the other sectors also occurring in 2001, 2007, and 2012. In 2003 and 2009, industry was the only sector with increasing GVA per employee, which predetermined its growth for the overall economy. LP in the sector decreased only during the COVID-related crisis in 2020, during 2023, which was affected by the high base effect, and during 2018, which was characterised by a simultaneous drop in GVA and growth in employment. In services, LP grew fastest in 2002 – by 7.6%, and in 2010 and 2021 – both by 7.5%. In the first case, growth outpaced that in other sectors; in the third case, it lagged behind growth in AFF; and in the second case, it was accompanied by a decline in this sector. The years of falling productivity in the tertiary sector are more than those in industry, however at lower actual rates. The largest contraction of 3% was recorded in 2003, which, unlike the more moderate contraction of 1.7% in 2013, did not lead to a decline in the economy's productivity due to the significant growth in industrial productivity

The services sector has the highest level of LP for the entire period (Fig. 4). In 2000, this level was 38.2% higher than the LP for the economy, outpacing industry and agriculture by 31.5% and 3.9 times, respectively. Thereafter, the relative LP dynamics trended downward, which is associated with a more accelerated decline until 2012 and a subsequent stabilisation at around 120%. In the last year, the relative level of LP in the tertiary sector was 118.8%, exceeding that of industry and AFF by 22.1% and 5.2 times, respectively. The relative LP in industry up to 2019 fluctuates in different directions but remains above 100%. In 2016, it reached its peak value of 114.1% and lagged behind the relative LP of services by only 3.9 p.p. After 2019 LP in industry fell below that for the economy, except for 2022. During this interval, the gap with the same indicator in services increased again, but nevertheless in 2024 it was 9.4 p.p. lower than in 2000. Relative productivity in AFF followed a similar trend, with the difference being that the higher decrease lasted until 2007. It then stabilised at around 23%, with exceptions only of 2021 and 2022. The highlighted dynamics of relative LP in the three sectors reflect both the growth rates in each of them and the changes in the relative importance of these sectors in GVA and employment.

Figure 4. Dynamics of relative LP

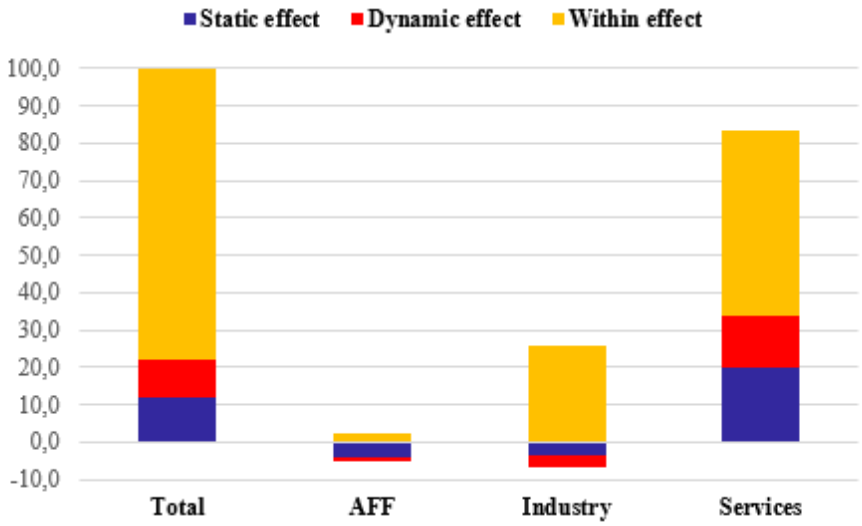


Source: Eurostat and own calculations.

The data in Fig. 5 show the extent to which the observed flows of employed persons between sectors with different levels of productivity affect LP. As expected, productivity growth depends mainly on intra-sectoral factors, whose contribution amounts to 78%. Structural changes account for the remaining 22% of productivity growth, with 12.2% reflecting the role of the static effect and 9.8% attributable to the dynamic effect. When using the transformed dynamic version of the equation, similar results were obtained, with the average annual total contribution of the two structural effects being 23.9%.

The assessment of the impact of the factors at a more disaggregated level shows that services are the only sector in which all three effects are positive. It accounts for 83.6% of the LP growth in the economy, with 33.6% attributable to structural changes (19.8% for the static effect and 14.1% for the dynamic effect) and 49.7% to fundamental factors. The within-industry effect formed slightly more than a quarter of total productivity growth, with negative values for both structural effects amounting to -7% (-3.8% and -3.2% for the static and dynamic effects, respectively). The total contribution of the sector to GVA growth per employee in the economy is 18.8%, which, added to the total contribution of services, gives 102.4%. This is caused by the negative overall contribution of AFF, where the negative cumulative effect of structural changes (-3.8% for the static component and -3.2% for the dynamic component) is two times higher in absolute terms than the positive intra-sectoral effect.

Figure 5. Decomposition of the LP growth



Source: Eurostat and own calculation

5. Conclusions

In summary, the Bulgarian economy is undergoing sustained structural changes towards an increase in the share of services and a decrease in the share of AFF. The sectoral structure of GVA differs from that of employment, which is related to differences in LP. The average annual growth in productivity is strongest in industry and weakest in agriculture, while services have the highest level of LP. The relative productivity of services is on a downward trend, which is accompanied by a narrowing gap with industry and a widening gap with the agricultural sector. Structural changes account for between 1/5 and ¼ of productivity growth, with the static effect being bigger than the dynamic effect. The services sector has a strongly dominant contribution to labour productivity growth, and unlike the other two sectors, it has positive structural effects.

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Kristina Stefanova[1]

LABOUR PRODUCTIVITY IN THE EDUCATION SECTOR IN CEE COUNTRIES

***Abstract**: The article aims to analyse labour productivity dynamics in the education sector in CEE countries during the period 2010-2024. The results of the study show that labour productivity in the education sector in CEE countries lags behind both the EU-27 average and the overall economy, showing no significant growth from 2010 to 2024. CEE's lag behind the EU-27 average in terms of labour productivity in the education sector is more significant than its lag behind the labour productivity indicator for the economy as a whole. The private education sector also demonstrates labour productivity below the EU-27 average.*

***Keywords**: labour productivity, education, CEE countries, non-market producers, public good*

JEL: *E24; H42; I20*

1. Introduction

Labour productivity (LP) is an important measure of economic development. It reflects not only the productivity resulting from labour use, but also the contributions of other production factors and technologies. At the same time, labour productivity is a key characteristic of the labour market and is linked to income in society (Stefanova, 2022). The quality and productivity of the human resources invested in education are crucial, as they are one of the main determinants of the quality of a country's newly formed human capital. Kirova et al. (2012) point out that the quality of human resources invested in the education sector significantly impacts the educational process, student learning and teachers and their teaching. The quality of human resources mainly depends on the educational and qualification level of teachers, as well as their motivation to improve the quality of the educational process. A key factor in teacher productivity is self-efficacy (Hidayat et al., 2018; Djigić et al., 2014). LP is also influenced by the availability and quality of material resources for the educational process. Different economic sectors exhibit different dynamics and levels of labour productivity. This is due to characteristics specific to each sector, such as the combination and quantities of production factors used, the technological principles applied and the characteristics of the producer. Education is a good that is primarily provided and financed by the public sector. The reasons for this are related to the state's efforts to internalise the significant positive externalities generated by education, and to ensure equal access to a wider range of educational services.

As education is mostly provided by the public sector, labour productivity in this field is influenced by factors inherent to the public sector. Although state funding aims to correct market failures, certain defects of state intervention also occur in practice. Penkova and Valkov (2022) point out that correcting market failures through non-market alternatives such as regulations, direct intervention or control, financial incentives and sanctions, 'correcting' economic conditions, and direct participation in production and provision may not be effective. The shortcomings of bureaucracy's specific utility function can also be added to these reasons. These general reasons for government failure apply to all government activities, including education, and have the potential to negatively affect the productivity of the sector. Additionally, the efficiency and competitiveness of the non-

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market service sector are largely determined by the primary objectives of state regulation (Kryvusha, 2020).

Due to the state's involvement in financing and providing education, non-market producers represent a significant proportion of the education sector. In this regard, the information provided by the analysis of LP in education offered by public institutions differs from that provided by LP in private enterprises and private educational institutions. The lack of a market valuation of the educational services of public educational institutions leads to differences in the measurement of education's added value in public organisations as an economic activity, and in the LP calculated on this basis. At the same time, there is a parallel private sector operating within the education services market. Its existence is economically justified due to the primary characteristics of education as a private good. However, the share of the private educational sector is significantly lower than that public. The services of the parallel private sector have a market value. In this regard, labour productivity has the same meaning as in the production of all market goods and services.

The article aims to analyse labour productivity dynamics in the education sector in CEE countries during the period 2010-2024. In order to achieve its objective, the it is structured as follows. The next section presents the state of the problem. The third section briefly outlines the research methodology. The fourth section presents the results of the empirical analysis, while the last section summarises the main findings of the study.

2. State of the Problem

Education is one of the most important goods consumed by every individual. Research in this field mainly focuses on analysing achieved results, funding, and its effectiveness and efficiency (e.g. Aristovnik, 2013; Jafarov and Gunnarsson, 2008; Yotova and Stefanova, 2017; Stefanova, 2019; Ahec Sonje et al., 2018; Buljan et al., 2019; Jelic and Kedzo, 2018, etc.). Hanushek and Ettema (2017) highlight that discussions about productivity are rarely part of debates on educational policy. This is because education is a good with multiple positive private and social benefits. Its importance is measured not only by the utility to specific users of the service, but also by the many positive externalities it generates. Consequently, the focus in the provision of education and its public funding is on the extent to which its broader objectives are realised. Like other publicly provided goods, education has no market valuation. In this r4egard, the study of labour productivity in education is related to the broader topic of analysing the labour productivity of non-market products and services, a topic that is covered in more detail in the scientific literature (e.g, Schreyer, 2010; Kozhemiakina et al., 2021; Kryvusha, 2020; Diewert, 2010).

Although education is predominantly publicly funded and provided, and therefore does not generate market revenues, it does have an economic impact. When viewed as an investment in human capital, education has its own private return, which is expressed as added value to the income and productivity of those who consume it. The positive external effects it generates also bring additional benefits to the economy. It is therefore important to pay attention to the productivity of the education sector. Studying labour productivity can provide an indirect indication of efficiency.

3. Methodology

The LP in education can be measured in various ways, relating to both outcomes and inputs. According to Atkinson (2005), the measurement of LP in the public sector should, where possible, follow the procedure adopted in the national accounts for market production. Education is classified as an economic activity in the system of national accounts. This is

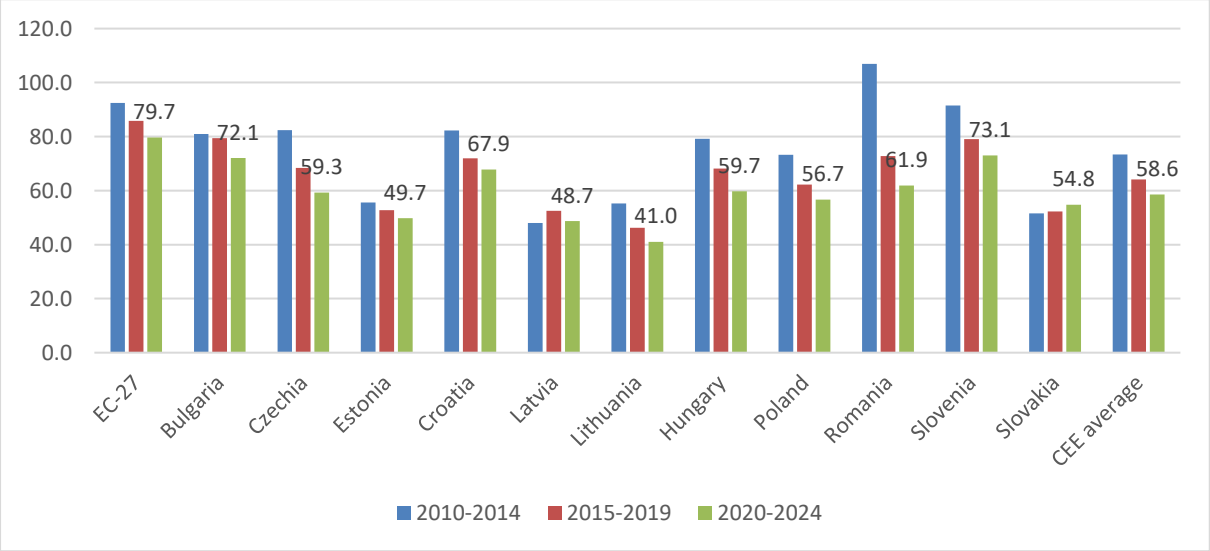
because all activities that produce goods or services, whether market or non-market, are considered economic activities. This approach enables comparison of labour productivity in education with overall labour productivity, as well as with productivity in other economic sectors in the market and non-market sectors.

For this purpose, real labour productivity is calculated for the education sector (NACE Rev. 2 code P – Education) and for the economy as a whole. Real labour productivity is calculated as the ratio of gross value added at constant prices (chain-linked volumes in 2010) to employment. Employment is presented in thousands of hours worked, as this indicator is more accurate than employment in thousands of persons. Additionally, labour productivity in the private education sector is examined using Eurostat's economic indicator for structural business statistics as a source. Available Eurostat data on value added per hour worked by employees in euros is used.

4. Research Results

Labour productivity in the education sector of CEE countries is lower than in the overall LP in the economy, as observed throughout all periods considered. The only exception is Romania in the period 2010-2014. This is evidenced by the values of the percentage of LP in the education sector of overall LP in the economy. The average values of the indicator for the EU-27 also show the same trend, confirming that this is not a regional peculiarity. This tendency is influenced by the more limited potential for increasing efficiency through market mechanisms in the public sector. However, with the exception of Romania in the first period, all CEE countries show a lower value than that reported in the EU-27 for the percentage of LP in the education sector of overall LP in the economy and that this trend remains consistent over time (Fig. 1).

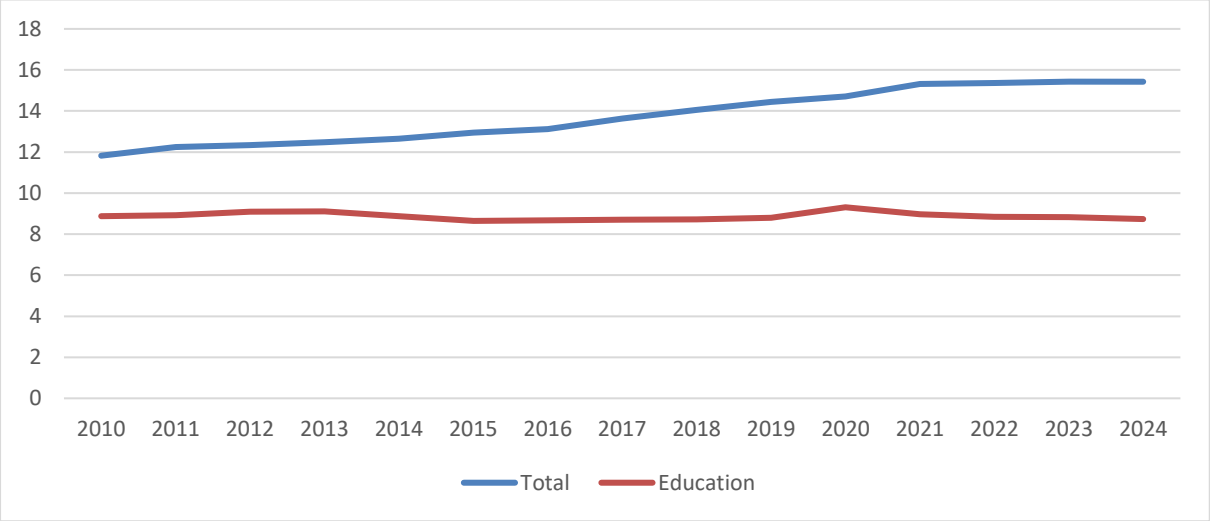
Figure 1. LP in the education sector as a % of overall labour productivity in the economy



Source: Author's calculation based on Eurostat data.

In almost all CEE countries, the percentage of LP in the education sector of overall LP in the economy has declined, which is also typical of EU-27. In the CEE region, this trend is primarily due to an increase in overall labour productivity and relatively stable values in the education sector, both on average and in most individual countries. Only Slovakia has reported a significant rise in LP within the education sector. In the other countries, the value of the indicator has increased slightly or decreased (Fig. 2).

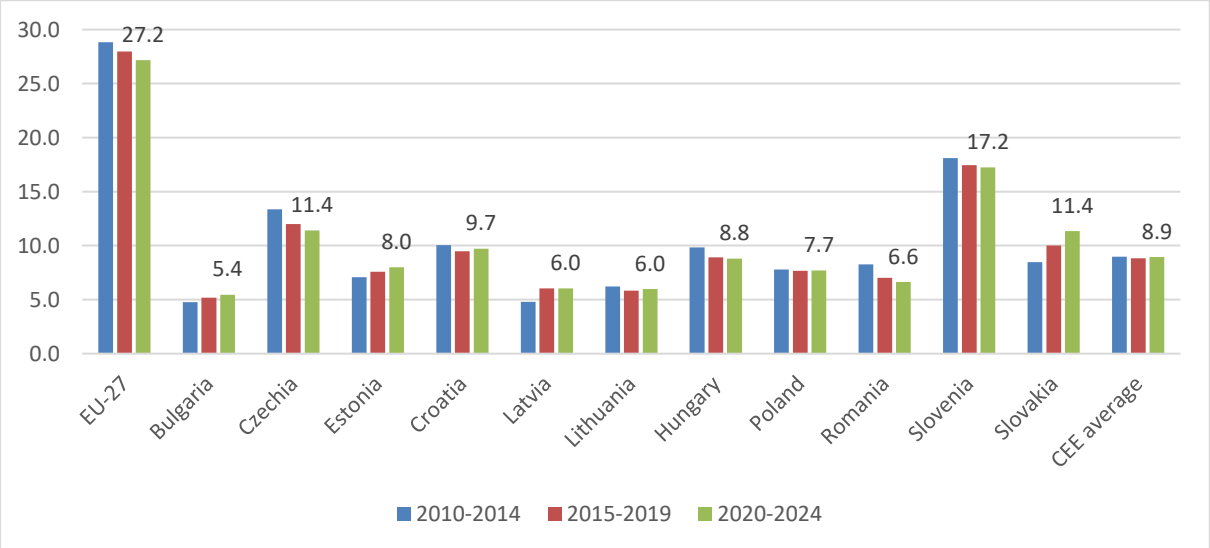
Figure 2. LP in the education sector and overall LP in the economy, CEE average, in euro



Source: Author's calculation based on Eurostat data.

Significant differences exist between individual CEE countries in terms of the percentage of LP in the education sector of overall LP in the economy. Average values for the period 2020-2024 range from 41% in Lithuania to 73% in Slovenia. The other two Baltic countries are close to the lower limit, while Bulgaria is close to the upper limit (Fig. 1). Consistent with these findings, the Baltic countries report some of the lowest labour productivity values in the education sector, while Slovenia reports the highest (Fig. 3). However, Bulgaria reports the lowest values of this indicator among the CEE countries in all three considered periods. The high percentage of LP in the education sector of the overall LP in the economy in Bulgaria is due to the lowest overall LP in the economy among the countries considered.

Figure 3. LP in the education sector (euro)

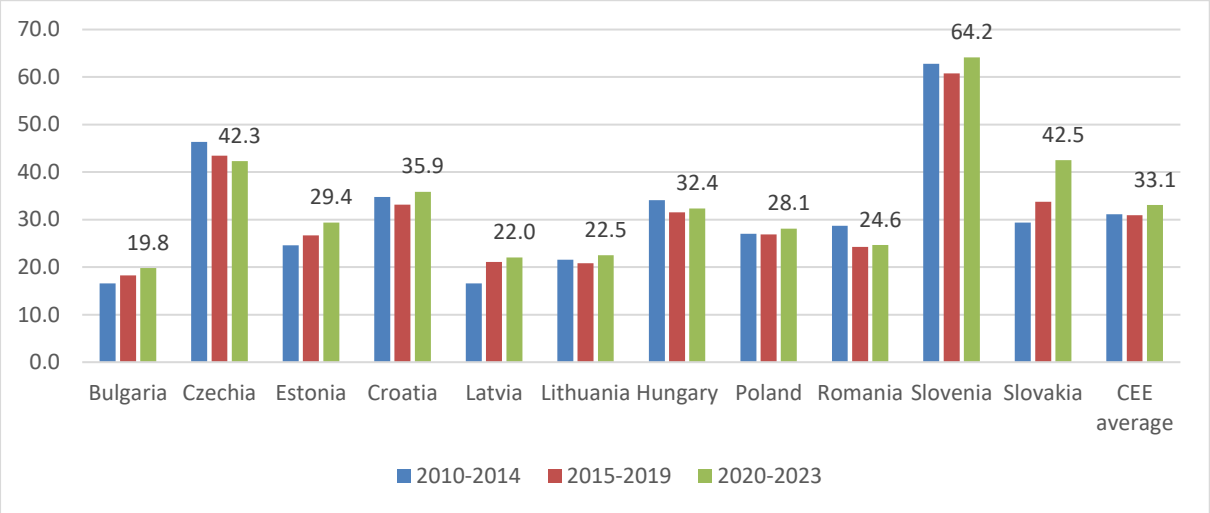


Source: Author's calculation based on Eurostat data.

CEE countries are characterised by lower LP than the EU-27 average, both in education and in the economy as a whole. On average, LP in the education sector in CEE countries is around 30% of the EU-27 average. Only Slovenia, Slovakia, and the Czech Republic have LP in the education sector above 40% of the EU-27 average for the period 2020-2023. During the period under review, convergence with the EU-27 average is observed in both CEE countries average and in most

individual countries. The Czech Republic and Hungary are exceptions, with LP in the education sector as a percentage of the EU-27 average lower in the third period than in the first (Fig. 4).

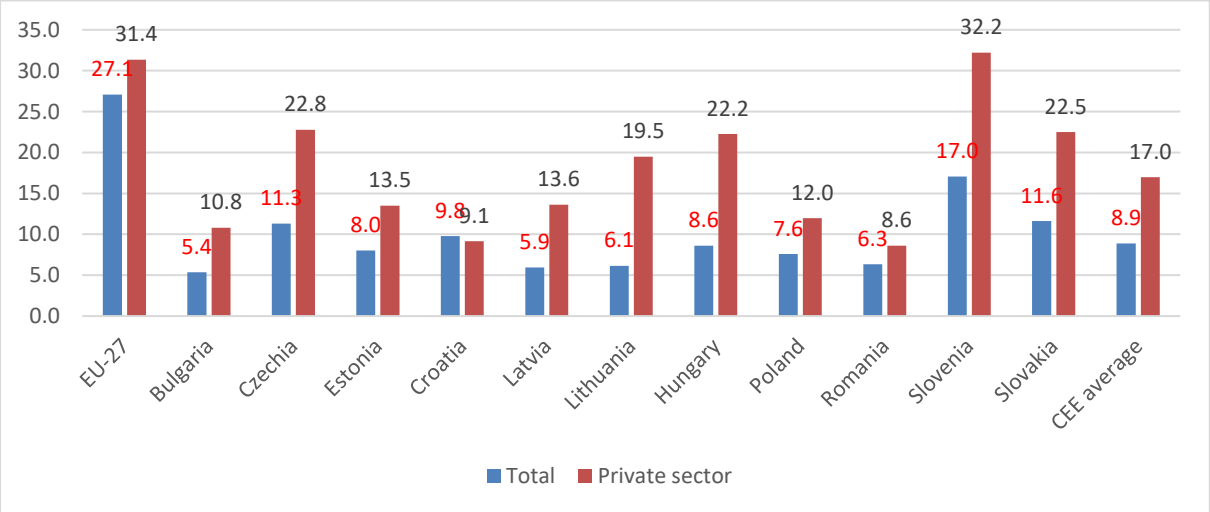
Figure 4. LP in education sector, % of EU-27 average



Source: Author's calculation based on Eurostat data.

A comparison between labour productivity in the education sector as a whole and in the private education sector, expressed as a percentage of EU-27, shows that, despite the variation in measurement methods, the ranking of countries remains similar. Nevertheless, certain discrepancies have been identified. In the context of labour productivity in private organisations, Bulgaria, Hungary, Latvia and Lithuania exhibit higher rankings. Conversely, Croatia has been observed to experience a marked decline in its regional standing (Fig. 5).

Figure 5. LP in education private sector, % of EU-27 average



Source: Author's calculation based on Eurostat data.

5. Conclusions

Despite the broader objectives of education provision and its non-market nature, improving labour productivity in the education sector is important. The results of the study show a clear lag in labour productivity in the education sector of CEE countries compared to the EU-27 average, as well as to overall labour productivity in the economy. At the same time, real labour

productivity in the education sector did not show a significant increase on average for CEE countries in the period 2010-2024, and in some countries in the region it even decreased, while overall productivity in the economy grew steadily and more significantly. Additionally, CEE's lag behind the EU-27 average in terms of labour productivity in the education sector is more significant than its lag behind the labour productivity indicator for the economy as a whole. The private education sector in the region also demonstrates labour productivity that is below the EU-27 average.

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Йордан Димитров / Yordan Dimitrov[1]

ВЛИЯНИЕТО НА ИЗКУСТВЕНИЯ ИНТЕЛЕКТ ВЪРХУ ТРУДОВИТЕ ПРОЦЕСИ В БЪЛГАРИЯ

Резюме: *Статията изследва влиянието на изкуствения интелект върху труда чрез реални внедрявания в предприятията, фокусирайки се върху структурата и динамиката на навлизане в контекста на техния размер и икономически сектор, както и върху ефектите върху съдържанието на труда – кои операции ИИ подпомага и кои замества. Анализират се данни на Евростат (2023–24) за технологии като анализ на текст, генериране на език, машинно обучение, процесна автоматизация, визуално разпознаване и автономни системи.В България ИИ се разпространява най-бързо при малките и средните предприятия, докато големите запазват най-високи нива на използване. Най-чести са анализът на текст (3.9%), процесната автоматизация (2.9%), генерирането на език (2.3%) и машинното обучение (2.1%). Технологиите подпомагат анализа и обработката на данни, изисквайки нови умения и алгоритмичен контрол, като заместват рутинни задачи. Секторът „Информация и комуникации“ води по внедрявания, секторът на услугите напредва чрез административни приложения, а индустрията и търговията – чрез контрол на качеството и логистика. Основните бариери остават липсата на експертиза, правната неяснота, притесненията за поверителност и високите разходи.*

Ключови думи: *изкуствен интелект; трудови процеси; внедряване в предприятия; основни технологии на изкуствения интелект.*

JEL: *J24 Човешки капитал; Умения; Производителност на труда, O33 Технологични промени: Иновации и дифузия, J21 Работна сила и заетост*

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE LABOR MARKET: TRENDS AND CHALLENGES

Abstract: *The article examines the impact of artificial intelligence (AI) on labor through real implementations in enterprises, focusing on the structure and dynamics of its adoption by firm size and economic sector, as well as on its effects on the content of work – which operations AI supports and which it replaces. Eurostat data (2023–2024) are analyzed on technologies such as text mining, natural language generation, image recognition and processing, machine learning, robotic process automation, and autonomous systems.In Bulgaria, AI is spreading most rapidly among small and medium-sized enterprises, while large firms maintain the highest levels of adoption. The most common technologies are text mining (3.9%), robotic process automation (2.9%), natural language generation (2.3%), and machine learning (2.1%). These technologies support data analysis and processing, requiring new skills and algorithmic oversight while replacing routine tasks. The information and communication sector leads in adoption, the services sector advances through administrative applications, and industry and trade mainly apply AI for quality control and logistics. The main barriers remain the lack of expertise, legal uncertainty, privacy concerns, and high implementation costs.*

Key words: *Artificial intelligence; labor processes; enterprise adoption; core AI technologies*

JEL: *J24 Human Capital; Skills; Labor Productivity, O33 Technological Change: Innovation and Diffusion, J21 Labor Force and Employment*

1. Увод

Настоящата статия изследва влиянието на изкуствения интелект (ИИ) върху труда чрез реални внедрявания в предприятията и техния ефект върху работните процеси. Фокусът е върху (1) структурата и динамиката на навлизането на ИИ по размер на предприятията и сектор и (2) въздействието върху съдържанието на труда - кои операции се подпомагат и кои рутинни дейности се заместват. Аналитичният подход се основава на съпоставими

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показатели за използване на основни технологии – анализ на текст, генериране на език, машинно обучение, процесна автоматизация, визуално разпознаване и автономни системи – с акцент върху България и сравнението с ЕС-27.

2. Състояние на проблема

Навлизането на ИИ в икономическите процеси поставя на преден план въпроса за неговото въздействие върху пазара на труда. Според ОИСР (OECD, 2023a) и McKinsey (McKinsey Global Institute, 2023), ИИ променя не само структурата на заетостта, но и съдържанието на труда, като трансформира начина, по който се извършват отделните задачи. Технологиите, задвижвани от ИИ, действат едновременно като допълващ инструмент и като заместител на човешкия труд (Acemoglu & Restrepo, 2018).

В литература се утвърждава схващането, че ефектите от ИИ са зависими от средата – те се проявяват различно по сектори, размер на предприятията и национални особености (Babina et al., 2023; Özkiziltan & Hassel, 2021). В развитите икономики ИИ вече е интегриран в стратегически бизнес процеси и иновационни вериги, докато в развиващите се страни проникването остава ограничено от институционални и инфраструктурни бариери (IMF, 2023). За България тази зависимост е особено видима, като проникването на ИИ е концентрирано в секторите на информация и комуникации и финанси, докато в индустрията, търговията и услугите то е на по-ниски нива (Иванова и Антонова, 2022).

Технологиите на ИИ са по-разпространени в големите предприятия, но малките и средните наваксват с по-бързи темпове, основно чрез административни и комуникационни решения, докато производствените и логистичните приложения остават по-ограничени. Това налага допълнителни емпирични изследвания върху бариерите пред внедряването – организация на данните, инфраструктура и умения (OECD, 2023b).

3. Методологични подходи

Изследването прилага емпирично-аналитичен методологически подход, основан на анализ и интерпретация на статистически данни от Евростат. Анализът обхваща компании с 10+ заети лица, групирани по класове малко, средно и голямо и по икономически сектори. Показатели отразяват дела на фирмите, прилагащи различни технологии на ИИ – анализ на текст, генериране на език, машинно обучение, роботизирана процесна автоматизация, визуално разпознаване и автономни системи.

Анализът използва сравнение за годините 2023-24 относно динамиката на използване на ИИ по размер на предприятията. Извършва се и сравнителен анализ с ЕС-27 и избрани държави близки по развитие до България или по-напредналите в съответната област, който позволява да се оцени относителното положение на българските компании спрямо европейските.

Данни се анализират чрез дескриптивен и сравнителен статистически анализ, като акцентът е върху динамиката и структурата на навлизане, и по-малко върху причинно-следствените връзки.

4. Резултати от изследването

Навлизане на ИИ в българските компании

По данни на Евростат през 2024[2] г. използването на ИИ в българските предприятия е най-високо при големите фирми, но малките и средните наваксват бързо. Делът на

[2] AI by size class of enterprise [isoc_eb_ai__custom_18465070]

използващите поне една технология на ИИ достига 14.2% при големите, 7.1% при средните и 3.6% при малките компании. Ръстът при МСП е почти двойно спрямо 2023 г., докато при големите увеличението е по-умерено поради по-висока изходна база. При малките фирми развитието има догонващ характер, с навлизане на приложения като автоматизирано обслужване, базова аналитика и предиктивни решения.

В сравнение с ЕС-27, където през 2024 г. ИИ използват 35.9% от големите, 16.6% от средните и 8.3% от малките предприятия, България стои под средните стойности, но следва сходна структура по размер и динамика. Сред най-добре представящите се страни като Дания, Австрия проникването на ИИ е значително по-високо (над 50% от големите фирми и 15–30% от МСП). В страни от централна и източна Европа с по-ниски равнища, като Румъния и Унгария, също се вижда по-бързо нарастване при малките фирми, а Естония и Словакия, показват сходна динамика, но по-високи текущи нива при всички компании.

От гледна точка на заетостта и организацията на труда големите фирми по-лесно интегрират ИИ в управленски и функционални процеси, разчитайки на вътрешни екипи и обучения, както и на преструктуриране на роли към аналитични и дигитални функции. При МСП внедряването започва в обслужването, маркетинга и логистиката и включва комбиниране на роли, въвеждане на данни и обучения „на място“.

Приложение на ИИ и въздействие върху труда

За България, нивата на навлизане на ИИ по икономически сектори и конкретни работни процеси са приблизително 4% от всички компании, поради което промените между 2023-24 г. трябва да се тълкуват с внимание. Те се намират в рамките на статистическите грешки и по-скоро показват посока на развитие, отколкото точен мащаб на разпространение на технологиите.

През 2024 г. използването на ИИ в българските предприятия (без селско стопанство, добивна промишленост и финансов сектор) се разширява във всички основни направления, с изключение на автономните системи (табл.1). Най-често ИИ се прилага за анализ на писмен език – делът на предприятията, използващи такива решения, достига 3.9% спрямо 1.3% година по-рано. Това показва навлизане на инструменти за обработка на текстова информация и анализ на документи.

Автоматизацията на работни процеси и вземането на решения е втората най-често използвана технология – 2.9% от фирмите през 2024 г. спрямо 1.9% през 2023 г. Тя оптимизира административни и логистични дейности чрез автоматично извличане и обмен на данни, замества ръчни операции и насочва труда към контрол и анализ на резултати.

Технологиите с ИИ за генериране на език и машинно обучение в българските фирми се е удвоило между 2023-24 г., достигайки 2.3% и 2.1%. Първите подпомагат създаването на текстове и автоматични отговори, а машинното обучение засилва аналитичните дейности чрез обработка на данни и прогнозиране, изместващи ръчната статистическа работа. Технологиите за разпознаване на изображения нарастват до 1.8%, подпомагайки контрола на качеството и визуалния надзор, докато автономните системи намаляват поради високи разходи и сложна интеграция.

Таблица 1. Използване на ИИ по видове технологии и икономически сектори, България и ЕС-27 2023–2024 г. (%)

Ик. Сектор	Анализ на писмен език	Генериране на език	Разпознаване на изображения	Машинно обучение	Автоматиза-ция на процеси и подпомагане на решенията	Автономни системи
C – Преработваща промишленост	**0.5→2.1** / *1.8→4.6*	**0.3→0.9** / *1.2→3.5*	**0.6→1.4** / *2.2→2.7*	**0.3→0.9** / *1.7→2.7*	**1.2→1.8** / *2.9→3.2*	**0.66→0.74** / *1.54→1.46*
G – Търговия и ремонт на МПС	**1.2→4** / *2.3→6*	**0.9→1.9** / *1.8→5*	**0.6→1.3** / *1.5→2.6*	**0.4→1.3** / *1.8→3*	**1→2.3** / *2.6→3.2*	**n.a.** / *0.7→0.8*
H – Транспорт и складиране	**(u)→2.3** / *1.7→3.7*	**(u)** / *1.3→3.3*	**(u)→1.4** / *1.5→2.4*	**(u)→1.8** / *1.4→2*	**1.7→2.6** / *1.9→2.3*	**(u)** / *0.6→0.8*
I – Хотелиерство и ресторантьорство	**(u)→1.1** / *1.3→3.3*	**(u)** / *1.2→2.2*	**(u)→1** / *1.2→1.1*	**(u)** / *0.8→1.4*	**0.5→0.4** / *1.1→1.4*	**0.00→(u)** / *0.4→0.4*
J – Информация и комуникации	**9.4→23.7** / *14.3→30.1*	**8.3→18** / *11.1→25.8*	**6.9→8.5** / *9.9→13.5*	**10.4→16.5** / *16.3→25.7*	**12→19.7** / *12.3→21.2*	**4.7→0.8** / *2.9→3.4*
L_M – Недвижими имоти; професионални, научни и технически дейности	**1.37→(u)** / *6.3→14.3*	**3.53→(u)** / *4.1→10.7*	**(u)** / *4.2→6.6*	**1.64→(u)** / *6.1→10.1*	**4.07→(u)** / *6.3→9.4*	**(u)** / *1.3→1.5*
N – Административни и спомагателни дейности	**(u)→1.04** / *3.6→8.1*	**(u)** / *2.5→5*	**(u)→1.4** / *1.9→3*	**(u)** / *2.3→4*	**2.1→2** / *2.5→4.3*	**(u)→0** / *0.7→0.7*
G45–S951_X_K – Услуги без финансов сектор	**1.7→5.2** / *3.7→8.6*	**1.8→3.2** / *2.8→6.7*	**1.1→2.3** / *2.5→3.8*	**1.4→3** / *3.4→5.5*	**2.3→3.9** / *3.5→5.2*	**0.7→0.4** / *0.9→1*
C10–S951_X_K Всички ик. д-и, без селско стопанство, горско стопанство, рибарство, както,без добивната промишленост и без финансов сектор	**1.3→3.9** / *2.9→6.9*	**1.→22.3** / *2.1→5.4*	**0.8→1.8** / *2.2→3.2*	**0.9→2.1** / *2.6→4.2*	**1.9→2.9** / *3→4.2*	**0.7→0.4** / *0.9→1*

Забележка:
Удебелени стойности = България
Курсив = *ЕС-27*
Стрелка (→) = промяна от 2023 г. към 2024 г.
Източник: Евростат, isoc_r_eb_ain2; (u) ниска надеждност на данните; n.a. – липсващи данни

Причините ИИ да навлиза с по-бавни темпове в българските компании са предимно организационни и институционални и изискват инвестиции в обучение, дигитална

инфраструктура и по-ясна регулация. По данни на Евростат[3] най-често посочваната бариера е недостигът на експертиза (7.1%), следвана от неясноти в правната рамка (5.3%) и опасения за защита на личните данни (4.9%). Високите разходи (3.3%) и липсата на качествени данни (4.4%) също ограничават внедряването. По-малък дял от предприятията посочват етични причини (2.4%) или липса на приложимост (2.1%).

Анализ по икономически сектори[4]

През 2024 г. секторът „Информация и комуникации“ (J) е най-развит в прилагането на ИИ в България, със значително по-високи стойности по всички технологии – анализ на писмен език (23.6%), генериране на език (18.0%), машинно обучение (16.5%) и процесна автоматизация (19.7%). ИИ е интегриран в продуктовото развитие, писане на програмен код, управлението на дигитални платформи, обслужване на клиенти и др.

Вторият най-активен сектор – „Услуги“, без финансов сектор – бележи ръст, особено при езиковите и процесните технологии (анализ на текст 5.2%, автоматизация 3.9%). ИИ се използва главно за обработка на документи, административни функции и ръчно въвеждане на информация.

В търговията (G) и преработващата промишленост (C) внедряването на ИИ се разширява, но с по-ниски темпове. В търговията той подпомага управлението на наличности, прогнозиране на търсенето и обслужването на клиенти, а в индустрията – контрола на качеството, логистиката и документооборота. В транспорта и складирането (H) ИИ се използва за планиране на маршрути, видеоанализ и разпознаване на документи, докато в хотелиерството и ресторантьорството (I) приложението му е пренебрежимо малко. В административните (N) и професионалните, научни и технически дейности (L_M) ИИ се прилага ограничено, главно за автоматизация на отчетност и документи.

Сравнение с ЕС по икономически сектори[5]

Сравнението с ЕС-27 показва сходна структура на използване на ИИ, но с по-ниски равнища и по-бавна динамика в България. И в двете икономики секторът „Информация и комуникации“ (J) е водещ, като в ЕС 30.1% от фирмите използват анализ на писмен език срещу 23.6% в България, машинно обучение – 25.7% срещу 16.5%, а автоматизация на процеси – 21.2% срещу 19.7%.

В преработващата промишленост (C) и търговията (G) дистанцията е по-голяма. В ЕС компаниите използват ИИ повече от два пъти по-често – например анализ на текст 4.6% срещу 2.0%, генериране на език 3.5% срещу 0.9%, машинно обучение 2.7% срещу 0.9%.

При услугите без финансов сектор и административните дейности посоката на развитие е сходна, но европейските стойности са около 1.5 пъти по-високи – например анализ на текст 8.6% в ЕС срещу 5.2% у нас, а роботизирана автоматизация 5.2% срещу 3.9%. Това може да се дължи на ограничен организационен капацитет на българските предприятия.

В транспорта и складирането (H) и хотелиерството (I) равнищата са ниски и почти изравнени – например при машинното обучение 2.0% в ЕС срещу 1.8%.

Най-голямо изоставане се наблюдава при професионалните, научни и технически дейности (L_M), където в ЕС 14.3% от фирмите използват анализ на текст, 10.1%

[3] Eurostat, Artificial intelligence by size class of enterprise [isoc_eb_ai__custom_18473238]
[4] Данните са от таблица 1
[5] Пак там

машинно обучение и 9.4% автоматизация на процеси, докато в България наличните стойности са няколко пъти по-ниски.

5. Изводи

Изследването показва, че ИИ се разпространява най-бързо при МСП, докато големите запазват най-високи нива на използване – с интеграция в управлението и контрола на качеството, докато при МСП внедряването е поетапно в обслужването и маркетинга. ИИ подпомага аналитични и координационни дейности – анализ на данни, генериране на съдържание и проследяване на процеси, изисквайки нови умения за работа с данни и алгоритмичен контрол, като замества рутинни задачи и променя труда към аналитичен.Секторът „Информация и комуникации" е лидер при използването на ИИ, а моделите му постепенно се разпространяват. Търговията и услугите използват езикови и процесни приложения, индустрията – контрол и планиране, транспортът – логистика и сигурност. В повечето сектори ИИ подсилва аналитичните функции, докато автономните решения остават ограничени поради високи разходи и трудна интеграция.

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Dimitar Sabev[1]

FROM ECONOMIC GROWTH TO SUSTAINABLE WELLBEING

Abstract: *This article argues that growth is not always a path to greater happiness: based on data from 134 countries grouped into 6 regions, the analysis identified three major patterns in the relationship between economic growth and subjective wellbeing. In the Global North, there is a significant negative association – that is, higher growth impedes the population's wellbeing. For the emerging economies in Asia and Latin America, the link is positive: higher economic growth promotes happiness. Finally, for a broad group of countries in Africa and the Middle East, as well as in the Eurasia region, there is no clear statistical association between growth and happiness, assumedly because of their statist and resource-based economic structure. The general conclusion confirms the existence of the Easterlin Paradox on an international level, which might be explained by two main factors: the higher marginal social and environmental costs of growth beyond a certain threshold, and the need for institutions to provide equitable distribution of the surplus output. The main policy implication of this finding is that "more growth" is an improper development prescription for both the richest and the poorest nations.*

Key words: *economic growth; subjective wellbeing; post-growth; Easterlin Paradox; institutions*

JEL: *O43; O47; I31; R11*

1. Introduction

Economic growth is a complex social process that has brought numerous benefits to humanity, yet it cannot be interpreted as a universally positive phenomenon. When growth's results are concentrated among a few individuals and companies, inequality increases and social cohesion deteriorates. Growth brings widespread prosperity only if there exist institutions that benefit its equitable distribution: social safety nets, proper labor rights, and public control over the direction of technological change (Acemoglu, Johnson, 2023). Additionally, when estimating the marginal costs of economic growth in terms of degraded social and natural capital, it becomes clear that nowadays, economic growth often turns into an anti-economic process (Daly, 1996, p. 87).

In the past, some scholars have argued that economic growth is the ultimate goal of every human society; for the sake of growth, not only social institutions and natural heritage but even the democratic principles of the functioning of the state could be compromised (Barro, 1996). Currently, the mainstream discussion increasingly sidelines such approaches, yet still holds the notion that growth is an invariably positive development. The scientific field of post-growth challenges this assumption, questioning the social expediency and the very ability of society to sustain the current path of output maximization. This new approach-turning-into-paradigm seeks alternatives in degrowth, steady-state economics, wellbeing and Doughnut economics, and many other global and regional solutions to the mixed blessings of growth (Kallis et al., 2025).

This article explores quantitatively the link between economic growth and subjective wellbeing within a broad sample of countries. Despite the established fact that the size of the per capita gross domestic product (GDP) is strongly correlated with the sense of wellbeing, the link between GDP growth and the self-reported wellbeing is much more nuanced, including negative. This is a counterintuitive result since GDP growth is the main vehicle to achieve a higher value of GDP per capita (the other – depopulation – would not contribute positively to the national wellbeing). The findings confirm the validity of the Easterlin Paradox (Easterlin, O'Connor, 2020), and reveal three major patterns of how growth influences happiness.

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2. Methods

The sample used in the quantitative research includes data on the socioeconomic status and the subjective wellbeing of 134 countries. (The smaller offshore jurisdictions and jurisdictions that do not supply regular data to the international bodies were subtracted from the global list). The countries were divided into six regional sub-groups: Middle East and North Africa (MENA, 11 countries), Sub-Saharan Africa (34), Latin America (18), the Western World (38), Asia (East and South Asia, 19), and Eurasia (16). The group of Eurasia comprises the countries of the former USSR that are not current members of the European Union (EU), as well as the Western Balkans. The Western World includes the member states of the EU, the other high-income countries in Europe, the United States, Canada, Australia, New Zealand, and Israel. The composition of the other groups follows the classification of the World Bank.

Economic growth was estimated for the five-year period between 2019 and 2023 and expressed in percentage points. To this end, the World Bank's data about the per capita GDP according to the purchasing power parity in constant 2021 international dollars were used. Additionally, data on the Gross National Income (GNI) for 2023, according to the World Bank's Atlas method, were utilized for dividing the sample into three equal parts: low-income, middle-income, and high-income. National average values on subjective wellbeing for 2023 are listed in the World Happiness Report (Helliwell et al., 2024). Gallup World Poll is responsible for the worldwide study on subjective wellbeing (SWB, or "happiness"), which main indicator is the Cantril Ladder, based on the following question: "Please, imagine a ladder with steps numbered from zero at the bottom to 10 at the top. The top of the ladder represents the best possible life for you, and the bottom of the ladder represents the worst possible life for you. On which step of the ladder would you say you personally feel you stand at this time?" (cit., p. 67).

Countries' economic growth was juxtaposed with their average reported subjective wellbeing by applying simple OLS regressions: for the whole sample and for the separate regions. In Figure 1, for each of the studied regions, predicted values from the linear regression were computed; a line with a negative slope indicates that economic growth is associated with declining SWB. Columns 6 and 7 in Table 1 list Pearson's correlation coefficients and their significance levels. As evident, only three regional values are statistically significant; for the insignificant values, a lack of explicit statistical association is assumed. Next, Table 2 tests the hypothesis that the relationship between SWB and economic growth is explicitly income-specific; the listed coefficients, standard errors, and R^2 values represent simple OLS regressions.

A scatterplot graph juxtaposing countries' average life expectancy at birth with the GNI values was used in the Discussion section to explain the varying link between economic growth and SWB. The Human Development Index of the United Nations provided the data on countries' life expectancy at birth for 2023. The curve that represents this non-linear association fits a fractional polynomial model.

3. Results

Table 1 presents the correlation between economic growth and subjective wellbeing, which is significant and positive though weak for the entire sample. Yet, within the regions, this relationship varies considerably. The correlation between growth and happiness turns moderate and negative for the Western World countries, and positive for Asia and Latin America (in the latter case, the association is valid only at the 10% level, and should be interpreted with caution). For the other three regions, no valid correlation between economic growth and subjective wellbeing was established, which might be due to the smaller and heterogeneous samples.

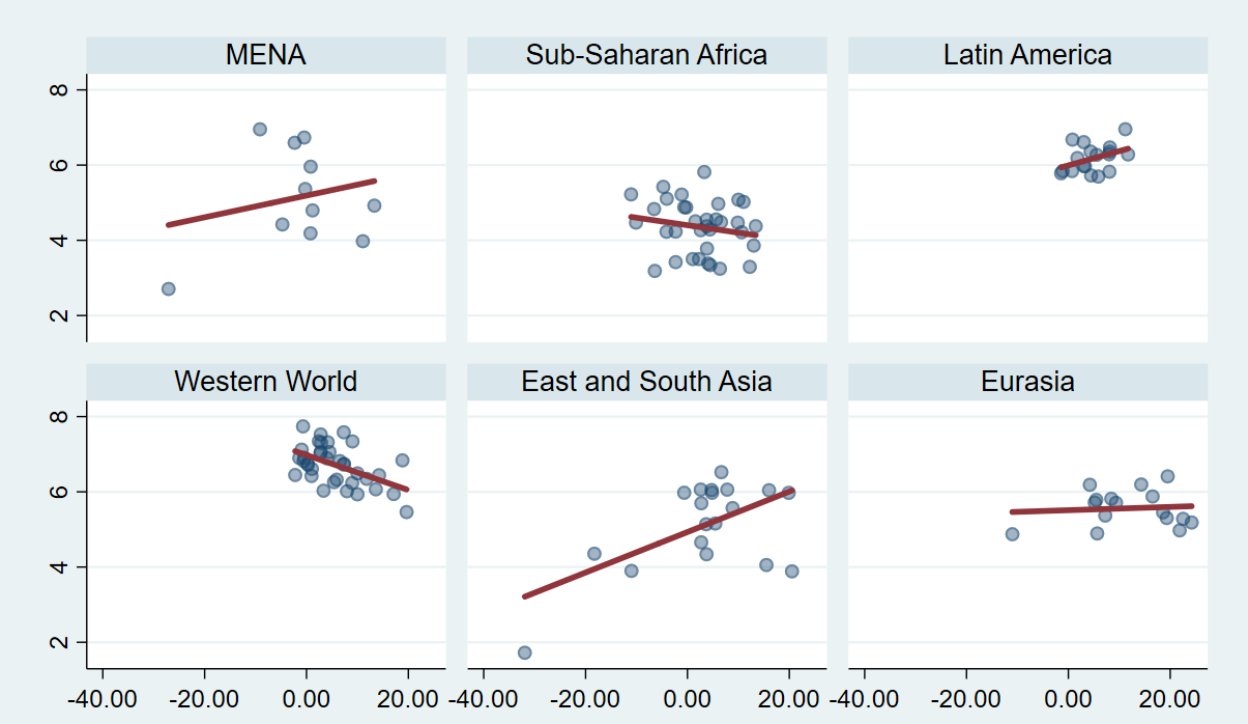
Table 1. Growth and wellbeing: descriptive statistics and correlation coefficients

Region	Cases	GNIpc Intnl. Dollars	GDPpc growth, %	Ladder	Life expectancy, years	Pearson's R	Sig.
Whole sample	134	13533	9.84	5.26	73.61	0.2209	0.0103
MENA	11	8605	5.91	4.83	75.64	0.2314	0.4935
Sub-Saharan Africa	34	1694	4.01	4.36	62.39	-0.1822	0.3025
Latin America	18	9589	3.86	6.25	75.94	0.4055	0.0950
Western World	36	57441	4.91	6.69	80.92	-0.5108	0.0150
Asia	19	8043	13.67	5.05	74.32	0.5748	0.0100
Eurasia	16	10267	9.57	5.53	74.25	0.0856	0.7526

Source: The World Bank 2024; The World Happiness Report 2024; UN Human Development Index 2024; Author's estimations. Note: the values in columns 2–6 are weighted with the countries' population numbers

Figure 1 provides visualization of the association of wellbeing and growth across the world's regions. Again, one might discern here three distinct cases: economic growth affects wellbeing positively (Asia and Latin America); economic growth affects wellbeing negatively (the Western World); and there is no definite link between wellbeing and growth (the Middle East, Africa, Eurasia).

Figure 1. Wellbeing and rates of economic growth: scatterplots and fitted values



Source: Author's estimations

Results presented in Figure 1 and Columns 6 and 7 of Table 1 are counterintuitive – from the perspective that holds growth's net contribution to wellbeing as always positive. Here we have opposing evidence for the wealthiest region in the world. Sedlarski (2025) provides a comprehensive explanation for the declining subjective wellbeing in developed countries, putting forward factors like self-exploitation, urban demographic pressure, the collapse of shared narratives, and others.

One might raise the issue that "happiness" is geographically and culturally determined and entirely detached from the socioeconomic determinants included in the statistical model here. To test this possibility, three groups of countries according to their per capita GNI have been additionally constructed. Table 2 shows the results of the OLS regressions.

Table 2. Association of economic growth and subjective wellbeing within three income groups

Group	GNI per capita, intnl. dollars	Ladder, mean	Coefficient	S.E.	Prob > F	Adj R-squared
High-income	16660 – 102910	6.68	-0.0291	0.0126	0.0261	0.0913
Middle-income	3840 – 15800	5.53	0.0320	0.0123	0.013	0.1152
Low-income	380 – 3760	4.46	0.0319	0.013	0.018	0.1027

Source: Author's estimations. Note: the three coefficients are significant at the 5% level

One sees here a typical case of the Easterlin Paradox: the wealthier group of countries reveals higher subjective wellbeing; still, economic growth does not contribute to further increases in wellbeing of the rich, and even erodes their "happiness". It has to be underlined that the studied associations are weak, with low coefficients of determination (R^2); therefore, one might not infer causal links but rather broader and often tacit influences.

4. Discussion

Still in the 1960s, leading economists emphasized that economic growth is not costless; growth is associated with a variety of tangible and psychological expenses for the individual and society (Offer, 2006). Yet the dominant notion – up to these days – is that the benefits of growth "always" outweigh its costs. Nevertheless, except for some individualistic attitudes that border on pathology, to paraphrase Keynes, the objective benefits of additional wealth are not endless. This argument becomes clear in Figure 2, which juxtaposes the countries' average life expectancy at birth with their per capita GNI. The life expectancy is a loose but still informative indicator of wellbeing. The evidence shows a very pronounced factor effect of wealth, but only up to a certain level. There is a threshold of roughly 20,000 international dollars (with a 2023 ppp value) per capita, after which the slope of the curve that depicts the statistical association of wealth and life expectancy flattens. This is a well-studied pattern, which indicates that not only subjective but also "objective" wellbeing does not grow *ad infinitum* in parallel with wealth (Vollrath, 2020).

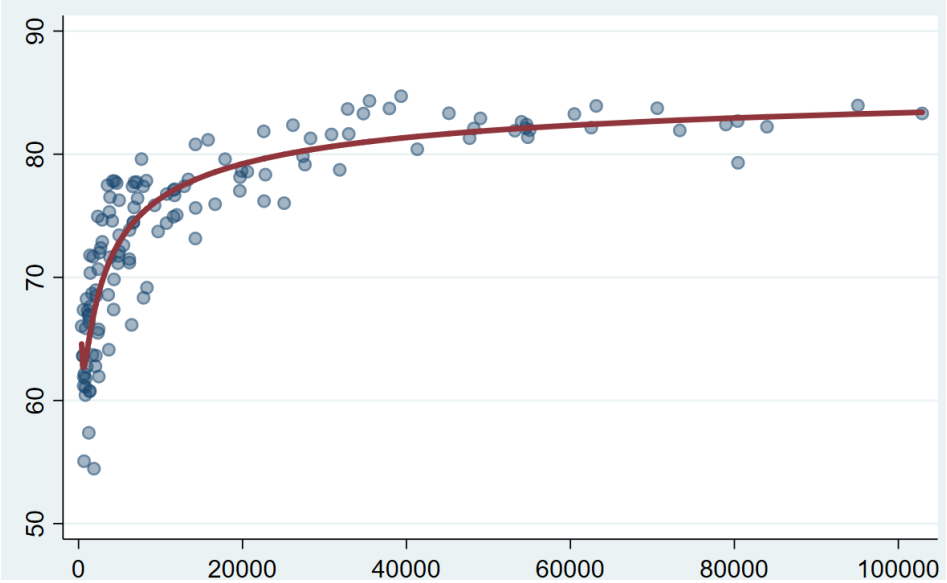
The everyday fact of decreasing marginal utility of wealth contradicts the attitudes on the stock markets and the general culture of consumption, which are major pillars of global capitalism. Growth has turned into a system-wide necessity thanks to the hegemonic financial sector and the drive to secure investment returns. Yet the negative link between growth and subjective wellbeing in the wealthier countries acknowledges that on some subliminal, tacit level, the

additional unit of wealth weighs less than the costs of growth to achieve it (Layard, 2006, p. 171).

The two regions with a positive link between growth and wellbeing (Asia and Latin America) have similar values of the mean per capita GNI. It might be implied that most of the countries in these emerging markets have already achieved a certain level of economic and institutional development, although still lagging behind the wealthiest parts of the world. In their case, surplus output directly contributes to the betterment of the quality of life. For these emerging economies, growth turned into a mechanism for sharing wealth among wider groups, which is a positively perceived trait.

For the Sub-Saharan countries, the mean GNI of less than 1700 dollars indicates deep structural challenges. Growth is slow and of the extensive type, heavily relying on the extractive sector. It provokes the loss of traditional livelihoods and the destruction of organic social safety nets, without bringing the blessings of the surplus output. These failed states do not possess mechanisms and institutions that guarantee the broad sharing of growth's benefits. The same is the hypothesis regarding the Eurasian region, although it has a considerably higher per capita GNI: institutional deficiency within command-style economies, often based on resource extraction, does not translate the surplus production into a higher quality of everyday life. Last, the heterogeneous MENA region combines wealthy oil-exporting countries and nations on the subsistence level; growth in this region has different foundations and it is impossible to infer a common tendency.

Figure 2. Relationship between life expectancy at birth and GNI per capita in 2023



Source: Human Development Index 2024; The World Bank 2024; Author's estimations

This research found the presence of a typical Easterlin Paradox (see Easterlin, O'Connor, 2020): the wealthier countries are also happier, yet the road to wealth does not necessarily bring happiness. The reasons for this phenomenon on a national level might be subsumed into two broad groups: a) the existence of marginal costs of growth, which are juxtaposed – explicitly or tacitly – with the marginal benefits of growth; b) the lack of institutions for broader sharing of the surplus output.

5. Conclusion

This research identified three separate patterns depicting the relationship between economic growth and subjective wellbeing. The typical textbook model posits that GDP growth directly contributes to greater happiness; such an association does exist, but mainly for the emerging economies (Asia and Latin America). For countries at a very low socioeconomic stage (Sub-Saharan Africa), the link between growth and wellbeing is problematic, since resource-led growth destroys traditional livelihoods, and there exist no institutions for broader sharing of the surplus output. The same observation holds for the Eurasian economies, who lack sophisticated economic structures; their growth is driven by extractive industries, and the results stay in the hands of a few multinational or state-controlled corporations. Finally, the pattern for the wealthier countries (the Western World) is that economic growth is statistically associated with lower subjective wellbeing.

The existence of these three distinct patterns throws doubt on the mainstream approach for using GDP growth maximization as a universal prescription in development policies. Maximization of GDP growth is pointless, from a developmental perspective, when there is a lack of institutions for equitable distribution. Regarding wealthier countries, the amount of growth necessitated by security needs and by the runaway financial sector already imposes negative social and psychological costs. Instead of squeezing out further gross growth from the wealthy world, a redirection of investment flows toward the Global South would contribute to a more equitable distribution of the benefits of globalization, as well as to a new structural development for the Global North, turning greater emphasis on the immaterial determinants of subjective wellbeing.

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ДЕКУПЛИРАНЕ НА ИКОНОМИЧЕСКИЯ РАСТЕЖ ОТ ЕКОЛОГИЧНИТЕ НАТИСКИ: ПРЕДИЗВИКАТЕЛСТВА И ПЕРСПЕКТИВИ ПРЕД БЪЛГАРИЯ

Резюме: *Тази статия разглежда как икономическият растеж в България се отделя от натиска върху околната среда, като специален акцент е поставен върху дългосрочния преход към въглеродна неутралност. Подходът се основава на дефиниции и методологически насоки на ОИСР, Европейската комисия и съвременни академични изследвания. Анализът стъпва върху официални данни на Националния статистически институт (НСИ) и Евростат, които позволяват да се проследи и сравни развитието на България във времето. Резултатите показват обнадеждаващи тенденции – в различни сектори се наблюдават както относителни, така и абсолютни прояви на декуплиране, макар че остават и структурни бариери. На тази основа статията прави изводи за способността на българската икономика да се доближи до целта на Европейския съюз за нулеви емисии до 2050 г.*

Ключови думи: *декуплиране; икономически растеж; устойчиво развитие; Европейски съюз; България*

JEL: *O44; Q01; Q56; Q58; C82*

DECOUPLING ECONOMIC GROWTH FROM ENVIRONMENTAL PRESSURES: CHALLENGES AND PROSPECTS FOR BULGARIA

Abstract: *This article explores how economic growth in Bulgaria has become decoupled from environmental pressures, with particular focus on the long-term transition to carbon neutrality. The approach builds on definitions and methodological guidelines from the OECD, the European Commission, and recent academic studies. The analysis draws on official data from the National Statistical Institute (NSI) and Eurostat, making it possible to track and compare Bulgaria's development over time. The results indicate encouraging trends: both relative and absolute forms of decoupling are observed across different sectors, although structural barriers remain. Based on these findings, the article outlines conclusions about the capacity of the Bulgarian economy to move toward the European Union's goal of net-zero emissions by 2050.*

Keywords: *decoupling; economic growth; sustainable development; European Union; Bulgaria*
JEL*: O44; Q01; Q56; Q58; C82*

1. Увод

Зеленият преход е ключов приоритет в дневния ред на ЕС, заложен в Парижкото споразумение и системата EU ETS. Целта е ускорена трансформация към климатична неутралност и нулеви нетни емисии до 2050 г. В този контекст стратегическият доклад на Драги „Бъдещето на европейската конкурентоспособност“ (Draghi, 2024) и последвалият документ на ЕК „Компас на ЕС за възстановяване на конкурентоспособността и осигуряване на устойчив просперитет“ (European Commission, 2025) подчертават централната роля на декарбонизацията за конкурентоспособността, намаляване на стратегическите зависимости и технологично догонване. В синхрон с приоритетите на Урсула фон дер Лайен (von der Leyen, 2023) и двата документа конкретизират действията и рисковете, като крайната цел остава непроменена – намаляване на въглеродната интензивност.

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Основната цел на настоящата публикация е да разкрие текущото състояние на процеса на декуплиране на икономиката на България и на тази база да изведе възможни сценарии за развитие.

2. Състояние на проблема

Анализите на зеления преход често започват с дефинирането на неговата начална и крайна точки. Общо прието е, че това е преход от линеен тип икономика към състояние на икономическа ресурсна неутралност и циркулярност. Тази рамка очертава две крайни точки. Изходната точка е икономика на растежа. Класическите модели на икономически растеж, представени от Робърт Солоу (Solow 1956), поставят акцент върху натрупването на капитал, труда и ролята на технологичния прогрес като основен двигател на дългосрочното развитие. В рамките на този подход икономическите процеси се разглеждат в условия на неограничени природни ресурси, докато екологичните измерения остават извън основната аналитична рамка. Критиката към този модел се корени в разбирането, че растежът не може да бъде безкраен в условията на ограничена планета. Херман Дейли (Daly 1977), един от основоположниците на екологичната икономика, предлага концепцията за steady-state economy, според която дейностите трябва да се ограничат в рамките на екологичния капацитет. Тази перспектива пренасочва дебата от „как да растем" към „как да живеем устойчиво", показвайки, че растежът често поражда неикономически ефекти като замърсяване и социални разходи.

Зеленият преход на ЕС е опит за съчетаване на двете парадигми – технологичния оптимизъм на Солоу и екологичните ограничения на Дейли и неговите последователи. Чрез Европейската зелена сделка зеленият преход се явява преходна хибридна стратегия, която се стреми едновременно да поддържа икономическия растеж и да интегрира екологичната устойчивост като системно ограничение. Централна роля в този подход заема зеленият растеж, който представлява изграждане на оптимистични очаквания базирани на своеобразна крива на Кузнец, за която говорят автори като Гросман и Крюгер (Grossman and Krueger 1991, 1995) и Шафик и Бандьопадяй (Shafik and Bandyopadhyay1992), според която растежът сам създава условия за по-добра околна среда. В подкрепа на подобна теза Стиглиц (Stiglitz,2023) представя зеления растеж като стратегическа посока, която съчетава икономическа ефективност, екологична устойчивост и социална справедливост, и която изисква активна роля на международното сътрудничество. Този технологичен оптимизъм е основният двигател на публичните политики на ЕС. Редица автори застават зад идеята за зеления растеж. Майрате (Mairate 2023), например, разглежда зеления преход от макроикономическа перспектива. За разлика от критичния подход на екологичната икономика, той аргументира, че чрез координирани инвестиции, иновации и публични политики в рамките на Европейската зелена сделка, е възможно да се постигне устойчив икономически растеж, съвместим с климатичните цели на ЕС. От друга страна, Парик (Parrique et al. 2019) в своя доклад поставят под съмнение самата възможност за „истинско" отделяне на икономическия растеж от екологичните натиски, изтъквайки структурни ограничения като ефекта на обратния удар, прехвърлянето на екологичните разходи и ограничената ефективност на рециклирането. Така двата подхода очертават различни парадигми – Парик призовава към преосмисляне на самата концепция за растеж, докато Майрате търси начини за неговото екологично реинженерство в рамките на съществуващата икономическа система.

Опитите за теоритични интерпретации на интеграцията на екологичната устойчивост в политиките и анализа на зеленият растеж на икономиката води до друго крайно състояние, дефинирано от изследователи като Летуш (Latouche, 2009) и Калис (Kallis,

2011) като икономика на Пострастеж (Degrowth). Преди това състояние да бъде постигнато, обаче, е необходимо да бъде извършена огромна изследователска работа. Ето защо не е изненада, че темата за зеления преход и нейните подтематични направления, засягащи всички икономически аспекти, преживява истински възход в съвременната научна литература, включително и в България. Организират се редица научни прояви, като се засягат множество свързани теми (Кирова, 2023). Въпреки засиленото научно внимание обаче, остават сериозни аналитични затруднения, свързани с отсъствието на надеждна емпирична база. Както подчертава Бобева (Бобева 2023): „Липсата на данни за България по важни показатели на прехода затруднява анализа и получаването на ясна картина. Наличните данни и методологии не дават възможност да се оцени пътят напред и как той да се извърви, доколкото е зададена крайната точка, но не и траекторията“. Това напрежение между увеличаващия се изследователски интерес и ограничената наличност на надеждни данни очертава една от ключовите бариери пред по-задълбоченото разбиране и ефективното управление на зеления преход в България. Страната рядко попада в полезрението на изследователите като обект за сравнения и анализи, а там където го прави е на едно скромно, общо ниво. Пример за това състояние е темата за декуплирането на икономическия растеж от екологичните натиски.

3. Методология

Смисловото съдържание на термина „декуплиране“ произтича от идеята за разделянето на една двойка променливи, които са във взаимозависимост по между си. В конкретния случай става дума за отделянето на икономическия растеж от отделяните вредни емисии в атмосферата от икономическата дейност на хората. В настоящото изследване се възприема топ-даун декомпозиционен подход, развит в рамките, предложени от ОИСР (OECD, 2002), и доразви в документите на Европейската агенция по околна среда и Европейската комисия (EEA, 2019; European Commission, 2021). В съответствие с тези методологии, декуплирането е отделяне на растежа от екологичните натиски, измерено чрез връзката между БВП и емисиите на вредни вещества. Тъй като БВП се използва в международни сравнения, тук се прилага показателят БДС. По такъв начин, във фокуса на анализа ще попаднат общото представяне на икономиката и междусекторните сравнения. Анализът се основава на официални макроикономически и емисионни данни на НСИ и Евростат за периода 2019–2023 г. Чрез съпоставяне на показателите по сектори се определят четири основни типа състояния: абсолютен декуплинг (БДС ↑, емисии ↓), относителен декуплинг (БДС ↑, емисии ↑, но по-бавно), куплинг (емисии растат по-бързо от БДС) и фалшив декуплинг (БДС ↓, емисии ↓), следвайки класификацията на *OECD (2002)*. Подходът позволява да се направи оценка на това до каква степен икономическите дейности в България се „откъсват“ от въглеродната интензивност, както и кои са секторите с най-съществен принос.

Следва да се отбележи, че прилаганият подход има своите ограничения. Агрегираните данни по сектори не отразяват вътрешните различия между предприятията и технологиите, а косвените емисии, свързани с внос и международна търговия, остават извън обхвата на анализа. Това означава, че резултатите трябва да се разглеждат като ориентировъчни оценки за степента на декуплиране.

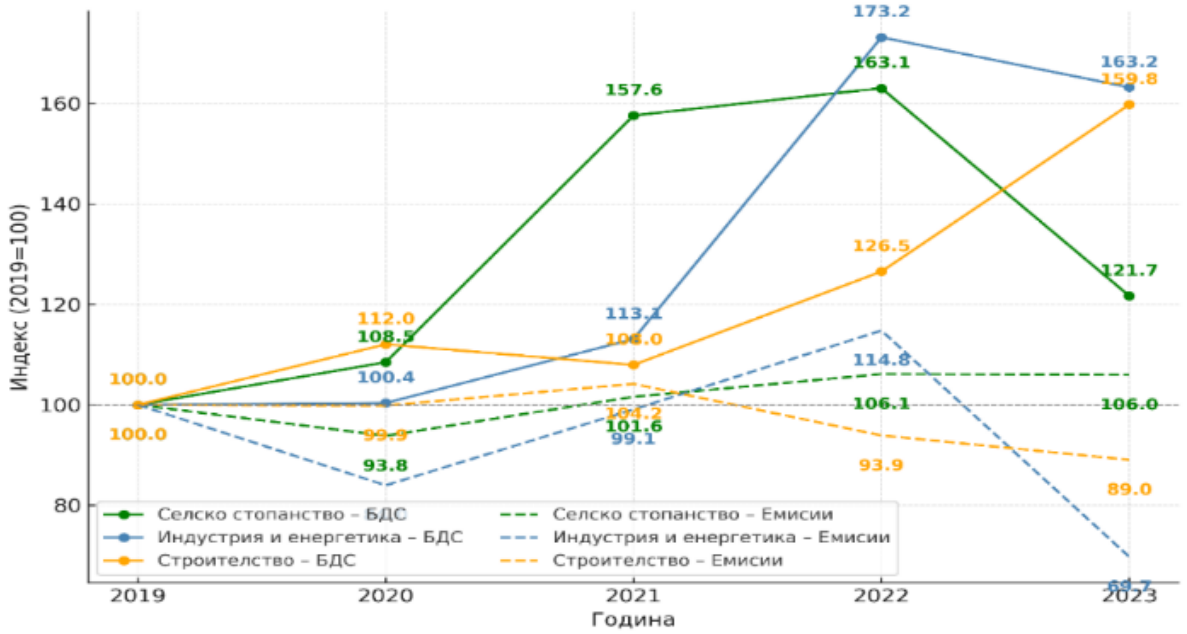
4. Резултати от изследването

По данни на Евростат, през 2023[2]г. общият обем на отделените емисии в атмосферата от икономически дейности възлиза на 31,782 kt CO2e, при 41,209 kt CO2e за 2019 г., което

[2] Последната година с налични данни в Евростат

е с 22,7% по-малко. Най-голям спад има в обема на емисиите на сектор „Производство на електроенергия и електроразпределение" (–38,4%). Секторът има дял от 42,97% от всички емисии и е най-големият емитент. На второ място, с дял от ¼, сред емитентите е сектор „Индустрия". Тук понижението в обемите на отделените вредни вещества в атмосферата с -12,7%. На трето място е сектор „Строителство", който също допринася за намаляване на общите емисии (-11%). Паралелно с процесите на намаление в някои сектори, като сектор „Добивна промишленост" (+41,9%), Водоснабдяване и управление на отпадъците (+15,3%) и сектор „Селско стопанство" (+6%), например, се регистрират повишения в обемите на отделяните емисии. Тези сектори, обаче, имат нисък относителен дял от общите емисии. Данните на НСИ очертават параметрите на въглеродното декуплиране. Така например, в сектор „Селско стопанство", БДС за периода 2019-2023 г. нараства с 21,7%, в секторите „Индустрия" и „Производство и разпределение на електроенергия" нарастването е с 63,2%. В сектор „Строителство", растежа на БДС е 59,8% за 2023 г. За целите на анализа за изходна година се взема 2019 г. (= 100). Резултатите са показани на фигура 1.

Фигура 1. Декуплиране БДС и емисии CO2 по сектори в икономиката 2019-2023 г.



Източник: Изчисления на автора по данни на НСИ

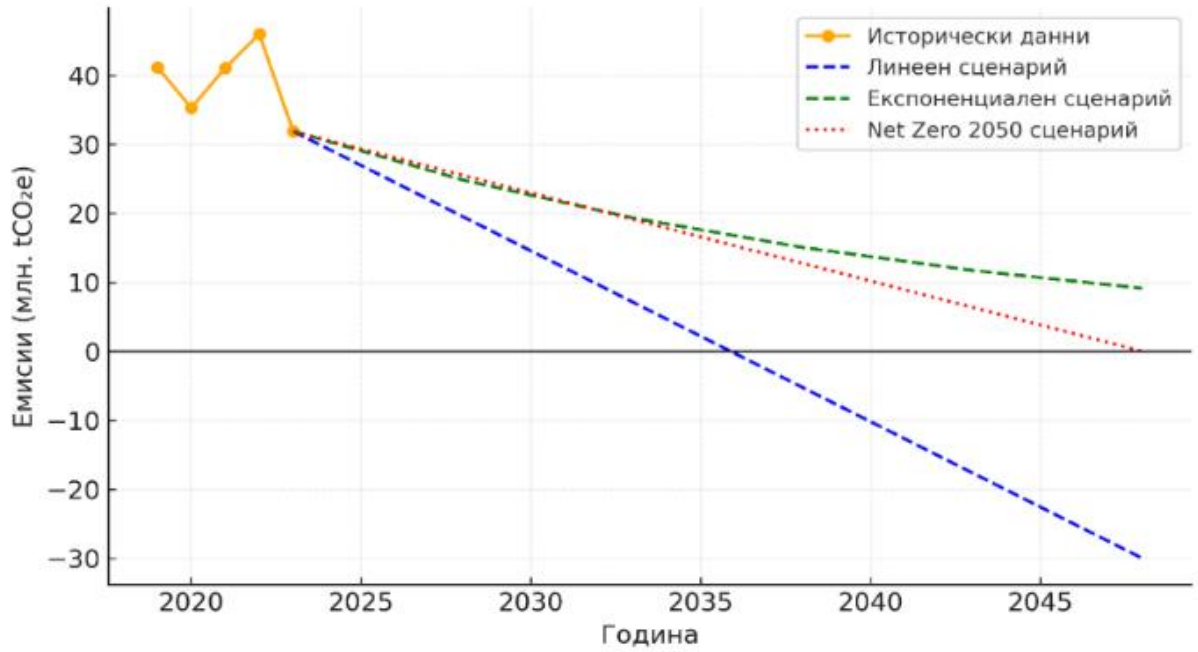
Съотнасянето на резултатите за емисиите по сектори с тези за БДС за периода 2019-2023 г. позволяват да се направят следните заключения:

- Сектор „Селско стопанство" е в състояние на относително декуплиране. БДС расте, но и емисиите растат с по-нисък темп. През 2020 г. секторът е бил в абсолютен декуплинг.
- Сектор „Индустрия" и сектор „Производство и разпределение на електроенергия" регистрират силен абсолютен декуплинг през 2023 г.
- Сектор „Строителство", стабилен абсолютен декуплинг. БДС расте, емисиите намаляват през 2022-2023 г., като единствено през 2021 г. емисиите нарастват с +4,5% за една година.

- Останалите сектори имат нисък дял от емисиите, но показват признаци на относително декуплиране.

Екстраполирането на данните предоставя възможност за извеждането на три възможни сценария за развитие в България за периода 2019–2050 г. показани на фигура 2.

Фигура 2. Прогноза за емисиите на България до 2050 г.



Източник: изчисления на автора

Историческите данни показват спад на емисиите след 2019 г., основно вследствие на намаленото потребление на въглища, повишената енергийна ефективност и частичното въвеждане на възобновяеми енергийни източници. Трите възможни сценария са:

Линейният сценарий (синя линия), който предполага постоянен темп на намаление на емисиите, при който България би постигнала нулеви нетни емисии около 2048–2050 г. Този подход обаче изисква устойчива и ускорена декарбонизация във всички сектори, което е трудно без значителни инвестиции и структурни промени.

Експоненциалният сценарий (зелена линия), който отразява по-реалистична траектория, при която първоначално намалението е по-бавно, но се ускорява след 2030 г. благодарение на навлизането на нови технологии и политики.

Net Zero 2050 сценарият (червена линия), който съответства на стратегическата цел на ЕС за въглеродна неутралност до средата на века. Той изисква пълно заместване на въглищата, мащабна електрификация на транспорта и индустрията, както и засилване на улавянето и съхранението на въглерод (CCS).

В сравнение с тях, историческата тенденция показва, че България е в начална фаза на абсолютно декуплиране между икономически растеж и емисии, като скоростта на промяната трябва да се утрои, за да се достигне целта Net Zero до 2050 г.

5. Изводи

Целите за въглеродна неутралност са постижими при определени условия. Ключово условие е изграждането на изследователска база данни за наблюдение на връзката между

растежа и емисиите поради нейния реверсивен характер (Parrique et al., 2019). Ето защо трябва да се включат освен топ-даун декомпозиционен подход в анализа (Sanyé-Mengual et al., 2019; Beylot et al., 2019) и други подходи като оценка на жизнения цикъл(отдолу-нагоре) (Sanyé-Mengual, Secchi, Corrado, Beylot, Sala 2019), хибридни подходи (Beylot et al., 2019, Wood et al.,2018), анализ на материалните потоци (Giljum et al., 2014), Schandl et al., 2016) и алтернативни индикатори (UNEP, 2011; Kubiszewski et al., 2013; van den Bergh, 2009).

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Teodora Peneva[1]

POTENTIAL GAPS IN BULGARIA'S SOCIAL CLIMATE PLAN: ASSESSING DRAFT MEASURES AND IMPACT ON ENERGY-POOR HOUSEHOLDS

***Abstract**: This article examines potential gaps and limitations in the Social Climate Plan, focusing on its draft versions. The study analyzes key components of the plan, including its structural framework, types of measures, budget allocation, and administrative mechanisms, with attention to potential challenges in implementation. Particular emphasis is placed on the identification of target groups, the intensity of grants, and support schemes, highlighting possible weaknesses in design, effectiveness, and administrative procedures. In addition, the study critically assesses the possible impacts on energy-poor households, including the risk of unequal access to benefits or potential loss of support due to gaps in targeting or implementation. The analysis aims to provide a critical framework for assessing the Social Climate Plan in its early stages and to offer insights for optimizing its design, promoting more equitable and sustainable implementation, without drawing conclusions on the finalized plan outcomes.*

***Keywords**: Social climate plan, energy poverty, climate management, government policy, sustainability*

JEL: *H53 I38 Q01 Q54*

1. Introduction

The Social Climate Plan (SCP) represents a key policy instrument designed to address the social effects of the green transition, particularly for energy-poor households and vulnerable consumers. The Plan allocates funds across several priority sectors and measures, aiming to support building renovation, sustainable transport, and direct income assistance. The Bulgarian draft version of the SCP[2] was published for public consultation in late June 2025, containing measures designed in accordance to Regulation (EU) 2023/955.

The objective of the article is to analyse the draft versions of the SCP, focusing on its overall structure, budget distribution, and mechanisms for implementation. It identifies methodological and design-related weaknesses that could limit its effectiveness in reducing energy poverty and promoting fair access to benefits.

2. State of the Problem

Although green transformation policies are a priority under the European Green Deal, the social dimension often remains secondary. Despite that the SCP is specifically invented to address the needs of the most vulnerable social groups in a society, yet, only 10 countries in the EU profited from the available technical support and conducted impact assessment prior to their plans design. Bulgaria was not one of them.

The definitions of the new vulnerable groups were published prior to the plan publication, to include more groups – households directly affected by the ETS 2 scheme (using oil, gas and coal for heating) with income below the mean (later on replaced by median income), and three subgroups for transport vulnerability. Yet, there are uncertainties about the size and energy consumption of the groups, the mechanisms for targeting them, as well as limited tools for tracking the real impact on vulnerable groups. There is a risk that some households in energy poverty will not be covered, while others, with less need, may receive disproportionate support.

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[2] *Draft SCP https://www.strategy.bg/bg/public-consultations/11203*

Furthermore, the administrative procedures for providing grants and subsidies can be overly complex and resource-intensive, especially for smaller municipalities and social institutionsq and can impede the timely and efficient investment of the fund's money.

Studies emphasise that the social dimension of climate change must be integrated into all stages of policy design to prevent regressive outcomes (Braun et al., 2022; Creutzfeldt et al., 2021, IMF, 2022). Several institutions stress the importance of targeted and data-driven interventions. The OECD (2022) and IMF (2022) point out that well-designed compensation mechanisms and income-support schemes can offset the distributional effects of carbon pricing and help maintain public trust. Similarly, some argue that targeted measures—rather than universal subsidies—are more effective in protecting vulnerable consumers while maintaining fiscal sustainability (Sgaravatti et al. (2023)). It is possible that untargeted financial transfers or across-the-board subsidies risk benefiting higher-income households disproportionately, thereby increasing inequality and reducing the incentive to reduce emissions (Guenette, 2020).

Recent studies highlight that effects of the ETS 2 scheme extend far beyond the technical domain of carbon pricing and emission reduction (Strambo et al., 2022). The transition to low-carbon mobility and housing systems depends on complex social, cultural, material, and economic transformations (Welch & Southerton, 2019). Energy and transport policies are embedded in pre-existing structures of social and spatial inequality, which influence who benefits from public investment and who bears the adjustment costs (Gates et al., 2019; Jessel et al., 2019). These insights are directly relevant for the SCP, whose effectiveness depends on its ability to integrate both financial and structural support mechanisms.

3. Methodology

The study is based on a qualitative analysis of the official draft versions of the Social Climate Plan published by the European Commission and individual Member States. A comparative approach is applied, through which the structural elements of the plan are assessed: target groups, types of measures, budgetary framework and administrative mechanisms.

4. Research Results

The results show that the SCP projects have a good conceptual basis, but suffer from several key weaknesses. Tthere are no sufficiently specific criteria for determining the intensity of financial support in relation to the degree of vulnerability. The envisaged administrative procedures do not always guarantee efficiency and transparency in the allocation of resources.

Overall Design

The Social Climate Plan (SCP) mobilizes a total of €3.33bn, combining European funds (€2.49bn, around 75%) and national financing (€0.83 billion, around 25%). The largest allocation of 45.1% targets the building sector to improve energy efficiency and reduce energy poverty. About 39.0% supports the automotive transport sector, fostering cleaner mobility and cutting transport poverty. Another 13.4% is directed to temporary income support for vulnerable households, while 2.5% funds technical assistance to strengthen implementation capacity. Together, these measures aim to ease the social impact of the green transition and contribute to emission reductions across key sectors.

Measure I1: Renovation of Multifamily Buildings

The measure allocates €826.7 million between 2026–2032 to renovate 2,050 buildings, supporting 25,625 vulnerable households. Criteria for selecting buildings with "high concentration" of energy-poor households are unclear. Municipalities are expected to play the

leading role in coordination, project preparation, and implementation. All residents, regardless of income, will receive full grants in eligible buildings, which risks.

Challenges of the measure include 1) unclear principles for determining buildings with "high concentration" of energy-poor households; 2) inefficient targeting and potential benefit leakage toward non-vulnerable groups - nearly 80% of the grants going to households with income above the "energy poverty" threshold (ERI-BAS, 2025); 3) overburden of local capacities and high concentration of decision-making in local municipalities, non-inclusion of all stakeholders in the process – banks, businesses, NGOs.

Measure I2: Energy Communities

This measure foresees €333 million to establish renewable energy communities, producing an additional 676 MW of capacity by 2032. Participation requires upfront investment, which may limit access to wealthier participants, though at least 30% of the produced energy must be supplied to vulnerable households at fixed prices. The measure is intended to support 84,525 vulnerable households. The measure targets community-based renewable energy generation, aiming to provide long-term benefits for energy-poor households. Administrative mechanisms rely on local coordination of energy communities.

Challenges include 1) the upfront investment requirement, which restricts participation by the most vulnerable households, potentially reinforcing inequality, creating dependency on community organizers rather than empowering households directly; 2) lack of a framework or mechanism to monitor when and under what conditions the investment is considered repaid; 3) lack of transparency regarding project stages, objectives, and evaluation indicators further complicates effective monitoring and accountability.

Measure I3: Warm Home

With a budget of €200 million, this measure supports energy efficiency improvements in 12,000 single-family homes and the installation of heat pumps in 2,300 homes. Municipalities act as intermediaries in project management, and the measure is intended to cover households that are energy-poor. The measure focuses on home insulation, heating system upgrades, and heat pump installations to reduce energy consumption and costs.

Challenges arise from 1) vague eligibility criteria for affected by ETS 2 groups; 2) the reliance on municipal administration creates potential bottlenecks and overburden of local capacities.

Measure I4: Energy-Efficient Cooking Appliances

This €139 million measure introduces a voucher-based system for purchasing energy-efficient cooking appliances. It targets vulnerable households and aims to combine transparency and flexibility in its implementation. The measure is intended to support 166 594 vulnerable consumers. Administrative mechanisms rely on voucher distribution, which simplifies access and ensures a standardized process. The measure contributes to reducing household energy consumption and provides a direct, tangible benefit for energy-poor consumers.

Challenges include 1) the lack of a clear definition of "vulnerable consumers," which may result in unfair allocation; 2) a risk of undercoverage if eligibility rules are too vague or inconsistently applied.

Measure T1: Support for Sustainable Transport Solutions in Bulgarian Municipalities

This measure aims to promote sustainable transport solutions at the municipal level, including the deployment of electric vehicles across municipalities in Bulgaria. The goal is the delivery

of 1,325 electric vehicles by 2032, contributing to lower emissions and enhanced accessibility in urban areas. Administrative responsibilities include project management at municipal and national levels, including coordination, monitoring, and reporting of vehicle procurement and deployment.

Challenges for this measure include the risk that selection criteria for municipalities and projects may not adequately prioritize areas with the most vulnerable populations, potentially reducing the social impact of the intervention.

Measure T2: Support for the Purchase of Zero- and Low-Emission Vehicles by Vulnerable Microenterprises

This measure provides financial support for vulnerable microenterprises to acquire zero- or low-emission vehicles, aiming to improve environmental performance in both the building and transport sectors. By 2027, approved projects will be published, with implementation targets set for 1,032 microenterprises by 2029. The measure is designed to reduce emissions, promote green business practices, and enhance the resilience of small enterprises. Administrative mechanisms include project approval, monitoring, and reporting of beneficiary enterprises.

Challenges include limited accessibility for the most resource-constrained microenterprises, as some may lack the capacity to co-finance initial investments or navigate grant procedures.

Measure T3: Provision of Regular Services with Electric Motor Trains on Electrified Railway Lines

This measure focuses on improving rail transport by purchasing 23 electric motor trains by 2027, aiming to enhance services along 143 electrified railway lines. The measure is expected to improve mobility for potentially vulnerable transport users, targeting 519,000 beneficiaries by 2027. Administrative responsibilities include procurement, scheduling, and ensuring service reliability on electrified lines, with oversight by national and regional rail authorities.

Challenges include: 1) addressing social criteria is impossible with this measure; 2) lack of additional services and transport roots connecting residents with the railway stations.

Measure T4: Mobile Access to Health Services for Vulnerable Groups in Transport-Isolated Areas

This measure provides vulnerable populations in transport-isolated areas with access to health services through electric mobile health units. Contracts for vehicle delivery are scheduled for 2026 and 2027, with the target of delivering 50 vehicles by 2027 and 150 vehicles by 2029. The measure aims to enhance healthcare accessibility for isolated communities, reduce social exclusion, and contribute to a fair climate transition. Administrative mechanisms involve procurement, vehicle deployment, and coordination with healthcare providers.

Challenges include the logistical complexity of deploying mobile units across isolated regions, ensuring that vehicles are used efficiently and reach the intended vulnerable populations. Unclear criteria for prioritizing locations and beneficiaries may result in uneven access or underutilization.

Measure T5: Solidarity Mobility for a Fair Climate Transition

This measure seeks to improve transport access for vulnerable users, ensuring enhanced access to essential health and social services. By 2030, the measure aims to improve mobility for 42,000 vulnerable transport users, promoting social inclusion and equitable participation in the

green transition. The intervention relies on integrated transport planning and monitoring mechanisms to ensure that mobility gains translate into tangible social benefits.

Challenges are not analyzed for this measure, as all organization and management details are lacking at this level.

5. Conclusions

The Social Climate Plan (SCP) has a strong conceptual foundation, targeting key sectors for decarbonization and social support, but several weaknesses may limit its effectiveness. Targeting mechanisms often rely on outdated data, and financial support is not clearly linked to the degree of vulnerability, reducing equity. Administrative procedures do not always ensure efficiency or transparency, increasing the risk of delays, mismanagement, or misallocation of funds.

Building measures, such as renovations and energy efficiency improvements, face unclear selection criteria and overburdened municipal administrations, which may compromise effectiveness and risk benefiting non-vulnerable households. Energy communities require upfront investments, potentially excluding the most vulnerable and creating dependency on wealthier participants.

Transport measures, including electric vehicles, mobile health units, and railway upgrades, face similar challenges: administrative complexity, insufficient beneficiary criteria, and gaps in complementary services could limit access for vulnerable populations.

Overall, the SCP mobilizes €3.33 billion to support buildings, transport, income assistance, and technical capacity. Its success depends on flexible, localized, and data-driven monitoring and adjustment mechanisms; without them, social disparities may persist, benefits could be misallocated, and environmental and equity goals may not be fully achieved..

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Nikolay Baltov[1]

ECONOMIC ARGUMENTS IN THE PROCESSES OF (DE)LEGITIMATION OF THE GREEN TRANSITION POLICY: TWO CASES FROM THE BULGARIAN MEDIA DISCOURSE

***Abstract**: Economic arguments have a crucial role in the (de)legitimation of the green transitions. This article examines the economic debate on the European Green Transition in two Bulgarian online-based media outlets. The discourse analysis identifies sixteen economic story-lines. Nine of them are embedded within a strongly delegitimizing discourse that portrays the transition as a bureaucratized process leading to economic decline. Seven are organized around a discourse of inevitable economic transformation, which presents the transition not as a threat to the economy but as an opportunity for its modernization, emphasizing the benefits of renewable energy sources over the limitations of a fossil fuel-based economy. The study contributes by revealing the fundamental arguments underpinning the (de)legitimation of the green transition, as well as the logic of their unfolding.* ***Keywords**: story-line; economic arguments; (de)legitimation; discourse, green transition*
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1. Introduction

Legitimation as a process has a discursive dimension and is linked to argumentation (Bäckstrand, Söderbaum, 2022; Berger, Luckmann, 1991; Patterson, 2023; van Leeuwen, 2008). The importance of economic discourses has increased since the crisis at the end of the first decade of the 21st century (Gillard, Lock, 2017; McNally, 2015), and today they have become the dominant resource in the struggles over the (de)legitimation of green transitions (Küppers, 2024; Markard et al., 2021; McNally, 2015).

The main objective of the study is descriptive: to trace how the debate on the European Green Transition (EGT)—and, more specifically, its economic dimension—unfolds in two influential Bulgarian media outlets. Such an endeavor expands knowledge about (de)legitimation of the EGT in the post-socialist countries, where these processes remain understudied. The research demonstrates that arguments for (de)legitimization are constitutive for story-lines constructing the EGT as a threat (delegitimizing story-lines) or as an opportunity (legitimizing story-lines).

2. Theoretical Framework

Economic arguments for legitimation

Past studies have shown that the main group of legitimation arguments is based on rationalizations, in the sense used by van Leeuwen (2008), in which (economic) benefits can serve as a point of legitimation. Among the most common arguments are those concerning "neo-industrialisation" (Fischer et al., 2020), "innovations" (Leipprand et al., 2016), the promised ecological and social modernization (Leipprand, Flachsland, 2018; Markard et al., 2021), economic benefits and new jobs (Aklin, Urpelainen, 2013; Leipprand et al., 2016; Leipprand, Flachsland, 2018; Markard et al., 2016), "opening up of new markets" (Leipprand et al., 2016) and "strengthening of competitiveness" (Leipprand et al., 2016). Hermwille et al. (2023) have identified a legitimating narrative that views the European Green Deal (EGD) as a factor that can transform Silesia in a "locomotive of growth" (p. 8).

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In other cases, result-based legitimation is constructed through the delegitimation of coal-fired power plants, represented as causing reduced competitiveness (Rosenbloom, 2018) and as hindering the emergence of new opportunities for economic development (Hermwille et al., 2023).

Morality plays an important role in processes of (de)legitimation (van Leeuwen, 2008), and economic values such as "economic viability" (Shukla, Swarnakar, 2023) are used to legitimize renewable energy. Economic arguments are used to legitimize low-carbon transitions by moralizing coal as "expensive" (Markard et al., 2021) and the activity of coal-fired power plants as a "drain on the economy" (Rosenbloom, 2018) , and invoking claims about the rising "price of inaction" (Gillard, Lock, 2017).

Economic arguments for delegitimation

The first type of economic arguments are those that refer to undesirable economic effects and include claims that climate mitigation policies cause harm to the national economy (Küppers, 2024; Lamb et al., 2020; Leipprand, Flachsland, 2018) regional economies (Hermwille et al., 2023; Leipprand, Flachsland, 2018), deindustrialization (Kungl, 2015; Vatsov et al., 2025), harm to citizens (Küppers, 2024; Lamb et al., 2020; Vatsov et al., 2025), "job losses" (Brauers et al., 2020; Leipprand et al., 2016; Leipprand, Flachsland, 2018) "unemployment" (Markard et al., 2021), "loss of competitiveness" (Brauers et al., 2020; Carattini et al., 2017; Haas, 2019; Kungl, 2015; Leipprand, Flachsland, 2018) and "rising electricity prices" (Aklin, Urpelainen, 2013; Leipprand et al., 2016; Leipprand, Flachsland, 2018). Renewables can be delegitimized through claims about their lack of capacity to meet energy needs (Hermwille, 2016), while climate policies are delegitimized by portraying them "as a tool to squeeze money out of the taxpayers" (Küppers, 2024, p. 15).

Common moral arguments about decarbonization policies include those related to "economic unfairness" (Hylander et al., 2024; Leipprand, Flachsland, 2018), "financial injustice" (Arning, Ziefle, 2020), being "costly" (Gillard, Lock, 2017) and arguments describing transition policies as "socialism" (Küppers, 2024). Another type of argument concerns the "affordability" of electricity produced from fossil fuels (Hermwille et al., 2023; Pons-Seres de Brauwer, 2022; Rosenbloom, 2018), including the claim that coal is "cheap" (Markard et al., 2021). Delegitimation can also be achieved through the representations of the coal industry as "the backbone of prosperity" (Hermwille et al., 2023, p. 8). The EGD has been delegitimized on the basis of a manifested incompatibility with the values of economic rationality and economic efficiency (Vatsov et al., 2025), and the values of economic security (Hermwille et al., 2023).

3. Methodology

The methodological approach is based on a secondary analysis of data from a broader media study grounded in discourse analysis following the model of van Leeuwen (2008). As a result of the analysis conducted in the aforementioned study, arguments through which the EGT policy is (de)legitimized have been identified. For the purposes of the present research, the already identified economic (de)legitimation arguments are examined as elements of "story-lines" in the sense proposed by Hajer (2002; 2006)—"condensed statements summarizing complex narratives" (Hajer, 2006, p. 69). They are analyzed within the traditions of argumentative discourse analysis, developed by Hajer (2002; 2006), where "[t]he point of the story-line approach is that by uttering a specific element one effectively reinvokes the story-line as a whole" (Hajer, 2002, p. 62). The identified arguments are subject to a re-analysis, tracing whether and by which story-lines they are embedded.

The arguments examined and re-analyzed here were identified in 493 publications containing the keywords ("Green transition," "Green Deal," "Green Pact") within the period from October

1, 2023, to March 31, 2025. All publications meeting these criteria were included, making the corpus comprehensive for the specified period. The arguments are part of the content of two of the media outlets analyzed in the source study—the specialized economic media outlet (capital.bg) and the media outlet with propagandistic characteristics (fakti.bg), identified as spreading propaganda by Vatsov et al. (2025). The two media outlets were selected because of their high public recognition across different audiences and contrasting profiles, allowing the debate to be captured more comprehensively. The study has its limitations: it does not provide a fully representative picture of the entire complexity of the economic debate on the EGT but rather outlines its significant focal points.

4. Results

The data analysis reveals the presence of seven legitimizing story-lines and nine delegitimizing story-lines. The delegitimizing story-lines are constructed more frequently in the content of the media outlet with propagandistic characteristics, while the legitimating story-lines are more prominently represented in the specialized economic media.

Figure 1. Story-lines of legitimation and delegitimation of the EGT

LEGITIMIZING STORY-LINES	DELEGITIMIZING STORY-LINES
The coal industry has declining functions in the electricity market.	The Green Deal is killing the Bulgarian/European energy sector
Coal-fired power plants are loss-making, inefficient, and uncompetitive.	The Green Deal is a major problem for farmers
Green transition is an opportunity for the economy and the energy sector to modernize.	The Green Deal is destroying the economy and competitiveness.
Energy from renewables is cheap and competitive.	Emission quotas make electricity expensive and coal-fired power plants uncompetitive.
Electricity from coal-fired power plants is expensive and uncompetitive.	More expensive electricity.
Decarbonization leads to the creation of new jobs.	Thousands of people will lose their jobs.
Decarbonization leads to a reduction in energy costs.	The Green Deal/transition is bureaucratic and overregulated.
	The Green Deal leads to deindustrialization.
	The Green Deal causes losses for citizens.
	Emission quotas make electricity expensive and power plants uncompetitive.

Source: Author's elaboration

The legitimizing and delegitimizing story-lines position the subjects in entirely different ways. It is particularly evident that the story-lines delegitimizing the EGT position various actors as victims of the transition—those who lose their jobs, face difficulties, pay higher electricity prices due to emission quotas, and live in economies that are suffering. On the other hand, the legitimizing story-lines position social actors as people who lose out because of the absence of a transition and as people for whom the transition opens up new opportunities. Threat and opportunity are juxtaposed.

Delegitimizing story-lines are particularly critical of institutions at both the European and national levels, while the legitimizing ones do not problematize the institutional order. In this

sense, while the legitimizing story-lines convey ideas of hope, the delegitimizing ones seek to impose ideas of institutional guilt and the responsibility of Bulgarian and European institutions.

5. Conclusion

The findings indicate that, overall, the economic argumentation underlying the (de)legitimation of the EGT follows the pattern established in previous research, reproducing well-known arguments both "for" and "against" decarbonization policies. It is notable how events from social reality—particularly the farmers' protests—are strategically exploited to construct delegitimizing story-lines. Such a strategy delegitimizes the EGD by portraying it as an economic problem for farmers but also increases its credibility. The analysis further shows that the debate on the EGT oscillates between two constructed discourses: a discourse of economic decline, which delegitimizes transition policies by depicting social reality as a world of economic deterioration, and a discourse of economic transformation, presented as inevitable and as opening opportunities for the modernization of the economy and the replacement of energy from inefficient, uncompetitive, and loss-making coal-fired power plants with cheap and competitive energy produced from renewable sources.

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ПУБЛИЧНО-ЧАСТНОТО ПАРТНЬОРСТВО В ОБРАЗОВАТЕЛНАТА СФЕРА

Резюме: *В статията се разглежда ролята и значението на публично-частните партньорства (ПЧП) в образователната сфера, като анализира техните възможности, предизвикателства и постигнати успехи. Въвежда се концепцията за ПЧП като модел за съвместна дейност между държавата и частния сектор с цел подобряване на качеството и достъпа до образование. Възможностите, които предлага ПЧП, включват разширяване на ресурсната база, иновации в обучението, модернизация на инфраструктурата и повишаване на ефективността на управлението. Този модел позволява по-голяма гъвкавост, привличане на инвеститори и развитие на нови образователни програми, съобразени с нуждите на пазара на труда.*

Ключови думи*: образование; иновации; развитие; управление; устойчивост.*

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PUBLIC-PRIVATE PARTNERSHIP IN THE EDUCATIONAL SPHERE

Abstract: *The article examines the role and significance of public–private partnerships (PPPs) in the educational sphere, analyzing their opportunities, challenges, and achievements. It introduces the concept of PPPs as a model of joint activity between the state and the private sector with the aim of improving the quality and access to education. The opportunities offered by PPPs include expanding the resource base, innovations in teaching, modernization of infrastructure, and increasing the efficiency of governance. This model enables greater flexibility, attracts investors, and fosters the development of new educational programs aligned with the needs of the labor market.*

Keywords*: education; innovation; development; governance; sustainability****.***

JEL*: I21*

1. Увод

Обосновка на темата и значимостта на публично-частното партньорство в образованието

Публично-частното партньорство (ПЧП) е модел на сътрудничество между публични органи и частни компании, който става все по-популярен в световен мащаб. Обосновката на темата и значимостта на ПЧП могат да бъдат разгледани от няколко различни ъгъла:

- ефективност на ресурсите – ПЧП позволява по-ефективно използване на публичните и частните ресурси. Частният сектор често разполага с по-гъвкави технологии, иновации и управленски практики, които могат да подобрят качеството на услугите и инфраструктурата, предоставяни от публичния сектор. Чрез партньорства, държавата може да намали разходите и да увеличи ефективността.
- иновации и технологии - Частните компании обикновено имат по-добро възприятие във внедряването на иновации и нови технологии. ПЧП може да стимулира иновациите в публичния сектор, като предоставя възможности за експериментиране и внедряване на нови решения в управление на проекти, услуги и инфраструктура.

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- качество на услугите - чрез ПЧП се постига по-високо качество на услугите, предлагани на гражданите. Частните партньори са мотивирани да предоставят услуги на високо ниво, тъй като техният успех зависи от удовлетвореността на потребителите. Това може да доведе до по-добро обслужване и по-високо качество на публичните услуги.
- финансова устойчивост – ПЧП може да осигури допълнителни финансови ресурси за публичния сектор, особено в условия на ограничени бюджетни средства. Частният сектор може да инвестира в инфраструктура и проекти, които иначе биха били извън финансовите възможности на държавата.,да ангажира обществото и местните общности в процеса на вземане на решения. Частните компании, които работят в партньорство с публичния сектор, могат да бъдат по-отговорни и ангажирани в социални инициативи, които подобряват живота на гражданите, защото са в непосредствен контакт с крайния ползвател.
- устойчиво развитие - ПЧП може да допринесе за устойчивото развитие, като осигурява интегриран подход към икономическото, социалното и екологичното развитие. Партньорствата могат да включват проекти, насочени към опазване на околната среда и социална справедливост.

Публично-частното партньорство представлява важен инструмент за модернизация и развитие на обществени услуги и инфраструктура. То предлага множество предимства, включително повишена ефективност, иновации, по-добро качество на услугите и финансова устойчивост. То дава възможност на публичния сектор да държи ръка на пулса на деня, а на частния да бъде адекватен в конкурентна среда чрез допълнителни гаранции за стабилност.(вж.„Публично-частното партньорство в училищното…")

2. Теоретични основи на публично-частното партньорство. Определение и основни концепции на ПЧП.

Публично-частното партньорство (ПЧП) представлява форма на сътрудничество между публичния сектор (държавни и местни власти) и частния сектор (частни компании и инвеститори) с цел предоставяне на услуги, инфраструктура или публични проекти. Основната идея е да се обединят ресурсите, опитът и иновациите на двата сектора, за да се постигнат по-добри резултати в общественото обслужване и инфраструктурното развитие.

Основни концепции на ПЧП:

1. *Съвместна работа*: ПЧП предполага активна колаборация между публичния и частния сектор. Двете страни работят заедно за постигане на общи цели, като всяка от тях носи свои специфични ресурси и компетенции.
2. *Риск и отговорност:* В ПЧП рисковете и отговорностите се разпределят между партньорите. Частният сектор често поема значителна част от финансовите рискове, докато публичният сектор осигурява регулаторна рамка и контрол.
3. *Дългосрочен ангажимент*: ПЧП обикновено се реализира чрез дългосрочни договори, които могат да продължат десетилетия. Това позволява на частния сектор да направи значителни инвестиции, знаейки, че ще има дългосрочна възвращаемост.
4. *Иновации и ефективност:* Частният сектор често внася иновации и ефективност в управлението на публични проекти. Той може да предложи нови технологии,

управленски практики и по-добра организация, което води до по-добро обслужване на гражданите.

5. *Финансиране:* ПЧП може да включва различни модели на финансиране, включително частно финансиране, държавно финансиране или комбинация от двете. Частният сектор може да инвестира в изграждането на инфраструктура, а публичният сектор да осигури дългосрочни приходи чрез такси или публични средства.
6. *Обществена стойност:* Целта на ПЧП е не само икономическа печалба, а и създаване на обществена стойност. Проектите трябва да отговарят на обществени нужди и да допринасят за устойчивото развитие на общността.
7. *Регулаторна рамка:* ПЧП трябва да се осъществява в съответствие с ясни правни и регулаторни рамки, които да защитават интересите на всички участници и да осигурят прозрачност и отговорност за всички въвлечени страни.

ПЧП представлява динамична и гъвкава форма на споразумение, която може да бъде адаптирана към различни контексти и нужди на обществото. Правилното планиране и управление на ПЧП може да доведе до значителни ползи както за публичния, така и за частния сектор, както и за гражданите.

Основни модели на ПЧП в образованието:

В глобалното общество често ПЧП в образованието е форма на сътрудничество.

В Европа е инструмент за модернизация и развитие на образователните системи, но изисква внимателно управление, прозрачност и баланс между интересите на държавата и частния сектор:

- образователни програми с участието на частни компании в Германия и Франция;
- модели на сътрудничество в Обединеното кралство за развитие на университетски кампуси;
- иновационни училищни проекти в скандинавските страни.
- Примери за ПЧП в САЩ:
- Charter Schools: Частни инициативи, които функционират независимо от държавната система, финансирани и управлявани чрез публични средства и частни инвеститори;
- технологични партньорства: компании като Google, Microsoft и други си сътрудничат с училища за внедряване на дигитални платформи, обучение и инфраструктура;
- Спонсорство и дарения: корпорации и фондации предоставят финансиране за учебни програми, инфраструктурни подобрения и спортни или културни събития.

Публично-частното партньорство (ПЧП) в образованието в Близкия изток е важна стратегия за подобряване на качеството, достъпа и ефективността на образователните услуги. В региона, който включва страни като Саудитска Арабия, Обединените арабски емирства, Египет, Йордания и други, ПЧП се използва като инструмент за привличане на частни инвестиции, иновации и управление в сферата на образованието.

У нас може да бъде форма на сътрудничество между публичния сектор (държавата или местните власти) и частния сектор (частни компании и организации) с цел подобряване на качеството на образованието и ефективното управление на ресурсите.

Основните модели на ПЧП в образованието могат да бъдат разгледани в следните направления:

1) Строителство и управление на учебни заведения:
   а) Частни инвеститори изграждат учебни заведения (училища, университети) и след това ги управляват за определен период от време.
2) Финансиране на образователни програми:
   а) Частни компании финансират специализирани образователни програми или проекти, които са в интерес на обществото. В замяна те получават определени данъчни облекчения или публична видимост.
3) Съдействие за развитие на учебни програми:
   а) Частният сектор може да участва в разработването на учебни планове и програми, особено в области, свързани с новите технологии и иновации, което улеснява прехода на учениците към реалния пазар на труда.
4) Обучение и повишаване на квалификацията на учители:
   а) Частни организации предлагат програми за професионално развитие на учители, което може да включва курсове, семинари и менторски програми.
5) Технологични решения и иновации:
   а) Частни компании предлагат технологии и софтуерни решения за управление на образователния процес, което може да включва платформи за онлайн обучение, системи за оценяване и управление на данни.
6) Управление на извънкласни дейности:
   а) ПЧП може да включва и управлението на извънкласни дейности и програми, които допълват образователния процес, като спортни, културни и социални инициативи.
7) Спонсорство и партньорства:
   а) Частният сектор може да спонсорира събития, конкурси и програми в училищата, което предоставя допълнителни ресурси и възможности за учениците.
8) Модели, при които държавата плаща на частния сектор за предоставяне на образователни услуги, се срещат в различни държави по света. Тези модели са част от по-широката концепция за публично-частно партньорство (ПЧП) в образованието и могат да варират по структура и степен на държавна намеса.

Някои примери включват:

- образователни ваучери и финансова подкрепа – в страни като Швеция, Дания, Нидерландия и Великобритания държавата предоставя ваучери или финансова подкрепа, които родители могат да използват за плащане на частни училища. Това позволява на частни институции да предоставят услуги, финансирани от държавата.
- договаряне и договори с частни училища – в Австралия, Канада и части от Съединените щати държавата може да сключва договори с частни училища, които получават финансиране за предоставяне на образование, съответстващо на държавните стандарти;
- публично-частни партньорства в образователната инфраструктура и услуги – в някои държави се използват модели, при които частни компании управляват училища или предоставят допълнителни услуги (например, транспорт, хранене), като получават финансиране от държавата.

Обобщено, такива модели се срещат главно в скандинавските страни, Обединеното кралство, Австралия, Канада и някои щати в САЩ. Те са част от усилията за повишаване на конкуренцията, подобряване на качеството и разширяване на достъпа до образование чрез включване на частния сектор в публичната образователна система.Успешното прилагане на ПЧП в образованието изисква ясни рамки, правила и контрол, за да се гарантира качеството на услугите и защита на обществените интереси. В България вече се наблюдават подобни практики, като те се превръщат постепенно в национални програми и стратегически рамки на МОН. (вж. ophelia.live/wp-content/uploads/2024/05)

3. Възможности на ПЧП в образователната сфера

Публично-частното партньорство не е чуждо за българската действителност. Успешно се реализират партньорства при предоставянето на социални услуги почти две десетилетия.

1) Цел и значение:
   a) Осигурява финансиране, експертиза и ефективност на частния сектор за реализиране на важни обществени проекти.
   b) Позволява разпределяне на рисковете между публичния и частния сектор.
   c) Постигане на високо качество на предлаганите образователни дейности
   d) Намаляване на бюджетните разходи
2) Типове ПЧП:
   a) Договори за строителство и експлоатация (Build-Operate-Transfer, BOT)
   b) Договори за управление (Management contracts)
   c) Лизингови схеми
   d) Споразумения за съвместно предприятие
3) Основни характеристики:
   a) Дългосрочно сътрудничество
   b) Финансово участие на частния сектор
   c) Предоставяне на услуги или инфраструктура за обществото
   d) Разпределяне на рисковете и отговорностите между участниците
4) Предимства:
   a) Повишена ефективност и качество на услугите
   b) Намаляване на публичните разходи
   c) Иновации и експертен опит от частния сектор
   d) Стимулиране на икономическия растеж и развитие
5) Предизвикателства и рискове:
   a) Необходимост от добро управление и контрол
   b) Възможни конфликти на интереси
   c) Необходимост от прозрачност и коректност при сключване на договорите
   d) Дългосрочната финансова ангажираност
6) Модели и форми:
   a) Концесии
   b) Договори за управление
   c) Оперативни договори
   d) Дългосрочни партньорства за доставка на услуги
7) Етапи на реализиране:
   a) Идентифициране на проектите и нуждите
   b) Подготовка и анализ на проекта
   c) Процес на избор на партньор
   d) Подписване на договори

   e) Изпълнение и контрол
   f) Мониторинг и оценка
8) Основни принципи:
   a) Прозрачност и публичност
   b) Ефективност и икономическа обоснованост
   c) Оспоряваемост и конкуренция
   d) Държавен контрол и регулация
   e) Споделяне на рисковете между партньорите
9) Рискове и предизвикателства:
   a) Рискове от неправилна оценка и управление
   b) Възможност за корупционни практики
   c) Непрозрачност в процесите
   d) Дългосрочни ангажименти и финансови последици
10) Ролята на държавата:
   a) Регулатор и надзор
   b) Инициатор и координатор
   c) Гарант и посредник

Публично-частното партньорство е инструмент за съвместна реализация на обществени цели, който съчетава ресурсите и експертизата на двата сектора с цел постигане на по-ефективно и устойчиво развитие. Тази концепция е важна за развитието на съвременната публична администрация и икономика, като позволява по-устойчиво и ефективно реализиране на обществени нужди чрез сътрудничество между публичния и частния сектор. (вж. ophelia.live/wp-content/uploads/2024/05/Pedagogy)

Правна рамка на управлението на училищното образование и възможностите за публично-частно партньорство в сферата, съгласно действащото в страната законодателство

Правно-нормативна уредба

Училищното образование в Република България се регулира от Закона за предучилищното и училищното образование, както и подзаконовите актове по приложението му. Законът определя като участници в образователния процес децата, учениците, учителите, директорите и другите педагогически специалисти, както и родителите (ЗПУО, чл. 2, ал. 2). Образователният процес се осъществява посредством институциите в образованието - детските градини, училищата, центровете за подкрепа за личностно развитие и специализираните обслужващи звена (ЗПУО, чл. 2, ал. 3). Законът дава възможност за участието и на по-широк кръг от лица в образователния процес, доколкото съгласно чл. 2, ал. 4 от ЗПУО участниците в образователния процес и институциите могат да си партнират с общините и с други заинтересовани страни.

Държавната политика в областта на училищното образование се осъществява от Министерския съвет (ЗПУО, чл. 251). Министърът на образованието и науката ръководи и координира провеждането на държавната политика в областта на училищното образование.(ЗПУО, чл.256, ал.3). (вж.analiz-publichno-chastni-partnorstva….)

4. Изводи

Образователната система все повече е в затруднение да отговори на предизвикателствата на съвремието, както и на заинтересованите страни – общността, семейството, личността. Инициирането на практиките на ПЧП в училищното

образование ще съдейства за намиране на по-добри решения, които да гарантират в бъдеще успехите на личностните, социокултурни и икономически фактори на процеса.

Комбинирането на ресурси в практико-приложни решения в духа на съвременното управление на процесите така, че да се изграждат механизми за изпреварване на предизвикателствата и несъвършенствата на училищното ежедневие, е все по-естествен за обществото и държавата еволюционен ход. Той не е чужд за България.

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Mihaela Todorova[1]

BLOCKCHAIN IN THE PUBLIC SECTOR – OPPORTUNITIES AND CHALLENGES

***Abstract**: Today's dynamic society is characterised by increasing digitalisation, which is changing the way citizens interact with institutions and participate in public processes. The public sector faces many challenges, and modern solutions must be found to overcome them. Blockchain is an innovative technology that can provide transparent and decentralized data storage, creating the conditions for optimizing public services and increasing trust between citizens and institutions. This study examines and summarizes the opportunities that the technology can provide, such as improving the efficiency of e-government, education, healthcare, corruption, e-voting, and others. The main challenges to the implementation of the technology in the public sector, which should not be overlooked, are also discussed. Practical examples are examined and a comparison is made of the blockchain application in the public processes of Estonia, Georgia, and Sweden.*

***Keywords**: blockchain; innovation; public sector; digitalization*

JEL: *O33; P43; E02*

1. Introduction

The efficiency of the public sector is of great public importance because the quality of life of citizens and the sustainable development of the country depend on its efficiency and transparency. In today's environment, the public sector faces many challenges and, for this reason, innovative solutions are being sought. The implementation of modern technologies is a key factor for the modernisation and optimisation of public administration.

Blockchain technology stands out as an alternative that has the potential to change the way data is stored, exchanged and verified in public administration. The technology is characterised by decentralisation, security and immutability of data, which creates conditions for the optimisation of administrative processes.

The significance and relevance of the topic stem from the fact that the public sector plays a key role in the well-being of society and that blockchain is an innovative technology. The subject of this study is the public sector, and the focus is on the processes that can be optimised with blockchain. The study aims to analyse the opportunities and challenges facing the implementation of blockchain in the public sector.

2. Problem

The main role of the public sector is to ensure the effective management of limited resources and the social welfare of society. There are many problems that a country must face in order to ensure the most effective and optimal results. The main challenges facing the public sector are presented in Figure 1

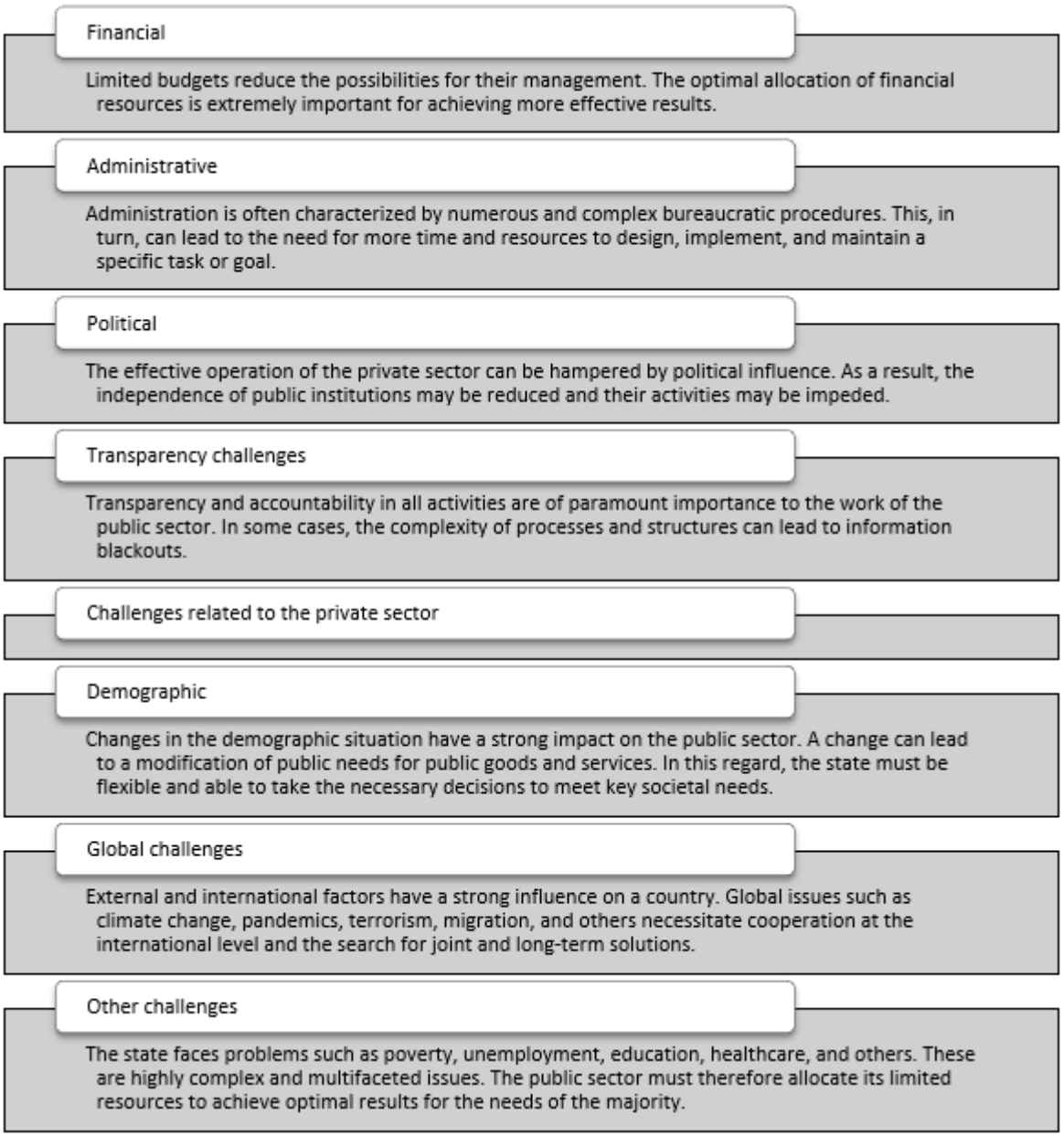
To overcome these challenges, innovative and modern solutions are sought to optimize public processes and increase efficiency, transparency, and security in information management. One of the alternatives that stands out is blockchain, which can offer decentralized data storage and immutability of records.

Blockchain became popular with the creation of Bitcoin and is therefore often associated with cryptocurrencies. At a basic level, the technology represents a chain of blocks, with each block containing a set of records and the hash value of the previous block. In today's world,

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blockchain has a lot of practical uses in different business processes and activities. The tech is mainly known for being secure, immutable, and transparent. No one can change or remove an existing block stored in the blockchain because the blocks in the technology are linked by hash values.

Figure 1: Main challenges facing the public sector



Source: Summary by the author:

The effectiveness of the technology depends on a number of factors such as the choice of consensus mechanism, type of blockchain, scalability, and others. There are public, private, and consortium blockchain systems, which differ in terms of control and access levels. The consensus mechanism used to ensure data consistency is also important. The combination of these factors is key to the degree of security, transparency, and sustainability of a blockchain system. It is necessary to thoroughly research all details and select the optimal options for the needs of the respective blockchain project.

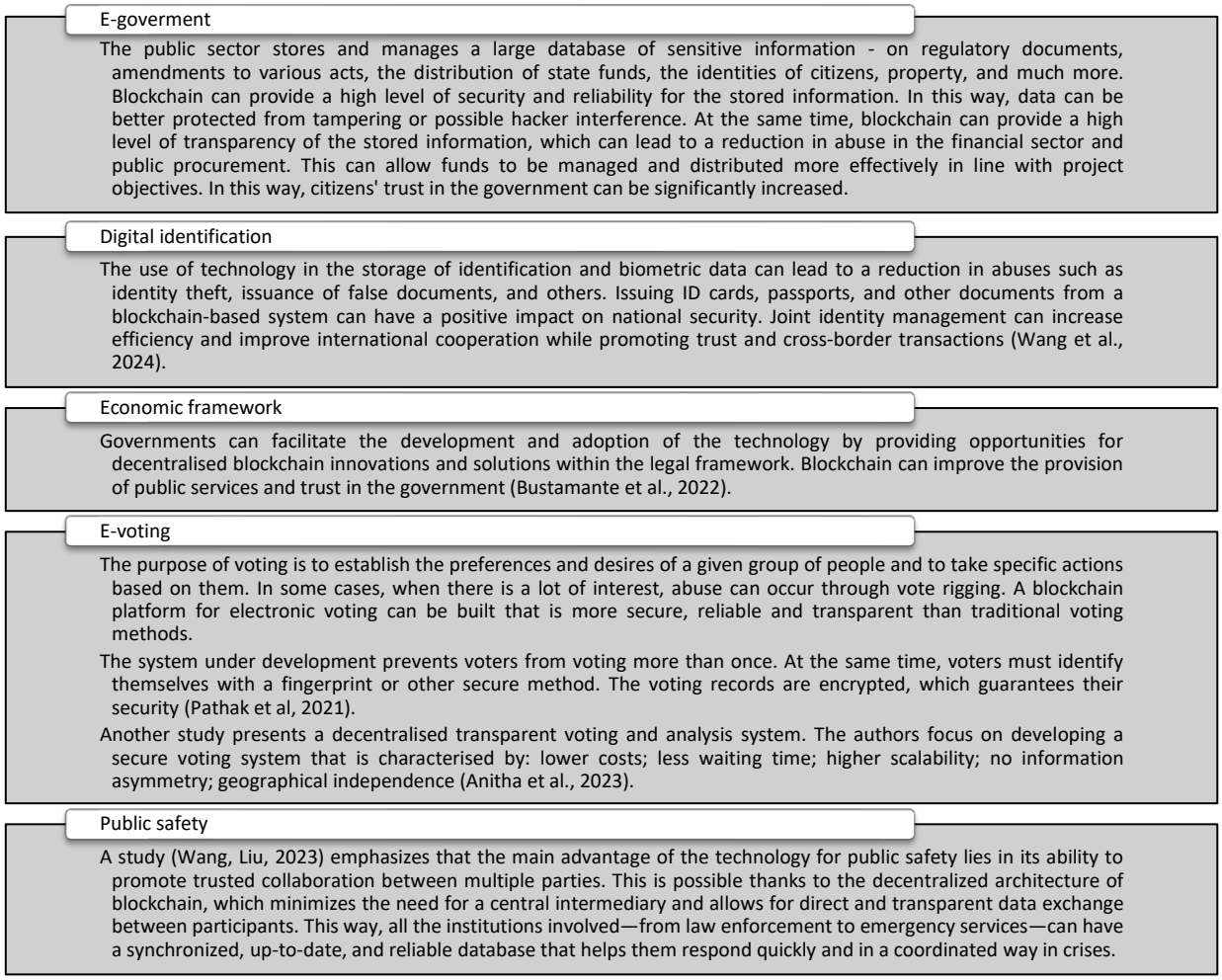
3. Methodology

The research methodology is based on a literature review on the application of blockchain technologies in the public sector, combined with a comparative analysis of practical examples. The following evaluation criteria were used for this purpose: level of digitization, areas of blockchain application, public attitudes, technical capacity, main challenges, and results achieved. This approach allows for the identification of both the potential and limitations of the technology in different contexts.

4. Results

Governments provide a wide range of services to citizens, and in a dynamic environment, their needs and desires are increasing. Administrative services are typically slow and inefficient, which in turn fails to meet citizens' expectations. (Aristidou, Marcou, 2019). For this reason, innovative measures need to be taken to improve services and increase public trust in the government. The main applications of blockchain in the public sector can be classified by their primary benefits into three groups: transparency and trust (Figure 2), efficiency and optimization (Figure 3), and data security (Figure 4).

Figure 2: Application of blockchain in the public sector for transparency and trust



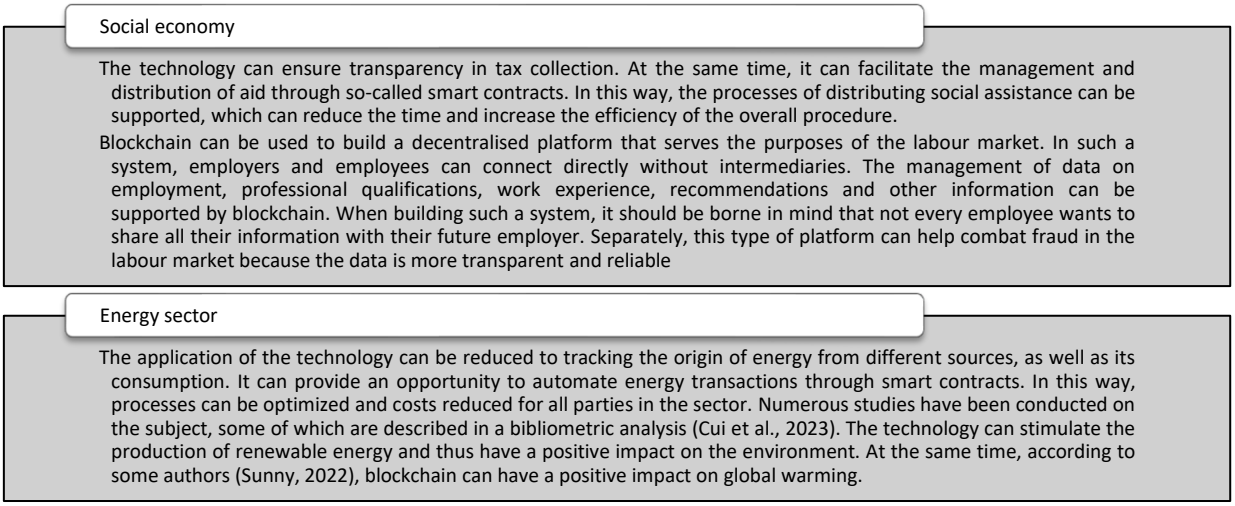
Source: Summary by the author

Corruption is seen as a threat to global security, which is why numerous studies and research projects are being carried out, as it is an extremely difficult quantity to measure. The application of blockchain in various aspects of the public sector can ensure transparency and thus help in

the fight against corruption. This, in turn, can lead to a more efficient and rational use of public funds for the management and provision of public goods.

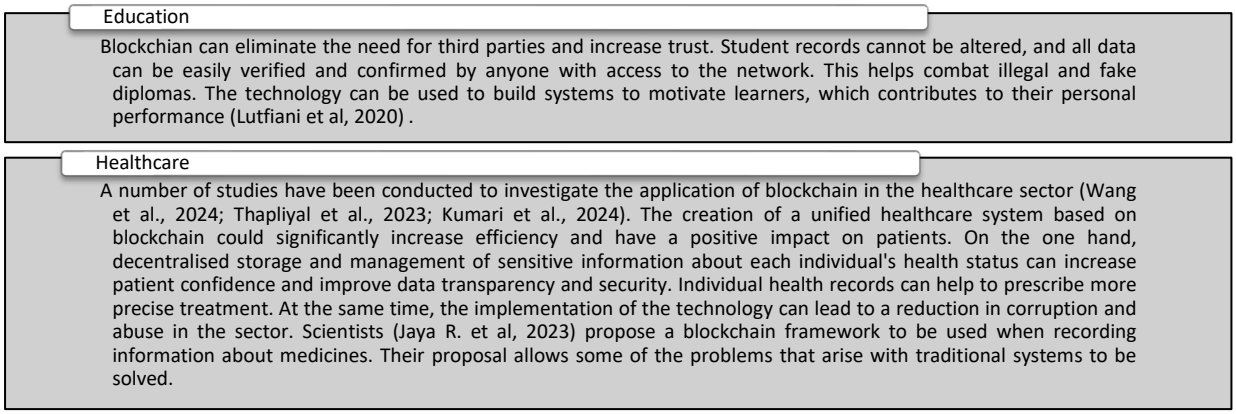
A study (Wamba et al., 2024) summarizes the following effects of the application of blockchain in the public sector: reduction in the level of bureaucracy and corruption; increased automation, transparency, and dissemination of information for the benefit of citizens; increased trust of citizens and businesses in government processes. This confirms that the technology has a place and a role in the public sector. The application of blockchain in the public sector can achieve higher levels of security, transparency, and reliability, which in turn can help fight corruption. classified by their primary benefits. The implementation of blockchain in the public sector can provide a solution to some of the problems. The benefits of applying blockchain can be of high public importance and interest because it can ensure higher levels of security, reliability, and transparency in the management of public goods.

Figure 3: Application of blockchain in the public sector for efficiency and optimization



Source: Summary by the author

Figure 4: Application of blockchain in the public sector for data security



Source: Summary by the author

Despite the many possibilities, the technology may not deliver the desired results, as it depends on a number of factors. Some of the challenges to the implementation of blockchain can be minimized through preliminary research and timely action. Blockchain projects vary depending on the goals and needs for which they are built and implemented. The main challenges that can hinder the achievement of the desired results are: Technical complexity and scalability; Integration with existing systems; Lack of qualified personnel; Public resistance;

Security and confidentiality and other. The challenges described above can be minimized by thoroughly analyzing the specific situation and the goals for which the technology will be implemented. Blockchain can provide numerous opportunities if the necessary research is conducted in advance, the needs of each stage of implementation are examined in detail, and the necessary actions are taken.

The described possibilities of blockchain in the public sector are not just theoretical constructs, but are already finding real practical application in various countries. There are examples of experimentation and actual use of the technology for various purposes in administration, such as electronic identification, electronic elections, healthcare, cadastre, and others. Key examples can be found in Estonia, Georgia, Sweden, Dubai, Singapore, Canada, and others. In order to examine the practical application of blockchain in more detail, a comparison is made between the first three countries (Table 1), as they represent different models and approaches to the implementation of the technology in the public sector.

Estonia is among the world's leading countries in blockchain implementation, using the technology to ensure the security and storage of national data. KSI protects key systems such as healthcare, identification, tax, and corporate registries. Blockchain is integrated into the country's overall digital infrastructure, creating a stable and transparent basis for providing electronic services to citizens and businesses (European Commission, 2024; Rong, Peng, 2023).

Georgia is among the first countries to introduce the technology in cadastre and property management. Blockchain creates a secure and transparent land registry, which significantly reduces the risk of fraud and corruption. In this way, Georgia has successfully demonstrated the practical applicability of the technology in a key area for society (Exonum, n.d.).

Sweden is experimenting with a pilot project in the field of land registries (Wong, Wong, 2022; ICA IT, 2016). The aim is to create a more efficient and transparent system for transferring real estate ownership, thereby reducing administrative costs and transaction processing time. Although the project is in its early stages of development, it represents an important step towards the implementation of blockchain in the country's public administration.

Table 1: Comparison of blockchain application in Estonia, Georgia, and Sweden

Criterion / Country	Estonia	Georgia	Sweden
Level of digitization	Very high – global leader in e-government and e-identification	Moderately high – actively developing within the framework of e-Gov initiatives	High – strong focus on cadastre and electronic registers
Areas of blockchain application	Electronic voting, healthcare, national and corporate registers Cadastre	Cadastre and property register	Pilot project for land registry
Public attitudes	High trust in digital services	Mostly positive	Positive perception
Technical capacity	Strong IT sector, integrated X-Road infrastructure, KSI blockchain	Limited local capacity, compensated by international support	Well developed, especially in cadastre and e-services
Key challenges	Cybersecurity, personal data protection, infrastructure resilience	Insufficient resources, dependence on international partners	Legislative slowness, need to scale up solutions
Results	99% digital services, saving 2% of GDP annually	More than 1.5 million property records; less than 3 minutes to generate a digital document	Potential savings of 100 million annually

Source: Author's summary

The examples discussed confirm the practical applicability and effectiveness of blockchain in the public sector. Although positive results have been reported in these countries, this should not be taken to mean that blockchain is a universal solution. Each blockchain project must be tailored to the needs and objectives of the country concerned and local specificities.

5. Conclusion

Blockchain has a place and role in the public sector because it can optimize a large part of administrative processes. The technology has the potential to increase the security and transparency of e-government, healthcare, education, energy, and other sectors. Blockchain can help the public sector tackle key challenges such as: financial challenges, through more transparent and efficient allocation of resources; administrative challenges, through automation and smart contracts; political challenges, through decentralisation and objective control; transparency, through immutable and accessible registers; competition with the private sector, especially in healthcare, through secure data management and services; demographic changes, through adaptive information analysis systems; global challenges, such as climate change and migration, through facilitated international cooperation; and complex social problems – poverty, unemployment and education – through more efficient use of limited resources.

Successful implementation and achievement of the desired results requires strategic planning at every stage and component in accordance with specific goals and public needs. It is necessary to consider the possible risks and challenges that could negatively impact the effectiveness of the blockchain project in question. Key factors for the successful application of the technology in the public sector are public attitude and technical capacity. Blockchain has great potential to optimize administrative processes if its implementation is geared towards specific public needs and is supported by a clear and well-argued framework, sustainable funding, and effective coordination between institutions.

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ПРЕДСТАВЕНИ НА
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