



„Constantin Brâncuși” University of Targu Jiu
Doctoral School of Economic Sciences

PROCEEDINGS OF THE INTERNATIONAL SCIENTIFIC SYMPOSIUM

Horizons of Economic Research
in a Global Context

1ST EDITION

16 MAY 2026
TARGU JIU, ROMANIA



„ACADEMICA BRÂNCUȘI” PUBLISHER
ISSN 3153 – 2179, ISSN-L 3153 – 2179





Scientific Committee

Adriana BURLEA-SCHIOPOIU — University of Craiova, Romania

Alexandru STRATAN — Academy of Economic Studies of Moldova, Republic of Moldova

Alic BIRCA — Academy of Economic Studies of Moldova, Republic of Moldova

Ana-Gabriela BABUCEA — „Constantin Brâncuși” University of Targu Jiu, Romania

Anca Antoaneta BOCEAN-VĂRZARU — University of Craiova, Romania

Angela-Eliza MICU — Ovidius University of Constanta, Romania

Aniela BĂLĂCESCU — „Constantin Brâncuși” University of Targu Jiu, Romania

Asena BOZTAŞ
Sakarya University of Applied Sciences, Türkiye

Aurelia PĂTRAŞCU — Petroleum-Gas University of Ploieşti, Romania

Aurelian PLOPEANU — Institute of Interdisciplinary Research, “Alexandru Ioan Cuza” University of Iaşi, Constantin Brâncuși University of Targu Jiu, Romania

Bogdan George TUDORICĂ — Petroleum-Gas University of Ploieşti, Romania

Carina-Elena STEGĂROIU — „Constantin Brâncuși” University of Targu Jiu, Romania

Carlo DRAGO — University Niccolò Cusano, Roma, Italy

Carmen NASTASE — Stefan cel Mare University of Suceava, Romania

Cecilia Irina RĂBONȚU — „Constantin Brâncuși” University of Targu Jiu, Romania

Claudiu BOCEAN — University of Craiova, Romania

Constanța ENEA — „Constantin Brâncuși” University of Targu Jiu, Romania

Cristi Marcel SPULBĂR — University of Craiova, Romania

Daniela-Emanuela DĂNĂCICĂ — „Constantin Brâncuși” University of Targu Jiu, Romania

Eleftherios (El) THALASSINOS — University of Piraeus, Greece

Emil SIMION — University Politehnica of Bucharest/ Cloud Security Alliance Romanian Chapter, Romania

Emilia ŻUCHOWSKA-KOTLARZ — Radom Academy of Economics, Poland

Firdous Ahmad MALIK - Jammu and Kashmir Economic Association, India

Flavius Cristian MĂRCĂU — „Constantin Brâncuși” University of Targu Jiu, Romania

Gabriela BUŞAN — „Constantin Brâncuși” University of Targu Jiu, Romania

Gabriela DOBROTĂ — „Constantin Brâncuși” University of Targu Jiu, Romania

Genu Alexandru CĂRUNTU — „Constantin Brâncuși” University of Targu Jiu, Romania

Georgiana-Raluca LĂDARU — Bucharest University of Economic Studies, Romania

Halil İbrahim AYDIN — Batman University, Türkiye

Hebatallah ADAM - Horizon University College, United Arab Emirates

Irina- Elena CHIRTOC — „Constantin Brâncuși” University of Targu Jiu, Romania

Irina Gabriela RĂDULESCU — Petroleum-Gas University of Ploieşti, Romania

Jean-Vasile ANDREI — Petroleum-Gas University of Ploieşti, Romania

Kutluhan BOZKURT – Istanbul Gedik University, Türkiye

Larisa GABUDEANU – Cloud Security Alliance Romanian Chapter/ University of Craiova, Romania

Liliana LAZARI — Academy of Economic Studies of Moldova, Republic of Moldova

Liviu NEAMȚU — „Constantin Brâncuși” University of Targu Jiu, Romania

Liviu Octavian POPESCU
University of Craiova, Romania

Lucia PALIU-POPA — „Constantin Brâncuși” University of Targu Jiu, Romania

Luminița CHIVU — National Institute for Economic Research „Costin C. Kirilescu” of the Romanian Academy, Romania

Magdalena ZIOLO — University of Szczecin, Poland

Marian SIMINICA — University of Craiova, Romania

Martyna MAJEWSKA — Radom Academy of Economics, Poland

Martyna MOSTOWSKA — Radom Academy of Economics, Poland

Mehtap Nasiroğlu AYDIN — Batman University, Türkiye

Mircea Constantin SCHEAU — Cloud Security Alliance Romanian Chapter/ University of Craiova, Romania

Mirela CRISTEA — University of Craiova, Romania

Mirela PANAIT — Petroleum-Gas University of Ploieşti & Institute of National Economy, Romanian Academy

Mirela-Ionela ACELEANU — Bucharest University of Economic Studies, Romania

Monika ANGELOSKA-DICHOVSKA — University "St. Kliment Ohridski"- Bitola, Faculty of Economics - Prilep, Republic of North Macedonia

Murat SARI — Istanbul Technical University, Türkiye

Naveed Ahmad LONE — Government Degree College Pulwama, India

Nitin BISHT — H. N. B. Garhwal University (A Central University), Srinagar (Garhwal), Uttarakhand, India

Poojha Chaturvedi SHARMA — Apeejay School of Management, India



Oxana BARBĂNEAGRĂ — Academy of Economic Studies of Moldova, Republic of Moldova
Onur OĞUZ — Batman University, Türkiye
Przemysław OSÓBKA — Institute for Life, Environment and Climate Science, Poland
Raluca-Ioana IORGULESCU — Institute for Economic Forecasting, Romanian Academy
Rodica-Manuela GOGONEA — Bucharest University of Economic Studies, Romania

Simona Roxana PĂTĂRLĂGEANU — Bucharest University of Economic Studies, Romania
Svetlana MIHAILA — Academy of Economic Studies of Moldova, Republic of Moldova
Valeriu POTECEA — Romanian-American University, Romania
Viana HASSAN — ETE Academy, American University of Malta, Malta
Zbigniew MICHALIK — Krakow University of Economics, Poland

Scientific Reviewers

Alic BIRCA
Academy of Economic Studies of Moldova, Republic of Moldova
Ana - Gabriela BABUCEA
„Constantin Brâncuși” University of Targu Jiu, Romania
Anca Antoaneta BOCEAN - VĂRZARU
University of Craiova, Romania
Angela-Eliza MICU
Ovidius University of Constanta, Romania
Aniela BĂLĂCESCU
„Constantin Brâncuși” University of Targu Jiu, Romania
Asena BOZTAŞ
Sakarya University of Applied Sciences, Türkiye
Aurelian PLOPEANU
Institute of Interdisciplinary Research, “Alexandru Ioan Cuza” University of Iasi, Constantin Brancusi University of Targu Jiu, Romania
Carina_Elena STEGĂROIU
„Constantin Brâncuși” University of Targu Jiu, Romania
Carlo DRAGO
University Niccolò Cusano, Roma, Italy
Carmen NASTASE
Stefan cel Mare University of Suceava, Romania
Cecilia Irina RĂBONȚU
„Constantin Brâncuși” University of Targu Jiu, Romania
Claudiu BOCEAN
University of Craiova, Romania
Constanța ENEA
„Constantin Brâncuși” University of Targu Jiu, Romania
Daniela - Emanuela DĂNĂCICĂ
„Constantin Brâncuși” University of Targu Jiu, Romania
Emilia ŻUCHOWSKA-KOTLARZ
Radom Academy of Economics, Poland
Firdous Ahmad MALIK
Jammu and Kashmir Economic Association, India
Flavius Cristian MĂRCĂU
„Constantin Brâncuși” University of Targu Jiu, Romania
Gabriela BUȘAN
„Constantin Brâncuși” University of Targu Jiu, Romania
Gabriela DOBROTĂ
„Constantin Brâncuși” University of Targu Jiu, Romania

Genu Alexandru CĂRUNTU
„Constantin Brâncuși” University of Targu Jiu, Romania
Georgiana-Raluca LĂDARU
Bucharest University of Economic Studies, Romania
Halil İbrahim AYDIN
Batman University, Türkiye
Harpreet KAUR
Christ University, India
Hebatallah ADAM
Horizon University College, United Arab Emirates
Irina Gabriela RĂDULESCU
Petroleum-Gas University of Ploiesti, Romania
Jean Vasile ANDREI
Petroleum-Gas University of Ploiesti, Romania
Jihene MRABET
Amity University Dubai, United Arab Emirates
Kutluhan BOZKURT
Istanbul Gedik University, Türkiye
Larisa GABUDEANU
Cloud Security Alliance Romanian Chapter/ University of Craiova, Romania
Liliana LAZARI
Academy of Economic Studies of Moldova, Republic of Moldova
Liviu NEAMȚU
„Constantin Brâncuși” University of Targu Jiu, Romania
Liviu Octavian POPESCU
University of Craiova, Romania
Magdalena ZIOLO
University of Szczecin, Poland
Martyna MAJEWSKA
Radom Academy of Economics, Poland
Martyna MOSTOWSKA
Radom Academy of Economics, Poland
Mehtap Nasiroğlu AYDIN
Batman University, Türkiye
Mircea Constantin SCHEAU
Cloud Security Alliance Romanian Chapter/ University of Craiova, Romania
Mirela PANAIT
Petroleum-Gas University of Ploiesti & Institute of National Economy, Romanian Academy
Mirela CRISTEA
University of Craiova, Romania



Monika ANGELOSKA-DICHOVSKA

University "St. Kliment Ohridski" - Bitola, Faculty of
Economics - Prilep, Republic of North Macedonia

Naveed Ahmad LONE

Government Degree College Pulwama, India

Navita GURBANI

Asian Business School, Noida, India

Nikhath KHALID

Indian School of Business, Mohali, India

Oxana BARBĂNEAGRĂ

Academy of Economic Studies of Moldova, Republic of
Moldova

Ömer DUMAN

Independent researcher, Türkiye

Poojha Chaturvedi SHARMA

Apeejay School of Management, India

Przemysław OSÓBKA

Institute for Life, Environment and Climate Science,
Poland

Ritu SINDHU

Amity University, Gurugram, India

Rodica-Manuela GOGONEA

Bucharest University of Economic Studies, Romania

Shivangi PRIYA

IMM Business School, New Delhi, India

Simona Roxana PĂTĂRLĂGEANU

Bucharest University of Economic Studies, Romania

Svetlana MIHAILA

Academy of Economic Studies of Moldova, Republic of
Moldova

Tarvinder KAAUR

St. Aloysius College (Auto) Jabalpur, Madhya Pradesh,
India

Viana HASSAN

ETE academy, American University of Malta, Malta

Organizing Committee

Chair: Aniela BĂLĂCESCU — “Constantin Brâncuși” University of Targu Jiu, Romania

Secretary: Olivia-Roxana ALECSOIU — “Constantin Brâncuși” University of Targu Jiu, Romania

Members:

Adela-Mihaela DUȚU — “Constantin Brâncuși”

University of Targu Jiu, Romania

Angela-Eliza MICU — Ovidius University of Constanța,
Romania

Aurelia PĂTRAȘCU — Petroleum-Gas University of
Ploiești, Romania

Carmen NASTASE — Ștefan cel Mare University of
Suceava, Romania

Corneliu BITOK-BĂNEASĂ — CorneliuGroup Research
– Innovation Association, Romania

Daniela-Emanuela DĂNĂCICĂ — “Constantin
Brâncuși” University of Targu Jiu, Romania

Denis CĂLINA — “Constantin Brâncuși” University of
Targu Jiu, Romania

Dragoș STANCU — “Constantin Brâncuși” University of
Targu Jiu, Romania

Ecaterina MIHĂLCEANU — “Constantin Brâncuși”
University of Targu Jiu, Romania

Firdous Ahmad MALIK — Jammu and Kashmir
Economic Association, India

Georgiana – Raluca Lădaru — Bucharest University of
Economic Studies, Romania

Halil Ibrahim AYDIN — Batman University, Türkiye

Ioana-Alexandra GHINTUEALĂ — “Constantin
Brâncuși” University of Targu Jiu, Romania

Irina Gabriela RĂDULESCU — Petroleum-Gas
University of Ploiești, Romania

Jean-Vasile ANDREI — Research Network on
Resources Economics and Bioeconomy Association

Luminița CHIVU — National Institute for Economic
Research “Costin C. Kirițescu” of the Romanian
Academy

Marian SIMINICA — University of Craiova, Romania

Martyna MOSTOWSKA — Radom Academy of
Economics, Poland

Mircea Constantin SCHEAU — Cloud Security Alliance
Romanian Chapter / University of Craiova, Romania

Raluca PETCUȚ — “Constantin Brâncuși” University of
Targu Jiu, Romania

Răzvan-Ștefan STAN — “Constantin Brâncuși”
University of Targu Jiu, Romania

Robert BĂLAN — “Constantin Brâncuși” University of
Targu Jiu, Romania

Svetlana MIHAILA - Academy of Economic Studies of
Moldova

Vasilica-Ramona GUȚĂ — “Constantin Brâncuși”
University of Targu Jiu, Romania

KEYNOTE SPEAKERS:



Murat SARI
*Istanbul Technical University,
Türkiye*

Predictive Decision Modelling in Economic Processes



Aurelian PLOPEANU
*Alexandru Ioan Cuza University of Iași,
Constantin Brâncuși University of Targu Jiu, Romania*

A short economic history of Japan: from Tokugawa isolation to the postwar miracle



Eleftherios THALASSINOS
*University of Piraeus,
Greece*

Sustainability in Business Today: Why It Is not the Main Priority



Hebatallah ADAM
*School of Business, Horizon University College,
United Arab Emirates*

Resilient Development in the Age of Polycrisis: Strategic Statecraft and Structural Transformation in the Global South



Firdous Ahmad MALIK
*Jammu and Kashmir Economic Association,
India*

Financial Inclusion in the Age of Data: Evidence-Based Pathways to Sustainable Development



SESSION CHAIRS:

Session 1: Economic Development and Structural Change

Anca Antoaneta BOCEAN-VĂRZARU

University of Craiova, Romania

Ana-Gabriela BABUCEA

"Constantin Brâncuși" University of Targu Jiu, Romania

Session 2: Competitiveness, Productivity and Innovation

Onur OĞUZ

Batman University, Türkiye

Cheta DESAI

Bhagwan Mahavir University, India

SESSION 3: Digital Economy and AI-driven Transformation

Mircea Constantin SCHEAU

Cloud Security Alliance Romanian Chapter/ University of Craiova, Romania

Jyoti CHAHAL

Government College for Women Gohana, India

SESSION 4: Circular Economy and Green Transition Policies

Laeq Razzak JANJUA

WSB University, Poland

Halil İbrahim AYDIN

Batman University, Türkiye

SESSION 5: Labor Markets and Skills

Claudiu BOCEAN

University of Craiova, Romania

Adrian-Eugen PREDA

"Constantin Brâncuși" University of Targu Jiu, Romania

SESSION 6: Tourism and Agritourism Economics

Rubvita Chadha

Woxsen University, Hyderabad India

Rodica-Manuela GOGONEA

Bucharest University of Economic Studies, Romania

SESSION 7: Social inclusion and welfare economics

Daniela - Emanuela DĂNĂCICĂ

„Constantin Brâncuși” University of Targu Jiu, Romania

Flavius-Cristian MĂRCĂU

"Constantin Brâncuși" University of Targu Jiu, Romania

TABLE OF CONTENTS

SESSION 1: Economic Development and Structural Change

DEMOGRAPHIC CHANGE IN GEORGIA: AGEING, FERTILITY, AND MIGRATION Tinatin TCHARKHALASHVILI	14
EXCHANGE RATE DYNAMICS AND BILATERAL TRADE BALANCE ADJUSTMENT IN INDIA: REVISITING THE J-CURVE HYPOTHESIS Riddhi MEHTA; Arshad BHAT	16
DYNAMICS OF EMPLOYMENT ELASTICITY OF OUTPUT IN THE UZBEKISTAN ECONOMY: EVIDENCE FROM ARDL AND ROLLING REGRESSION APPROACHES Nazia ISRAR, Mushtaq Ahmad MALIK	21
UNPACKING EDUCATION'S ROLE IN INDIA'S ECONOMIC GROWTH: HUMAN CAPITAL AND STRUCTURAL TRANSFORMATION Rajeev PARASHAR	23
STRUCTURAL CHANGES IN ROAD FREIGHT TRANSPORT IN THE CONTEXT OF EUROPEAN INFRASTRUCTURE DEVELOPMENT Adrian George FOGHIŞ; Octavian-Mihai PETRE	29
NEARSHORING, RESILIENCE, AND STRUCTURAL CHANGE: EVIDENCE FROM ROMANIA AND POLAND Gabriel-Dorian GLĂMAN	36
ROMANIA'S POLITICAL AND ECONOMIC POSITION IN THE RUSSIA-UKRAINE WAR Ömer DUMAN	41
FROM INDUSTRIAL SOCIETY TO DIGITAL SOCIETY: AN ANALYSIS OF SOCIOECONOMIC TRANSFORMATION Gülten AKGÜL; İsmail BACAŞIZ, Özcan ÇELİK, Yusuf ÖZKURT, Sıla SEZER, Emre YONAR	44

SESSION 2: Competitiveness, Productivity and Innovation

ROMANIA'S INTERNATIONAL TRADE COMPETITIVENESS – A COMPARATIVE ADVANTAGE PERSPECTIVE Martyna MOSTOWSKA	48
INFLUENCER MARKETING AND TRUST: DO CONSUMERS REALLY TRUST? Monika ARSOVA	52
SOCIAL CAPITAL AND INNOVATION ECOSYSTEM IN BALKAN COUNTRIES Fatma Betül URHAN	54
RESILIENCE AND INNOVATION: A CRITICAL ANALYSIS OF SMART CITY IMPACT ON URBAN AND ECONOMIC DEVELOPMENT IN GERMANY Imane KECHACHA; Koudoua FERHATI	58
TRUST, CHOICE AND NOSTALGIA: CONSUMER PERCEPTION OF LEGACY F&B BRANDS IN INDIA Shivani MEHTA, Diva KAPOOR	62

DEVELOPMENT OF E-COMMERCE IN THE REPUBLIC OF MOLDOVA AS A DRIVER OF INTERNATIONAL COMPETITIVENESS AND MARKET EXPANSION Daniela BUGA	64
THE IMPACT OF SME DIGITALIZATION ON ECONOMIC PERFORMANCE: EVIDENCE FROM 28 EUROPEAN COUNTRIES Ecaterina MIHĂLCEANU (STAN), Răzvan Ștefan STAN	66
OPERATING WORKING CAPITAL, FIRM PROFITABILITY, AND CRISIS MODERATION: EVIDENCE FROM LISTED FIRMS IN AN EMERGING EUROPEAN MARKET Valerica TĂTĂRANU (SOARE), Elena TOADER (VASILE)	70
YOUTH PERCEPTIONS OF COMPENSATION GAPS AND BOARD INDEPENDENCE IN LISTED EUROPEAN BANKS: AN EMPIRICAL STUDY Matei KACSO-CARSTOCEA; Lucian Claudiu ANGHEL	72
INTEGRATING FINANCIAL PERFORMANCE ANALYSIS AND RISK ASSESSMENT IN CORPORATE ACTIVITY Daniel Costin MATACHE	75
DETERMINANTS OF ECONOMIC BEHAVIOR IN ATTRACTING NON-REIMBURSABLE FUNDS Ioana GHINTUEALA (HATĂRĂ)	77
SESSION 3: Digital Economy and AI-driven Transformation	
ASSESSING THE ROLE OF DIGITAL INDICATORS IN INDIA’S ECONOMIC DEVELOPMENT USING MACHINE LEARNING Yash JADHAV, Arshad BHAT	82
IMPACT OF THE USE OF ARTIFICIAL INTELLIGENCE IN THE PUBLIC SECTOR Constantin Stefan PONEA	87
FROM HUMAN JUDGEMENT TO ALGORITHMIC FINANCE: THE TRANSFORMATION OF FINANCIAL DECISION-MAKING Mila MITREVA PANDEVA, Marija GOGOVA-SAMONIKOV	91
THE IMPACT OF DIGITALIZATION ON FEMALE UNEMPLOYMENT IN TURKEY: ARDL ANALYSIS FOR THE PERIOD 1994-2024 Bayram KAYANTAŞ, Muhammed Okan TAN	94
DIGITALIZATION OF EUROPEAN HEALTHCARE SYSTEMS: OPPORTUNITIES AND DEVELOPMENT PATHWAYS FOR THE REPUBLIC OF MOLDOVA Roman BONDARCIUC; Victoria TROFIMOV	98
ALGORITHMIC TRUST, EXPLAINABILITY, AND CONTESTABILITY AS STRATEGIC CAPABILITIES IN BANKING: EMPIRICAL EVIDENCE FROM ROMANIA Valentin MANGIUREA, Lucian Claudiu ANGHEL	102
COMPARATIVE ANALYSIS OF GLOBAL REGULATORY FRAMEWORKS FOR BLOCKCHAIN AND CRYPTOCURRENCY TOKENS Alexandr SCUTARI	106



AI-ENABLED COST OPTIMIZATION AND CLINICAL PERFORMANCE IMPROVEMENT IN ROMANIAN COUNTY EMERGENCY HOSPITALS Petronela-Alice GRIGORESCU, Dan Marius COMAN, Ruxandra GEORGESCU	108
ROBOTIC PROCESS AUTOMATION IN ACCOUNTING: GLOBAL IMPLICATIONS FOR EFFICIENCY, LABOR DYNAMICS AND DIGITAL TRANSFORMATION Sandra-Elena MARINESCU, Dan-Marius COMAN	112
COMPARATIVE ANALYSIS OF TRADITIONAL ECONOMETRIC AND AI-BASED MODELS IN ASSESSING THE IMPACT OF MACROECONOMIC FACTORS ON BANKING PERFORMANCE Daniela Iulia Maria CĂRBUNE	114
AI-DRIVEN DIGITAL TRANSFORMATION AND THE EVOLUTION OF HUMAN CAPITAL: EVIDENCE FROM REMOTE SOFTWARE ENGINEERING TEAMS Aydin RZAYEV	116
ARTIFICIAL INTELLIGENCE AND THE IMPACT ON FINANCIAL STABILITY Domnița ISAC	120
INTEGRATION OF BANKING SYSTEMS THROUGH AI-BASED FINTECH TECHNOLOGIES Andrei Cristian SPULBAR	125
SAF-T, THE DIGITAL GOVERNANCE OF ACCOUNTING AND FISCAL INFORMATION CAPITALIZATION - A BIBLIOMETRIC STUDY Carmen Mihaela BULĂU, Beatrice Elena GORE, Mirela MATEI (PANĂ), Alexandru Cătălin NEAGU, Mihaela Denisa COMAN	127
DIGITAL ECONOMY AND AI-DRIVEN TRANSFORMATION: ADOPTION PATTERNS AND THE PRODUCTIVITY PUZZLE IN THE EUROPEAN UNION, WITH A FOCUS ON ROMANIA Andreea-Ioana VĂCUȚ, Andreea-Adriana SIMION	129
DIGITAL MATURITY ASYMMETRIES AMONG SMES IN SOUTH-EAST ROMANIA Oana Roxana RADU	132
SESSION 4: Circular Economy and Green Transition Policies	
THE EVOLUTION OF GREEN FINANCIAL INSTRUMENTS IN CENTRAL AND EASTERN EUROPE Daniel – George SURDU	137
STRUCTURAL CHALLENGES OF THE EU ELECTRIC VEHICLE INDUSTRY AND THE PROSPECTS FOR CHINA–EU GREEN COOPERATION Yanhao ZHANG	140
GREEN ECONOMY AND SUSTAINABLE DEVELOPMENT INTERACTION: A POLITICAL ECONOMY ANALYSIS OF EUROPEAN UNION COUNTRIES Ronayi YITIK, Halil Ibrahim AYDIN	144

AI-POWERED IOT SYSTEMS FOR REAL-TIME MONITORING OF INDUSTRIAL CIRCULAR FLOWS AT THE TERRITORIAL SCALE: AN ARCHITECTURAL FRAMEWORK	
Koudoua FERHATI, Yakhlefoune MANEL	148
THE RELATIONSHIP BETWEEN RENEWABLE ENERGY AND URBANIZATION: AN ASSESSMENT ON ROMANIA	
Ömer DEMİRHAN, Halil İbrahim AYDIN	152
COMPARATIVE ASSESSMENT OF ESG AND CSR PRACTICES IN ROMANIA AND THE EUROPEAN UNION AFTER 2020	
Robert BĂLAN	156
NEURO-SYMBOLIC AI GOVERNANCE FOR CLIMATE-RESPONSIVE ECONOMIES: A REAL-TIME PREDICTIVE FRAMEWORK INTEGRATING GREEN FINANCE, URBAN DIGITAL TWINS, AND BEHAVIORAL MACROECONOMICS	
Priyant BANERJEE, Arshad BHAT	160
ROMANIAN CEREALS SECTOR ANALYSIS: FOOD SECURITY, IMPORT DEPENDENCE, AND SELF-SUFFICIENCY RATE IN THE PERIOD 2014–2024	
Steliana MOCANU	163
AI AS AN EMERGING ESG RISK IN FINTECH: IMPLICATIONS ACROSS ENVIRONMENTAL, SOCIAL, AND GOVERNANCE DIMENSIONS	
Elena MUNTEANU	165
BIDIRECTIONAL PRICE DISCOVERY BETWEEN ROMANIAN AND CENTRAL EUROPEAN ELECTRICITY MARKETS: EVIDENCE FROM COINTEGRATION AND VECM ANALYSIS	
Mihai FRUNZA, Lucian Claudiu ANGHEL	168
ADAPTING THE INSTITUTIONAL SYSTEM TO ADDRESS THE CHALLENGES OF SUSTAINABLE DEVELOPMENT	
Andreea Adriana SIMION	173
SESSION 5: Labor Markets and Skills	
EMPLOYEE RETENTION IN CONTEMPORARY ORGANIZATIONS: A PREDICTIVE ANALYSIS OF MOTIVATIONAL, OCCUPATIONAL, AND DEMOGRAPHIC FACTORS	
Ana-Maria SĂCUIU, Angela-Eliza MICU, Bianca Elena MIRON	176
FROM LEADERSHIP TO TURNOVER INTENTION: THE MEDIATING ROLE OF EMPOWERMENT IN HEALTHCARE ORGANIZATIONS	
Stefan-Daniel FLOREA, Dragos GRUIA	180
DOES INVESTMENT IN LABOUR (SKILLS AND TRAINING) TRANSLATE INTO ORGANIZATIONAL PERFORMANCE?	
Otilia TRĂȘCĂ	183
EDUCATION SYSTEMS AND HUMAN CAPITAL ALIGNMENT IN EUROPE: EVIDENCE ON STEM GENDER GAPS, OVER-QUALIFICATION, AND SKILL MATCHING	
Stefan Laurentiu PRAHOVEANU, Mustafa Latif EMEK; Andreea Elena LUNGU, Mile VASIĆ; Firdaus ABDULLAH	185

ABOUT COMPETENCIES REQUIRED FOR THE INTEGRATION OF DIGITAL TECHNOLOGIES	
Daniela Gheorghita MARIA (IFTIMOV)	194
THE ROLE OF ARTIFICIAL INTELLIGENCE IN PERFORMANCE APPRAISAL: AN ANALYSIS OF HR PROFESSIONALS' PERSPECTIVES	
Otilia-Ana LUNGU, Isabelle-Ana-Maria VÎLSAN	198
A CONCEPTUAL ANALYSIS OF EMPLOYMENT AND UNEMPLOYMENT IN THE MODERN ECONOMY: THEORETICAL PARADIGMS AND REGIONAL REALITIES IN ROMANIA	
Adela – Mihaela DUȚU	202
YOUTH EMIGRATION INTENTIONS AND THE DECLINE OF THE FUTURE LABOR FORCE IN ROMANIA	
Mihaela-Georgiana OPREA; Carmen-Adriana GHEORGHE; Mihaela-Irma VLĂDESCU	207
THE PARADOX OF ENTREPRENEURSHIP EDUCATION IN TÜRKİYE: BALANCING QUANTITY AND QUALITY	
Sertaç ERCAN	209
THE IMPACT OF DIGITALIZATION ON FEMALE UNEMPLOYMENT IN TURKEY: ARDL ANALYSIS FOR THE PERIOD 1994-2024	
Bayram KAYANTAŞ; Muhammed Okan TAN	212
GIG ECONOMY, PLATFORM WORK, AND LABOUR RIGHTS: RE-EXAMINING LEGAL PROTECTION IN THE ERA OF DIGITAL CAPITALISM	
Gousia Feroz BHAT, Firdous Ahmed MALIK	216
REVISITING HEGEMONIC STABILITY THEORY IN A FRAGMENTING WORLD	
Adrian-Eugen PREDA	219
GIG ECONOMY, INFORMALITY, AND SOCIAL EXCLUSION: A COMPARATIVE STUDY OF LABOUR MARKET VULNERABILITIES IN INDIA AND BRAZIL	
Abhilash AGGARWAL; Mehvish MEHRAJ	222
SESSION 6: Tourism and Agritourism Economics	
PERSISTENT TOURISM CONCENTRATION AND REGIONAL DOMINANCE IN ROMANIA: EVIDENCE FROM A LONG-TERM MULTI-INDICATOR ANALYSIS (2010–2024)	
Cristiana-Alexandra BELU, Roxana-Marcela ZAHARIA	228
ORAL CARTOGRAPHY AND ACTIVE AGEING: INTEGRATING ELDERLY STORYTELLERS INTO MOLDOVA'S TOURISM VALUE CHAIN	
Mihail CIOBANU	232
DEVELOPMENT OF EDUCATIONAL TOURISM BASED ON CULTURAL HERITAGE IN THE CURRENT ECONOMIC CONTEXT	
Elena-Minodora SIMCEA, Aliona LÎSÎI	236

**DIMENSIONS OF REGIONAL CULTURE IN ROMANIA: AN EXPLORATORY ANALYSIS
BASED ON PRINCIPAL COMPONENTS**

Maria-Magdolna MACULA 240

SESSION 7: Social inclusion and welfare economics

**IDENTITY OR INCOME? EVALUATING THE TARGETING EFFICIENCY OF
AFFIRMATIVE ACTION IN INDIA THROUGH A WELFARE ECONOMICS
FRAMEWORK**

Solomon JOASH, Arshad BHAT 245

**NATURAL RESOURCES AND CONFLICT IN ECOWAS: THE MODERATING ROLE OF
SOCIAL COHESION**

Lawal Olamilekan Abdulwahab, Pang Wei Loon, Roslee bin Hj Baha, Ahmed M. Khalid 253

**FINANCIAL SYSTEM SUSTAINABILITY APPROACHED THROUGH THE PRISM OF
INTERMEDIATION, STABILITY AND INCLUSION: BIBLIOMETRIC AND
CONCEPTUAL ASSESSMENT**

Angela SECRIERU, Eduard KENIG 256

**MODERNIZING THE SOCIAL ASSISTANCE SYSTEM THROUGH THE RESTART
REFORM IN THE REPUBLIC OF MOLDOVA: IMPLICATIONS FOR CHILDREN IN
DIFFICULTY**

Mihail CIOBANU, Silvia SAVCENCO 260

**THE IMPACT OF ARTIFICIAL INTELLIGENCE ON SOCIAL RESPONSIBILITY IN
PUBLIC INSTITUTIONS**

Lucian MITUCA, Lucian SPULBAR 264

**AN ANALYTICAL ASSESSMENT OF SPATIAL CONCENTRATION AND TERRITORIAL
INEQUALITY OF POVERTY RISK AND GDP DISTRIBUTION BY URBAN-RURAL
TYPOLOGY IN THE EUROPEAN UNION**

Madalina Laura IONESCU, Irene PAPADOPOL, Rudy UJANG, Mihai Viorel MIHALCEA, Izzat AL-HADI RAZALI 266

**THE ROLE OF PUBLIC ACCOUNTING IN OPTIMIZING ADMINISTRATIVE
EFFICIENCY AND INSTITUTIONAL ACCOUNTABILITY IN THE CONTEXT OF
ARTIFICIAL INTELLIGENCE**

Simona MOISE 275

**THE IMPACT OF INSTITUTIONAL SYNERGIES ON COMMUNITY RESILIENCE IN THE
CONTEXT OF SUSTAINABLE DEVELOPMENT GOALS**

Lavinia-Adelina MITRACHE 278

**FOOD CONSUMPTION BEHAVIOR UNDER ECONOMIC CONSTRAINTS: ADAPTATION
MECHANISMS AND IMPLICATIONS FOR FOOD SECURITY**

Antonia-Gabriela MALOȘ, Tudor HOLERGA 282

**DYNAMICS OF WATER AND WASTEWATER SERVICE COVERAGE IN ROMANIA
OVER THE PERIOD (2014-2023)**

Vasilica-Ramona GUȚĂ (COCONEȚU) 287



A COMPARATIVE ANALYSIS OF THE LEGAL FRAMEWORKS AND EXEMPLARY PRACTICES GOVERNING INTERNAL PUBLIC AUDIT IN ROMANIA AND POLAND Melania Mirela COSMA, Silviu Ionel STOICA, Omar ALHATO, Vladimir CRISTEA	291
SPIRITUAL AND ETHICAL DETERMINANTS OF ECONOMIC DEVELOPMENT IN POST-COMMUNIST EUROPE: A PANEL ANALYSIS OF ECE COUNTRIES WITH ROMANIA AS COMPARATIVE REFERENCE Dragoş STANCU	296
THE ROLE OF INTERNAL AUDIT IN STRENGTHENING ORGANIZATIONAL GOVERNANCE IN THE PUBLIC SECTOR UNDER THE NEW GLOBAL INTERNAL AUDIT STANDARDS (2025) Lidia TONU, Galina BĂDICU	300

DEMOGRAPHIC CHANGE IN GEORGIA: AGEING, FERTILITY, AND MIGRATION

Tinatin TCHARKHALASHVILI

Georgian Technical University, Faculty of Social Sciences, Tbilisi, Georgia

Charkhalashvilitinano12@gtu.ge

Abstract

Demographic change has emerged as a defining structural challenge for contemporary Georgian society. This theoretical paper examines the interrelated processes of population ageing, declining fertility, and migration dynamics within the Georgian demographic context, situating these trends within broader demographic transition frameworks. Georgia is experiencing a steady increase in the proportion of older age cohorts alongside persistently low fertility rates, both of which exert long-term pressure on population sustainability and intergenerational balance.

At the same time, sustained outward migration particularly among young and economically active populations has reinforced demographic ageing and contributed to labor force contraction. Drawing on demographic transition theory, migration systems theory, and life-course perspectives, this study conceptualizes how structural socio-economic conditions and institutional factors interact to shape Georgia's current demographic profile. The paper argues that addressing these challenges requires an integrated demographic policy approach that supports family formation, encourages youth retention, and adapts social protection systems to an ageing population.

Keywords: Population ageing; Fertility decline; Migration dynamics; Demographic transition; Georgia.

1. Introduction

Demographic trends play a central role in shaping long-term socio-economic development, particularly in small and post-transition societies. Georgia is currently experiencing profound demographic change characterized by population ageing, declining fertility, and persistent migration outflows. These trends pose significant challenges for labor markets, social welfare systems, and integrated development planning.

The objective of this study is to provide a theoretical analysis of Georgia's demographic transformation by examining the cumulative and interdependent nature of ageing, fertility, and migration processes. The paper seeks to contribute to a more holistic understanding of demographic change in post-Soviet contexts.

2. Literature Review

Demographic transition theory provides a foundational framework for understanding long-term shifts in fertility, mortality, and population structure. In post-Soviet societies, demographic transitions have been shaped by economic restructuring, institutional instability, and changing family norms.

Research on population ageing emphasizes its close association with sustained low fertility and increased life expectancy, while migration studies highlight the selective nature of emigration, particularly among younger and skilled populations. However, the literature often addresses these processes separately. This study contributes by integrating fertility decline, migration dynamics, and ageing within a single theoretical framework applied to the Georgian case.

3. Data and Methodology

This paper adopts a theoretical and conceptual approach. It is based on secondary demographic analyses, comparative insights from international research, and established theoretical perspectives, including demographic transition theory and migration systems theory. The methodology focuses on synthesizing existing knowledge rather than generating original empirical data, enabling an integrated interpretation of demographic change in Georgia.

4. Results and Discussion

The analysis indicates that population ageing in Georgia is the cumulative outcome of prolonged fertility decline and sustained outward migration. Low fertility reduces the size of younger cohorts, while migration disproportionately affects the working-age population, accelerating age structural imbalance. These interlinked processes contribute to labor force contraction and rising dependency ratios.

The discussion highlights that demographic change in Georgia represents a structural condition rather than a temporary trend. Individual decisions regarding family formation and migration are closely linked to broader socio-economic uncertainty, reinforcing long-term demographic challenges.

5. Conclusions

The study concludes that demographic change in Georgia is shaped by the interaction of population ageing, fertility decline, and migration dynamics. These processes collectively challenge demographic sustainability and socio-economic resilience. The findings underscore the importance of integrated demographic policies that simultaneously address family support, youth retention, and adaptation to population ageing. While theoretical in nature, the paper provides a conceptual foundation for future empirical research and evidence-informed policy development in Georgia and similar post-Soviet societies.

References

Lesthaeghe, R. (2010). The unfolding story of the second demographic transition. *Population and Development Review*, 36(2), 211–251.

United Nations. (2023). *World Population Prospects*. UN Department of Economic and Social Affairs.

EXCHANGE RATE DYNAMICS AND BILATERAL TRADE BALANCE ADJUSTMENT IN INDIA: REVISITING THE J-CURVE HYPOTHESIS

Riddhi MEHTA^{1*}; Arshad BHAT²

¹ SVKM's Narsee Monjee Institute of Management Studies, School of Economics, Mumbai, India

² Amity University Mumbai, Amity Institute of Liberal Arts, Mumbai, India

* Corresponding author: 7905rm@gmail.com | ORCID: 0009-0002-7713-3402

Abstract

The J-curve hypothesis has been used in long time to analyze the relationship between the exchange rate fluctuations and adjustment in trade balance especially in developing economies. This paper re-tests the existence of the bilateral J-curve effect in the case of India in monthly data and in a multivariate time-series model that both accounts for the short-run dynamics and the long-run relationships. The evaluation is based on the bilateral trade of India, with the 5 top trading partners, namely the United States, China, Japan, Germany, and the United Arab Emirates during the years 1991-2024. Unit-root tests, Johansen cointegration tests and Vector Error Correction Models are utilized where they are statistically and diagnostically appropriate. The findings suggest that bilateral trade relations of India do not depict a strong/systematic J-curve effect. There is also long-run cointegration of the limited number of trading partners and no long-run consistent relationship between the real exchange rate and the trade balance of China and Japan. Even though cointegration is found to be the case in Germany, the instability of the parameters is indeed high, due to probable macroeconomic and structural shocks within the Eurozone, which restricts the accuracy of the dynamic VECM estimation. In the case of the United Arab Emirates and the United States, there are weak and statistically insignificant adjustment dynamics at the error-correction mechanisms and impulse response analyses after the exchange rate shocks. Altogether, the results indicate that the adjustment mechanisms, based on exchange rates, have a minor impact on the bilateral balance of the Indian trade, and the structural factors prevail in the dynamics of trade. These findings have significant implications to the exchange rate management and other external sector policy in India.

Keywords: J-curve hypothesis; Bilateral trade; Exchange rate dynamics; Cointegration; Vector Error Correction Model

JEL codes: F31, F14, F32, C32, F41

1. Introduction

The relationship between exchange rate movements and trade balance adjustment has long been central to international macroeconomics. According to the J-curve hypothesis, devaluation of currency leads to a reduction in the trade balance of a country in the short run after which it is improved in the long run as long as the Marshall-Lerner condition is met. Although this relationship has been well researched in developed as well as developing economies, the empirical evidence has been inconsistent, especially when it comes to emerging economies with structural rigidities and import reliance.

The problem is of particular concern in the case of India, where the country is more prone to the effect of critical imports like crude oil, capital products, and intermediate products, which are usually price inelastic. Meanwhile, the changing trade forms, the integration of the global value chains and the flexibility of the exchange rates since the 1990s requires a re-evaluation of the traditional exchange-rate recalibrations.

This paper re-tests J-curve view with regard to India based on monthly data (1991-2024) of five leading trading partners, including the United States, China, Japan, Germany, and the United Arab Emirates.

The research seeks to offer partner-specific information on exchange-rate responsiveness by examining bilateral trade flows instead of aggregate trade flows. The value addition is the updating empirical evidences with the latest data, analysing structural changes in the trade processes and determining whether the exchange-rate depreciation can be effectively utilized as an adjustment instrument in the modern Indian setting.

2. Literature Review

The empirical literature on the J-curve hypothesis presents mixed evidence across countries, time periods, and methodological frameworks. Early aggregate-level studies produced inconclusive results. For instance, Rose and Yellen (1989) found no strong empirical support for the J-curve in U.S. trade data, challenging the conventional expectation that currency depreciation systematically improves trade balances over time. In contrast, Bahmani-Oskooee (1985, 1991) documented evidence of long-run relationships between exchange rates and trade balances in several developing economies, suggesting that exchange-rate effects may be more pronounced in certain structural contexts.

Subsequent research shifted toward bilateral trade analysis to mitigate aggregation bias inherent in country-level data. Bahmani-Oskooee and Ratha (2004) emphasized that aggregate trade statistics may obscure partner-specific dynamics, leading to misleading conclusions regarding the J-curve phenomenon. Their review highlighted substantial heterogeneity in bilateral responses, reinforcing the need for country-pair-specific investigations.

In the Indian context, empirical findings remain inconclusive. Upadhyaya et al. (1996) and Singh (2004) reported weak or insignificant exchange-rate effects on India’s trade balance, attributing these outcomes to structural rigidities and import dependence. Conversely, Dash (2013), employing a Vector Error Correction Model (VECM), found evidence of J-curve effects in India’s bilateral trade with Japan and Germany, but not with other partners. More recent studies incorporating nonlinear approaches, such as the NARDL framework, suggest asymmetric responses of trade balances to currency movements (Ganai & Khan, 2025), though results remain partner-specific and sensitive to model specification.

Despite extensive investigation, several research gaps persist. First, many studies rely on datasets that predate significant post-2000 structural transformations in India’s trade composition and exchange-rate regime. Second, stability diagnostics are often insufficiently emphasized before dynamic modeling. Third, increasing integration into global value chains and persistent import dependence raise questions regarding the continuing empirical relevance of price-based adjustment mechanisms implied by the Marshall–Lerner condition. The present study addresses these gaps by employing updated monthly data (1991–2024), conducting rigorous stability testing, and adopting a bilateral framework to reassess the J-curve hypothesis in the contemporary Indian context.

3. Data and Methodology

The study employs monthly bilateral trade, exchange rate, and price data for India and five major trading partners over the period 1991–2024. The trade balance (TB) is measured as the logarithm of the export–import ratio to avoid definitional issues associated with trade deficits and ensure elasticity-consistent interpretation.

The key explanatory variable is the real exchange rate (RER), constructed using nominal bilateral exchange rates and relative price indices. Domestic and foreign income proxies are included to control for demand-side effects.

Given the time-series nature of the data, the empirical strategy follows a structured approach:

1. Unit-root tests (ADF and KPSS) to determine stationarity.
2. Johansen cointegration tests to identify long-run equilibrium relationships.
3. Vector Error Correction Models (VECM) for countries exhibiting cointegration.

4. Impulse Response Functions (IRFs) and Forecast Error Variance Decomposition (FEVD) to evaluate short-run adjustment dynamics and the presence of J-curve behaviour.
5. Stability diagnostics (eigenvalue tests, CUSUM, and CUSUMSQ) to ensure parameter consistency.

Country-specific effective samples are constructed due to differences in data continuity, prioritizing econometric validity over cross-country uniformity. The focus remains on partner-specific inference rather than coefficient comparison.

4. Results and Discussion

Unit-root tests ensure that all the variables are unanimously integrated at order one hence the cointegration analysis. Only in the case of India-US and India-UAE trade, Johansen tests demonstrate there are long-run relationships. There is no evidence of cointegration between China and Japan and Germany is found to be unstable in spite of formal cointegration. VECM forecasts of the US and the UAE show poor and statistically insignificant error-correction terms, meaning that there is limited long-run adjustment. The coefficients of the real exchange rates are not large and they are not statistically significant, which means that depreciation has no significant positive impact on bilateral balances of trade.

The Impulse Response Functions indicate that the initial trade balance becomes slightly worse off after exchange-rate shocks, which is in line with theoretical onset of J-curve. Nonetheless, the improvements thereafter are practically non-significant and confidence intervals contain zero. Subsequent outcomes in FEVD show that exchange-rate shocks explain very low percentage of variation in trade balance.

In general, the results give weak empirical evidence on J-curve hypothesis in bilateral trade in India. The exchange-rate movements seem to have a small role when compared to structural features like import dependence, supply constraints, as well as integration in the global value chain. These findings indicate that currency depreciation in itself would not be a viable measure of correcting bilateral trade imbalances.

5. Conclusions

The paper has re-examined the bilateral J-curve hypothesis on India based on monthly data (1991-2024) in the framework of cointegration and a VECM model. The results do not give a lot of support to the J-curve mechanism. Cointegration exists also between the United States and the United Arab Emirates only, but the dynamics of adjustment are weak and statistically insignificant. China and Japan do not have a stable relationship in terms of long-run and Germany has instability in the parameters. The outcomes of impulse response and variance decomposition go on to show that a large part of fluctuations in trade balance is attributed to exchange-rate shocks. Such results indicate that India is more affected by structural issues, including dependence on imports and integration into global value chains, that makes the exchange-rate depreciation as a remedial option less effective.

There are limitations to the study in terms of the linear modelling framework, and the constraints of data of some partners. Further studies can examine nonlinear specifications and sector-specific analysis to understand how asymmetric and structural reactions to trade are more captivated in the future.

References

- Ari, A., Cergibozan, R., & Cevik, E. (2019). J-curve in Turkish bilateral trade: A nonlinear approach. *The International Trade Journal*, 33(1), 31–53. <https://doi.org/10.1080/08853908.2018.1521316>
- Arora, S., Bahmani-Oskooee, M., & Goswami, G. (2003). Bilateral J-curve between India and her trading partners. *Applied Economics*, 35(9), 1037–1041. <https://doi.org/10.1080/0003684032000102172>

- Bagaria, N. (2021). Analysing Opportunities for India in Global Value Chains in Post COVID-19 Era. *Foreign Trade Review*, 1–22 DOI:10.1177/0015732520981470
- Bahmani-Oskooee, M. (1985). Devaluation and the J-curve: Some evidence from LDCs. *The Review of Economics and Statistics*, 67(3), 500–504. <https://doi.org/10.2307/1925980>
- Bahmani-Oskooee, M. (1991). Is there a long-run relation between the trade balance and the real effective exchange rate of LDCs? *Economics Letters*, 36(4), 403–407. [https://doi.org/10.1016/0165-1765\(91\)90206-Z](https://doi.org/10.1016/0165-1765(91)90206-Z)
- Bahmani-Oskooee, M., & Ratha, A. (2004). The J-curve dynamics of U.S. bilateral trade. *Journal of Economics and Finance*, 28(1), 32–38. <https://doi.org/10.1007/BF02761473>
- Bahmani-Oskooee, M., & Ratha, A. (2004). The J-curve: A literature review. *Applied Economics*, 36(13), 1377–1398. <https://doi.org/10.1080/0003684042000201794>
- Bahmani-Oskooee, M., & Ratha, A. (2007). The bilateral J-curve: Sweden versus her 17 major trading partners. *International Journal of Applied Economics*, 4(1), 1–13.
- Bahmani-Oskooee, M., Bose, N., & Zhang, Y. (2017). Asymmetric cointegration, nonlinear ARDL and the J-curve: A bilateral analysis of China and its 21 trading partners. *Emerging Markets Finance and Trade*. <https://doi.org/10.1080/1540496X.2017.1373337>
- Bahmani-Oskooee, M., Goswami, G. G., & Talukdar, B. K. (2008). The bilateral J-curve: Canada versus her 20 trading partners. *International Review of Applied Economics*, 22(1), 93–104. <https://doi.org/10.1080/02692170701745952>
- Dash, A. K. (2013). Bilateral J-curve between India and her trading partners: A quantitative perspective. *Economic Analysis and Policy*, 43(3), 315–328. <https://doi.org/10.1016/j.eap.2013.06.001>
- Dash, R. K., & Sharma, C. (2011). FDI, trade, and growth dynamics: New evidence from the post-reform India. *The International Trade Journal*, 25(2), 233–266. <https://doi.org/10.1080/08853908.2011.554787>
- Demirden, T., & Pastine, I. (1995). Flexible exchange rates and the J-curve: An alternative approach. *Economics Letters*, 48(3–4), 373–377. [https://doi.org/10.1016/0165-1765\(94\)00634-2](https://doi.org/10.1016/0165-1765(94)00634-2)
- Ganai, S. G., & Khan, J. A. (2025). An asymmetric NARDL approach to the J-curve phenomenon and export competitiveness in India–US trade. *Cogent Economics & Finance*, 13(1), 2483866. <https://doi.org/10.1080/23322039.2025.2483866>
- Gupta-Kapoor, A., & Ramakrishnan, U. (1999). Is there a J-curve? A new estimation for Japan. *International Economic Journal*, 13(4), 71–79. <https://doi.org/10.1080/101687399000000045>
- Halicioglu, F. (2008). The bilateral J-curve: Turkey versus her 13 trading partners. *Journal of Asian Economics*, 19(3), 236–243. <https://doi.org/10.1016/j.asieco.2008.02.006>
- Hye, Q. M. A., & Lau, W.-Y. (2015). Trade openness and economic growth: Empirical evidence from India. *Journal of Business Economics and Management*, 16(1), 188–205. <https://doi.org/10.3846/16111699.2012.720587>
- Iqbal, B. A., Turray, A. M., & Sami, S. (2017). Impact of Indo–US trade on India’s economic growth: An empirical analysis. *Transnational Corporations Review*. <https://doi.org/10.1080/19186444.2017.1290918>
- Jawaid, S. T., & Raza, S. A. (2013). Effects of terms of trade on growth performance of India. *Economic Modelling*, 33, 940–946. <https://doi.org/10.1016/j.econmod.2013.04.043>
- Marwah, K., & Klein, L. R. (1996). Estimation of J-curves: United States and Canada. *The Canadian Journal of Economics / Revue canadienne d'Économique*, 29(3), 523–539. <https://www.jstor.org/stable/136248>
- Rose, A. K., & Yellen, J. L. (1989). Is there a J-curve? *Journal of Monetary Economics*, 24(1), 53–68. [https://doi.org/10.1016/0304-3932\(89\)90016-0](https://doi.org/10.1016/0304-3932(89)90016-0)
- Sharma, N., Young, L., & Wilkinson, I. (2006). The commitment mix: Dimensions of commitment in international trading relationships in India. *Journal of International Marketing*, 14(3), 64–91. <https://doi.org/10.1509/jimk.14.3.64>
- Singh, T. (2004). Testing J-curve hypothesis and analysing the effect of exchange rate volatility on the

- balance of trade in India. *Empirical Economics*, 29(2), 227–245. <https://doi.org/10.1007/s00181-003-0162-8>
- slam, F., Tiwari, A. K., & Shahbaz, M. (2016). Indo–US bilateral trade: An empirical analysis of India's trade balance. *The Indian Economic Journal*, 64(1–2), 75–94. <https://doi.org/10.1177/0019466216653505>
- Upadhyaya, K. P., Dhakal, D., & Thompson, H. (1996). Devaluation and the trade balance in India: Stationarity and cointegration. *Applied Economics*, 28(4), 429–432. <https://doi.org/10.1080/000368496328551>
- Wu, Y., & Zhou, Z. (2006). Changing bilateral trade between China and India. *Journal of Asian Economics*, 17(3), 509–518. <https://doi.org/10.1016/j.asieco.2006.04.007>.

Acknowledgements

The author expresses gratitude for the organizations whose data has been used to come out with this study in a meaningful way. The authors are also thankful to the School of Economics, SVKM's Narsee Monjee Institute of Management Studies for providing logistic support. The authors value the helpful conversations and feedback from colleagues at different points in the research.

DYNAMICS OF EMPLOYMENT ELASTICITY OF OUTPUT IN THE UZBEKISTAN ECONOMY: EVIDENCE FROM ARDL AND ROLLING REGRESSION APPROACHES

Nazia ISRAR^{1*}, Mushtaq Ahmad MALIK²

^{1,2}University of Kashmir, Centre of Central Asian Studies, Srinagar, Kashmir, India

* Corresponding author: nazia.ccasscholar@kashmiruniversity.net

Abstract

This study examines a pivotal question in development economics: Does economic growth in Uzbekistan create substantial employment opportunities? Concentrating on the years 1991 to 2024, it assesses the inclusiveness of growth by analyzing the employment elasticity of output (EEOG) and pinpointing the principal factors that influence it over time.

The study employs annual time-series data within an Autoregressive Distributed Lag (ARDL) framework to analyze both long-term trends and short-term fluctuations. This method lets us examine both long-term relationships and short-term dynamics simultaneously. An Error Correction Model (ECM) shows how quickly the system goes back to equilibrium after shocks. We also use rolling regression analysis to see how the relationship between growth and employment changes over time. The model includes variables that capture changes in the economy and its structure, such as the share of jobs in the service sector, labor force participation, trade openness, investment, foreign direct investment (FDI), inflation, and a dummy variable for reforms after 2017.

The results indicate a stable long-term correlation between employment elasticity and its determinants. However, the overall size of the long-run elasticity is still small, indicating that economic growth hasn't always led to many new jobs. The adjustment to long-run equilibrium is slow, meaning short-run imbalances are gradually corrected. When you look at the data more closely with rolling regression, you can see that this relationship is not stable at all. During the early years of transition, growth often led to fewer jobs, which was a sign of structural problems. However, over time, things improve, and the elasticity of employment steadily rises to about 0.52 by 2024. The growth of the service sector is one of the main reasons why employment is responsive.

In the short term, trade openness and a larger workforce help create jobs. On the other hand, investment and reform-related factors can sometimes have the opposite effect, probably because of the stress of adjustment and the fact that some growth processes require substantial capital.

The study indicates that Uzbekistan's growth trajectory has progressively become more conducive to employment; however, significant challenges persist. Growth by itself has not been enough to create enough jobs, especially in the long run. The results show how important structural change is, especially the move toward service-oriented activities, for making growth more likely to create jobs. In the future, it will be important to have policies that support labor-intensive sectors, make it easier for people to find work, and ensure that economic reforms align with job goals. The larger point is clear: the ability of growth to create jobs depends not only on how fast the economy grows, but also on how that growth is set up and supported by policy.

Keywords: Uzbekistan; employment elasticity of output; ARDL model; rolling regression; structural transformation;

References:

- Bhat, J. A., Haq, I., Bhat, S. A., & Megits, N. (2022). Employment elasticity of output growth in the Kazakhstan economy: Recent evidence from a macroeconomic perspective. *Journal of Eastern European and Central Asian Research*, 9(2), 369-384.
- Chenery, H., & Syrquin, M. (1975). *Patterns of development, 1950–1970*. Oxford University Press.
- Engle, R. F., & Granger, C. W. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica: Journal of the Econometric Society*, 251-276.
- Ghose, A. K. (2013). *Jobs and development: Challenges and strategies in the developing world*. International Labour Organization.
- International Labour Organization. (2013). *Global employment trends 2013: Recovering from a second jobs dip*. International Labour Office.
- Irshad, M., & Qayed, S. H. (2025). Determinants of employment intensity of growth in India: An insight from panel data. *Millennial Asia*, 16(4), 584-612.
- Islam, I., & Nazara, S. (2000). Estimating employment elasticity for the Indonesian economy: Technical note on the Indonesian labour market.
- Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics & Statistics*, 52(2).
- Kapsos, S. (2006). The employment intensity of growth: Trends and macroeconomic determinants. In *Labor markets in Asia: Issues and perspectives* (pp. 143-201). London: Palgrave Macmillan UK.
- Kuznets, S. (1966). *Modern economic growth: Rate, structure, and spread*. Yale University Press.
- Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester School*, 22(2), 139–191.
- Mkhize, N. I. (2019). The sectoral employment intensity of growth in South Africa. *Southern African Business Review*, 23, 24-pages.
- Pattanaik, F., & Nayak, N. C. (2014). Macroeconomic determinants of employment intensity of growth in India. *Margin: The Journal of Applied Economic Research*, 8(2), 137-154.
- Pesaran, M. H., & Shin, Y. (1995). *An autoregressive distributed lag modelling approach to cointegration analysis* (Vol. 9514, pp. 371-413). Cambridge, UK: Department of Applied Economics, University of Cambridge.
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289-326.
- Rodrik, D. (2016). Premature deindustrialization. *Journal of Economic Growth*, 21(1), 1–33. <https://doi.org/10.1007/s10887-015-9122-3>.
- Sawtelle, B. (2007). Analyzing the link between real GDP and employment: An industry sector approach. *Business Economics*, 42(4), 46-54.
- Seyfried, W. (2011). Examining the relationship between employment and economic growth in the ten largest states. *Southwestern Economic Review*, 32, 13-24.
- Upender, M. (2006). Output elasticity of employment in the Indian economy: An empirical note. *Applied Econometrics and International Development*, 6(1).
- World Bank. (2019). *Uzbekistan country economic update: Transition to a market economy*. World Bank.

UNPACKING EDUCATION'S ROLE IN INDIA'S ECONOMIC GROWTH: HUMAN CAPITAL AND STRUCTURAL TRANSFORMATION

Rajeev Parashar

Shiv Nadar Institution of Eminence, Delhi-NCR, India

Corresponding author: rp433@snu.edu.in

Abstract

This paper quantifies the contribution of education to India's per-capita output growth over 2014 to 2024 and decomposes that contribution into a within-sector productivity channel and a between-sector reallocation channel. Using the CMIE Consumer Pyramids Household Survey, a nationally representative panel with continuous income and education data, we estimate a structural model of sequential discrete choices in which individuals first decide whether to obtain education and then choose between agricultural and non-agricultural employment. Sector-specific returns to education are estimated at approximately 23 percent in agriculture and 46 percent in non-agriculture. Of the 65.1 percent per-capita output growth recorded over the decade, education accounts for roughly 9.75 percent of headline per capita growth. Within-sector productivity gains dominate overwhelmingly, contributing 9.55 percent, while the reallocation channel adds only 0.20 percent. Two counterfactual exercises show that removing observable-group barriers (caste, gender, geographic frictions) raises the between-sector contribution more than eightfold to 1.67 percent of total per capita growth, and that sharpening the productivity contrast between low- and high-productivity sectors raises it further to 3.10 percent. Results are robust to alternative education thresholds. The findings imply that expanding educational access alone is insufficient to drive structural transformation; complementary labour-market reforms are required to unlock the reallocation dividend.

Keywords: human capital; structural transformation; India; labour-market frictions; growth accounting

JEL codes: O15; O41; J24; J62; I25

1. Introduction

India's per-capita output expanded by more than 60 percent in real terms between 2014 and 2024, a performance that places it among the world's fastest-growing large economies. Over the same period, educational attainment rose sharply: the share of the population with at least a higher secondary qualification increased from around 27 to 38 percent, and university degree holders grew from 17 to 19 percent (CMIE-CPHS). These parallel trends raise a fundamental question for development economics: how much of the growth can be attributed to education, and through what mechanisms does education operate?

Two mechanisms have been proposed in the literature. First, following Lucas (1988) and Mankiw, Romer and Weil (1992), education raises human capital and thus the productivity of workers within whatever sector they currently occupy. Second, following Lewis (1954) and the structural transformation literature surveyed by Herrendorf, Rogerson and Valentinyi (2014), education may lower the barriers to moving out of low-productivity agriculture into higher-wage non-agricultural employment, generating aggregate gains through reallocation even without any change in within-sector productivity. The relative importance of these channels has direct implications for policy: where growth is driven primarily by within-sector productivity gains, as in the Indian case, the appropriate policy response is to

simultaneously tackle the labour-market frictions that suppress the reallocation channel, so that both mechanisms contribute to aggregate growth.

This paper estimates the separate contributions of these two channels for India over 2014 to 2024. We do so by combining a growth-accounting decomposition with a structural model of education and sector choice, estimated on panel data from the CMIE Consumer Pyramids Household Survey (CPHS). Our central finding is that education operates almost entirely through the within-sector channel, with reallocation barely visible in the baseline. Counterfactual analysis reveals, however, that this result reflects the binding nature of labour-market frictions: removing caste, gender and geographic barriers to non-agricultural entry, or sharpening the measured productivity contrast between sectors, substantially enlarges the latent reallocation channel.

2. Literature Review

The empirical literature on education and growth, originating with Barro (1991) and Mankiw, Romer and Weil (1992), has consistently found positive cross-country associations between human capital accumulation and output growth, though de la Fuente and Domenech (2006) caution that data quality substantially affects the estimated magnitudes. For India specifically, Duraisamy (2002) documents rising private returns to schooling over 1983 to 1994, and Kingdon and Unni (2001) show that education significantly improves women's labour market outcomes, albeit unevenly across sectors.

The structural transformation literature, building on Lewis (1954) and Kuznets (1966), emphasises that aggregate productivity growth in developing economies reflects not only within-sector improvement but also the reallocation of labour from agriculture to higher-productivity activities (Caselli and Coleman, 2001; Herrendorf et al., 2014). Lee and Malin (2013) provide the closest antecedent to our analysis, quantifying education's role in China's structural transformation. Acemoglu and Zilibotti (2001) show how technology-skill complementarities can generate cross-country productivity differences even with similar factor endowments.

A distinct strand of the Indian literature documents the frictions that constrain reallocation. Munshi and Rosenzweig (2006, 2016) show that caste-based social networks simultaneously provide insurance and trap workers in low-productivity rural employment, generating a rural-urban wage gap that persists even as education expands. Deshpande (2011), Thorat and Newman (2010), and Deshpande and Ramachandran (2023) document pervasive economic discrimination along caste lines in labour markets. Klasen and Pieters (2015) identify the stagnation of female labour force participation in urban India as a binding constraint on reallocation, while Mehrotra et al. (2012) and Basu and Maertens (2007) emphasise the role of informality and jobless growth. Lanjouw and Murgai (2009) trace agricultural wage dynamics and their interaction with sectoral movement. These frictions motivate the counterfactual exercises central to our analysis.

3. Data and Methodology

The primary data source is the CMIE Consumer Pyramids Household Survey (CPHS), a nationally representative individual panel covering 2014 to 2024. Monthly income observations are aggregated to annual frequency and deflated to constant 2012 INR using the Consumer Price Index. The estimation sample comprises approximately 609,000 person-year observations in agriculture and 1.36 million in non-agriculture. The CPHS is preferred over alternatives because it uniquely combines panel structure,

continuous individual income measurement, and joint observation of education and sectoral employment. The NSS Employment-Unemployment Survey is quinquennial and lacks continuous income data; the Periodic Labour Force Survey is available only from 2017 and is a repeated cross-section rather than a panel.

The empirical strategy proceeds in two stages. First, we estimate a structural model of sequential discrete choices. In the first stage, individual i decides whether to obtain education E (defined in the baseline as at least eight completed years of schooling). In the second stage, conditional on E , the individual chooses between agricultural ($s = a$) and non-agricultural ($s = n$) employment. Log earnings in sector s satisfy a log-linear equation with controls for age, gender, marital status, caste, religion, region, state fixed effects, a sector-specific education premium parameter, and a persistent unobserved productivity term. Sector entry costs depend on observable group characteristics and an idiosyncratic shock; education costs depend on demographics and the state-level secondary enrolment rate. Workers maximise the present discounted value of lifetime earnings at a 5 percent annual discount rate. The model is estimated by Simulated Method of Moments.

Second, education's contribution to aggregate growth is quantified using a formal decomposition identity. Total per-capita output is expressed as the employment-share-weighted average of sectoral outputs per worker. The total education effect is the difference in log output between the observed economy and a counterfactual in which no individual obtains education, with sector allocations set at their no-education equilibrium. This total is decomposed into a within-sector component, isolating the productivity gain from education holding sector allocation fixed at the no-education counterfactual, and a between-sector component, measuring the additional output arising purely from the sector reallocation that education induces.

4. Results and Discussion

Structural estimates yield sector-specific education premia of approximately 23 percent in agriculture and 46 percent in non-agriculture, meaningfully lower than naive OLS estimates (31 and 58 percent respectively), consistent with positive selection on unobservables into both education and non-agricultural employment. The model fits the data well, closely replicating observed sector participation rates, education rates, and income levels across demographic subgroups. Per-capita output growth over the sample period is estimated at 65.1 percent, closely tracking the national accounts benchmark of 60.7 percent.

Of the 65.1 percent growth, education accounts for approximately 9.75 percent of headline per capita growth. Of education's total contribution, around 98 percent operates through within-sector productivity gains, while the between-sector reallocation channel accounts for only about 2 percent. Education raised worker productivity primarily where workers already were; it did not appreciably accelerate structural transformation in the baseline.

Counterfactual 1 removes all observable-group barriers to non-agricultural entry (setting to zero the effects of gender, caste, religion and state on sector entry costs) while preserving idiosyncratic frictions. Total growth rises to 71.8 percent, and the between-sector contribution increases more than eightfold to 1.67 percent of total per capita growth, representing 14.5 percent of education's total contribution. This demonstrates that systematic discrimination and geographic segmentation actively suppress the reallocation channel. Yet even without these group-level barriers, reallocation remains a minority

channel, indicating that idiosyncratic and unobserved constraints continue to bind.

Counterfactual 2 replaces the standard agriculture/non-agriculture sector classification with a low-productivity group (agriculture plus informal and low-skill services) and a high-productivity group (formal industry and professional services). This sharpens the measured productivity contrast: the income premium for the high-productivity sector rises to 42.2 percent. Under this specification, the between-sector contribution rises to 3.10 percent of total per capita growth, or 27.6 percent of education's total contribution, with headline growth at 67.5 percent. The result reveals that the conventional binary sector split masks substantial heterogeneity within non-agriculture: informal services are barely more productive than farming, diluting the measured reallocation incentive.

Robustness checks confirm the stability of the core finding. Raising the education threshold from 8 to 12 completed years yields a within-sector contribution of 7.82 percent and a between-sector contribution of 0.45 percent of headline per capita growth, preserving the dominance of the within-sector channel. Table 1 summarises results across all specifications.

Specification	Headline Growth	Education's Contribution (% of headline growth)	Within-Sector (% of headline growth)	Between-Sector (% of headline growth)	Reallocation Share of Education's Contribution
Baseline (≥ 8 yrs)	65.1%	9.75%	9.55%	0.20%	2.1%
Robustness (≥ 12 yrs)	62.5%	8.27%	7.82%	0.45%	5.4%
CF 1: reduced frictions	71.8%	11.52%	9.85%	1.67%	14.5%
CF 2: low/high productivity	67.5%	11.21%	8.11%	3.10%	27.6%

Table 1: Results at a Glance - Education's Contribution Across Specifications

These findings are consistent with the broader literature on caste, gender and geographic frictions in Indian labour markets. Munshi and Rosenzweig (2016) identify insurance-migration trade-offs embedded in caste networks as a key mechanism generating misallocation; our counterfactual provides a quantified aggregate cost of those frictions. Klasen and Pieters (2015) link stagnant female participation in urban employment to compositional and norm-based constraints; in our framework these constraints enter directly as gender-specific entry costs.

5. Conclusions

This paper establishes four principal findings. Education accounts for approximately 9.75 percent of India's 65.1 percent per-capita output growth over 2014 to 2024. Within-sector productivity gains dominate in every specification, confirming that education primarily raises worker productivity within existing sectors rather than driving occupational or sectoral mobility. Observable-group barriers, particularly along caste, gender and geographic lines, suppress the reallocation channel: removing them raises the between-sector contribution more than eightfold. Sector aggregation matters: the conventional agriculture/non-agriculture split masks productivity heterogeneity that, once accounted for, reveals a substantially larger latent reallocation channel.

The policy implication is clear. Expanding educational access, though valuable, is insufficient to drive

structural transformation. India's growth strategy must pair investment in schooling with complementary reforms that reduce labour-market frictions: anti-discrimination measures in hiring, portability of social protection to ease migration, and formal-sector job creation that widens the high-productivity employment base. Without these reforms, the reallocation dividend from rising educational attainment will remain largely unrealised.

This study has several limitations. The model restricts sector choice to a binary decision and precludes life-cycle sector switching; a multi-sector extension with dynamic reallocation would be more realistic. Firm-side responses to labour supply shifts, education quality heterogeneity, and occupational mobility within sectors are not modelled. Future work could address these gaps using matched employer-employee data and exploit quasi-experimental variation in school construction or labour law reforms to identify causal effects.

References

- Acemoglu, D., & Zilibotti, F. (2001). Productivity differences. *Quarterly Journal of Economics*, 116(2), 563-606.
- Barro, R. J. (1991). Economic growth in a cross section of countries. *Quarterly Journal of Economics*, 106(2), 407-443.
- Basu, K., & Maertens, A. (2007). The pattern and causes of economic growth in India. *Oxford Review of Economic Policy*, 23(2), 143-167.
- Caselli, F., & Coleman II, W. J. (2001). The US structural transformation and regional convergence: A reinterpretation. *Journal of Political Economy*, 109(3), 584-616.
- de la Fuente, A., & Domenech, R. (2006). Human capital in growth regressions: How much difference does data quality make? *Journal of the European Economic Association*, 4(1), 1-36.
- Deshpande, A. (2011). *The Grammar of Caste: Economic Discrimination in Contemporary India*. Oxford University Press.
- Deshpande, A., & Ramachandran, R. (2023). Covid-19 and caste inequalities in India. *Applied Economic Perspectives and Policy*, 45(4), 1982-1997.
- Duraisamy, P. (2002). Changes in returns to education in India, 1983-94: By gender, age-cohort and location. *Economics of Education Review*, 21(6), 609-622.
- Herrendorf, B., Rogerson, R., & Valentinyi, A. (2014). Growth and structural transformation. In P. Aghion & S. Durlauf (Eds.), *Handbook of Economic Growth* (Vol. 2B, pp. 855-941). Elsevier.
- Kingdon, G., & Unni, J. (2001). Education and women's labour market outcomes in India. *Education Economics*, 9(2), 173-195.
- Klasen, S., & Pieters, J. (2015). What explains the stagnation of female labor force participation in urban India? *World Bank Economic Review*, 29(3), 449-478.
- Kuznets, S. (1966). *Modern Economic Growth: Rate, Structure and Spread*. Yale University Press.
- Lanjouw, P., & Murgai, R. (2009). Poverty Decline, Agricultural Wages, and Non-Farm Employment in Rural India 1983–2004. World Bank Policy Research Working Paper No. 4858.



- Lee, S., & Malin, B. A. (2013). Education's role in China's structural transformation. *Journal of Development Economics*, 101, 148-166.
- Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester School*, 22(2), 139-191.
- Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3-42.
- Mankiw, N. G., Romer, D., & Weil, D. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107(2), 407-437.
- Mehrotra, S., Gandhi, A., Saha, P., & Sahoo, B. K. (2012). *Joblessness and Informalization: Challenges to Inclusive Growth in India*. PARI: The CounterMedia Trust.
- Mincer, J. (1974). *Schooling, Experience, and Earnings*. Columbia University Press.
- Munshi, K., & Rosenzweig, M. (2006). Traditional institutions meet the modern world: Caste, gender, and schooling choice. *American Economic Review*, 96(4), 1225-1252.
- Munshi, K., & Rosenzweig, M. (2016). Networks and misallocation: Insurance, migration, and the rural-urban wage gap. *American Economic Review*, 106(1), 46-98.
- Thorat, S., & Newman, K. S. (2010). *Blocked by Caste: Economic Discrimination in Modern India*. Oxford University Press.

STRUCTURAL CHANGES IN ROAD FREIGHT TRANSPORT IN THE CONTEXT OF EUROPEAN INFRASTRUCTURE DEVELOPMENT

Adrian George FOGHIȘ^{1*}; Octavian-Mihai PETRE²

1 School of Advanced Studies of the Romanian Academy, Romanian Academy House,
Bucharest, Romania

2 Doctoral School of Economics II, Faculty of Agrifood and Environmental Economics,
Bucharest University of Economic Studies, Romania

* Corresponding author: adifoghis@gmail.com | ORCID: 0009-0003-6382-4840

Abstract

Road freight transport has become, in recent decades, the main driver of economic mobility in Europe, reflecting the dynamics of internal market integration and the structural transformations of national economies. This article analyses the relationship between road infrastructure development, public investment, and the growing role of road transport in Central and Eastern European countries, based on statistical indicators regarding the modal split of transport. The results highlight a trend toward increased road transport, partial convergence among countries, and persistent structural differences stemming from different historical development trajectories. The analysis underscores the role of infrastructure and investment in shaping economic competitiveness and regional integration, while also highlighting the limitations of a development model based predominantly on road transport.

Keywords: transport; roads, infrastructure; regional integration;
JEL codes (optional): L9; N7;R4 Q43.

1. Introduction

The development of transport infrastructure is one of the fundamental pillars of European economic integration and the structural modernization of member states. In this context, road freight transport has progressively established itself as a central element of economic mobility, becoming the primary mode of goods distribution within the internal market. The structural transformations of this sector cannot be understood in isolation but must be analyzed in conjunction with the dynamics of infrastructure investment, economic convergence processes, and the reconfiguration of logistics chains at the continental level. In Central and Eastern Europe, these processes are particularly visible, as the region has undergone an accelerated phase of infrastructure recovery and economic integration over the past two decades. The relationship between road freight transport and infrastructure development is a central topic in economic literature and transport studies, analyzed from multiple perspectives: regional integration, economic growth, logistics, sustainability, and technological transformation. Recent research highlights that infrastructure is not merely a physical support for the mobility of goods, but a determining factor in economic competitiveness, market integration, and the structural transformations of logistics systems.

The expansion and modernization of road networks have created the conditions for an unprecedented increase in freight transport, particularly road transport, which offers clear advantages in terms of flexibility, accessibility, and operational efficiency. The growing share of road transport in the overall

structure of freight mobility reflects the adaptation of European economies to the requirements of the single market, characterized by rapid deliveries, fragmented distribution, and increased mobility of trade flows. In Central and Eastern European countries, this trend is associated with profound structural transformations, including infrastructure modernization, increased public investment, and progressive integration into European transport corridors. From a macroeconomic perspective, Cigu, Agheorghiesei, Gavriluță, and Toader (2018) examine the link between transport infrastructure development, public sector performance, and long-term economic growth in European Union member states. The logistical dimension of road transport in the context of globalization is analyzed by Nowicka-Skowron and Mesjasz-Lech (2013), who emphasize the role of logistics infrastructure in supporting international trade flows. The specific role of Central and Eastern European countries in the structure of European road transport is highlighted by Matuszczak, Michałek, and Woźniak (2025), who analyze patterns of road transport services at the continental level. The authors show that these countries have become important players in the European logistics system, both as transit hubs and as providers of transport services.

The literature on intermodal transport offers a complementary perspective on the role of infrastructure. Beuthe (2007) emphasizes the importance of integrating different modes of transport to increase logistical efficiency and reduce costs. Intermodality is presented as a solution for optimizing freight flows and reducing excessive dependence on road transport, contributing to a better organization of the European transport system. The relationship between infrastructure and economic development is also addressed by Kuranovič et al. (2025), who highlight that the modernization of transport systems contributes to increased economic competitiveness and improved logistics efficiency. An increasingly important area in recent research is the energy transition and the sustainability of road transport. Carboni, Dall-Orsoletta, Hawkes, and Giarola (2024) analyze the future of road freight transport in the context of the use of alternative technologies, highlighting their role in reducing emissions and transforming the sector. Similarly, Aryanpur and Rogan (2024) examine the decarbonization of road transport, emphasizing the importance of zero-emission trucks and the impact of the intangible costs associated with the energy transition.

The dimension of public policies and environmental commitments is addressed by Jullien and Marin-Lamellet (2026), who analyze the role of the European Green Deal in shaping transport infrastructure. The authors highlight the importance of institutional actors' involvement and the development of green infrastructure in supporting the transition to a sustainable transport system. In the same vein, Ismael et al. (2026) analyzes the relationship between transport infrastructure, economic growth, and CO₂ emissions, emphasizing the role of green energy consumption in reducing the transport sector's environmental impact.

One of the early lines of analysis concerns the role of infrastructure in integrating transport systems on a continental scale. Nijkamp et al. (1997) emphasize the importance of major infrastructure projects aimed at transforming Alpine transport systems, highlighting their potential to connect national networks into a coherent European system.

The logistical dimension of freight transport is explored in depth by Macioszek et al. (2017), who analyze the development of logistics systems in Poland, with a focus on the Silesia province. The study highlights how infrastructure accessibility and the proximity of logistics centers influence the efficiency of freight transport. The issue of infrastructure fragmentation is addressed by Prussi et al. (2021), who analyze the

development of infrastructure for alternative fuels, using biomethane as a case study and underscore the need for integrated and synchronized policies at the European level to support the transition to more sustainable freight transport.

2. Data and Methodology

This research is based on a comparative analysis of the evolution of road freight transport and transport infrastructure in Central and Eastern Europe, using statistical indicators relevant to the assessment of logistics performance and infrastructure development. The methodological framework is built on the use of official secondary data, drawn from Eurostat databases, and the application of a descriptive and comparative analysis of time series. Methodologically, the study is based on a longitudinal descriptive analysis, used to identify trends, fluctuations, and inflection points in the evolution of the indicators. Annual time series were compared across countries to highlight structural differences, growth rates, and regional convergence processes. The research employs an interpretive approach, correlating statistical trends with broader economic processes, such as regional integration, infrastructure modernization, and the development of domestic markets.

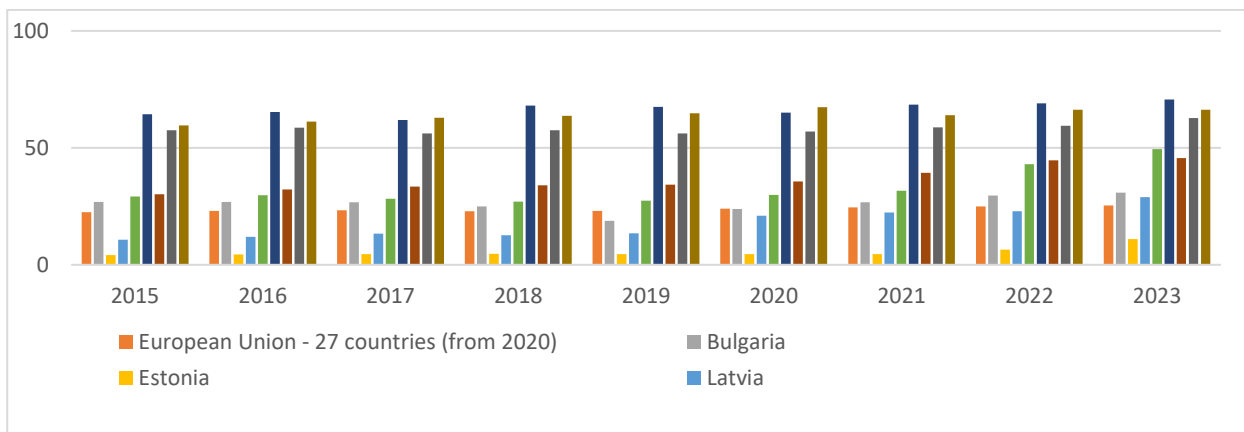
Table 1: Indicators used in the analysis

Indicator	Time period	Source
Modal split of freight transport in the EU	2013–2023	Eurostat: Freight transport statistics - modal split (tran hv ms frmod) /
Road freight transport by type of goods and type of transport, Food, beverages, and tobacco	2013–2024	Eurostat: Road freight transport by type of goods and type of transport (t, tkm) - annual FOODS [road go ta tg custom 20017018)

Source: author based on Eurostat database

The empirical analysis of the selected indicators highlights significant structural changes in the transport and infrastructure systems of Central and Eastern European countries during the period 2013–2024. Based on the statistical series taken from the Eurostat database and summarized in the figures presented growth trends, processes of partial convergence, but also persistent structural differences between economies can be identified.

3. Modal split of road freight transport

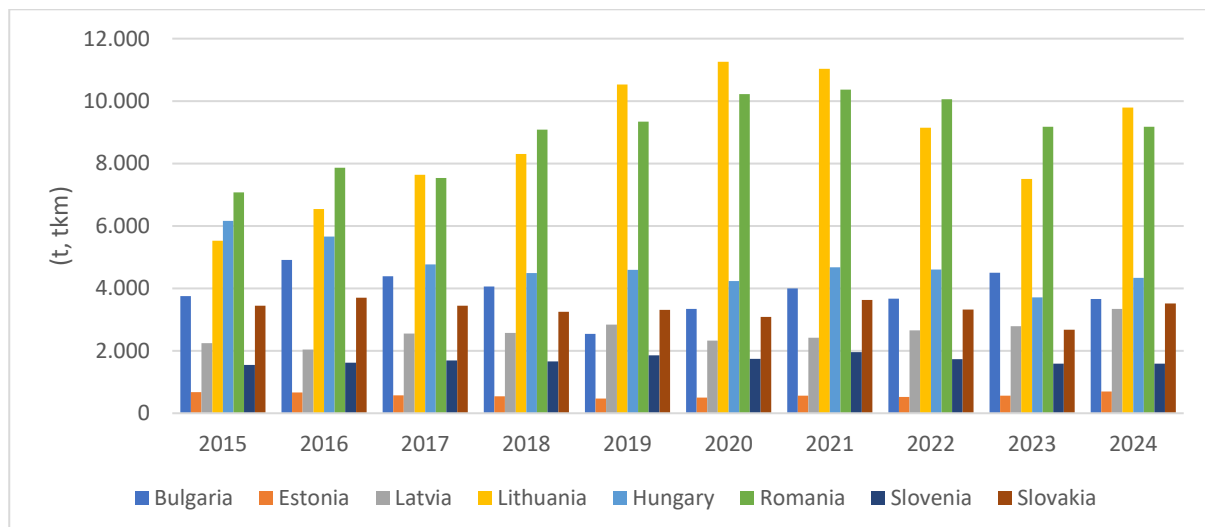


Source: author based on Eurostat (2025). Modal split of road freight transport (https://doi.org/10.2908/TRAN_HV_MS_FRMOD)

In 2023, the share of road freight transport in the EU (measured in ton-kilometers) increased by 2.8 percentage points compared to 2013. Comparing 2023 with 2013, the share of road transport in total freight transport decreased slightly in three EU countries (Figure 1). The largest decrease was recorded in Poland (-0.5 percentage points), followed by Portugal (-0.4 percentage points). In contrast, substantial increases were observed in Lithuania (+20.7 percentage points), Latvia (+18.9 percentage points), Romania (+15.0 percentage points), Finland (+12.1 percentage points), Slovakia (+10.5 percentage points), and Sweden (+10.2 percentage points). In the case of Sweden, the increase in the share of road freight transport is nearly equal to the decrease in the share of maritime freight transport when comparing 2023 to 2013. For the other countries, with the exception of Romania, this increase was accompanied by a more or less similar decrease in the share of rail transport.

Looking at the most recent two reference years, Poland recorded the sharpest decline in the share of road freight transport, down 2.1 percentage points between 2022 and 2023. Only four other EU countries recorded a decline during the same period (by less than 1 percentage point). In contrast, the share of road freight transport increased the most in Lithuania (+6.4 pp), followed by Latvia (+6.0 pp), Estonia (+4.5 pp), and Finland (+4.3 pp). The other countries recorded an increase of less than 3.5 pp.

Road transport of food, beverages, and tobacco thus becomes not only an indicator of logistics activity but also a barometer of economic development and the stability of supply chains. Figure 2 shows the evolution of road freight transport in the food, beverages, and tobacco category, expressed in ton-kilometers, for eight countries in Central and Eastern Europe during the period 2015–2024.



Source: Author, based on Eurostat’s “Road freight transport by type of goods and type of transport (t, tkm) – annual data” [road_go_ta_tg_custom_20017018]

The transformations of road freight transport systems for agri-food products in Central and Eastern Europe, analyzed for the period 2015–2024, reflect profound economic developments, increasingly pronounced regional interdependencies, and persistent structural constraints. Analysis of the data series on the volume of road transport of food, beverages, and tobacco, expressed in ton-kilometers, reveals consistent growth trends, partial convergence processes, as well as structural differences that remain relatively stable over time. In this context, agri-food transport becomes a relevant indicator of economic dynamism, trade integration, and infrastructure capacity. From the perspective of descriptive data

analysis, the 2015–2020/2021 period is characterized by a significant increase in transport volumes in most of the analyzed countries. This trend is particularly pronounced in the case of Lithuania and Romania, where figures rise from approximately 5,500–7,000 t·km in 2015 to over 10,000–11,000 t·km around 2019–2021. The growth rate is accelerating and relatively steady, indicating a strong intensification of trade flows and a consolidation of these economies’ role in regional agri-food distribution networks. In Romania’s case, this trend can be linked to the expansion of agricultural production and rising domestic demand, while in Lithuania, its strategic geographic location and role as a transit hub help maintain high transport volumes.

Countries at the mid-level, such as Hungary and Bulgaria, show a more stable trend, with moderate variations and no dramatic increases. Transport volume in these economies generally ranges between 3,500 and 6,000 t·km, with annual fluctuations reflecting economic adjustments but without major structural changes. This stability suggests the existence of well-established logistics systems, characterized by a relative balance between demand and infrastructure capacity.

At the lower end of the distribution, Estonia, Latvia, Slovenia, and Slovakia record lower values, typically below 3,000–3,500 t·km. Nevertheless, these economies also show a general upward trend through around 2020, indicating their participation in a shared regional process of intensifying agri-food transport. The growth is, however, slower and more volatile, suggesting greater dependence on the size of the domestic market, economic specialization, and geographic location.

A comparative analysis of the time series thus indicates the existence of persistent structural polarization. Two economies—Lithuania and Romania—clearly dominate the region in terms of the volume of road agri-food transport, while the other countries cluster around average or low levels. This polarization reflects differences in production capacity, the size of the consumer market, the degree of integration into trade flows, and the development of logistics infrastructure. At the same time, the data suggest partial convergence in terms of growth rates, but not in absolute levels. Most countries follow an upward trajectory through 2020–2021, indicating the presence of common regional factors, such as rising food demand, increased trade, and infrastructure modernization.

A significant element in the analysis of the time series is the identification of an inflection point around 2020–2021. During this period, most countries reach peak values, followed by stagnation or a moderate decline in 2022–2023. This trend suggests that agri-food transport is highly sensitive to external shocks. The moderate volatility observed subsequently indicates that regional logistics systems were subject to pressures that limited the pace of growth, but without leading to a structural decline. The partial recovery in 2024, observable in several countries, suggests a capacity for adaptation and stabilization of trade flows. From an economic perspective, these developments reflect a direct relationship between the dynamics of agri-food road transport and regional integration processes. The increase in volumes indicates the expansion of distribution networks, the specialization of production, and the growth of trade interdependencies. At the same time, persistent differences between countries suggest that infrastructure development and geographical location continue to play a decisive role. Economies located along major trade corridors or with better access to large markets tend to record higher volumes and more pronounced growth.

The data analyzed in Figure 2 suggest that agri-food road transport in Central and Eastern Europe has gone through a period of expansion and consolidation, followed by a stabilization phase. The initial

growth reflects the intensification of economic integration and the development of domestic markets, while the subsequent stabilization indicates the attainment of a certain level of logistical maturity. Polarization among countries remains a defining feature, and convergence is more a matter of pace than of level.

5. Conclusions

The analysis of the evolution of road freight transport and road infrastructure in Central and Eastern European countries highlights a complex process of economic and logistical transformation during the period 2013–2024. The results show that road transport has become a central pillar of freight mobility in the region, both in terms of its share in the transport mix and the ever-increasing volume of trade flows, particularly in the agri-food sector.

A first conclusion is the general increase in the importance of road transport in most of the analyzed countries. This trend reflects the adaptation of regional economies to the demands of an integrated market, characterized by flexible supply chains, reduced delivery times, and increased demand for efficient logistics services. At the same time, the increase in the share of road transport indicates a process of modal shift, in which rail transport and, in some cases, maritime transport is gradually losing their relative importance. Second, the analysis of road transport of food, beverages, and tobacco shows a pronounced dynamic up to around 2019–2021, followed by a phase of adjustment and stabilization. This trend underscores the role of the agri-food sector as a barometer of economic stability and supply chain resilience. From the perspective of regional convergence, this manifests itself more in terms of growth rates than absolute levels. Countries with low initial levels tend to progress more rapidly, but the gaps relative to economies with mature infrastructure remain significant.

References

1. Aryanpur, V., & Rogan, F. (2024). Decarbonising road freight transport: The role of zero-emission trucks and intangible costs. *Scientific reports*, 14(1), 2113.
2. Beuthe, M. (2007). Intermodal freight transport in Europe. *Globalized freight transport. Intermodality, e-commerce, logistics and sustainability*/edited by Thomas R. Leinbach, Cristina Capineri. Cheltenham: Edward Elgar (Transport economics, management and policy), 54-99.
3. Carboni, M., Dall-Orsoletta, A., Hawkes, A., & Giarola, S. (2024). The future of road freight transport and alternative technologies: A case study for Italy. *Energy Conversion and Management*, 299, 1178–119.
4. Cigu, E., Agheorghiesei, D. T., Gavriluță, A. F., & Toader, E. (2018). Transport infrastructure development, public performance, and long-run economic growth: a case study for the EU-28 countries. *Sustainability*, 11(1), 67.
5. Gizetdinov, R. (2024). Automation and digitalization of transport forwarding services or logistics. *Infrastructure Asset Management*, 11(2), 100–107.
6. Ismael, K., Salih, A. M., Yaqub, K. Q., Tesoriere, G., & Campisi, T. (2026). Transport Infrastructure, Economic Expansion, and CO2 Dynamics: The Critical Role of Green Energy Consumption in the United States. *Sustainability*.
7. Jullien, A., & Marin-Lamellet, C. (2026). The EU Green Deal, stakeholder communities, and environmental commitment. In *Transportation Geotechnics for Green, Digital, and Modern Infrastructures* (pp. 1-23). CRC Press.

8. Kotowska, I. (2016). Method of assessing the role of short sea shipping in sustainable development of transport. *International Journal of Shipping and Transport Logistics*, 8(6), 687–704.
9. Kuranovič, V., Ustinovichius, L., Nowak, M., Bazaras, D., & Sokolovskij, E. (2025). Improving the Freight Transportation System in the Context of the Country’s Economic Development. *Sustainability*, 17(14), 6327.
10. Macioszek, E., Staniek, M., & Sierpiński, G. (2017). Analysis of trends in the development of freight transport logistics using the example of the Silesian Province (Poland)—a case study. *Transportation Research Procedia*, 27, 388-395.
11. Matuszczak, Ł., Michałek, J. J., & Woźniak, R. (2025). The Pattern of Road Freight Transport Services in Europe: The Role of Central and Eastern European Countries. *Gospodarka Narodowa. The Polish Journal of Economics*, 324(4), 15-29.
12. Nijkamp, P., Reggiani, A., & Bolis, S. (1997). European freight transport and the environment: empirical applications and scenarios. *Transportation Research Part D: Transport and Environment*, 2(4), 233-244.
13. Nowicka-Skowron, M., & Mesjasz-Lech, A. (2013). Globalization and the development of logistics infrastructure for road freight transport. *Regional Integration: Europe, the Mediterranean, and the World Economy*. 53rd.
14. Prussi, M., Julea, A., Lonza, L., & Thiel, C. (2021). Biomethane as an alternative fuel for the EU road sector: analysis of existing and planned infrastructure. *Energy Strategy Reviews*, 33, 100612.
15. Rafał, S., Norbert, C. G., Wojciech, M., Emilian, S., & Piotr, F. W. (2025). Electrification of Road Transport Infrastructure in the Context of Sustainable Transport Development and the Deployment of Alternative Fuels Infrastructure on the TEN-T Network in Poland. *Energies*, 19(1), 15.

NEARSHORING, RESILIENCE, AND STRUCTURAL CHANGE: EVIDENCE FROM ROMANIA AND POLAND

Gabriel-Dorian GLĂMAN*

* Corresponding author: gglaman95@gmail.com

Abstract

This paper examines the role of nearshoring in reshaping European supply chains and its implications for structural change in emerging economies, with a focus on Romania and Poland. In the context of recent global disruptions—including the COVID-19 pandemic, geopolitical tensions, and the conflict in Ukraine—firms have increasingly prioritized supply chain resilience over cost efficiency. This shift has accelerated the relocation of logistics, manufacturing, and distribution activities closer to end markets within Europe.

Using a qualitative and comparative case study approach, the paper analyzes how Romania and Poland have emerged as strategic logistics hubs within the European Union. The findings suggest that nearshoring contributes to structural transformation by increasing the share of logistics and high-value services, enhancing integration into global value chains, and generating new employment patterns. However, the process also raises challenges related to infrastructure capacity, regional disparities, and long-term sustainability.

The paper concludes that nearshoring is not merely a logistical adjustment but a driver of structural economic change, with significant implications for development strategies in Central and Eastern Europe. These findings highlight the strategic repositioning of Central and Eastern Europe within European supply chains.

Keywords: Nearshoring; Supply chain resilience; Structural change; Logistics hubs; Central and Eastern Europe

1. Introduction

This paper addresses the following research question: How does nearshoring influence structural change in emerging European economies, particularly in Romania and Poland?

The organization of global supply chains has undergone profound transformations in recent years, driven by a combination of economic, technological, and geopolitical factors. Traditionally optimized for efficiency and cost minimization, supply chains have increasingly been restructured to enhance resilience and reduce vulnerability to external shocks. Events such as the COVID-19 pandemic and the conflict in Ukraine have exposed the fragility of global production networks and accelerated a shift toward regionalization and nearshoring.

Within this context, Central and Eastern Europe has emerged as a key destination for relocated logistics and production activities. Countries such as Romania and Poland are increasingly integrated into European supply chains, benefiting from geographic proximity to Western markets, relatively lower labor costs, and improved infrastructure connectivity.

This paper investigates how nearshoring contributes to structural change in Romania and Poland, building on existing literature on structural transformation and global value chains (Kuznets, 1973;

Rodrik, 2016). At the same time, this transformation introduces new policy challenges related to infrastructure development, labor market adaptation, and regional cohesion.

The paper contributes to the literature by linking supply chain reconfiguration to structural transformation in the context of recent geopolitical and economic disruptions.

2. Literature Review

The relationship between economic development and structural change has long been a central theme in development economics. Classical contributions by Simon Kuznets emphasize the reallocation of labor from low-productivity sectors such as agriculture to higher-productivity industrial and service sectors. Similarly, W. Arthur Lewis highlights the transition from traditional to modern sectors as a key mechanism of development.

More recent literature has expanded this perspective by incorporating the role of global value chains (GVCs) and international trade. According to Dani Rodrik, participation in global production networks can accelerate structural transformation but may also lead to premature deindustrialization in developing economies.

The concept of nearshoring has gained prominence in response to supply chain disruptions. Unlike offshoring, which prioritizes cost reduction, nearshoring emphasizes geographic proximity and supply chain resilience. This shift reflects a broader transition from efficiency-driven to resilience-oriented production models.

Recent studies highlight three key drivers of supply chain reconfiguration:

- geopolitical risks;
- technological advancements;
- changing demand patterns.

However, there remains a gap in the literature regarding the implications of nearshoring for structural change in emerging European economies. This paper contributes to filling this gap by focusing on Romania and Poland as case studies.

3. Data and Methodology

Data Sources

The analysis is based on data collected from international and European databases, including:

- World Bank – World Development Indicators (WDI);
- Eurostat – sectoral employment and gross value added (GVA);
- OECD – Trade in Value Added (TiVA);
- European Commission reports on supply chains and industrial strategy;
- Industry reports on logistics and warehousing development in Europe.

Variables and Indicators

To capture structural change and supply chain transformation, the following indicators are used:

- **Sectoral composition of GDP (GVA by sector):** (agriculture, industry, services, logistics-related services);

- **Employment structure by sector:** (shift from manufacturing to logistics and services);
- **Logistics and warehousing capacity:** (growth in industrial/logistics space);
- **Trade integration indicators:** (exports as % of GDP, participation in global value chains);
- **Foreign direct investment (FDI):** (particularly in manufacturing and logistics sectors).

Analytical Approach

The study applies a **comparative case study methodology**, focusing on Romania and Poland as representative economies of the CEE region. The analysis is structured along three dimensions:

1. **Pre-shock baseline (pre-2020)** – supply chain configuration based on efficiency;
2. **Shock period (2020–2022)** – disruptions caused by the COVID-19 pandemic and the conflict in Ukraine;
3. **Post-shock adjustment (2022–present)** – emergence of nearshoring and regionalization trends.

The methodological framework combines:

- **Trend analysis** (sectoral and logistics growth);
- **Comparative analysis** (Romania vs. Poland);
- **Conceptual interpretation** grounded in structural change theory and global value chains literature.

This approach allows for identifying patterns of structural transformation driven by supply chain reconfiguration, even in the absence of highly granular firm-level data.

4. Results and Discussion

Expansion of Logistics and Warehousing Capacity

The analysis reveals a significant expansion of logistics and warehousing infrastructure in both Romania and Poland, particularly after 2020. This growth reflects increasing demand for regional distribution centers and the relocation of supply chain nodes closer to European markets.

In Romania, the stock of modern logistics space has grown rapidly, driven by investments around Bucharest and key transport corridors. Similarly, Poland has consolidated its position as a major logistics hub, benefiting from its strategic location between Western Europe and Eastern markets.

Shift in Sectoral Composition

Both countries exhibit a gradual increase in the contribution of services—particularly transport, storage, and logistics—to gross value added. At the same time, manufacturing remains important but is increasingly integrated with logistics and supply chain services.

Labor Market Reallocation

Employment data suggests a reallocation of labor from traditional industrial activities toward logistics, distribution, and related services. This trend is more pronounced in Poland, where logistics ecosystems are more mature, but is increasingly visible in Romania as well.

Nearshoring and Supply Chain Resilience

The findings confirm that nearshoring has become a key strategic response to supply chain vulnerabilities. Firms are increasingly adopting multi-node regional supply chains, reducing dependence on distant suppliers.

Structural Change Implications

The combined effects of logistics expansion, sectoral shifts, and labor reallocation point to a broader process of structural transformation:

- Increased role of logistics as a value-adding sector;
- Deeper integration into European and global value chains;
- Emergence of Romania and Poland as strategic nodes in regional supply networks.

However, this transformation also raises challenges:

- infrastructure bottlenecks;
- regional disparities;
- dependence on external demand.

5. Conclusions

This paper has examined the relationship between nearshoring, supply chain resilience, and structural change in Central and Eastern Europe, focusing on Romania and Poland.

Main Findings

The analysis demonstrates that:

- Nearshoring has accelerated the reconfiguration of European supply chains;
- Romania and Poland have emerged as key logistics and distribution hubs;
- These changes contribute to structural transformation, particularly through the expansion of logistics and service sectors.

Theoretical Implications

The findings extend traditional theories of structural change by highlighting the role of logistics and supply chain integration as drivers of development. Unlike classical models focused on industrialization, the current transformation is characterized by the growing importance of intermediate services within global value chains.

Practical Implications

For policymakers, the results suggest the need to:

- invest in transport and logistics infrastructure;
- support workforce reskilling;

- enhance digitalization of supply chains;
- strengthen regional integration within the EU.

Limitations

The study has several limitations:

- reliance on secondary data;
- limited availability of firm-level evidence;
- focus on only two case studies.

Future Research

Future research could:

- incorporate econometric modeling;
- analyze firm-level strategies;
- expand the analysis to other CEE countries;
- examine long-term sustainability of nearshoring trends.

References

- [1] World Bank. (2023). *World development indicators*. World Bank. <https://databank.worldbank.org>
- [2] European Commission. (2022). *EU industrial strategy update*. Publications Office of the European Union
- [3] OECD. (2021). *Trade in value added (TiVA) database*. OECD Publishing.
- [4] Dani Rodrik. (2016). Premature deindustrialization. *Journal of Economic Growth*, 21(1), 1–33. <https://doi.org/10.1007/s10887-015-9122-3>
- [5] Simon Kuznets. (1973). Modern economic growth: Findings and reflections. *American Economic Review*, 63(3), 247–258.
- [6] W. Arthur Lewis. (1954). Economic development with unlimited supplies of labour. *The Manchester School*, 22(2), 139–191.
- [7] Eurostat. (2023). *National accounts and employment data*. <https://ec.europa.eu/eurostat>

ROMANIA’S POLITICAL AND ECONOMIC POSITION IN THE RUSSIA-UKRAINE WAR

Dr. Ömer DUMAN^{1*}

1 Independent Researcher/International Relations/Middle Eastern Studies, Van, Türkiye

* Corresponding author: omerduman6054@gmail.com | ORCID: 0000-0001-9570-4171

Abstract

In February 2022, the Russia-Ukraine War began with Russia’s invasion of Ukraine, triggering global repercussions. The United States and its Western allies have provided Ukraine with political, diplomatic, economic, military, and intelligence assistance in this war against Russia. In response to Russia’s aggression, the EU and NATO imposed sanctions on Russia and severed diplomatic ties. Romania, a member of the EU and NATO, also took anti-Russian political and diplomatic initiatives and scaled back its bilateral trade relations. Romania has stood in solidarity with Ukraine and supported the EU and NATO’s policies in favor of Ukraine. Throughout the war, Romania has respected Ukraine’s sovereignty and rejected Russia’s attempts at occupation, which are based on harsh and security-driven policies. In this context, Romania has joined the sanctions decisions against Russia adopted by the international organizations of which it is a member and has imposed restrictions on its energy, trade, and financial relations with Russia. In light of these and similar developments, this study aims to examine Romania’s political and economic stance during the Russia-Ukraine War. Romania’s political and economic stance in the Russia-Ukraine War has been shaped by considerations of security, national interests, avoiding conflict with the West, supporting Ukraine, and anti-Russian policies.

Keywords: Russia-Ukraine War, Romania, Ukraine, Russia, International Conflicts

1. Introduction

Romania has been the NATO (2004) and EU (2007) member state most severely affected by the Russia-Ukraine War that began in February 2022 (NATO, 2024; Pridham, 2007: 168). As a neighboring country of Ukraine and a nation with a coastline on the Black Sea, Romania has been severely affected by all the negative consequences of the war (Popoviciu, 2025).

Due to its membership in the EU and NATO, Romania has been involved in the war on Ukraine’s side, and throughout the conflict, political, diplomatic, and economic relations between Romania and Ukraine have continued uninterrupted (Șerban and Pyatt, 2026).

As the largest importer of Russian natural gas and a key player in commercial imports, Romania has been one of the major countries facing supply chain and energy shortages (Diaconu and Tiliuta, 2023: 232–234). In this study, Romania’s political and economic stance during the Russia-Ukraine War has been analyzed from a broad perspective in light of these and similar developments.

2. Literature Review

Regarding Romania’s political and economic stance on the Russia-Ukraine War, see Diaconu and Tiliuta (2023), “The Impact of the Russian-Ukrainian Conflict on Romania’s Economy”; Porumbescu (2025), “Romania’s response to the war in Ukraine: Diplomacy, humanitarian action, and regional security,”

Catrina (2024), “The Influence of the Ukrainian Conflict on Romanian, Polish, and Bulgarian Security and Defense Policies,” and Popovici (2022), “Facing the conflict in Ukraine: Romania’s position.” Thus, all these studies have examined Romania’s stance in the Russia-Ukraine War from a broad perspective. This study, however, focuses not only on Romania’s political stance but also on its import and export data with Russia and Ukraine in the context of the Russia-Ukraine War.

3. Data and Methodology

This study employs qualitative analysis methods to examine Romania’s political and economic stance during the Russia-Ukraine War from a broad perspective. The central research question is formulated as follows: What factors have shaped Romania’s political and economic stance during the Russia-Ukraine War? The study draws on secondary sources and bases its assessments on these sources.

4. Results and Discussion

The study discusses Romania’s political and economic stance during the Russia-Ukraine War from a broad perspective and evaluates Romania’s relations with Ukraine and Russia between 2022 and 2025 based on import and export data. Additionally, the study examines whether Romania’s support for Ukraine and its stance toward Russia have been influenced by its membership in the EU and NATO.

Romania’s stance in the Russia-Ukraine War has been shaped by its national interests, resulting in strengthened relations with Ukraine and weakened ties with Russia. It should also be noted that Romania’s proactive policy toward Russia has followed a course parallel to the policies of the EU and NATO, of which it is a member. In this regard, since 2002, joint defense and economic relations between Romania and Ukraine have taken on a new dimension.

5. Conclusions

In addition to Romania’s decision to downgrade its relations with Russia and condemn its invasion of Ukrainian territory and ongoing military operations, its trade relations have also been negatively affected. While Romania’s imports from Ukraine have been negatively affected (Trade Map (a), 2026), its exports to Ukraine have steadily increased (Trade Map (b), 2026).

However, there has been a significant decline in Romania’s imports from Russia and exports to Russia, resulting in an unstable situation (Trade Map (c), 2026; Trade Map (d), 2026). Consequently, due to the Russia-Ukraine War, not only the political and diplomatic relations but also the trade relations between Russia and Romania have become strained.

References

- Catrina, C.-S. (2024). The Influence of the Ukrainian Conflict on Romanian, Polish and Bulgarian Security and Defence Policies. *Perspective Politice*, 17(1-2), 29-48. <https://doi.org/10.25019/perspol/24.17.3>.
- Diaconu, Ioana Raluca & Tiliuta, Bogdan Andrei. (2023). The Impact of the Russian-Ukrainian Conflict on Romania's Economy. “Ovidius” University Annals, Economic Sciences Series, Volume XXIII, Issue 2, 232-236.
- NATO. (2024). NATO member countries. Access Address: <https://www.nato.int/en/about->

us/organization/nato-member-countries, 11 March 2024, Access Date: 02.03.2026.

Popovici, Oana Cristina. (2022). Romania external relations briefing: Facing the conflict in Ukraine: Romania's position. China-CEE Institute, Vol. 48, No. 4 (RO), 1-4.

Popoviciu, Andrei. (2025). 'We live with war over our heads': the Romanian villagers threatened by Russian drones. Access Address: <https://www.theguardian.com/world/2025/dec/31/war-romanian-villagers-threat-russian-drones>, Access Date: 02.03.2026.

Porumbescu, Alexandra. (2025). Romania's Response To The War In Ukraine: Diplomacy, Humanitarian Action, And Regional Security. Social Sciences and Education Research Review, Volume 12, Issue 2, 163-167, <https://doi.org/10.5281/zenodo.17870685>.

Pridham, Geoffrey. (2007). Romania and EU membership in comparative perspective: A post-accession compliance problem? – The case of political conditionality. Perspectives on European Politics and Society, Volume 8, Issue 2, 168-188, <https://doi.org/10.1080/15705850701322491>.

Șerban, Alex and Pyatt, Geoffrey R. (2026). Romania's drone and energy plans with Ukraine make Europe stronger and more secure. Access Address: <https://www.atlanticcouncil.org/dispatches/romanias-drone-and-energy-plans-with-ukraine-make-europe-stronger-and-more-secure/>, Access Date: 02.03.2026.

Trade Map (a). (2026). Romania's imports from Ukraine. Access Address: https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c642%7c%7c804%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c1%7c2%7c1%7c1%7c1%7c1%7c1, Access Date: 02.03.2026.

Trade Map (b). (2026). Romania's exports to Ukraine. Access Address: https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c642%7c%7c804%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1, Access Date: 03.03.2026.

Trade Map (c). (2026). Romania's imports from Russian Federation. Access Address: https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c642%7c%7c643%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c1%7c2%7c1%7c1%7c1%7c1%7c1, Access Date: 03.03.2026.

Trade Map (d). (2026). Romania's exports to Russian Federation. Access Address: https://www.trademap.org/Bilateral_TS.aspx?nvpm=1%7c642%7c%7c643%7c%7cTOTAL%7c%7c%7c2%7c1%7c1%7c2%7c2%7c1%7c1%7c1%7c1%7c1, Access Date: 03.03.2026.

FROM INDUSTRIAL SOCIETY TO DIGITAL SOCIETY: AN ANALYSIS OF SOCIOECONOMIC TRANSFORMATION

Gülten AKGÜL^{1*}; İsmail BACAŞIZ²; Özcan ÇELİK³; Yusuf ÖZKURT⁴; Sıla SEZER⁵;
Emre YONAR⁶

The Republic of Türkiye Ministry of National Education, Kütahya, Türkiye

* Corresponding author: gulakgul5@gmail.com | ORCID: 0000-0002-0476-6826

Abstract

This paper aims to analyze the socioeconomic transformation that occurred during the transition from industrial society to digital society. The structural economic changes that began with the Industrial Revolution led to radical transformations in many areas, from production methods to labor force structure, from education systems to social relations. Today, digitalization and artificial intelligence-based technologies are reshaping a similar transformation process. The study adopts a qualitative research method and uses a historical comparative analysis approach. Industrial and digital societies are compared in terms of labor structure, production methods, labor force organization, and social impacts. The findings show that both periods produced new forms of inequality along with economic growth, restructured labor markets, and transformed education systems. In addition, it was determined that surveillance, data-based control, and flexible work models are prominent in digital society. In conclusion, it is emphasized that technological developments bring about not only economic but also social and cultural transformations, and that these processes should be addressed in a multidimensional way.

Keywords: Digitalization; labor force; socioeconomic transformation; structural change; the Industrial Revolution

1. Introduction

Economic development and structural change are fundamental determinants of the transformations that societies undergo throughout history. The Industrial Revolution, which began in England in the 18th century, radically changed production processes, enabling the transition from an agricultural society to an industrial society. This transformation profoundly affected not only the economic structure but also social relations, the labor force structure, and lifestyles. The Industrial Revolution is a central concept in conventional understandings of the modern world and, as such, remains a core topic (Berlanstein, 2003). Each industrial revolution has introduced both advantages and challenges for the socioeconomic conditions of the countries involved. For example, Great Britain spearheaded the first industrial revolution through the development of the commercial steam engine, which transformed transportation and communication and stimulated further industrial progress. During the second industrial revolution, the United States took the lead, with the invention of the telephone once again reshaping communication. In the third industrial revolution, the Internet emerged as the central innovation, achieving widespread success largely because it was designed as a public infrastructure rather than a proprietary technology (Morrar et al., 2017). Today, digitalization, artificial intelligence, and information technologies are reproducing a similar transformation in a different dimension. This new structure, called the digital society, is reshaping production and labor processes while also transforming the ways individuals work and their social positions. Digital technology—marked by constant connectivity and advanced artificial intelligence—represents the latest phase in humanity’s socioeconomic development. Earlier

technological shifts date back to the Stone, Bronze, and Iron Ages, when changes in material use fueled what Schumpeter described as creative destruction. A subsequent major paradigm of modernization centered on energy transformation, encompassing the industrial revolutions driven by water, steam, electricity, and combustion engines. Today, the dominant paradigm is oriented around the transformation of information (Hilbert, 2020).

The transition from an industrial to a digital society is not merely a technological change; it is a multi-layered process that fundamentally transforms economic, social, and cultural structures. This transformation affects a wide range of areas, from modes of production and labor force structures to communication practices and the construction of individual identities. However, in the existing literature, this change is often addressed either solely from an economic perspective or only within the framework of technological developments. This makes it difficult to understand the transformation holistically. Furthermore, there is a need to analyze the multi-dimensional effects of digital transformation from a holistic socio-economic perspective. In particular, automation, artificial intelligence, platform economies, and the proliferation of digital communication tools have significant consequences for income distribution, employment structures, social relations, and individual behaviors. Moreover, problems such as inequality, the digital divide, data security, and social isolation brought about by digitalization necessitate a critical approach to examining this transformation. In this context, this study aims to reveal both the opportunities and the risks of this transformation. While the transition from an industrial to a digital society makes economic production methods information and data-based; Digital transformation is a multidimensional socioeconomic transformation process that reshapes the workforce structure, social relations, and individual behaviors, while also generating new inequalities and risks. Accordingly, this study argues that digitalization not only leads to increased productivity and technological progress, but also results in structural transformation of unemployment, deepening income inequality, weakening of privacy, and redefinition of social ties. Therefore, digital transformation should not be considered a neutral process; it should be viewed as a restructuring process containing both opportunities and problems, requiring careful management. The aim of this paper is to analyze the socioeconomic transformation experienced during the transition from an industrial society to a digital society and to reveal the similarities and differences between these two periods. The study intends to contribute to the literature by focusing on the social effects of economic transformations.

2. Literature Review

Studies on the Industrial Revolution reveal that this process provided economic growth and increased productivity, but also deepened class inequalities. The Industrial Revolution is often portrayed as a disastrous period that damaged the English landscape and subjected workers to severe social oppression and harsh living conditions. Despite the impact of wars and rapid population growth, the overall material conditions of most people in Britain improved, and technological advances not only generated economic benefits but also stimulated increased intellectual creativity (Ashton, 1997). When industry shifted from using wood to coal as its primary fuel, long-standing limitations on industrial expansion were suddenly lifted, making previously unimaginable levels of growth possible. As a result, the Industrial Revolution became a turning point in British history. It marked the transition from manual production and reliance on organic energy sources to the use of coal-powered machinery. In the early twentieth century, historians such as Sidney and Beatrice Webb, along with J. L. and Barbara Hammond, supported Toynbee's interpretation of the Industrial Revolution as a social catastrophe that offered little immediate

benefit to the working poor (Griffin, 2017). The factory system that emerged during this period changed the way labor was organized, paving the way for the formation of the working class. Current studies on digital transformation emphasize that information technologies are reshaping the economic structure and creating a new system called the “digital economy.” In this system, labor is based on cognitive and digital processes rather than physical production.

Digital transformation is ushering in a new period of change, reshaping the world by integrating advanced digital technologies into everyday life. As these technologies spread, they are transforming all areas of life and production: a digital economy is emerging in economic relations, digital government is redefining interactions between society and the state, digital spaces are developing within high-tech infrastructure, and a digital society is taking shape overall. This transformation is largely driven by the automation of business processes and significantly influences human relationships and individual behavior. At the same time, it may also produce serious social consequences, including rising unemployment, a shrinking workforce, the decline of traditional companies, cybercrime, and forms of social disintegration (Ivushina et al., 2021). However, studies that comparatively examine industrial and digital transformation processes are limited in the literature. This study aims to fill this gap by analyzing these periods together.

3. Data and Methodology

This study is based on a qualitative research method. A historical comparative analysis approach has been adopted in the research. In this context, industrial society and digital society have been examined through forms of production, labor structure, organization of labor force, and social effects. Relevant literature, historical documents, and current studies have been used as data sources. In the analysis process, similarities and differences between the two periods have been systematically compared.

4. Results and Discussion

The literature review and conceptual analysis conducted within the scope of this study show that the transition process from industrial to digital society has created multi-dimensional and profound effects. The findings reveal that transformation is taking place in a wide range of areas, from the economic structure to the labor market, from social relations to individual behaviors. Firstly, the transformation in the economic structure is one of the most prominent findings. While production in industrial society was based on physical labor and factories; in digital society, production has increasingly become data, information, and technology-centric. Today e-commerce platforms have become the main actors in global trade. This situation has led to the production and consumption processes becoming independent of location. Secondly, the widespread use of automation, artificial intelligence, and robotics has reduced the need for human labor, especially in low- and medium-skilled jobs.

Thirdly, the change in social structure and relations stands out as an important finding. In the digital society, communication between individuals has largely shifted to online platforms. Social media tools have transformed the ways individuals express themselves, while also producing new social norms focused on “visibility” and “being liked.” Fourthly, a transformation in the understanding of state and governance is observed. In the digital society, e-government applications have become widespread, and public services have become faster and more accessible. Fifthly, the transformation in the field of education is noteworthy. With digitalization, learning processes have become independent of time and place. Distance learning platforms have become widespread, especially during the pandemic, and have

increased the role of digital tools in education. However, the inequality called the digital divide has caused individuals without access to technology to not be able to fully benefit from educational opportunities. In both periods, economic transformations have produced new forms of inequality. Finally, digitalization brings social risks such as increased cybercrime, the spread of misinformation, and digital addiction, especially among young people. Although it improves efficiency and accessibility, it also leads to issues like inequality, unemployment, loss of privacy, and social fragmentation. Overall, digital transformation is not only a technological change but also a sociological and economic restructuring process.

5. Conclusions

This study examines the transition process from industrial society to digital society. It has been shown that this is not only a technological but also a profound socio-economic transformation. Both periods have seen the emergence of new inequalities alongside economic growth, changes in the labor force structure, and the need for education systems to adapt to this change. The digital age offers a more flexible and global economic structure, but it also generates new risks and uncertainties. Therefore, economic transformations need to be addressed not only from a technical but also from a social perspective. Policies should be developed to reduce digital inequalities. Future research could conduct comparative studies across different countries and cultural contexts.

References

- Ashton, T. S. (1997). *The industrial revolution 1760-1830*. Oxford University Press.
- Berlanstein, L. R. (Ed.). (2003). *The industrial revolution and work in nineteenth century Europe*. Routledge.
- Griffin, E. (2017). The industrial revolution: Social costs and social change. In *Routledge Handbook of the History of Sustainability* (pp. 106-119). Routledge.
- Hilbert, M. (2020). Digital technology and social change: the digital transformation of society from a historical perspective. *Dialogues in clinical neuroscience*, 22(2), 189-194.
- Ivushkina, E., Alieva, N., & Morozova, N. (2021, November). Social Consequences of Economic Digital Transformation. In the *Second Conference on Sustainable Development: Industrial Future of Territories (IFT 2021)* (pp. 328-334). Atlantis Press.
- Morrar, R., Arman, H., & Mousa, S. (2017). The fourth industrial revolution (Industry 4.0): A social innovation perspective. *Technology innovation management review*, 7(11), 12-20.

ROMANIA’S INTERNATIONAL TRADE COMPETITIVENESS – A COMPARATIVE ADVANTAGE PERSPECTIVE

Martyna MOSTOWSKA

Radom Academy of Economics, Department of Strategic and Technical Studies, Radom, Poland

mmostowska@ahns.pl | ORCID: 0009-0005-6533-5738

Abstract

The article assesses Romania’s competitive position in international trade in 1997–2024 using selected indicators of comparative advantage and trade performance. It examines which export sectors demonstrate revealed comparative advantages and how Romania’s export structure and trade performance have evolved over time. The study applies a quantitative analysis based on Eurostat, UN Comtrade, and World Bank data, using the RCA index, export market share, and trade balance indicators. The findings highlight changes in Romania’s export specialization and its position in European and global markets, contributing to the literature on trade competitiveness in emerging EU economies and offering policy implications for export diversification and long-term trade development.

Keywords: competitiveness; international trade; revealed comparative advantage; Romania

JEL codes: F14; F15

1. Introduction

Trade competitiveness is a key dimension of international economic competitiveness, determined by the ability to sell, attract, invent and innovate, and adjust (Mostowska, 2024). These abilities shape income generation and social welfare, with the creation of welfare being more crucial than its level. Export competitiveness, investment attractiveness, human capital, and adaptive capabilities form a system underpinned by technological progress (Delgado et al., 2012).

Transforming economies, like Romania, had to rapidly adjust production and institutions for market economy and global competition. Since the late 1980s, Romania transitioned from a centrally planned to a market economy, pursuing European integration via CEFTA and EU accession in 2007. Meeting the Copenhagen criteria required structural reforms and trade liberalization, with foreign trade driving economic growth post-accession (Voinea, 2002).

Over three decades, Romania’s export structure, sectoral specialization, and global value chain integration have changed significantly, yet sectoral comparative advantages and long-term export dynamics remain underexplored. This study aims to identify directions for further export specialization amid globalization and economic integration.

2. Literature Review

Trade competitiveness reflects a country’s ability to engage in international trade while maintaining sustainable economic benefits. Classical and neoclassical theories, especially comparative advantage and factor endowments, explain trade specialization: countries export goods using relatively abundant factors and import those using scarce ones (Misala, 2007). Factor endowment theorems highlight dynamic competitive processes, including price equalization and shifts in specialization.

Contemporary approaches emphasize export competitiveness, determined by costs, innovation, quality, differentiation, adaptability, and institutional efficiency (Lu, 2024). Intra-industry trade, driven by product diversification, economies of scale, technology, and transnational corporations, enhances innovation, product quality, and consumer welfare. Overall, trade competitiveness depends on both exogenous (resource endowments) and endogenous (enterprise activity, innovation, technology) factors.

In Central and Eastern Europe, trade competitiveness initially relied on low labor costs but shifted toward innovation, quality, and global value chain integration with FDI and technological transfer. EU integration facilitated market access, trade liberalization, technology transfer, production networks, institutional quality, and human capital development, reshaping export structures toward higher value-added and technologically advanced goods. Challenges remain, including dependency on foreign investment, competition from developed EU economies, and the need for continuous innovation and productivity growth (Wydymus, Głodowska, 2013). Long-term competitiveness depends on transitioning from cost-based to knowledge- and technology-based advantages, supported by R&D, education, entrepreneurship, and industrial policies.

3. Data and Methodology

The aim of the study is to assess Romania’s international trade competitiveness in the period 1997–2024. The analysis is based on international trade data obtained from Eurostat, UN Comtrade, and the World Bank. The sample covers Romania’s external trade flows and export sectors, with key variables including export values, export market shares, trade balance indicators, and the Revealed Comparative Advantage (RCA) index.

The study applies a quantitative analytical approach using indicators of export structure and dynamics, trade performance measures, and the RCA index as a synthetic measure of comparative advantage, allowing for the assessment of changes in Romania’s export specialization and trade competitiveness over time.

4. Results and Discussion

Between 1997 and 2024, Romania’s revealed comparative advantages expanded both quantitatively and qualitatively. Initially concentrated in traditional and resource-based sectors, such as animal and vegetable oils, fats and waxes, and manufactured goods, this pattern reflected early post-socialist specialization in labor- and resource-intensive activities, in line with factor endowment theory (Marinescu, Szeles, 2010; Marinescu, 2023). By 2024, Romania showed advantages in six commodity groups, including machinery and transport equipment, miscellaneous manufactured articles, beverages and tobacco, crude materials, and other commodities. Particularly notable was the strengthening of machinery and transport equipment, reflecting structural upgrading toward more technologically advanced and capital-intensive sectors, similar to trends observed in other Central and Eastern European countries (Klimek, 2024).

This development was strongly linked to FDI and integration into European value chains. Renault (Automobile Dacia) significantly increased automobile production and exports following facility modernization in Mioveni, while Ford Otosan in Craiova expanded passenger car and light commercial vehicle production for European markets. Companies like Continental AG and other international component manufacturers further enhanced domestic technological and production capacities,

supporting the shift toward higher value-added and more technologically advanced exports (Geodecki, Grodzicki, 2015) . Similar processes occurred in Poland, Hungary, and Slovakia, highlighting both export growth and increased dependence on foreign capital. Nevertheless, the persistence of comparative advantages in some low- and medium-tech sectors indicates Romania’s export structure remains partially dualistic.

Trade turnover grew nearly twelvefold between 1997 and 2024, with Romania’s share of world trade systematically increasing, demonstrating enhanced export capacity and global integration. The period 1997–2008 saw dynamic growth fueled by liberalization, pre-accession reforms, and foreign capital inflows. EU accession and prior trade integration transformed Romania’s trade geography: by 2024, approximately 72% of exports and 78% of imports were with EU countries, mainly Germany and Italy, confirming the strong orientation toward the European Single Market and the significance of regional integration.

Post-2008, Romania’s economy showed vulnerability to external shocks, but subsequent recovery indicated resilience in export structure. The commodity composition shifted, with machinery and transport equipment exceeding 47% of exports, while imports increasingly consisted of investment goods and chemicals, reflecting modernization and deeper industrial integration. Intra-industry trade expanded, characteristic of economies within common value chains, promoting technology transfer, quality upgrading, and competitiveness, though also increasing sensitivity to cyclical fluctuations in key trading partners (Molendowski, Polan, 2015) .

5. Conclusions

In 2024, Romania’s revealed comparative advantages were in machinery and transport equipment, manufactured goods, beverages and tobacco, crude materials, animal and vegetable oils and fats, and other commodities, with machinery and transport equipment being the most economically significant due to integration into European production chains and a shift toward advanced specialization.

Romania’s export structure evolved from labor-intensive and traditional goods toward a more diversified, technologically advanced model, accompanied by increased trade turnover, a higher share in world trade, and a shift to higher value-added sectors.

Overall, Romania’s trade competitiveness improved, but sustaining it long-term requires moving from cost-based to knowledge- and technology-based advantages, raising domestic value added in exports, and reducing vulnerability to external shocks, reflecting broader challenges for Central and Eastern European economies in achieving sustainable convergence with developed EU states.

References

- Delgado, M., Ketels, C., Porter, M., Stern, S. (2012). The Determinants of National Competitiveness. *National Bureau of Economic Research*, 1–48. https://www.researchgate.net/publication/236903847_The_Determinants_of_National_Competitiveness
- Geodecki, T., Grodzicki, M. (2015). Jak awansować w światowej lidze gospodarczej? Kraje Europy Środkowo-Wschodniej w globalnych łańcuchach wartości. *Zarządzanie publiczne* (3), 16–40. <https://bazekon.uek.krakow.pl/rekord/171390059>
- Klimek, A. (2024). Economic upgrading of Central and Eastern European economies through global

- value chain participation and foreign direct investment. *Baltic Journal of Economics* (24), 180–202. <https://www.tandfonline.com/doi/full/10.1080/1406099X.2024.2376503>
- Lu, R. (2024). The Heckscher-Ohlin Model in Modern International Trade. *Advances in Economics Management and Political Sciences* (67), 26–31. https://www.researchgate.net/publication/382370133_The_Heckscher-Ohlin_Model_in_Modern_International_Trade
- Marinescu, N., Szeles, M. (2010). A comparative analysis of Romanian and Greek exports in the process of EU-integration. *European Research Studies Journal* (13), 113–124. https://www.ersj.eu/repec/ers/papers/10_2_p9.pdf
- Marinescu, R. (2023). Investigating Romania’s Export Performance Over Two Decades. *Bulletin of the Transilvania University of Braşov. Series V: Economic Sciences* (16), 137–142. https://www.researchgate.net/publication/377286752_Investigating_Romania%27s_Export_Performance_Over_Two_Decades
- Misala, J. (2007). Międzynarodowa zdolność konkurencyjna i międzynarodowa konkurencyjność gospodarki narodowej. Wydawnictwo Politechniki Radomskiej.
- Molendowski, E., Polan, W. (2015). Handel wewnątrzgaleziowy – miernikiem międzynarodowej pozycji konkurencyjnej gospodarek. *Zeszyty Naukowe Uniwersytetu Szczecińskiego* (41), 11–24. https://www.researchgate.net/publication/322626675_Handel_wewnatrzgaleziowy_-_miernikiem_miedzynarodowej_pozycji_konkurencyjnej_gospodarek
- Mostowska, M. (2024). Integracja ekonomiczna a międzynarodowa konkurencyjność gospodarki. Studium przypadku Bułgarii i Rumunii. Wydawnictwo Akademii Handlowej Nauk Stosowanych w Radomiu.
- Wydymus, S., Głodowska, A. (2013). Handel międzynarodowy w dobie gospodarki opartej na wiedzy, Wydawnictwo Difin.
- Voinea, L. (2002). Escaping Periphery through Trade: a Tale about Romania's Convergence to the EU. *IES Proceedings* (1), 1–17. <https://www.sar.org.ro/wp-content/uploads/2012/01/Escaping-Periphery-through-TradeA-Tale-about-Romanias-Convergence-to-the-EU.pdf>

INFLUENCER MARKETING AND TRUST: DO CONSUMERS REALLY TRUST?

Monika ARSOVA

1 Faculty of Economics, Goce Delcev University, Stip, North Macedonia
Corresponding author: monika.arsova@ugd.edu.mk | ORCID: 0009-0007-1517-829X

Abstract

In the era of digital transformation, influencer marketing has emerged as a powerful tool for brands seeking to connect with consumers through more authentic and relatable communication channels. Platforms such as Instagram and TikTok have enabled influencers to shape consumer perceptions, attitudes, and purchasing decisions. With the proliferation of social media platforms, consumers are increasingly exposed to content created not by traditional advertisers, but by individuals who have cultivated dedicated audiences and personal brands. These influencers often occupy a unique position between peer and opinion leader, raising a critical question: do consumers genuinely trust influencers, or is this trust diminishing over time?

This paper aims to examine the complex relationship between influencer marketing and consumer trust, with a particular focus on the factors that influence credibility, authenticity, and perceived transparency. While influencer marketing is frequently praised for its authenticity and relatability, growing skepticism among consumers suggests that trust in influencers is neither uniform nor guaranteed. The study aims to investigate whether influencers are perceived as credible sources of information, how trust is built or eroded, and what implications this has for marketing effectiveness. This study explores how variables such as influencer expertise, content quality, sponsorship disclosure, and audience engagement impact trust and ultimately affect consumer behavior.

The research is grounded in key theoretical frameworks, including source credibility theory, parasocial interaction, and social proof. Source credibility theory suggests that trust is influenced by perceived expertise, attractiveness, and trustworthiness of the communicator. In the context of influencer marketing, these elements are often carefully curated, yet their authenticity may be questioned by increasingly media-literate audiences. Parasocial interaction further explains how consumers develop one-sided emotional relationships with influencers, which can enhance perceived trust and relatability. Additionally, social proof plays a role in reinforcing trust, as large follower counts, likes, and positive engagement can signal credibility to potential consumers.

To achieve the research objectives, a mixed-method approach will be used, with primary data collected through structured surveys distributed to a sample of social media users. The survey will assess consumer attitudes toward influencer content, levels of trust, and the extent to which such content influences purchasing decisions. Additionally, descriptive and comparative analyses will be conducted to identify patterns and differences across demographic groups.

Preliminary expectations suggest that trust in influencers is highly contingent upon several key factors. First, perceived authenticity is likely to play a central role. Consumers tend to trust influencers who appear genuine, transparent, and consistent in their messaging, particularly when they disclose sponsored content openly. Second, relevance and expertise within a specific niche are expected to enhance

credibility; for example, consumers are more likely to trust a fitness influencer promoting health products than a general lifestyle influencer doing the same. Third, the frequency and nature of sponsored content may impact trust, as excessive commercialization can lead to skepticism and reduced perceived authenticity.

Furthermore, the study anticipates generational differences in trust levels. Younger consumers, who have grown up with social media, may exhibit higher familiarity with influencer marketing but also greater skepticism toward overt advertising tactics. Conversely, older consumers may place more trust in traditional sources or perceive influences differently. Cultural and regional factors may also influence trust, particularly in emerging markets where influencer marketing is still developing.

In conclusion, while influencer marketing holds significant potential as a trust-based communication strategy, its effectiveness is not guaranteed. Trust remains a fragile and dynamic construct, influenced by authenticity, transparency, relevance, and consumer awareness. As consumers become more critical and selective, brands and influencers alike must adapt their approaches to maintain credibility and foster meaningful connections.

The expected contribution of this research is to provide insights into the effectiveness of influencer marketing strategies and to determine whether trust remains a sustainable foundation for this rapidly growing marketing practice. The findings may offer practical implications for marketers, brands, and influencers in designing more transparent and trustworthy communication strategies.

Keywords: consumer trust; social media; purchasing decision; credibility; influencer marketing

References:

1. Álvarez-Monzóncillo J., M. (2023). *The Dynamics of Influencer Marketing. A multidisciplinary approach.* Routledge studied in marketing.
2. Gupta V. (2023). *Fostering Global Entrepreneurship Through Business Model Innovation.* IGI Global Scientific Publishing. ISBN: 9781668469750, 1668469758
3. Liu H. (2024). *Strategies and effectiveness analysis of modern marketing methods: A comparative study based on influencer marketing and traditional advertising marketing.*
4. SHS Web Conf., Volume 207, <https://doi.org/10.1051/shsconf/202420702008>
Sharma, S., Verma, H.V. (2018). *Social Media Marketing: Evolution and Change.* In: Heggde, G., Shainesh, G. (eds) *Social Media Marketing.* Palgrave Macmillan, Singapore. https://doi.org/10.1007/978-981-10-5323-8_2
5. SproutSocial. *What is influencer marketing: An influencer strategy guide for 2026.* <https://sproutsocial.com/insights/influencer-marketing/#types-of-influencers-by-size-and-reach>
6. Jiacheng W. (2022). *The Pros and Cons of Influencer Marketing.* Proceedings of the 2022 2nd International Conference on Economic Development and Business Culture (ICEDBC 2022). DOI: [10.2991/978-94-6463-036-7_161](https://doi.org/10.2991/978-94-6463-036-7_161)

SOCIAL CAPITAL AND INNOVATION ECOSYSTEM IN BALKAN COUNTRIES

Fatma Betül URHAN

Nevşehir Hacı Bektaş Veli University, Faculty of Arts and Sciences, Department of Geography,
Nevşehir, Türkiye

* betulurhan@nevsehir.edu.tr | ORCID: 0000-0003-0929-1206

Abstract

This study examines the relationship between social capital and innovation ecosystems in Balkan countries through a comparative and quantitative framework. Social capital is conceptualized as a multidimensional construct encompassing structural, relational, and international dimensions, operationalized through proxy indicators such as innovative SMEs collaborating, public–private co-publications, and international scientific co-publications. Innovation performance is measured using indicators including PCT patent applications, sales of innovations, intellectual assets, and employment in innovative enterprises. The study employs a cross-sectional dataset derived from the European Innovation Scoreboard (2025) and applies Pearson correlation analysis to test the relationships between variables. The findings reveal generally positive and statistically significant associations between social capital and innovation outputs. Public–private collaboration and international scientific networks emerge as the strongest predictors of patent production, while international collaboration shows no significant effect on innovation sales, indicating a structural gap between knowledge production and commercialization. Additionally, results suggest that social capital alone is not sufficient to explain innovation performance; it operates alongside institutional capacity, R&D investments, and policy frameworks. The study concludes that innovation performance in Balkan countries is largely shaped by network-based social capital structures and highlights the need to consider social capital as a multidimensional and spatially differentiated process.

Keywords

Keywords: Social capital; innovation; Balkan countries; regional development; economic geography.

JEL codes : O33; R11; C21

1. Introduction

Recent economic and regional development literature emphasizes that economic growth and competitiveness cannot be explained solely by physical and financial capital, but also depend on social and institutional factors. In this context, social capital plays a crucial role in shaping innovation processes through trust-based relationships, collaboration networks, and knowledge exchange mechanisms. Innovation ecosystems are inherently complex systems influenced by interactions among multiple actors rather than isolated R&D investments.

Balkan countries provide a unique analytical context due to their post-socialist transformation, post-conflict restructuring, ethnic diversity, and integration into the European Union. These dynamics shape both social capital structures and innovation capacities, making the region a suitable “natural laboratory” for examining the relationship between social capital and innovation. This study aims to fill the gap in the literature by offering a comparative and multidimensional analysis of this relationship.

2. Literature Review

Social capital, first introduced by Hanifan (1916) and later theorized by Bourdieu (1986), Coleman (1988), and Putnam (1993), has become a key concept in economic geography and regional development, particularly in relation to innovation. One strand of the literature emphasizes its role in facilitating knowledge production and diffusion, thereby indirectly enhancing innovation (Do et al., 2025; Jin et al., 2024). A second perspective highlights the spatial and contextual variability of this relationship, showing that different forms of social capital produce varying effects across regions (Marino et al., 2025; Crescenzi et al., 2013; Kobbeisi et al., 2023; Peiró-Palomino, 2019). A third approach questions its uniformly positive impact, suggesting diminishing or even negative returns under conditions of excessive network density (Echebarria & Barrutia, 2013; Amonarriz et al., 2019).

Recent research further conceptualizes innovation as a non-linear and multidimensional process shaped by the interaction of social, institutional, and technological factors (Dai et al., 2025; Krautscheid, 2025; Rutten, 2025). Overall, the literature converges on the view that the social capital–innovation nexus is context-dependent, multidimensional, and spatially heterogeneous.

3. Data and Methodology

The study is based on a cross-sectional dataset covering Balkan countries, including Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Montenegro, North Macedonia, Kosovo, Romania, Serbia, Slovenia, Greece, and Türkiye. Data are obtained from the European Innovation Scoreboard (2025), ensuring comparability across countries.

Social capital is operationalized using proxy indicators:

- Innovative SMEs collaborating (structural social capital)
- Public–private co-publications (bridging social capital)
- International scientific co-publications (international social capital)

Innovation outputs include:

- PCT patent applications
- Sales of innovations
- Intellectual assets
- Employment in innovative enterprises

The study adopts a correlational research design, employing Pearson correlation analysis to examine the strength and direction of relationships between variables.

4. Results and Discussion

The findings indicate that social capital and innovation are generally positively associated, though the strength of relationships varies across dimensions.

Collaboration among SMEs shows a strong positive relationship with patent applications and a moderate relationship with innovation sales, suggesting that network density enhances both knowledge production and commercialization processes. Public–private collaboration emerges as one of the strongest determinants of innovation performance, particularly patent production, highlighting the importance of academia–industry linkages.

International scientific collaboration demonstrates a strong positive relationship with patent production but no significant relationship with innovation sales. This finding points to a structural disconnect between knowledge generation and commercialization, particularly in less developed economies.

The combined effect of social capital dimensions reveals a moderate relationship with innovation

outputs, indicating that social capital acts as an enabling factor rather than a sole determinant. Country-level comparisons further show spatial differentiation, with high-performing countries (e.g., Slovenia, Greece, Croatia) exhibiting stronger and more balanced social capital structures compared to lower-performing countries.

5. Conclusions

This study demonstrates that social capital is a critical but not sufficient factor in explaining innovation performance in Balkan countries. Its impact depends on complementary elements such as institutional capacity, R&D investments, and policy frameworks.

The findings highlight that innovation ecosystems are shaped by multidimensional and network-based social capital structures, which vary spatially across countries. The study contributes to the literature by providing a comparative and multidimensional analysis of social capital and innovation in a transition economy context.

From a policy perspective, strengthening collaboration networks, fostering public–private partnerships, and enhancing integration into international knowledge networks are essential for improving innovation performance. Future research should incorporate longitudinal data and advanced econometric methods to further explore causal relationships and spatial dependencies.

References

- Amonarriz, C. A., Iturrioz, C., Narvaiza, L., & Parrilli, M. D. (2019). The role of social capital in regional innovation systems: Creative social capital and its institutionalization process. *Papers in Regional Science*, 98(1), 35–56.
- Bourdieu, P. (1986). The forms of capital. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241–258). Greenwood.
- Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, S95–S120.
- Crescenzi, R., Gagliardi, L., & Percoco, M. (2013). Social capital and the innovative performance of Italian provinces. *Environment and Planning A*, 45(4), 908–929.
- Dai, Y. X., Hu, Y. H., Ahmad, M., & Mou, Y. T. (2025). Innovation-driven growth: The power of technological capability in regional development. *Journal of Innovation & Knowledge*, 10(5), 100763. <https://doi.org/10.1016/j.jik.2025.100763>
- Do, H., Nguyen, B., & Dao, M. (2025). Social capital and SME innovations: The importance of knowledge combination and customer demands. *Small Business Economics*, 66(1), 323–360.
- Echebarria, C., & Barrutia, J. M. (2013). Limits of social capital as a driver of innovation: An empirical analysis in the context of European regions. *Regional Studies*, 47(7), 1001–1017.
- Hanifan, L. (1916). The rural school community center. *Annals of the American Academy of Political and Social Science*, 67, 130–138.
- https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard_en
- Jin, X., Zhang, M., Sun, G. H., & Eriksson, T. (2024). Influence of social capital of innovation network on innovation: The moderating effect of knowledge sharing and knowledge diffusion. *International Journal of Technology Management*, 94(1), 103–134.



- Kobeissi, N., Hasan, I., Wang, B., Wang, H. Z., & Yin, D. S. (2023). Social capital and regional innovation: Evidence from private firms in the US. *Regional Studies*, 57(1), 57–71.
- Krautscheid, L. (2025). Growing innovation: Business models for sustainable regional development in Skåne, Sweden. *Regional Studies, Regional Science*, 12(1), 963–974.
- Marino, M., Montresor, S., & Faggian, A. (2025). Social capital and regional innovation in the aftermath of crisis: Evidence from Italian provinces. *Annals of Regional Science*, 74(25), 2–40. <https://doi.org/10.1007/s00168-024-01352-4>
- Peiró-Palomino, J. (2019). The geography of social capital and innovation in the European Union. *Papers in Regional Science*, 98(1), 53–74.
- Putnam, R. D., Leonardi, R., & Nanetti, R. Y. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton University Press.
- Rutten, R. (2025). Levelling-up regional innovation: A configurational study. *European Planning Studies*. Advance online publication. <https://doi.org/10.1080/09654313.2025.2544963>

RESILIENCE AND INNOVATION: A CRITICAL ANALYSIS OF SMART CITY IMPACT ON URBAN AND ECONOMIC DEVELOPMENT IN GERMANY

Imane KECHACHA¹ *; Koudoua FERHATI²

¹ Algiers 1 University, Faculty of Science /Department of Architecture, Algiers, Algeria

² Crat, Constantine, Algeria

* Corresponding author: im.kechacha@univ-alger.dz | ORCID: 8281-8999-0001-0000

Abstract

The socio-economic and structural impacts of Smart Cities and Intelligent Environments (IE) within the context of German urban planning are explored in this study. While smart city initiatives are frequently said to be force multipliers for efficiency and economic development. In the actual event, however, resilience in multimodal boundary-crossing scenarios ("polycrises")-where stressors appear simultaneously across cyber and physical as well as social domains-remains under-examined geographically speaking. Using case studies from Berlin and Hamburg. The findings suggest that while German models excel in data privacy and sustainability, they exhibit weaknesses in interoperability and social engagement.

The paper argues that enhancing resilience in intelligent urban environments requires a paradigm shift in governance structures. More flexible, adaptive, and decentralized approaches are necessary to facilitate real-time coordination across sectors and scales. Furthermore, fostering greater social engagement and participatory governance is essential to ensure that smart city transitions remain inclusive to diverse urban populations.

Research Objectives

1. **To analyze** the conceptual foundations of Smart Cities and Intelligent Environments within German urban planning.
2. **To evaluate** the socio-economic and infrastructural impacts of smart city initiatives in Berlin and Hamburg.
3. **To investigate** the capacity of these systems to respond to polycrisis scenarios involving cyber, physical, and social disruptions.
4. **To identify** key limitations related to interoperability, governance structures, and citizen participation.

Keywords: Smart Cities, Intelligent Environments, Urban Resilience, Polycrisis, Governance

1. Introduction

The incorporation of the Internet of Things (IoT) and Artificial Intelligence (AI) into urban infrastructure has significantly transformed the course of economic development. In Germany, smart city projects are not just upgrades to technology; they are also strategic tools for the Common Welfare (Gemeinwohl). These initiatives stimulate economic innovation by cultivating "Urban Tech" ecosystems, drawing venture capital, and creating high-value employment opportunities in data analytics and sensor manufacturing (Musa, 2017; Lim, 2024). However, there is a paradox: smart cities can help the economy grow as a whole, but if digital dividends are not shared fairly, they could make inequalities between cities worse (Marchesani, 2026).

2. Literature Review

[Despite extensive research on Smart Cities and Intelligent Environments (IE), much of the existing literature remains **techno-centric**, emphasizing efficiency, sustainability, and digital innovation while assuming stable operating conditions. Studies have explored socio-economic impacts, urban mobility, and environmental benefits (Lim, 2024; Quijano et al., 2022), and recent German-focused work highlights strong data governance and citizen trust (Beucker, 2023; Späth & Knieling, 2020). However, critical gaps remain regarding **resilience under multi-domain, simultaneous crises (polycrises)**. Existing research rarely examines how smart city infrastructures perform when cyber, physical, and social stressors interact, nor how governance structures and citizen participation mediate these outcomes (Jovanović, 2025; Argyroudis et al., 2020).

This study addresses these gaps by integrating the polycrisis concept into smart city analysis, comparing Berlin and Hamburg, and explicitly linking digital infrastructure, governance flexibility, and socio-technical resilience. In doing so, it contributes both **theoretically**, by extending resilience and smart city frameworks, and **practically**, by highlighting governance reforms needed to enhance adaptive capacity in complex urban contexts.

2.1 Case Studies in German Urban Planning

2.1.1 Berlin: The Collaborative "Gemeinsam Digital" Model

Berlin's "**Gemeinsam Digital: Berlin**" (GD:B) strategy serves as a benchmark for collaborative urban planning. Unlike top-down technocratic models, GD:B emphasizes stakeholder integration and public-private partnerships. Key projects include "Smart City Squares" and "Smart Water Modeling," which utilize real-time data to mitigate climate risks (Beucker, 2023). The methodology is inherently iterative, characterized as a "**learning strategy**" that adapts based on implementation feedback.

2.2. Hamburg: KPI-Driven Resilience and Digital Twins

Hamburg's participation in the EU-funded **mySMARTlife** project highlights a data-centric approach. The city has pioneered the use of **Urban Digital Twins**—dynamic virtual representations of the city—to simulate urban energy flows and transportation patterns (Quijano et al., 2022). This allows for "predictive planning," where the impact of new policies can be assessed in a virtual environment before physical implementation.

3. Methodological Stress-Test: The DIN SPEC 91461 Framework

To evaluate these methodologies, we employ a stress-test based on **DIN SPEC 91461**, which provides standardized procedures for assessing the resilience of critical infrastructures against emerging risks (Jovanović, 2025).

3.1. Stress-Test Parameters and Findings

We evaluate the German planning frameworks across three critical dimensions: **Interoperability**, **Social Resilience**, and **Systemic Robustness**.

Stress-Test Dimension	Parameter	Observation	Stress Result
Interoperability	Data Exchange across Silos	Significant friction between municipal departments and private providers.	FAIL: High risk of "Digital Islands."
Social Resilience	Citizen Buy-in & Participation	Rhetoric of engagement often masks top-down implementation.	MARGINAL: Risk of public resistance to data-driven policies.
Systemic Robustness	Performance in Polycrises	Heavy reliance on historical data for Digital Twin simulations.	FAIL: Vulnerability to "Black Swan" events (e.g., cyber-attacks during climate events).

4. Critical Synthesis

The stress-test reveals a **"Simulation Gap"**: while German digital twins are technically sophisticated, they often fail to account for the non-linear human behavior inherent in social stressors. Furthermore, the **DIN SPEC 91461** analysis indicates that the current focus on "efficiency" may come at the cost of "redundancy," which is essential for true resilience in a polycrisis environment (Argyroudis et al., 2020).

5. Conclusions

This study critically evaluated the capacity of Smart Cities and Intelligent Environments (IE) in Germany to function under polycrisis conditions. Evidence from Berlin and Hamburg shows that, despite advances in sustainability, data governance, and digital infrastructure, these systems remain constrained by weak interoperability, fragmented institutional arrangements, and limited citizen integration. These are structural, not incidental, shortcomings that significantly undermine resilience in situations requiring coordinated, cross-domain responses.

The findings challenge the prevailing techno-centric narrative by demonstrating that technological sophistication does not inherently produce adaptive capacity. Rather, resilience emerges as a governance issue shaped by the degree of system integration, institutional flexibility, and participatory depth. In this sense, current smart city models risk optimizing efficiency under stable conditions while amplifying vulnerability under systemic stress.

From a policy standpoint, incremental adjustments are insufficient. A shift toward interoperable infrastructures, decentralized governance, and embedded civic participation is necessary to address systemic fragmentation.

References

- Argyroudis, S. A., Fotopoulou, S., Karafagka, S., Pitilakis, K., Selva, J., Tsionis, G., ... Casotto, C. (2020). A risk-based multi-level stress test methodology: Application to six critical non-nuclear infrastructures in Europe. *Natural Hazards*, 102(3), 1613–1633. <https://doi.org/10.1007/s11069-019-03828-5>
- Beucker, S. (2023). *Navigating smart city development: A view from Germany*. Heinrich-Böll-Stiftung. <https://il.boell.org/en/2023/03/29/navigating-smart-city-development-view-germany>
- Jovanović, A. S. (2025). Stress-testing the resilience of critical infrastructures exposed to polycrises triggered by emerging risks. *International Journal of Disaster Risk Science*, 16(1). <https://doi.org/10.1007/s13753-025-00663-0>



Lim, Y. (2024). What is the impact of smart city development? Empirical evidence from global indices. *Sustainable Cities and Society*, 101, 105123. <https://doi.org/10.1016/j.scs.2023.105123>

Marchesani, F. (2026). The paradox of smart cities: Enhancing sustainability while aggravating inequalities. *Regional Studies*, 60(2), 245–258. <https://doi.org/10.1080/00343404.2025.2596742>

Musa, W. S. (2017). *The impact of smart city initiatives on cities' local economic development* (Master's thesis). Fort Hays State University.

TRUST, CHOICE AND NOSTALGIA: CONSUMER PERCEPTION OF LEGACY F&B BRANDS IN INDIA

Dr Shivani MEHTA^{1*}; Diva KAPOOR²

¹Jagan Institute of Management Studies, India

²National University of Singapore, Singapore

*drshivanimehta32@gmail.com

Abstract

Nostalgia marketing has become an important emotional branding strategy in the food and beverage (F&B) industry. This study examines the influence of nostalgia marketing on purchase intention in the Indian F&B sector through the mediating roles of brand attitude, trust and authenticity, and emotional attachment, while considering innovation as a moderating factor. Primary data were collected from 198 consumers using a structured questionnaire. Correlation and hierarchical regression analyses were employed to test the proposed framework. The findings reveal that nostalgia marketing significantly influences purchase intention both directly and indirectly. Emotional attachment emerged as the strongest predictor of purchase intention, followed by brand attitude and trust and authenticity. The results also indicate that innovation positively strengthens the relationship between nostalgia marketing and purchase intention. The study highlights that nostalgic branding strategies are most effective when combined with modern relevance and innovation. The findings contribute to emotional branding literature and provide practical implications for Indian F&B brands seeking to balance heritage with innovation.

Keywords: Nostalgia marketing; Emotional attachment; Purchase intention; Innovation; Food and beverage industry

1. Introduction

Firms are increasingly using emotionally driven branding strategies to strengthen consumer engagement. Nostalgia marketing, which evokes memories of the past through heritage-based communication and traditional brand elements, has gained importance in the food and beverage (F&B) industry where consumption is closely linked with emotions, memories, and cultural traditions. In India, legacy F&B brands frequently use nostalgic appeals to reinforce trust, familiarity, and emotional bonding with consumers. However, empirical studies on nostalgia marketing in emerging markets remain limited. This study examines the influence of nostalgia marketing on purchase intention in the Indian F&B sector while analysing the mediating role of brand attitude, trust and authenticity, and emotional attachment, along with the moderating role of innovation.

2. Literature Review

Nostalgia refers to a sentimental longing for the past that generates positive emotions such as warmth and familiarity (Holbrook & Schindler, 1991). Research suggests that nostalgic cues positively influence consumer attitudes and behavioural intentions by creating emotional comfort and familiarity (Muehling & Sprott, 2004). Studies further indicate that heritage-based branding enhances trust and authenticity because consumers perceive legacy brands as more reliable and credible (Merchant & Rose, 2013). Emotional attachment is considered one of the strongest outcomes of nostalgia marketing, as consumers form deeper emotional bonds with brands associated with meaningful memories. Innovation is also important because it helps nostalgic brands maintain relevance in changing markets.

3. Methodology

The study adopts a quantitative and empirical research design. Primary data were collected from 198 consumers of packaged food and beverage products in India through a structured online questionnaire. Respondents were asked to evaluate a nostalgic F&B brand familiar to them. The study examined six constructs: nostalgia marketing, brand attitude, trust and authenticity, emotional attachment, purchase intention, and innovation. All variables were measured using a five-point Likert scale. Reliability and validity were assessed using Cronbach’s alpha and convergent validity measures. Statistical analysis included correlation analysis and hierarchical regression to test the proposed relationships.

4. Results and Discussion

The findings indicate that nostalgia marketing significantly influences purchase intention. Correlation analysis showed strong positive relationships among all variables, with emotional attachment demonstrating the strongest association with purchase intention. Reliability analysis confirmed strong internal consistency across all constructs. Regression analysis revealed that nostalgia marketing positively predicts purchase intention both directly and indirectly. Brand attitude, trust and authenticity, and emotional attachment significantly contributed to purchase intention, with emotional attachment emerging as the strongest predictor. These findings suggest that nostalgia-based branding strategies are most effective when they foster emotional bonds with consumers.

The moderating effect of innovation was also significant. Consumers responded more positively when nostalgic elements were combined with modern product improvements and contemporary branding strategies. Thus, the effectiveness of nostalgia marketing increases when brands successfully balance heritage with innovation.

5. Conclusion

The study concludes that nostalgia marketing significantly shapes consumer perception and purchase intention in the Indian F&B industry. Emotional attachment plays the most important role in influencing behavioural intention, while innovation strengthens the effectiveness of nostalgic branding strategies. The findings suggest that F&B firms should combine heritage-driven communication with modern product and branding innovations to sustain consumer engagement and competitive advantage. The study contributes to the growing literature on emotional branding and nostalgia marketing in emerging markets.

References

- Holbrook, M. B., & Schindler, R. M. (1991). Echoes of the dear departed past: Some work in progress on nostalgia. *Advances in Consumer Research*, 18, 330–333.
- Merchant, A., & Rose, G. M. (2013). Effects of advertising-evoked vicarious nostalgia on brand heritage. *Journal of Business Research*, 66(12), 2619–2625.
- Muehling, D. D., & Sprott, D. E. (2004). The power of reflection: An empirical examination of nostalgia advertising effects. *Journal of Advertising*, 33(3), 25–35.

DEVELOPMENT OF E-COMMERCE IN THE REPUBLIC OF MOLDOVA AS A DRIVER OF INTERNATIONAL COMPETITIVENESS AND MARKET EXPANSION

Daniela BUGA

Academy of Economic Studies of Moldova, World Economy and International Economic Relations,
Chişinău, Republic of Moldova

*Bludarudaniela@gmail.com | ORCID: 0009-0004-8690-316X

Abstract

The expansion of the digital economy has significantly influenced the way firms engage in international trade, offering new opportunities for accessing foreign markets. In this context, the present study explores the development of e-commerce in the Republic of Moldova and its role in supporting international competitiveness and market expansion.

The research focuses on how the adoption of e-commerce solutions can help small and medium-sized enterprises (SMEs) overcome traditional barriers to entering external markets. The analysis is based on a combination of statistical data, international reports, and relevant examples from business practice.

The findings suggest that e-commerce contributes to lowering transaction costs, increasing market accessibility, and improving the visibility of Moldovan firms at the international level. At the same time, several limitations remain, including gaps in digital infrastructure, regulatory constraints, and insufficient digital skills among entrepreneurs.

Overall, the study highlights that, while e-commerce creates important opportunities for internationalization, its impact depends on both the internal readiness of firms and the broader economic environment. The paper also outlines several directions for improving the use of digital tools in supporting sustainable economic development.

Keywords: e-commerce; digital economy; international competitiveness; SMEs; market expansion

JEL codes: O33; F23; L81

1. Introduction

The increasing role of digital technologies in the global economy has created new opportunities for companies to expand beyond domestic markets. Among these technologies, e-commerce has become an important instrument for facilitating international trade and improving firm competitiveness.

In the Republic of Moldova, the use of e-commerce has grown in recent years, supported by wider internet access and changes in consumer behavior. Despite this progress, the extent to which e-commerce contributes to the international expansion of local businesses is still not fully understood.

The aim of this paper is to examine how e-commerce supports the process of entering and expanding into foreign markets for Moldovan enterprises. At the same time, the study seeks to identify the main challenges that limit its effectiveness and to highlight possible directions for improvement.

2. Literature Review

The existing literature shows that e-commerce plays a key role in reducing transaction costs and facilitating access to international markets. Digital platforms allow companies, especially SMEs, to reach customers across borders without the need for a physical presence.

Several studies emphasize that cross-border e-commerce contributes to export growth and increases competitiveness. However, in developing economies, these benefits are often limited by structural constraints such as insufficient infrastructure, regulatory barriers, and limited access to digital skills.

Although the topic has been widely studied at the global level, there is still a lack of research focused specifically on the Republic of Moldova. This paper contributes to filling this gap by analyzing the local context and identifying the main factors influencing the adoption and effectiveness of e-commerce.

3. Data and Methodology

The research is based on a mixed approach that combines both quantitative and qualitative analysis. Statistical data were collected from national sources and international reports related to the digital economy and trade development. The methodological approach is mainly descriptive and comparative, aiming to better understand the relationship between the use of digital tools and the ability of firms to access foreign markets.

4. Results and Discussion

The results indicate that e-commerce offers real opportunities for Moldovan companies to expand internationally. Firms that adopt digital solutions benefit from easier access to foreign customers, greater flexibility, and lower operational costs. At the same time, the research highlights several challenges that limit these advantages. Among the most important are the insufficient development of logistics infrastructure, gaps in digital skills, and certain regulatory difficulties.

These findings suggest that, although e-commerce can support international expansion, its effectiveness depends on both company-level capabilities and the broader economic and institutional environment.

5. Conclusions

The study shows that e-commerce can play an important role in supporting the internationalization and competitiveness of businesses in the Republic of Moldova. It represents a practical and accessible tool for SMEs seeking to enter foreign markets.

However, to fully benefit from these opportunities, it is necessary to improve digital infrastructure, strengthen digital competencies, and create a more supportive regulatory framework.

Future research could focus on more detailed quantitative analysis or comparisons with other countries in the region to better understand the long-term impact of e-commerce on economic development.

References

- OECD. (2021). E-commerce in the Global Economy.
- UNCTAD. (2022). Digital Economy Report.
- World Bank. (2022). Digital Economy for Moldova.
- National Bureau of Statistics of the Republic of Moldova. (2023). ICT indicators.

THE IMPACT OF SME DIGITALIZATION ON ECONOMIC PERFORMANCE:

EVIDENCE FROM 28 EUROPEAN COUNTRIES

Ecaterina MIHĂLCEANU STAN^{1*}, Răzvan Ștefan STAN²
Constantin Brâncuși University of Târgu Jiu, Romania

*Corresponding author: ecaterina.stan@e-ucb.ro | ecaterina.stan@outlook.com

Abstract

This paper investigates the relationship between the level of digitalization of small and medium-sized enterprises (SMEs) and GDP per capita across 28 European countries (EU27 and Norway). Using cross-sectional data from Eurostat for 2024, the study employs a simple linear regression model estimated by ordinary least squares (OLS). The results indicate a positive and statistically significant relationship between SME digitalization and economic performance, although the model exhibits limited explanatory power. The findings suggest that while digitalization contributes to economic development, it represents only one component among multiple structural determinants of GDP per capita.

Keywords: SMEs, digitalization, GDP per capita, OLS regression, European Union

JEL codes: O33; O47; L25; C21

1. Introduction

Digital transformation has become a central driver of economic development in modern economies. In the European Union, the digitalization of small and medium-sized enterprises (SMEs) is particularly relevant, as these enterprises represent a dominant share of economic activity and employment (European Commission, 2023). The increasing adoption of digital technologies is expected to enhance productivity, competitiveness, and integration into global value chains. Despite the growing importance of digitalization, significant disparities persist across European countries in terms of digital adoption among SMEs. These differences may contribute to variations in economic performance, particularly in GDP per capita. In this context, this study examines the relationship between SME digitalization and GDP per capita across 28 European countries (EU27 and Norway). By employing a cross-sectional econometric approach, the paper aims to provide empirical evidence on the extent to which digitalization contributes to economic performance.

2. Literature Review

The relationship between digitalization and economic performance has been widely analyzed in the economic literature. Digital technologies are recognized as key drivers of productivity growth, innovation, and competitiveness in modern economies (Brynjolfsson & McAfee, 2014). At the firm level, the adoption of digital tools enhances operational efficiency, reduces transaction costs, and facilitates access to new markets, particularly for small and medium-sized enterprises (OECD, 2021). Given the structural importance of SMEs in the European economy, their level of digitalization is expected to play a significant role in shaping overall economic outcomes. At the macroeconomic level, empirical studies suggest that information and communication technologies (ICT) have a positive impact on economic growth, although the magnitude and significance of this relationship vary across countries (Niebel, 2018). These differences are often explained by

variations in institutional quality, human capital, and investment levels. From a theoretical perspective, economic growth models emphasize the role of technological progress as a key determinant of long-term economic performance (Solow, 1956; Mankiw et al., 1992). However, digitalization alone is not sufficient to explain cross-country differences in GDP per capita, as economic performance is influenced by a broader set of structural factors. In this context, the present study contributes to the existing literature by providing empirical evidence on the relationship between SME digitalization and GDP per capita across European countries, focusing on recent data and a comparative cross-country framework.

3. Data and Methodology

The analysis draws on Eurostat data for the year 2024, using the following datasets:

- *Gross domestic product (GDP) and main components per capita* [nama_10_pc]
- *Digital Intensity by size class of enterprise* [isoc_e_dii]

The variables included in the analysis are defined in Table 1.

Table 1. Variable definitions

Variable	Description	Unit
GDP	Gross domestic product per capita	PPS
DIMM	SMEs with high digital intensity (10-249 employees)	%

Methodology

To assess the relationship between SME digitalization and economic performance, a simple linear regression model is estimated using ordinary least squares (OLS):

$$GDP_i = a_0 + a_1 \cdot DIMM_i + \varepsilon_i$$

where:

- GDP_i represents GDP per capita (PPS)
- $DIMM_i$ denotes the share of SMEs with high digital intensity
- ε_i is the error term

The statistical significance of the model is evaluated using the F-test, while individual coefficients are assessed using the t-test, at a significance level of 5%.

3.1 Research hypotheses and statistical testing

The empirical analysis is based on both an economic hypothesis and statistical hypotheses.

Economic hypothesis

H_1 : A higher level of SME digitalization leads to an increase in GDP per capita

This hypothesis is grounded in the premise that digital technologies enhance productivity, innovation capacity, and market integration (Brynjolfsson & McAfee, 2014; OECD, 2021).

Model significance (F-test)

$$H_0: a_1 = 0; H_1: a_1 \neq 0$$

The decision rule is:

$$F < F_{\alpha; k; n-k-1} \text{ or } p\text{-value} > \alpha$$

where:

- $k = 1, n = 28$

$$F_{0.05; 1; 26} = 4.22$$

Coefficient significance (t-test)

$$H_0: a_i = 0; H_1: a_i \neq 0 \mid |t| < t_{\alpha/2; n-1} \text{ or } p\text{-value} > \alpha_{0.025; 27} = 2.052$$

4. Results and Discussion

The results of the regression analysis are presented in Table 2.

Table 2. Regression results

Regression Statistics					
Multiple R: 0.40063		R Square: 0.16050		Adjusted R Square: 0.12822	
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	1.25E+09	1.25E+09	4.971104	0.034625
Residual	26	6.55E+09	2.52E+08		
Total	27	7.81E+09			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	
Intercept	17649.480	11496.37	1.535222	0.13681	
DIMM	901.097	404.15	2.229597	0.03462	

Source: Author's calculations using Eurostat data.

The estimated model is: $GDP = 17649.480 + 901.097 \cdot DIMM + \epsilon$

The empirical results support the research hypothesis, confirming the positive association between SME digitalization and GDP per capita. The coefficient associated with SME digitalization is positive and statistically significant ($p\text{-value} = 0.0346 < 0.05$), indicating that higher levels of digital adoption among SMEs are associated with higher GDP per capita. Specifically, a one percentage point increase in the share of highly digitalized SMEs is associated with an increase of approximately 901 PPS units in GDP per capita. However, the relatively low coefficient of determination ($R^2 = 0.1605$) suggests that the model has limited explanatory power. This suggests that GDP per capita is influenced by multiple additional factors, such as human capital, investment levels, and institutional quality (Mankiw et al., 1992; Solow, 1956).

These findings are consistent with previous empirical studies that highlight the role of digital adoption

in enhancing economic performance, although the magnitude of the effect varies across countries.

5. Conclusions

The results confirm the existence of a positive relationship between SME digitalization and economic performance, although the strength of this relationship is relatively weak. While digitalization contributes to economic growth, it does not fully explain cross-country differences in GDP per capita. Therefore, policies aimed at improving digital adoption should be complemented by broader structural reforms.

A 1 percentage point (1%) increase in the share of SMEs with a high level of digitalization, employing between 10 and 249 persons, may lead to an increase in GDP per capita of approximately 901.1 PPS units, at a 95% confidence level.

The findings have important policy implications, suggesting that promoting SME digitalization can contribute to economic performance, although such policies should be complemented by investments in human capital, infrastructure, and institutional quality.

6. Limitations and Future Research

The analysis is subject to several limitations:

- reliance on a single explanatory variable
- cross-sectional data structure
- potential omitted variable bias

Future research could extend the model by incorporating additional determinants and employing panel data techniques.

References

- Brynjolfsson, E., & McAfee, A. (2014). *The Second Machine Age*. MIT Press. ISBN 10 0393239357
- European Commission (2023). *Digital Economy and Society Index*. <https://digital-strategy.ec.europa.eu>
- Mankiw, N. G., Romer, D., & Weil, D. (1992). A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107(2), 407-437. RePEc:oup:qjecon:v:107:y:1992:i:2:p:407-437.
- Niebel, T. (2018). ICT and economic growth - Comparing developing, emerging and developed countries. *Economics of Innovation and New Technology*, 27(3), 189-210.
- Niebel, Thomas, 2018. "ICT and economic growth - Comparing developing, emerging and developed countries," *World Development*, Elsevier, vol. 104(C), pages 197-211 DOI: 10.1016/j.worlddev.2017.11.024
- OECD (2021). *The Digital Transformation of SMEs*. OECD Publishing. <https://doi.org/10.1787/bdb9256a-en>, ISBN 978-92-64-36760-9
- Solow, R. M. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70(1), 65-94. <https://doi.org/10.2307/1884513>

OPERATING WORKING CAPITAL, FIRM PROFITABILITY, AND CRISIS MODERATION: EVIDENCE FROM LISTED FIRMS IN AN EMERGING EUROPEAN MARKET

Valerica Tătăranu (Soare); Elena Toader (Vasile)*

¹Valahia University of Targoviste, IOSUD – Doctoral School of Economic Sciences and Humanities,
Targoviste, Romania

²Valahia University of Targoviste, IOSUD – Doctoral School of Economic Sciences and Humanities,
Targoviste, Romania

* Corresponding author: valerica.tataranu.ct@valahia.ro

Abstract

This study examines the relationship between operating working capital (OWC) and firm profitability under conditions of economic instability, with particular attention to the moderating role of crisis periods. Anchored in the trade-off perspective and financial resilience literature, the analysis investigates whether the profitability implications of OWC intensify during periods of economic stress and whether this relationship varies across industry structures. Using a balanced panel of 25 firms listed on the Bucharest Stock Exchange across four sectors over the period 2013–2024 (300 firm-year observations), the study analyses the association between OWC, asset turnover (AT), firm size, and profitability measured by return on assets (ROA). The period 2020–2021 is treated as an exogenous crisis episode. Linear mixed-effects models are employed to capture firm-level heterogeneity and temporal variation in performance. The results indicate that the direct OWC–profitability association is negative across all specifications, but statistically significant only in the full model ($p = 0.033$) and not robust to more parsimonious specifications ($p = 0.187$), indicating that this effect should not be interpreted as uniformly strong in isolation. The interaction between OWC and the crisis period is negative and statistically significant: the total marginal effect of OWC on ROA intensifies from -0.065 in non-crisis periods to -0.165 during crisis conditions, equivalent to an additional profitability reduction of approximately 2.7 percentage points at the sample mean OWC. Industry group interactions do not reach statistical significance, a result attributable at least in part to the limited representation of project-based firms in the sample rather than definitive evidence of sectoral homogeneity. By contrast, asset turnover emerges as the dominant and robust profitability determinant across all specifications, with a standardised coefficient 2.7 times larger in magnitude than that of OWC. These findings indicate that the profitability implications of working capital are context-dependent, becoming economically meaningful primarily under macroeconomic stress, with relevant implications for financial management in emerging capital markets.

Keywords: Operating working capital; Firm profitability; Crisis conditions; Financial resilience; Mixed-effects models

JEL codes: M41; G32; G01.

References:

- Afrifa G.A., Padachi K. (2016). Working capital level influence on SME profitability. *Journal of Small Business and Enterprise Development*, 23 (1) 44–63. <https://doi.org/10.1108/JSBED-01-2014-0014>
- Ahmad, M., Bashir, R., & Waqas, H. (2022). Working capital management and firm performance: are their effects same in covid 19 compared to financial crisis 2008? *Cogent Economics & Finance*, 10(1). <https://doi.org/10.1080/23322039.2022.2101224>
- Bai, L., Wei, Y., Wei, G., Li, X. and Zhang, S. (2021). Infectious disease pandemic and permanent volatility of international stock markets: A long-term perspective. *Finance Research Letters*, 40, 101709. <https://doi.org/10.1016/j.frl.2020.101709>
- Baker S. R., Bloom N., Davis, S. J., Kost, K., Sammon, M., & Viratyosin, T. (2020). The Unprecedented Stock Market Reaction to COVID-19. *The Review of Asset Pricing Studies*, 10, (4), 742–758, <https://doi.org/10.1093/rapstu/raaa008>
- Banerjee, P., & Guha Deb, S. (2024). Working capital management efficiency, managerial ability, and firm performance: New insights. *Applied Economics*, 56(33), 4001-4018. <https://doi.org/10.1016/j.bir.2024.03.004>
- Bănică, A., Pascariu, G.C., Kourtit, K. et al. (2024). Unveiling core-periphery disparities through multidimensional spatial resilience maps. *Ann Reg Sci* 73, 1–29. <https://doi.org/10.1007/s00168-024-01259-0>
- Bell, A., Fairbrother, M. & Jones, K. (2019). Fixed and random effects models: making an informed choice. *Qual Quant* 53, 1051–1074 (2019). <https://doi.org/10.1007/s11135-018-0802-x>
- Burcă, V., Bogdan, O., Bunget, O.-C., & Dumitrescu, A.-C. (2024). Corporate Financial Performance vs. Corporate Sustainability Performance, between Earnings Management and Process Improvement. *Sustainability*, 16(17), 7744. <https://doi.org/10.3390/su16177744>
- Cowling, M., Brown, R., Liu, W., & Yang, H. (2025). Growth, working capital and refinancing, The geography of post-pandemic regional financial resilience in UK SMEs. *Papers in Regional Science*, 104(4), 100101. <https://doi.org/10.1016/j.pirs.2025.100101>
- Fernandez-Gallardo, A. (2023). Preventing financial disasters: Macroprudential policy and financial crisis. *European Economic Review* 151, 104350. <https://doi.org/10.1016/j.euroecorev.2022.104350>.
- Huynh, N., & Le, Q. N. (2025). From chain to capital: Supply chain risks and working capital management *Economics Letters*, 247, 112100. <https://doi.org/10.1016/j.econlet.2024.112100>
- Jaworski, J. & Czerwonka, L. (2023). Which Capital Structure Theory Explains Financial Behaviour of Small and Medium-Sized Enterprises? Evidence from Poland. *Gospodarka Narodowa. The Polish Journal of Economics*, 313(1), 82–92. <https://doi.org/10.33119/GN/159035>
- Liu, L., Wang, E.-Z., & Lee, -C.-C. (2020). Impact of the COVID-19 pandemic on the crude oil and stock markets in the US: A time-varying analysis. *Energy Research Letters*, 1(1), 13154. <https://doi.org/10.46557/001c.13154>
- Minerva, G. A. (2023). The strategic proximity-concentration trade-off theory with multiproduct multinational firms. *International Economics*, 174, 198-220. <https://doi.org/10.1016/j.inteco.2023.03.007>.
- Nguyen, D. T., & Pham, T. D. (2026). Determinant of Profitability: An Empirical Investigation of the Role of Financial Structure, Technological Innovation, and Managerial Attributes. *Economies*, 14(3), 85. <https://doi.org/10.3390/economies14030085>
- Pecina, E., Krišić, I.R. & Sabol, A. (2025). Testing the Efficiency of Classic Theories of Capital Structure in Bank-oriented Financial Systems. *Zagreb International Review of Economics and Business*, 28(2), 129-154. <https://doi.org/10.2478/zireb-2025-0019>
- Rufolo, A., Paientko, T., & Dziergwa, K. (2025). M&As and Corporate Financial Performance: An Empirical Study of DAX 40 Firms. *FinTech*, 4(3), 43. <https://doi.org/10.3390/fintech4030043>
- Shen, H., Fu, M., Pan, H., Yu, Z., & Chen, Y. (2020). The impact of the COVID-19 pandemic on firm performance. *Emerging Markets Finance and Trade* 56(10), 2213–2230 <https://doi.org/10.1080/1540496X.2020.1785863>.
- Tarighi, H., Zimon, G., Sheikh, M. J., & Sayrani, M. (2024). The Impact of Firm Risk and the COVID-19 Crisis on Working Capital Management Strategies: Evidence from a Market Affected by Economic Uncertainty. *Risks*, 12(4), 72. <https://doi.org/10.3390/risks12040072>
- Voutsinas, K., & Werner, R. A. (2025). Trade-off theory vs. the pecking order hypothesis: Japanese evidence on capital structure under financial constraints. *Structural Change and Economic Dynamics*, 74, 944-962. <https://doi.org/10.1016/j.strueco.2025.06.004>

YOUTH PERCEPTIONS OF COMPENSATION GAPS AND BOARD INDEPENDENCE IN LISTED EUROPEAN BANKS: AN EMPIRICAL STUDY

Matei KACSO-CARSTOCEA; Lucian Claudiu ANGHEL
SNSPA, Faculty of Management, Bucharest
lucian.anghel@facultateademangement.ro

Abstract

This study examines youth perceptions of compensation gaps and board independence in listed European banks, with a particular focus on the remuneration of independent directors. While executive compensation has long been a controversial and widely studied topic, the compensation of independent directors has received comparatively limited attention. The empirical analysis is based on a questionnaire survey designed to capture how young individuals perceive fairness, transparency, and accountability in compensation structures. Drawing on the existing literature, the study highlights that rising executive compensation may contribute to internal inequality, potentially marginalizing independent directors and affecting governance quality. Prior research also suggests that certain board structures, such as the presence of former CEOs, can widen compensation gaps and negatively influence firm performance and public perception. The results indicate that young respondents associate equitable compensation with improved transparency, reduced corruption risks, and stronger corporate legitimacy. The study contributes to the corporate governance literature by integrating a societal perspective and emphasizing the role of balanced remuneration in fostering trust, credibility, and sustainable performance in the banking sector.

Keywords: youth perceptions; executive compensation; board independence; corporate governance; European banks

Introduction

Executive compensation is one of the most debated topics in corporate governance, particularly in the banking sector, where public scrutiny and the need for trust are especially high. Although extensive research has focused on executive pay, the remuneration of independent directors remains relatively underexplored.

This study aims to analyze how compensation gaps and board independence are perceived by young individuals in the context of listed European banks. The focus on youth is relevant, as they represent future employees, investors, and decision-makers, and reflect evolving societal expectations regarding fairness, transparency, and accountability.

The paper argues that compensation structures are not only an internal governance issue but also a factor influencing external legitimacy and public trust. Therefore, understanding youth perceptions provides valuable insights into how corporate governance practices are evaluated from a societal perspective.

Literature Review

The literature shows that executive compensation has increased significantly over time, although not always in a consistent manner (Edmans et al., 2017). This trend has been associated with growing

economic inequality within firms (Ebert et al., 2008), potentially affecting the position and motivation of independent directors.

Corporate governance research also highlights the link between governance quality and compensation structures. Core, Holthausen, and Larcker (1999) demonstrate that weaker governance mechanisms may allow executives to influence their own remuneration, leading to excessive pay levels.

Additionally, board composition plays an important role. The presence of former CEOs as directors may contribute to wider compensation gaps and negatively impact firm performance and public perception. These findings suggest that compensation disparities are influenced not only by performance, but also by governance effectiveness.

From a theoretical perspective, Legitimacy Theory (Suchman, 1995) argues that firms must align with societal expectations in order to maintain credibility. In this context, large compensation gaps may undermine trust and legitimacy, especially among younger generations, who tend to be more sensitive to issues of fairness and ethical governance.

Recent research (Edmans et al., 2023) also emphasizes that compensation is not only financial, but also related to reputation and perceived fairness, reinforcing the importance of how remuneration is viewed by external stakeholders.

Data and Methodology

The study is based on primary data collected through a questionnaire survey targeting young individuals. The objective of the survey is to capture perceptions regarding compensation gaps, the role of independent directors, and the fairness of remuneration structures in listed European banks.

The questionnaire includes structured items addressing key aspects such as perceived inequality in executive compensation, the importance of independent directors, and the relationship between remuneration and corporate governance quality. Responses were collected in a standardized format, allowing for a consistent evaluation of attitudes and perceptions.

The data were analyzed using descriptive statistical methods, focusing on identifying general patterns in respondents' views. This approach enables an empirical assessment of how young people perceive compensation disparities and their implications for transparency, accountability, and governance effectiveness.

Results and Discussion

The results of the questionnaire indicate that compensation gaps are perceived as important indicators of corporate governance quality. Most respondents associate large disparities in executive pay with increased inequality and reduced effectiveness of board oversight.

The findings also suggest that independent directors are considered essential for maintaining balance and objectivity within boards. However, insufficient or disproportionate remuneration of these directors may weaken their perceived independence and effectiveness.

Furthermore, the results align with the literature, confirming that compensation structures influence not only internal governance dynamics but also external perceptions of legitimacy and trust. From the perspective of young individuals, fair remuneration is closely linked to transparency, accountability, and

ethical governance.

These insights support the argument that companies must consider societal expectations when designing compensation policies, particularly in sectors such as banking, where public confidence is critical.

Conclusions

This study highlights the importance of equitable compensation structures in strengthening corporate governance and maintaining institutional legitimacy. Youth perceptions emphasize that large compensation gaps may undermine trust, increase perceived inequality, and weaken confidence in board independence.

Fair remuneration of independent directors is therefore not only an ethical requirement but also a practical mechanism for improving transparency and reducing governance risks. The findings suggest that aligning compensation policies with societal expectations can enhance credibility and support sustainable performance.

However, the study is limited by the use of perceptual data and a relatively narrow sample. Future research could expand the analysis by incorporating larger datasets and combining survey results with firm-level financial indicators.

References

- Core, J. E., Holthausen, R. W., & Larcker, D. F. (1999). Corporate governance, CEO compensation, and firm performance. *Journal of Financial Economics*, 51(3), 371–406.
- Ebert, F. C., Torres, R., & Papadakis, K. (2008). *Executive compensation: Trends and policy issues*.
- Edmans, A., Gabaix, X., & Jenter, D. (2017). Executive compensation: A survey of theory and evidence.
- Edmans, A., Gosling, T., & Jenter, D. (2023). CEO compensation: Evidence from the field.
- Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of Management Review*, 20(3), 571–610.

INTEGRATING FINANCIAL PERFORMANCE ANALYSIS AND RISK ASSESSMENT IN CORPORATE ACTIVITY

Daniel Costin MATACHE^{1*}

¹ University of Craiova, "Eugeniu Carada" Doctoral School of Economic Sciences, Craiova, Romania

danielcostinmatache@gmail.com

Abstract

This paper examines how financial performance analysis can be integrated with the assessment of key risks specific to small and medium-sized enterprises (SMEs). It starts from the premise that SME performance is shaped not only by profitability, liquidity and solvency indicators, but also by heightened exposure to financing constraints, customer concentration and market volatility. The study adopts a conceptual approach, synthesising findings from the specialised literature on SME financial performance, capital structure and risk management, and illustrates how traditional ratio analysis can be combined with simple early warning tools adapted to smaller firms. The discussion highlights that, for SMEs, high leverage and weak liquidity can rapidly translate into solvency problems, making the joint evaluation of performance and risk essential for timely corrective action. The paper concludes that a comprehensive diagnosis of SME performance requires integrating classical financial statement analysis with structured risk assessment, in order to support more robust financial decisions and enhance the resilience of smaller firms in an uncertain economic environment.

Keywords: Financial performance; SMEs; financial risk; leverage; liquidity; bankruptcy risk.

JEL codes: G32; M41; L26

1. Introduction

SMEs are key drivers of growth and employment, but they remain highly exposed to financial constraints and business volatility, which makes their performance particularly fragile. The literature stresses that analyzing SME performance only through profitability indicators can hide vulnerabilities related to liquidity pressure, high indebtedness and limited access to external finance.

2. Literature Review

Studies show that SME financial performance is commonly evaluated using profitability, liquidity and solvency ratios, which provide a basic diagnosis of financial health. Research on capital structure and SME performance highlights that debt can support growth but increases financial risk, with credit risk and leverage levels significantly affecting outcomes. Early warning models such as Altman-type Z-scores have also been adapted to SMEs to predict bankruptcy risk and complement traditional ratio analysis.

3. Data and Methodology

The paper adopts a conceptual approach based on a selective review of academic articles and empirical studies on SME performance, capital structure and risk management. The analysis focuses on how core indicators (profitability, liquidity, solvency, leverage) are used together with simple risk metrics and bankruptcy prediction tools to evaluate SME financial health.

4. Results and Discussion

The reviewed evidence suggests that SMEs with moderate leverage, adequate liquidity and balanced solvency ratios tend to display more stable performance over time. However, excessive indebtedness and weak liquidity increase the probability of financial distress, and the relationship between debt and performance is often negative for low-risk SMEs, especially in bank-dependent environments. Studies also show that integrating basic risk management practices and early warning indicators can significantly improve the quality of financial decisions in SMEs.

5. Conclusions

Financial performance analysis and risk assessment in SMEs should be treated as complementary components of the same diagnostic process. Combining traditional ratio analysis with simple risk indicators and bankruptcy prediction tools can help SME owners and managers detect vulnerabilities early, adjust capital structure and strengthen resilience in volatile markets.

References

1. Adekunle, B. I., Chukwuma-Eke, E. C., Balogun, E. D., & Ogunsola, K. O. (2023). Integrating AI-driven risk assessment frameworks in financial operations: A model for enhanced corporate governance. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 9(6), 445-464.
2. Alina, S. (2012). Risk management: an integrated approach to risk management and assessment. *Annals of Faculty of Economics*, 21(2), 776-781.
3. Figini, S., Kenett, R. S., & Salini, S. (2010). Integrating operational and financial risk assessments. *Quality and Reliability Engineering International*, 26(8), 887-897.
4. Karami, M., Samimi, A., & Ja'fari, M. (2020). The impact of effective risk management on corporate financial performance. *Advanced Journal of Chemistry-Section B*, 2(3), 144-150.

DETERMINANTS OF ECONOMIC BEHAVIOR IN ATTRACTING NON-REIMBURSABLE FUNDS

GHINTUEALA (HATĂRĂ) IOANA

Ph.D. Student, "Constantin Brâncuși" University of Târgu- Jiu, Doctoral School of Economic Sciences, Târgu- Jiu, Romania
e-mail: ioanaa.hatara@gmail.com

Abstract

Attracting non-reimbursable funds is a complex economic process, located at the intersection of individual initiative, institutional capacity, organizational culture and socio-economic context. The economic behavior of the actors involved in accessing these funds cannot be explained exclusively by economic rationality or by the desire to maximize benefits, but must be analyzed through a set of historical, cultural and institutional determinants. The paper aims to highlight how historical experiences, cultural values, the level of social trust, administrative capacity and the quality of institutions influence the decision to access non-reimbursable funds. The approach is narrative-analytical and aims to provide a useful conceptual framework for doctoral research on economic behavior in public and European funding contexts.

Keywords: economic behavior, grants, institutions, economic culture, development, social trust.

JEL codes (optional): D91, O17, H81, R58

1. Introduction

Non-reimbursable funds represent an important instrument for supporting investment, innovation, social inclusion, regional development and institutional capacity. However, accessing these funds depends not only on available financing opportunities, but also on the economic behavior of the actors involved.

Economic behavior in attracting funds includes the ability to identify opportunities, evaluate risks, create partnerships, respect administrative rules and transform needs into eligible projects. This process is influenced by historical experience, local culture, trust in institutions and strategic capacity.

The paper analyzes the main determinants that influence economic behavior in attracting non-reimbursable funds, focusing on historical, cultural and institutional factors.

2. Literature Review

The literature shows that economic decisions are not based only on rational cost-benefit calculations, but are also shaped by social, cultural, institutional and psychological factors. Institutional economics highlights the role of formal and informal rules in reducing uncertainty and guiding economic behavior.

In the case of non-reimbursable funds, the quality of institutions, transparency, stability of rules and clarity of procedures are essential. Efficient institutions encourage participation, while bureaucracy and regulatory instability can discourage applicants.

The literature on social capital emphasizes the importance of trust, cooperation and social networks. These factors are relevant because funded projects often require partnerships and collaboration with public authorities or other institutions.

Studies on regional development underline the role of grants in reducing disparities, supporting investment, innovation and social inclusion. However, the availability of funds does not automatically ensure access or efficient use. Beneficiary capacity, experience and project management quality are decisive.

Economic culture also influences how actors perceive funding opportunities. Attitudes toward risk, cooperation, change and initiative can encourage or limit participation in funding programs.

The paper contributes by integrating institutional, cultural, historical and organizational factors into a common framework, showing that attracting non-reimbursable funds is both an economic and socio-institutional process.

3. Data and Methodology

The paper has a theoretical-narrative and exploratory character. It does not test statistical hypotheses, but develops an analytical framework that can support future empirical doctoral research.

Data Sources

The study uses secondary sources, such as:

- scientific articles and academic studies;
- reports issued by the European Commission and national authorities;
- funding guidelines and project calls;
- public databases on funded projects;
- documents on regional development and administrative capacity.

Analyzed Variables

The dependent variable is economic behavior regarding the attraction of non-reimbursable funds, reflected in the willingness to apply, the capacity to develop proposals and involvement in project implementation.

The explanatory variables are grouped into:

Institutional variables: quality of institutions, clarity of procedures, bureaucracy, transparency, stability of rules and beneficiary support.

Cultural variables: social trust, attitude toward risk, openness to cooperation, organizational culture and innovation orientation.

Historical variables: previous experience, relationship with public institutions, administrative practices and past positive or negative project experiences.

Organizational variables: administrative capacity, specialized staff, project management experience, consultancy access, co-financing capacity and level of information.

Sample and Units of Analysis

The sample is conceptual and analytical, not statistical. The units of analysis are actors involved in attracting funds, such as:

- local public institutions;
- small and medium-sized enterprises;
- non-governmental organizations;
- educational institutions;
- local communities;
- public-private partnerships.

In future research, the study could be developed empirically using beneficiaries and potential beneficiaries selected by region, type of organization, experience and field of activity.

Methodological Approach

The methodology is qualitative, descriptive-analytical and interpretative. It includes:

1. reviewing specialized literature;
2. analyzing funding guidelines, reports and institutional documents;
3. comparing determining factors;
4. developing a conceptual framework explaining why actors access or avoid non-reimbursable funds.

Possible Technical Data for Further Research

Future research may use indicators such as:

- number of submitted projects;
- number of approved projects;
- success rate;
- total value of attracted funds;
- average funding value per project;
- evaluation duration;
- number of implemented projects;
- projects with financial corrections;
- co-financing level;
- previous applicant experience.

Qualitative indicators may also include perceptions of bureaucracy, trust in institutions, information level, willingness to form partnerships and organizational capacity.

4. Results and Discussion

The analysis shows that attracting non-reimbursable funds depends not only on financial opportunities, but also on how actors perceive and use them. Economic behavior is influenced by institutional, cultural, historical and organizational factors.

A first result concerns institutional predictability. Clear procedures, stable regulations, transparent criteria and accessible communication increase the willingness to apply. In contrast, bureaucracy, unclear guidelines and frequent legislative changes discourage applicants.

A second result refers to organizational capacity. Actors with specialized staff, project management experience, access to consultancy and co-financing resources are more likely to submit successful applications.

A third result concerns trust and cooperation. Trust in institutions, authorities, consultants and partners influences the decision to access funding. Low trust can make the process seem risky or inaccessible, while higher trust supports cooperation and participation.

Previous experience also plays an important role. Beneficiaries with funded project experience are more confident and familiar with requirements, while inexperienced actors may avoid funding due to lack of information or fear of mistakes.

Table 1. Main determinants of economic behavior in attracting non-reimbursable funds

Category of determinants	Examples of factors	Expected influence
Institutional determinants	Clarity, transparency, stable rules, administrative support	Influence willingness to apply
Cultural determinants	Trust, risk attitude, cooperation	Shape perception of opportunities
Historical determinants	Previous experience, past relations with institutions	Influence confidence and participation
Organizational determinants	Specialized staff, project skills, co-financing, information	Affect capacity to prepare and implement projects

The determinants interact with one another. Even when funds are available, weak organizational capacity or low trust may prevent eligible actors from applying.

The results suggest that attracting non-reimbursable funds is a complex socio-economic process. It is not only a rational decision based on financial gain, but also a behavior shaped by institutional confidence, cultural attitudes, previous experience and administrative capacity.

Therefore, policies should not focus only on increasing available funds. They should also aim to simplify procedures, strengthen institutional trust, develop administrative capacity, provide support for beneficiaries and encourage cooperation and strategic planning.

5. Conclusions

The paper shows that attracting non-reimbursable funds depends both on available financial resources and on the economic behavior of beneficiaries. This behavior is influenced by institutional, cultural, historical and organizational factors.

The main determinants are clear procedures, transparency, institutional predictability, previous experience, trust, cooperation and administrative capacity. Strong organizations with experience and good information are more likely to access funds successfully, while bureaucracy, lack of trust and limited expertise may discourage applicants.

Theoretically, non-reimbursable funds are not only financial instruments, but part of a broader socio-economic and institutional process. Practically, authorities should simplify procedures, improve

communication and offer support, while organizations should develop project management skills and long-term strategies.

The study is limited because it is theoretical and does not analyze a specific country, region or funding program. Future research could use surveys, interviews, regional comparisons or case studies.

In conclusion, successful access to non-reimbursable funds depends on the ability of economic actors to identify, understand and use funding opportunities effectively.

References

1. Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, 91(3), 481–510. <https://doi.org/10.1086/228311>
2. Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations* (2nd ed.). Sage Publications.
3. Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–291. <https://doi.org/10.2307/1914185>
4. Kaufmann, D., Kraay, A., & Mastruzzi, M. (2010). *The worldwide governance indicators: Methodology and analytical issues* (Policy Research Working Paper No. 5430). World Bank. <https://doi.org/10.1596/1813-9450-5430>
5. North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.
6. Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511807763>
7. Putnam, R. D., Leonardi, R., & Nanetti, R. Y. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton University Press.
8. Regulation (EU) 2021/1060 of the European Parliament and of the Council of 24 June 2021 laying down common provisions on the European Regional Development Fund, the European Social Fund Plus, the Cohesion Fund, the Just Transition Fund and other funds. *Official Journal of the European Union*.
9. Williamson, O. E. (1985). *The economic institutions of capitalism: Firms, markets, relational contracting*. Free Press.

ASSESSING THE ROLE OF DIGITAL INDICATORS IN INDIA'S ECONOMIC DEVELOPMENT USING MACHINE LEARNING

Yash JADHAV^{1*}; Arshad BHAT²

¹Amity University Mumbai, Amity School of Engineering and Technology, Mumbai, India

²Amity University Mumbai, Amity Institute of Liberal Arts, Mumbai, India

* Corresponding author: yashjadhav3310@email.com | ORCID: 0009-0000-4378-2995

Abstract

This paper investigates the relationship between digital development and the economic performance of the Indian states in relation to the Digital India program through methods of machine learning. Based on a state-year panel dataset (2012-2023) the analysis is performed with the help of the Gradient Boosting Regression model that will be used to determine the predictive relationship between digital indicators like telecom access, tele-density and electronic transactions and per-capita Net State Domestic Product (NSDP) and control by structural factors, including urbanization, poverty and access to power. The findings suggest that digital indicators positively correlate with increased levels of income and have a significant value in explaining cross-state variation in per-capita NSDP. Nevertheless, an explainability method involving feature importances and SHAP values indicates that digitalization is more likely to be a complementary and enabling variable than a causal force of economic growth and strengthens already existing structural benefits. The results point out that although Digital India has increased access and use of digital, the long-term increase in income and convergence between regions is more contingent on underlying development condition e.g. poverty alleviation, infrastructure reliability and urbanization. The paper highlights the significance of implementing digital infrastructure into more comprehensive development policies as opposed to it being discussed as an isolated means to economic inequalities.

Keywords: Digitalization; development; machine-Learning; infrastructure; income.

JEL codes: O1; O10; C00

1. Introduction

During the past decade, digital infrastructure has been observed and believed to be one of the critical drivers of economic transformation, particularly in developing economies like India. To date, there has been an abundance of literature examining the 'Digital India' initiative; however, much of the work remains qualitative or descriptive in nature. Despite early attempts to quantify the size of the digital economy through standard Input-Output models, the ability of those methodologies to produce predictive outputs has been limited, particularly with respect to applying modern computational models. Alternatively, while Machine Learning has provided successful forecasts of India's GDP, many of the existing models rely only on traditional economic indicators (e.g., inflation, trade), which fail to consider the transformative impacts of digitalization. This means that no Machine Learning studies have yet been completed using an explicit modelling approach to evaluate how 'Digital India' initiatives impact economic development, creating a substantial research gap regarding the predictive capabilities of digital policy interventions

2. Literature Review

Machine learning (ML) techniques have shown strong potential in economic forecasting. Research by Adam Richardson, Thomas van Florenstein Mulder, and Tugrul Vehbi found that ML models often provide more accurate GDP nowcasts than traditional statistical methods like AR models, especially when multiple ML forecasts are combined. Studies on India’s digital economy indicate that digitalization is a key driver of economic growth. Research by Mishra and Kedia estimates that India’s digital economy contributed about 11.7% of GDP in 2022 to 23 and may reach 20% by 2030. Other researchers such as Siva Kumar show that ML models like Random Forest and Gradient Boosting improve GDP prediction accuracy. Studies on the Digital India initiative also highlight how digital infrastructure, online payments, and governance platforms are boosting economic growth and transparency. However, challenges such as skill gaps, cybersecurity risks, rural connectivity issues, and data privacy concerns still need to be addressed for sustained development.

3. Data and Methodology

This The study uses state–year level data from official Indian sources, including the Telecom Regulatory Authority of India (TRAI) for telecom indicators and the Reserve Bank of India (RBI) for digital payment statistics, along with national accounts and government publications for economic and socioeconomic variables. The dependent variable is the log of per-capita Net State Domestic Product (NSDP) at constant prices to measure economic growth. Digitalization is captured through indicators of connectivity (mobile subscribers, tele-density), digital usage (electronic transactions), and infrastructure (electricity availability), while urbanization, poverty, and power availability are included as control variables, along with a post-2016 structural indicator. The empirical strategy focuses on predictive associations rather than causal inference, using a Gradient Boosting Regressor based on the method developed by Jerome H. Friedman and implemented in scikit-learn to capture non-linear relationships and interactions among variables. Model performance is evaluated using out-of-sample R^2 and RMSE, while model interpretation relies on feature importance and SHAP (SHapley Additive exPlanations) developed by Scott M. Lundberg and Su-In Lee to understand how different predictors influence the model’s predictions, emphasizing predictive rather than causal relationships.

4. Results and Discussion

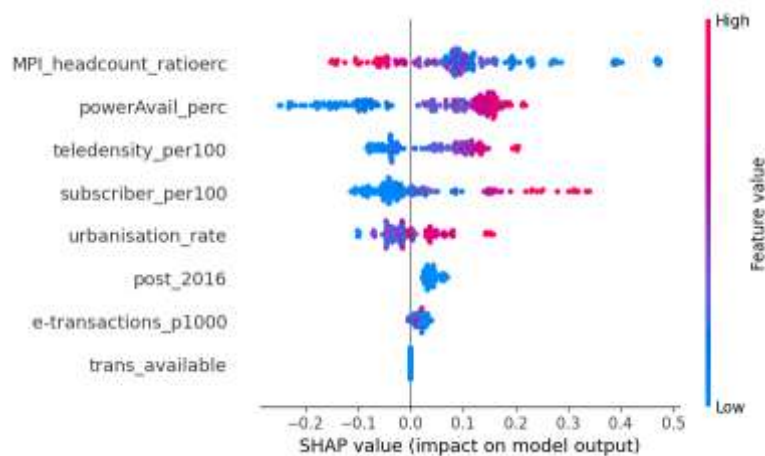
The Gradient Boosting Regression model demonstrates strong predictive performance with $R^2 = 0.774$ and RMSE = 0.2453, indicating it explains a significant portion of variation in state-level per-capita NSDP.

Model	R^2 value	RSME
Gradient Boosting Regression (with control variables)	0.774	0.2453

Feature importance results show that structural factors such as multidimensional poverty, power availability, and urbanization are the most influential predictors, while digital indicators like mobile subscribers, tele-density, and electronic transactions contribute smaller but meaningful effects. Explainability analysis using SHAP (SHapley Additive exPlanations) developed by Scott M. Lundberg and Su-In Lee indicates that higher digital connectivity and transaction intensity are generally associated with higher predicted income levels, whereas higher poverty levels reduce predicted income. The post-2016 Digital India period shows minimal predictive importance, suggesting that income differences

across states are driven more by long-term structural conditions than by a single policy phase. Overall, the findings indicate that digital infrastructure acts as an enabling factor for development, but its benefits are strongest when combined with improvements in broader socioeconomic conditions.

Feature	Relative importance	In percentage
Multidimensional Poverty	0.4584	45.84 %
Power Availability	0.1930	19.3%
Urbanisation Rate	0.1428	14.28%
Subscribers	0.0859	8.59%
Tele-density	0.0693	6.93%
e-Transactions	0.0445	4.45%
Post 2016	0.0061	0.61%



5. Conclusions

This study examines the relationship between digital expansion under the Digital India initiative and economic development across Indian states, using per-capita Net State Domestic Product (NSDP) as a measure of income levels. The results show that states with better digital access, such as higher telecom penetration and greater use of electronic transactions also tend to have higher income levels. However, this relationship should not be seen as a direct cause-and-effect link. The findings suggest that digital expansion mainly works as an enabling factor that supports development rather than acting as the main driver of growth. Economically stronger states often have better urbanization, education systems, infrastructure, and institutions, which also helps them adopt digital technologies more quickly. This means digital progress and economic development usually grow together and support each other. Therefore, digital initiatives are most effective when combined with broader development efforts such as poverty reduction, better education, reliable electricity supply, inclusive economic participation, and improvements in living standards. Digital infrastructure can expand opportunities and improve access to services, but lasting economic growth depends on strengthening these basic foundations. Overall, the study highlights that when digital tools are used alongside long-term structural development, they can play an important role in promoting inclusive and sustainable economic growth.

References

- Dani, R. K. (2022). Digital India is a global success story. The Times of India. <https://timesofindia.indiatimes.com/blogs/thedanispost/digital-india-is-a-global-success-story/>
- Desai, S. H. (2024). *Development of digital economy in India and its socio-economic impact*. *ShodhKosh: Journal of Visual and Performing Arts*. <https://doi.org/10.29121/shodhkosh.v5.i4.2024.6430>
- Emerging Trends (ICCIET 2024) (Advances in Computer Science Research, Vol. 112, pp. 578–586). Atlantis Press. https://doi.org/10.2991/978-94-6463-381-0_53
- ET Government. (2025). India's digital economy to become a \$1 trillion economy by 2028 enabled by digitalisation. Economic Times Government.
- Friedman, J. H. (2001). Greedy function approximation: A gradient boosting machine. *The Annals of Statistics*, 29(5), 1189–1232. <https://doi.org/10.1214/aos/1013203451>
- Gahlot, B., & Rani, P. (2024). Digitalization in India: Leading the way towards the development. *RESEARCH REVIEW International Journal of Multidisciplinary*, 9(12), 124–133. <https://doi.org/10.31305/rrijm.2024.v09.n12.015>
- Government of India, Ministry of Electronics & IT. (2025). Digital economy growth report. (Summary).
- Kumar, C. S., Sagar, P. L., Kumar, S. P., Abrar, S. M., Susanth, R. V. S., & Varma, S. S. Y. (2024). Predictive analysis of Indian GDP using machine learning algorithms. In K. R. Madhavi et al. (Eds.), *Proceedings of the International Conference on Computational Innovations and*
- Lundberg, S. M., & Lee, S.-I. (2017). A unified approach to interpreting model predictions. *Advances in Neural Information Processing Systems*, 30. <https://arxiv.org/abs/1705.07874>
- Manohar, S., Sathyeshwar, S., & Srinivasa, M. (2025). From inclusion to innovation: The impact of digital economy on India's development. *Journal of Informatics Education and Research*.
- Manorama Yearbook. (2024). Digital economy: Benefits & challenges. *Manorama Yearbook*.
- Ramannagol, S. K. (2025). Digital Economy, Startups, and Innovation: India's Growth Path Towards 2047. *ಅಕ್ಷರಸೂರ್ಯ (AKSHARASURYA)*, 9(03).
- MeitY, Government of India. (2025). Digital India growth story. Government of India.
- ET Government. (2025). India's digital economy to grow, driven by telecom and digital adoption. Economic Times Government.
- Mishra, D., Kedia, M., Reddy, A., Fernandez, C., Shukla, S., Ramnath, K., & Vanguri, S. (2025). Estimation and measurement of India's digital economy. *Indian Council for Research on International Economic Relations (ICRIER) & Ministry of Electronics and Information Technology (MeitY)*.
- Mullainathan, S., & Spiess, J. (2017). Machine learning: An applied econometric approach. *Journal of Economic Perspectives*, 31(2), 87–106. <https://doi.org/10.1257/jep.31.2.87>
- NITI Aayog (2025). Faster AI adoption could add to India's GDP. Economic Times.
- The Guardian (2025). India's digital revolution paving the path to economic growth. *Global news report*.
- Pedregosa, F., Varoquaux, G., Gramfort, A., Michel, V., Thirion, B., Grisel, O., ... Duchesnay, É.

(2011). Scikit-learn: Machine learning in Python. *Journal of Machine Learning Research*, 12, 2825–2830. <https://www.jmlr.org/papers/v12/pedregosa11a.html>

Rafee, B. M. (2024). Digital India and economic growth: An overview. *International Journal of Social Sciences and Commerce*, 1(1), 53–60. <https://doi.org/10.51470/IJSSC.2024.01.01.53>

Rani, R., Sharma, S., Kaur, K., Vij, T. S., Gill, M. S., & Lakshmi, M. R. (2023). Digital India: An emerging economy. *EELET*, 13(4), 583–595. <http://eelet.org.uk>

Richardson, A., Mulder, T., & Vehbi, T. (2018). Nowcasting New Zealand GDP using machine learning algorithms (CAMA Working Paper No. 47/2018). Centre for Applied Macroeconomic Analysis. <https://doi.org/10.2139/ssrn.3256578>

Acknowledgements

We are highly thankful to Vice-Chancellor Amity University Mumbai for providing valuable suggestions and proving a good research environment in the campus.

IMPACT OF THE USE OF ARTIFICIAL INTELLIGENCE IN THE PUBLIC SECTOR

Constantin Stefan PONEA

Spiru Haret University, Faculty of Legal, Economic and Administrative Sciences Craiova
ponea.stefan@yahoo.com

Abstract:

The study analyzes, from a theoretical perspective, the impact of the use of artificial intelligence in the public sector, following the way this technology penetrates the public sector, focusing on the work of civil servants, high government administration, central and local authorities, public services and academia. The paper highlights that the integration of artificial intelligence can contribute on the one hand to increasing administrative efficiency, improving decision-making and enhancing the quality of services provided to citizens, but on the other hand it also generates significant risks regarding transparency, data protection, information security, algorithmic discrimination and legal liability delimitation. At the same time, we believe it is important to identify the main sectors that could be exposed to an accelerated penetration of artificial intelligence, stressing that the contemporary public administration is in a comprehensive process of digital transformation, marked by automation, interoperability and intensive capitalization of data.

At European level, the analysis reveals that the current strategy of the European Union is aimed at developing and using reliable and human-centered artificial intelligence, through regulatory tools, digital innovation initiatives, thematic cooperation mechanisms and exchange platforms for good practices dedicated to public administration.

In conclusion, the article argues that the responsible use of artificial intelligence can become a determining factor for modernizing public administration and for strengthening a more efficient, transparent and better adapted governance to the needs of the citizen. In line with this EU strategy, modernisation is supported by both the European approach to trusted artificial intelligence and recent initiatives dedicated to public administrations, interoperability, exchange of experience and digital innovation.

Keywords: *artificial intelligence; public sector; public administration; digital transformation; algorithmic risks*

JEL codes: O33; H83; K24

1. Introduction

In the literature, artificial intelligence is typically presented as a complex category of technologies capable of processing large volumes of data, identifying regularities, formulating predictions, recommendations or decisions, and influencing, directly or indirectly, real or virtual processes and environments. From the current legal perspective, a key milestone is *Regulation (EU) 2024/1689, which defines „the artificial intelligence”* system as a machine-based system, designed to operate with varying degrees of autonomy and which can be adaptive after implementation, inferring, from input data, how to generate results such as predictions, content, recommendations or decisions capable of influencing physical or virtual environments.

A close definition is also promoted at OECD level, where the artificial intelligence system is described as a machine-based system which, for explicit or implicit objectives, gives the received data the way of generating results of the same type.

This delimitation is important because it allows the differentiation of artificial intelligence from the simple computerization of administrative activities. Not every computer program used in the public sector is necessarily an artificial intelligence system. There is a distinction between basic digitisation, the automation of standardised procedural flows and those systems capable of producing inferences, learning from data or generating results with a certain degree of functional autonomy.

Therefore, artificial intelligence should not be confused with either the general use of technology in administration or with classic deterministic software, based solely on fixed rules and entirely predictable results.

Artificial intelligence has become one of the most influential emerging technologies shaping the transformation of contemporary governance. In the public sector, its increasing use reflects a broader process of digital transformation aimed at improving administrative efficiency, simplifying procedures, strengthening institutional capacity, and making public services more responsive to citizens' needs.

At the same time, the growing deployment of IA in public decision-making, service delivery, and knowledge production raises complex legal, administrative, and ethical questions. The present study addresses these developments by examining how AI is entering different segments of the public sector and by assessing both its transformative potential and its systemic risks. The paper also seeks to explain why the European Union has placed AI at the center of its current digital and regulatory agenda, especially in relation to public administration.

2. Literature Review

Recent literature on artificial intelligence in government and public administration emphasizes two complementary trends. First, IA is increasingly presented as a tool capable of improving productivity, tailoring public services, supporting policy design, and strengthening administrative performance. Second, a growing body of scholarship and institutional analysis warns that IA may also generate opacity, bias, privacy concerns, accountability gaps, and new risks for democratic governance if adopted without adequate safeguards.

The OECD principles on artificial intelligence adopted in 2019 and updated in 2024 underline the need for innovative and trustworthy artificial intelligence that respects human rights and democratic values, emphasising requirements such as fairness, non-discrimination, privacy protection and adequate human oversight. These benchmarks are particularly relevant to the public sector, where the use of technology cannot be detached from the imperatives of legality, impartiality, transparency and the protection of the public interest.

OECD research highlights IA's relevance for core government functions and public service design, while European analyses such as Public Sector Tech Watch show that public administrations across Europe are rapidly experimenting with generative IA and related technologies. The present study contributes to this debate by integrating legal, administrative, and strategic perspectives into a single theoretical framework focused on the public sector.

At strategic level, the European Union is currently treating public administration as one of the priority areas for the application of artificial intelligence. Apply AI Strategy, launched in October 2025, is presented by the European Commission as the Union's overall sectoral artificial intelligence strategy. It aims to increase AI uptake and innovation in key sectors, including the public sector, promote first AI logic in the assessment of policy and management solutions, and focus on strengthening innovation ecosystems, developing skills and creating governance frameworks that bring together AI, industry, academia and the public sector providers.

3. Data and Methodology

Given its theoretical character, the paper does not rely on an empirical dataset in the strict statistical sense. Instead, it is based on documentary and normative sources, including European Union regulations and policy communications, OECD reports, and institutional analyses concerning IA adoption in public administration. The methodological approach combines doctrinal analysis, comparative reasoning, and conceptual synthesis.

More specifically, the paper examines the legal and policy framework established by the European Union, with particular reference to the IA Act and the broader European approach to trustworthy IA, and places these materials in dialogue with international governance reports on IA in the public sector. This approach makes it possible to identify both the main opportunities created by IA and the normative conditions required for its responsible integration into public institutions.

4. Results and Discussion

The analysis indicates that artificial intelligence is rapidly expanding across several areas of the public sector, especially where high volumes of data, repetitive procedures, and strong demands for efficiency and responsiveness are present. IA is increasingly relevant to public administration, tax systems, public services, justice-related functions, education, research, and smart urban governance. Its main advantages include faster processing of information, support for policy analysis, better allocation of public resources, and improved interaction between institutions and citizens.

However, these benefits are accompanied by significant risks, particularly in relation to explainability, data governance, discrimination, cybersecurity vulnerabilities, and the weakening of human control over decisions with legal or practical consequences. The discussion further shows that the current EU strategy attempts to balance innovation and safeguards through a combination of regulation, governance structures, innovation ecosystems, and public-sector-focused adoption strategies. In this regard, the IA Act, the European approach to IA, the IA Office, and the Apply AI Strategy reflect an effort to shape a model of IA deployment that is efficient, trustworthy, and centered on citizens' rights.

5. Conclusions

The study confirms that artificial intelligence can become a major driver of public sector modernization, but only under conditions of strong legal regulation, institutional preparedness, and effective human oversight. IA should not be understood merely as a technical instrument for automating tasks, but as a technology capable of reshaping public decision-making, service delivery, and administrative culture. Its responsible use therefore requires clear legal rules, sound data governance, digital literacy among public officials, transparency, accountability, and safeguards for fundamental rights. From this perspective, the European Union's current strategy offers an important normative and strategic reference

point for future public-sector deployment of IA. At the same time, the theoretical nature of the present study suggests the need for further empirical research on specific national experiences, sectoral case studies, and the practical implementation of IA governance standards within public institutions.

References

1. European Commission. (n.d.). *AI Act*. Shaping Europe’s Digital Future. Retrieved March 17, 2026, from <https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai>
2. European Commission. (n.d.). *Apply AI Strategy*. Shaping Europe’s Digital Future. Retrieved March 17, 2026, from <https://digital-strategy.ec.europa.eu/en/policies/apply-ai>
3. European Commission. (n.d.). *European AI Office*. Shaping Europe’s Digital Future. Retrieved March 17, 2026, from <https://digital-strategy.ec.europa.eu/en/policies/ai-office>
4. European Commission. (n.d.). *European approach to artificial intelligence*. Shaping Europe’s Digital Future. Retrieved March 17, 2026, from <https://digital-strategy.ec.europa.eu/en/policies/european-approach-artificial-intelligence>
5. European Parliament and Council of the European Union. (2024). *Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence*. EUR-Lex. <https://eur-lex.europa.eu/eli/reg/2024/1689/oj/eng>
6. Interoperable Europe. (2025). *Analysis of the generative AI landscape in the European public sector*. Public Sector Tech Watch. Retrieved March 17, 2026, from <https://interoperable-europe.ec.europa.eu/collection/public-sector-tech-watch/document/analysis-generative-ai-landscape-european-public-sector>
7. OECD. (2025). *Governing with Artificial Intelligence*. OECD Publishing. https://www.oecd.org/en/publications/governing-with-artificial-intelligence_795de142-en.html

FROM HUMAN JUDGEMENT TO ALGORITHMIC FINANCE: THE TRANSFORMATION OF FINANCIAL DECISION-MAKING

Mila MITREVA PANDEVA^{1*}; Marija GOGOVA-SAMONIKOV²

¹²Faculty of Economics, Goce Delcev University, Stip, North Macedonia

* Corresponding author: mila.mitreva@ugd.edu.mk | ORCID: 0009-0003-2442-3008

Abstract

In the past several years, the financial markets have been facing transition from traditional finance to algorithmic finance. The introduction of the newly developed data-driven processes has increased interest among the researchers, as well as the business, due to the impact of these new processes on the daily management and business operations. Therefore, this paper examines these new changes and their implications and analyzes how advanced algorithmic technologies create new opportunities to influence market dynamics and the behavior of market participants.

Although artificial intelligence is in its early stages, currently it is present in the processes of financial decision-making, investment management and portfolio optimization, credit scoring and risk assessment, algorithmic and high-frequency trading, fraud detection and financial security, as well as reducing human bias and errors. The human factor is still very important, but AI assists with greater precision, contributes to more accurate risk assessments and decreases the risk of fraudulent transactions. The further advancement and development of artificial intelligence is limitless. Nowadays, investors are facing daily changes in the trading systems, and the faster they adapt to the new technologies, the better the outcomes will be. Considering the importance of these new possibilities, in this paper it is deeply elaborated on the benefits of AI implementation in finance. It is provided comparison between the traditional and algorithmic finance and the future challenges that investors may face because of the implementation of artificial intelligence.

In this context, there are several types of AI used in finance, such as Machine Learning (ML), Deep Learning, Natural Language Processing (NLP), Reinforcement Learning, Expert Systems (Rule-Based AI), Robotic Process Automation (RPA), Hybrid AI Systems. On one hand, Machine Learning in finance is used to analyze large datasets, and its main application is in algorithmic trading, risk management, credit scoring, fraud detection, customer analytics etc. On the other hand, Deep Learning is an advanced option of ML and it is based on artificial neural network algorithms (Huang, et al, 2020). It is mainly used for analysis of big data, price prediction from complex data and algorithmic trading with sequence modeling. Additionally, Natural Language Processing (NLP) has become very important in financial research, and it is widely used in public opinion monitoring, financial report interpretation and risk assessment. From extracting key information, this technology is used in understanding the emotions of the investors, which may affect the stock market dynamic or monetary value (Xiao, et al, 2024).

Reinforcement Learning is used in improving decisions in complex financial environments with fewer model assumptions. The evolution of this technology is the fact that it combines classical RL theory with deep learning, and it works in real and simulated environments. Its main limitations are storage and simple function approximations (Hambly, et al, 2023). Expert Systems (Rule-Based AI) are the simplest form of AI, and they mainly use rules coded into the system rather than static facts (Grosan and Abraham, 2011). Expert Systems are more traditional and are mainly used in credit scoring and loan approval, fraud detection, portfolio management and investment advice. Moreover, Robotic Process Automation (RPA) has also big importance in finance. This technology assists in improving efficiency, accuracy and data handling and its application are mainly in market risk models, credit risk models, integrated risk assessment models and operational and regulatory compliance models. Main benefits of RPS in finance are for data gathering, processing, analysis, and reporting (Kothandapani, 2023). Last but not least, Hybrid AI Systems have several key components, such as neural networks, fuzzy logic, genetic algorithms. These components help in pattern recognition and predictive analysis, optimizes decision-making and problem solving and handles uncertainty (Corral de La Mata., et al, 2024). Undoubtedly, these technologies are contributing to better efficiency and accuracy in the decision-making process. The automation of various tasks helps many companies to adapt faster to the complex and dynamic financial environment. Also, implementation of new generation AI approaches will assist in overcoming many financial problems and potentially transform the entire financial services system. For instance, Fintech becomes very important in the financial markets, because it is very beneficial and allows better credit access for individuals and small businesses. Banking sector, especially traditional banks, are becoming more dependent on fintech services. However, new technologies come together with new types of risks. It is also worth mentioning that although artificial intelligence has many positive effects and contributes to better efficiency and effectiveness in the financial markets, it still has some drawbacks. As mentioned in the paper of Boppiniti (2021), main issues of the new technologies are related to data privacy, ethical concerns, transparency and accountability in decision-making processes. Considering these challenges, many regulatory bodies started working on addressing these issues. Evolving the regulatory framework is mainly needed for two reasons, to protect the data privacy of the consumers and to allow uninterrupted fintech development (Cao and Zhai, 2022).

Keywords: Algorithmic finance; Financial decision-making; Artificial intelligence; Behavioral finance; Machine learning

References

- Klioutchnikov, I. K. and Kliuchnikov, O. I. (2026). A Model of the Transition from Human to Algorithmic Decision Making in the Financial Sector, doi: 10.63550/ICEIP.2026.68.28.089.
- Boppiniti, S. T. (2021). Artifival intelligence in financial markets: Algorithms and Applications. International Journal of Innovations in Engineering Research and Technology. Vol. 8, No. 2.
- Huang, J., et al. (2020). Deep learning in finance and banking: A literature review and classification. Frontiers of Business Research in China. Vol. 14, No. 13.
- Xiao, J., et al. (2024). Application progress of natural language processing technology in financial research. Financial Engineering and Risk Management. Vol. 7, No. 3.
- Hambly, B., et al. (2023). Recent advances in reinforcement learning in finance. International Journal of Mathematics, Statistics and financial Economics. Vol. 33, No. 3.



Grosan, C. and Abraham, A. (2011). Rule-Based Expert Systems. In: Intelligent Systems. Intelligent Systems Reference Library, vol 17. Springer, Berlin, Heidelberg.

Kothandapani, H. P. (2023). Applications of Robotic Process Automation in Quantitative Risk Assessment in Financial Institutions. International Journal of Business Intelligence and Big Data Analytics. Vol. 6, No. 1, pp. 40-52.

Corral de La Mata., et al. (2024). Hybrid artificial intelligence: Application in the banking sector." *Revista de ciencias sociales* 30, no. 3 (2024): 22-36.

Cao, Y. and Zhai, J. (2022). A survey of AI in finance. Journal of Chinese Economic and Business Studies. Vol. 20, No. 2, pp. 125-137.

THE IMPACT OF DIGITALIZATION ON FEMALE UNEMPLOYMENT IN TURKEY: ARDL ANALYSIS FOR THE PERIOD 1994-2024

Bayram KAYANTAŞ^{1*}; Muhammed Okan TAN²

¹²Batman University/ Graduate Education Institute, Economy, Batman, TÜRKİYE

* Corresponding author: b.kayantas@gmail.com | ORCID: 0009-0002-7783-5420

Abstract

The aim of this study is to examine the impact of digitalization on female unemployment in Turkey and to reveal the short-term and long-term dynamics of this relationship. The study also evaluates the role of economic growth and inflation, in addition to digitalization, on female unemployment. The annual data used in the analysis covers the period 1994-2024. All data were obtained from the World Bank's World Development Indicators (WDI) database. In this study, the ARDL (Autoregressive Distributed Lag) bounds test approach was used to examine the short-term and long-term relationships between the variables. First, the stationarity properties of the series were examined with unit root tests, and it was determined that all series were stationary at level $I(0)$ and in the first difference $I(1)$, and that none of the series showed stationarity in the second difference $I(2)$. Thus, the long-term relationship between the series was estimated using the ARDL method in the analysis. The results reveal a long-term relationship between female unemployment and digitalization. Long-term forecasts indicate that increased digitalization has a positive and significant impact on female unemployment. Short-term analyses, however, show that the effect of digitalization on female unemployment becomes apparent, particularly in lagged periods. In contrast, the impact of economic growth on female unemployment was not found to be statistically significant, while the impact of inflation was determined to be limited. Diagnostic tests conducted to assess the model's validity show that the model lacks autocorrelation and heteroskedasticity, that the residuals are normally distributed, and that the model is stable. These findings offer significant implications for understanding the impact of digitalization on the labor market and highlight the need to develop policies that support women's employment.

Keywords: Digitalization, Female Unemployment, ARDL Analysis, Turkish Economy

JEL codes: J16, J64, O33, E31

1. Introduction

Digital transformation has become a key force shaping modern economies and labor markets. The rapid spread of digital technologies and ICT has altered production processes, employment structures, and skill demands. While digitalization increases productivity and creates new economic opportunities, it also generates structural changes that can affect labor market outcomes differently across demographic groups. Women's participation in the labor market and their vulnerability to unemployment remain critical concerns in Türkiye. Factors such as occupational segregation, skill mismatches, and limited access to technology influence how women are affected by digital transformation. Understanding the

interaction between digitalization and female unemployment is therefore essential for effective labor market policies.

Macroeconomic conditions, including economic growth and inflation, also play a role in shaping employment outcomes. While growth typically reduces unemployment, inflation may have indirect effects on labor markets. Examining these factors alongside digitalization provides a more comprehensive view of female unemployment dynamics. This study investigates the short- and long-run relationships between digitalization, economic growth, inflation, and female unemployment in Türkiye using annual data from 1994-2024 sourced from the World Bank’s WDI. Employing the ARDL bounds testing approach, the study aims to shed light on the impact of digital transformation on female employment and provide insights for policies that promote inclusive labor market participation.

2. Literature Review

Digitalization and technological advancements have been one of the fundamental factors redesigning the shape, functioning, and job opportunities of labor markets, especially in recent years. The literature indicates that digital technologies can create a substitution effect in daily work, leading to job losses in some occupational groups. Conversely, it is noted that they can play a complementary role in non-routine, highly skilled job areas (Autor, Levy, & Murnane, 2003; Autor & Dorn, 2013; Acemoglu & Restrepo, 2020).

In Turkey, female unemployment is shaped not only by macroeconomic conditions but also by structural and gender-based variables. Studies conducted in Turkey indicate that digitalization can have an impact on female employment; however, there are limited studies examining the effects of digitalization on women in conjunction with economic growth and inflation, both in the short and long term (Sovbetov, 2018; Demir & Grover, 2026). This study aims to contribute to filling this gap by analyzing the relationship between digitalization, economic growth, inflation, and female unemployment in Turkey for the period 1994-2024 using the ARDL method.

3. Data and Methodology

This study examines the relationship between digitalization and female unemployment in Türkiye, incorporating economic growth and inflation as control variables. The analysis uses annual data for 1994–2024 obtained from the World Bank’s World Development Indicators (WDI). Female unemployment (% of female labor force) is the dependent variable, while digitalization is proxied by the share of individuals using the Internet. Economic growth (annual GDP growth) and inflation (annual consumer price changes) are included to capture macroeconomic conditions affecting labor market dynamics.

To investigate both short- and long-run relationships, the study employs the Autoregressive Distributed Lag (ARDL) bounds testing approach, suitable for small samples and mixed integration orders $I(0)$ and $I(1)$. Stationarity is first assessed using ADF and PP unit root tests, followed by ARDL estimation with lag selection based on information criteria. The long-run cointegration is tested via the Bounds Test, and short-run dynamics are analyzed using an Error Correction Model (ECM). Model robustness is verified through diagnostic and stability tests, including serial correlation, heteroskedasticity, normality, Ramsey RESET, and CUSUM/CUSUMSQ tests.

4. Results and Discussion

The ARDL estimation shows that female unemployment, digitalization, and inflation are integrated of order one [I(1)], while economic growth is stationary at level [I(0)], confirming that the ARDL approach is appropriate. The Bounds Test indicates a long-run relationship among the variables ($F = 7.889 > 4.35$), suggesting that female unemployment, digitalization, economic growth, and inflation move together over time. Long-run coefficients reveal that digitalization has a positive and statistically significant effect on female unemployment (0.046), economic growth does not have a significant impact (0.028), and inflation exhibits a weak negative effect (-0.022, marginally significant at 10%).

The ECM results indicate that the lagged error correction term (CointEq(-1) = -0.789) is negative and highly significant, suggesting that roughly 79% of the short-run disequilibrium adjusts toward the long-run equilibrium in the following period. Among the short-run dynamics, only the two-period lag of digitalization (D(INT(-2))) is statistically significant, indicating that the effect of digitalization on female unemployment appears with a lag. Other coefficients, including contemporaneous and one-period lagged digitalization, are not statistically significant in the short run.

All diagnostic tests confirm the reliability and stability of the estimated model. Residuals are normally distributed (Jarque-Bera), free from serial correlation (Breusch-Godfrey), and homoskedastic (Breusch-Pagan-Godfrey). The Ramsey RESET test indicates that the model is correctly specified, and both CUSUM and CUSUMSQ tests confirm parameter stability over the study period. Together, these results suggest that the ECM and ARDL estimations are statistically robust and suitable for inference.

5. Conclusions

This study investigates the long-run and short-run relationship between digitalization, economic growth, inflation, and female unemployment in Türkiye using annual data covering 1994–2024. The empirical analysis employs the Autoregressive Distributed Lag (ARDL) bounds testing approach, which is suitable for small samples and allows the estimation of cointegration relationships among variables of mixed integration orders. The Bounds Test results confirm the existence of a long-run equilibrium relationship among female unemployment, digitalization, economic growth, and inflation. Long-run coefficient estimates indicate that digitalization exerts a positive and statistically significant impact on female unemployment, suggesting that technological transformation may induce structural labor market changes and skill mismatches that disproportionately affect women. In contrast, economic growth is not statistically significant, while inflation exhibits a weak negative association. The error correction mechanism further indicates a relatively rapid adjustment toward long-run equilibrium following short-run deviations.

From a policy perspective, these findings highlight the need for targeted strategies that enhance women's participation in the digital economy. Initiatives such as digital skills development, expanded access to technological training, and gender-sensitive labor policies in technology-intensive sectors may help mitigate the adverse effects of digitalization on female employment. The study is limited by its focus on a narrow set of macroeconomic variables and annual time-series data. Future research could extend the analysis by incorporating additional determinants such as education, labor market participation, and technological investment, or by applying alternative econometric frameworks and cross-country panel data to provide a more comprehensive understanding of the relationship between digitalization and female unemployment.

References

- Acemoglu, D., & Restrepo, P. (2020). Robots and jobs: Evidence from US labor markets. *Journal of Political Economy*, 128(6), 2188–2244. <https://doi.org/10.1086/705716>
- Ahmad, R., Sharif, F., Ahmad, S., Gul, A., & Abdirasulovna, Z. A. (2024). Does the digital economy improve female employment? A cross-country panel data analysis. *Heliyon*, 10(13), Article e33535. <https://doi.org/10.1016/j.heliyon.2024.e33535>
- Autor, D. H., & Dorn, D. (2013). The growth of low-skill service jobs and the polarization of the US labor market. *American Economic Review*, 103(5), 1553–1597. <https://doi.org/10.1257/aer.103.5.1553>
- Autor, D. H., Levy, F., & Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly Journal of Economics*, 118(4), 1279–1333. <https://doi.org/10.1162/003355303322552801>
- Demir, B., & Grover, A. (2026). *Do investments in digital infrastructure improve employment outcomes? Evidence from Türkiye* (Policy Research Working Paper No. 11314). World Bank.
- OECD. (2023). *Teleworking through the gender looking glass: Facts and gaps* (OECD Social, Employment and Migration Working Papers No. 285). OECD Publishing. <https://doi.org/10.1787/8aff1a74-en>
- Sovbetov, Y. (2018). Impact of digital economy on female employment: Evidence from Turkey. *International Economic Journal*, 32(2), 256–270. <https://doi.org/10.1080/10168737.2018.1478868>

DIGITALIZATION OF EUROPEAN HEALTHCARE SYSTEMS: OPPORTUNITIES AND DEVELOPMENT PATHWAYS FOR THE REPUBLIC OF MOLDOVA

Roman BONDARCIUC¹; Victoria TROFIMOV^{2*}

¹ Academy of Economic Studies of Moldova, Chisinau, Republic of Moldova

² University of Political and Economic European Studies "Constantin Stere", Chisinau, Republic of Moldova

* Corresponding author: e-mail: rbondarciuc@gmail.com | ORCID: 0009-0008-9361-4285

Abstract

Digitalization represents a strategic priority of the European Union, embedded in European standards, including those in healthcare, with the objective of enhancing economic competitiveness, strengthening interoperability among Member States, and improving the efficiency of healthcare delivery. Within the context of implementing European standards in ambulatory care systems, digitalization has proven to be both cost-effective and operationally efficient. This study employs observational and analytical research methods to examine healthcare policies, strategic documents, and digitalization frameworks across selected European countries, as well as at the European Union level. The analysis aims to identify key funding priorities, policy harmonization trends, and mechanisms for improving access to healthcare services while reducing associated costs. A comparative analysis was conducted between the Republic of Moldova, Poland and Romania, focusing on digitalization indicators in ambulatory care systems. The findings indicate that both Moldova and Romania demonstrate a relatively high level of functionality in digital services such as e-prescription and e-appointment systems, alongside partial interoperability of healthcare infrastructures. However, disparities persist in the implementation of Electronic Health Records (EHRs), with Romania achieving more advanced legislative adoption, while practical implementation remains limited; conversely, the Republic of Moldova is still in the planning phase at the national level. Furthermore, certain digital health services, such as telemedicine, remain underdeveloped in both countries despite their proven cost-efficiency and growing adoption in other European states, particularly in the Baltic region and Poland. The study concludes that while European digitalization standards contribute to improved interoperability and system efficiency, their implementation and economic impact vary significantly depending on national priorities, institutional capacity, and resource allocation.

Keywords: European standards, digitalization, client-centered care, economic policies, outpatient medical system.

JEL codes: I10, F15, O33

1. Introduction

The process of digital transformation is inevitable at the global level and, with the advancement of artificial intelligence (AI), it is entering an irreversible trajectory. The healthcare system will be approached as an integral component of the broader public digitalization framework and will undergo digital transformation based on the exchange of best practices at the global level. This will contribute to increasing public awareness regarding the benefits of integrating digital technologies within healthcare institutions. The transformation of the European Union’s digital economy in the healthcare sector requires the Republic of Moldova, as a candidate country for accession, to implement digitalization services. Their implementation represents an economic challenge for the Republic of Moldova, as it necessitates the provision of advanced technologies, a well-trained workforce, and robust cybersecurity, thereby placing an additional financial burden on the ambulatory healthcare system.

2. Literature Review

Another key component of the European Union’s policy is the digitalization of the healthcare system and the development of Electronic Health Records (EHRs). Studies indicate that the state of digital health development in Poland, assessed using the methodology of the Global Digital Health Index, rates Poland’s performance in digital health as generally strong, with an overall score of 3.45 out of 5. Compared to other developed countries, Poland often matches or exceeds scores, particularly in the following areas: Leadership and Governance, Strategy and Investment, Standards and Interoperability, Infrastructure, and Services and Applications. Areas requiring improvement include legislation, policies, compliance, and especially workforce development [1,2]. The Republic of Moldova is taking initial steps to implement European best practices by approving the National Program for Digitalization and Innovation in Healthcare 2025–2030. According to current statistical data, only 10% of the healthcare system is digitalized, and achieving full digital transformation of the healthcare system is estimated to require approximately 560 million MDL [3]. According to the Organization for Economic Cooperation and Development (OECD), Romania currently faces significant challenges in healthcare digitalization, ranking 26th out of 27 EU countries in the Digital Economy and Society Index (DESI) for digital public services in health [4]. Although Romania has more progress to make compared to other EU states, it struggles to keep pace with digital transformation trends and to meet the expectations of both patients and healthcare managers [5]. Studies analyzing the digitalization of Romania’s healthcare system conclude that a strategic approach is essential, and the adoption of new technologies is becoming an inevitable part of global transformation. This digital transformation is expected to streamline management processes, improve the quality of healthcare services, and increase access to medical care for a larger population. However, digitalization does not only entail the adoption of technology; it also requires additional resources, particularly in management, administration, professional training, education, and social support [6].

3. Data and Methodology

The data collection methods employed in this study included historical, statistical, observational, and analytical approaches. Healthcare policies, strategic documents, and frameworks from several European countries, as well as from the European Union as a whole, were examined in order to identify funding priorities and trends in policy harmonization aimed at improving access and reducing the cost of healthcare services. Financial data were sourced from European Union databases, specifically the Digital

Economy and Society Index (DESI) available on the Digital Decade platform, where multiple indicators were analyzed. For comparative purposes, the study assessed digitalization indicators of the ambulatory healthcare system in the Republic of Moldova in comparison with those of Romania. Furthermore, Poland and Romania were included as benchmark countries in terms of digitalization financing.

4. Results and Discussion

The implementation of patient-centered standards in the European Union following the COVID-19 pandemic revealed that these objectives cannot be effectively achieved without the digitalization of healthcare services, particularly at the primary and ambulatory levels. Consequently, many countries undertook economic restructuring and initiated the digital transformation of the healthcare sector. Through the National Recovery and Resilience Plans (NRRPs), the European Union allocated approximately €127 billion, while requiring Member States to dedicate a minimum of 20% of these funds to digitalization efforts. The digitalization indicators of ambulatory care services in Romania and Poland are reflected in the fourth dimension of the Digital Economy and Society Index (DESI), which focuses on digital public services. As a candidate country for EU accession, the Republic of Moldova has made incremental progress toward the digitalization of public services through national strategic programs, albeit with more substantial achievements in sectors other than healthcare. Within the healthcare system, particularly in ambulatory care, Moldova has implemented electronic prescriptions and online appointment systems; however, other digital services remain largely underdeveloped. In comparison with EU Member States such as Romania and Poland, the implementation of additional digital health services in Moldova is minimal. Only limited progress has been made at the legislative level regarding the adoption of electronic health records, the interoperability of healthcare systems, and the digitalization of documentation and administrative processes. The implementation status of each digital health service in ambulatory care across the three countries is presented in Table 1.

Table 1 Analysis of Ambulatory Healthcare Services through the Lens of Digitalization in Poland, Romania and the Republic of Moldova

Digital Health Service in Ambulatory Care	Republic of Moldova	Romania	Poland
E-prescription (electronic prescription)	Functional and modernized, including automated limits and more efficient reimbursement rules.	Implemented in the system, part of SIUI, recognized as an existing service.	Universal since 2020. Nearly 100% of prescriptions are digital and accessible via the IKP mobile application.
Online appointments / e-appointment	Planned for introduction and expansion through the national program (including online consultations and telemedicine by 2030).	Projected through the Social Insurance IT platform, launching 2025–2026; not universally functional at the national level.	Partially integrated into the centralized state system.
Electronic Health Record (EHR / DES)	In broad implementation phase through the national program 2025–2030; patient access still limited (~<10% have online access).	Legally and theoretically functional, but interoperability and effective access remain partial; real integration between providers is limited.	Centralized system (P1) functional; patients can view their complete history via the national health application.
Telemedicine / online consultations	Expanding; telemedicine pilot ongoing, services planned for 2026 and beyond.	Private and state initiatives exist but are not fully standardized/mandatory for all clinics; gradually evolving.	Teleconsultations reimbursed by the health insurance fund; standardized in most regions since 2020.

Interoperability of medical systems	Strategic objective and part of the national program, but still insufficiently integrated (disparate systems).	Recognized as a major issue in strategies, but real interoperability is missing in many cases.	Priority under the European Health Data Space; Poland centralized data via the national e-health platform.
Patient access to their own medical data online	In some pilot systems; currently less than 10% of citizens have access.	Theoretically possible via DES/portal, but often limited in practice and not widely adopted.	Over 15 million active users of the Internetowe Konto Pacjenta (IKP) application.
Digitalization of documents and bureaucracy	Modernizing through new applications, reducing paper registers (e.g., e-prescription).	Systems like SIUI exist for reporting, but paper or fragmented systems are still used in practice.	Digitalization of medical leave certificates is mandatory (no physical format exists).
Remote monitoring and mobile health applications	Planned expansion through mobilization of digital resources.	Private solutions exist, but not standardized nationally.	Rapid growth; no unified application exists.
Related services (e.g., lab/imaging reporting)	Included in strategic plans as part of interoperability.	Priority in the national digitalization strategy 2026–2030.	Test results are automatically transmitted to the citizen's patient account.

5. Conclusions

For the Republic of Moldova, digitalization is relatively easier to implement due to its smaller population; however, it faces significant challenges stemming from limited financial resources for digitalization and the establishment of a unified platform, as well as from insufficient educational resources to enable the population to access and effectively utilize digital data.

References

- Smółka, J., & Smółka, M. (2024). Digital Health Index in Poland: A comparative perspective. In *Digitalization and Innovation in Health*. Routledge.
- Białczyk, A., Kowalski, P., Nowak, T., & Wiśniewski, R. (2024). Exploring digital health horizons. *Prospects in Pharmaceutical Sciences*, 22(1), 32–37.
- Guvernul Republicii Moldova. (2025, September 3). Hotărârea nr. 556 privind aprobarea Programului Național pentru Digitalizare și Inovare în Sănătate 2025–2030.
- OECD. (2023). *Digital Government Review of Romania: Towards a digitally mature government*. Paris: OECD Publishing. <https://www.oecd.org/governance/digital-government>
- Păcuraru, I.-M., Popescu, A., & Ionescu, L. (2025). Digital transformation of medical services in Romania. *Healthcare*, 13(20), 2549. <https://doi.org/10.3390/healthcare13202549>
- Rotaru, N., & Edelhauser, E. (2024). Digital transformation: A challenge for the Romanian health system. *Systems*, 12(9), 366. <https://doi.org/10.3390/systems12090366>
- European Commission. (2022). *Digital Economy and Society Index (DESI) 2022: eHealth and digital public services*. <https://digital-strategy.ec.europa.eu>
- Ministry of Health Poland. (2021). *E-health in Poland: Development of P1 system and Internetowe Konto Pacjenta (IKP)*.

ALGORITHMIC TRUST, EXPLAINABILITY, AND CONTESTABILITY AS STRATEGIC CAPABILITIES IN BANKING: EMPIRICAL EVIDENCE FROM ROMANIA

Valentin MANGIUREA¹; Lucian Claudiu ANGHEL^{2*}

^{1,2} SNSPA – Doctoral School of Management, Bucharest, Romania

* Corresponding author: mangiurea_valentin@yahoo.com | ORCID: 0009-0004-6865-2651

Abstract

This study examines algorithmic trust, explainability, and contestability as strategic capabilities in the Romanian banking sector. Grounded in the resource-based view and dynamic capabilities framework, the research investigates how consumer perceptions of AI-driven decision-making influence competitive positioning in digitally transformed financial markets. The empirical analysis is based on a primary survey conducted on a sample of 100 Romanian banking consumers, focusing on three core dimensions: comparative trust between human operators and AI systems, perceived explainability of AI-based decisions, and perceived ability to contest automated outcomes.

The findings reveal a strong preference for human decision-makers (77%), highlighting a significant legitimacy gap for AI systems. Perceived explainability remains ambiguous, with responses clustered around neutrality (mean = 3.94/7), indicating widespread uncertainty regarding how AI decisions are made. In contrast, perceived contestability is significantly higher (mean = 5.59/7), suggesting that consumers believe they retain the ability to challenge automated decisions. Importantly, explainability and contestability emerge as statistically independent dimensions.

The study concludes that algorithmic governance represents a potential source of sustainable competitive advantage. Banks that effectively integrate transparency, explainability, and consumer control into their AI systems can enhance trust, align with ESG principles, and strengthen their strategic positioning in trust-constrained markets.

Keywords: *algorithmic trust; explainability; contestability; AI governance; banking strategy*

JEL codes (optional): G21; O33; D83

1. Introduction

The rapid integration of artificial intelligence (AI) into the banking sector has transformed decision-making processes, risk management, and customer interactions. However, this transformation raises critical questions regarding consumer trust, transparency, and control over automated decisions. In emerging markets such as Romania, where institutional trust and digital literacy remain uneven, these challenges are amplified.

This study investigates how consumers perceive AI-driven banking decisions and whether these perceptions can be understood as indicators of strategic capabilities. Specifically, it focuses on three

dimensions: trust in AI versus human operators, perceived explainability of AI decisions, and perceived ability to contest such decisions. The paper contributes by linking behavioral insights with strategic management theory, positioning algorithmic governance as a potential source of competitive advantage.

2. Literature Review

Existing research conceptualizes trust in AI as a multidimensional construct shaped by transparency, perceived control, and institutional credibility. Studies show that explainability enhances trust, while the ability to contest decisions significantly strengthens user confidence in automated systems.

From a strategic management perspective, the resource-based view suggests that capabilities that are valuable, rare, and difficult to imitate can generate sustained competitive advantage. Dynamic capabilities theory further emphasizes the importance of adapting to technological and regulatory change. Within this context, AI governance—encompassing explainability and contestability—emerges as a strategic capability rather than a purely technical or regulatory concern.

However, empirical evidence from Central and Eastern Europe remains limited, particularly regarding how consumers perceive these dimensions in practice. This study addresses this gap using primary data from Romania.

3. Data and Methodology

The study is based on a survey of 100 Romanian banking consumers aged 19–25, selected through convenience sampling. The questionnaire captures perceptions across three key variables: comparative trust (human vs. AI), perceived explainability (7-point Likert scale), and perceived contestability (7-point Likert scale).

Given the non-normal distribution of Likert-scale variables, nonparametric statistical methods were employed. Spearman’s rank correlation was used to assess relationships between variables, while descriptive statistics and one-sample tests were applied to evaluate central tendencies relative to scale midpoints.

4. Results and Discussion

The results indicate a strong preference for human operators (77%), confirming a significant trust gap in favor of traditional decision-making. Perceived explainability is moderate and centered around neutrality, reflecting uncertainty rather than informed acceptance or rejection of AI systems.

In contrast, perceived contestability is significantly higher, with most respondents expressing confidence in their ability to challenge automated decisions. This divergence suggests that consumers differentiate between understanding AI systems and controlling their outcomes.

The lack of significant correlation between explainability and contestability indicates that these dimensions function independently. From a strategic perspective, this implies that banks must address transparency and consumer control through distinct governance mechanisms.

5. Conclusions

The findings demonstrate that algorithmic governance constitutes a critical strategic capability in the Romanian banking sector. While consumers remain skeptical of AI decision-making and uncertain about its transparency, they exhibit strong confidence in their ability to contest outcomes.

This asymmetry creates both risks and opportunities. Banks that fail to improve explainability may face persistent trust deficits, while those that invest in transparent and contestable AI systems can differentiate themselves in a competitive market.

The study is limited by its sample size and exploratory design. Future research should expand the sample and incorporate comparative analyses across countries. Nonetheless, the results highlight the strategic importance of aligning AI deployment with consumer trust and governance expectations.

6. References

- Atz, U., Van Holt, T., Liu, Z. Z., & Bruno, C. C. (2023). Does sustainability generate better financial performance? Review, meta-analysis, and propositions. *Journal of Sustainable Finance & Investment*, 13(1), 802–825.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
- Binns, R., Van Kleek, M., Veale, M., Lyngs, U., Zhao, J., & Shadbolt, N. (2018). ‘It’s reducing a human being to a percentage’: Perceptions of justice in algorithmic decisions. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, Article 377, 1–14. <https://doi.org/10.1145/3173574.3173951>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum Associates.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage Publications.
- Doshi-Velez, F., & Kim, B. (2017). Towards a rigorous science of interpretable machine learning. *arXiv*. <https://arxiv.org/abs/1702.08608>
- European Banking Authority. (2021). *EBA analysis of RegTech in the EU financial sector (EBA/REP/2021/17)*. <https://www.eba.europa.eu>
- European Commission. (2023). *Romania in the Digital Economy and Society Index*. <https://digital-strategy.ec.europa.eu>
- Field, A. (2018). *Discovering statistics using IBM SPSS Statistics* (5th ed.). Sage Publications.
- Glikson, E., & Woolley, A. W. (2020). Human trust in artificial intelligence: Review of empirical research. *Academy of Management Annals*, 14(2), 627–660. <https://doi.org/10.5465/annals.2018.0057>
- Iansiti, M., & Lakhani, K. R. (2020). *Competing in the age of AI: Strategy and leadership when algorithms and networks run the world*. Harvard Business Press.
- Kizilcec, R. F. (2016). How much information? *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (pp. 2390–2395). ACM.
- Lankton, N. K., McKnight, D. H., & Tripp, J. (2015). Technology, humanness, and trust: Rethinking trust in technology. *Journal of the Association for Information Systems*, 16(10), 880–918.
- Lee, J. D., & See, K. A. (2004). Trust in automation: Designing for appropriate reliance. *Human Factors*, 46(1), 50–80.
- Mangiurea, V. (2025). *Who controls the decision? Artificial intelligence, algorithmic control, and consumer trust in banking*. SNSPA – Doctoral School of Management.

- Obelovska, K., Abziatov, A., Doroshenko, A., Dronyuk, I., Liskevych, O., & Liskevych, R. (2025). Analysis of digital skills and infrastructure in EU countries based on DESI 2024 data. *Future Internet*, 17(6), 228.
- Pasquale, F. (2015). *The black box society: The secret algorithms that control money and information*. Harvard University Press.
- Pînzaru, F. (2026). *Strategic management lecture notes and reading & watching packs*. SNSPA Doctoral School.
- Porter, M. (2021). Corporate strategic management. In *Successful management strategies and tools: Industry insights, case studies and best practices*.
- Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. Free Press.
- Porter, M. E., & Kramer, M. R. (2011). Creating shared value. *Harvard Business Review*, 89(1/2), 62–77.
- Ribeiro, M. T., Singh, S., & Guestrin, C. (2016). 'Why should I trust you?': Explaining the predictions of any classifier. *Proceedings of the 22nd ACM SIGKDD Conference* (pp. 1135–1144). <https://doi.org/10.1145/2939672.2939778>
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson.
- Shin, D. (2021). The effects of explainability and causability on perception, trust, and acceptance. *International Journal of Human–Computer Studies*, 146, 102551.
- Siau, K., & Wang, W. (2018). Building trust in artificial intelligence, machine learning, and robotics. *Cutter Business Technology Journal*, 31(2), 47–53.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533.
- World Bank. (2021). *Digital transformation in Romania: Opportunities and risks*. <https://www.worldbank.org>

COMPARATIVE ANALYSIS OF GLOBAL REGULATORY FRAMEWORKS FOR BLOCKCHAIN AND CRYPTOCURRENCY TOKENS

Alexandr SCUTARI

PhD candidate in Economics at the Academy of Economic Studies of Moldova (ASEM),

Chisinau, Republic of Moldova,

Corresponding author: alscut@gmail.com | ORCID: 0009-0005-7979-605X

Abstract

Blockchain technology and cryptocurrency tokens, particularly stablecoins, have prompted converging yet varied regulatory responses globally by 2026. This study compares frameworks for stablecoins, utility tokens, and security tokens across major jurisdictions, emphasizing licensing, reserve requirements, and classification. Employing qualitative comparative analysis of 2025–2026 reports covering over 50 jurisdictions, key findings reveal convergence in seven economies (US, EU, UK, Singapore, Hong Kong, UAE, Japan) toward full reserve backing (1:1), licensed issuance, and redemption guarantees for stablecoins as regulated payment instruments (BVNK, 2026; PwC, 2026). The EU's MiCA offers a unified crypto-asset model, while the US GENIUS Act (enacted 2025, implementation 2026) imposes bank-grade oversight on stablecoins (Sumsb, 2025). Utility tokens receive lighter regulation in innovation hubs, security tokens align with traditional securities laws. Persistent bans in some countries contribute to fragmentation. Conclusions stress the shift to risk-based implementation and recommend harmonized approaches for emerging markets to enhance stability and innovation.

Keywords: blockchain regulation; stablecoins; token classification; global frameworks; financial stability

JEL codes (optional): G28; K24; O38

1. Introduction

Blockchain and tokens enable efficient cross-border payments and new assets but pose risks to stability and illicit finance. Divergent regulations create adoption barriers. This study analyzes regulation types by token category in 2026, focusing on convergence via frameworks like the US GENIUS Act and EU MiCA (PwC, 2026; World Economic Forum, 2026). It identifies licensing, reserve, and oversight patterns, providing insights for emerging economies.

2. Literature Review

Studies highlight regional advances, such as MiCA's EU integration and stablecoin convergence (Sumsb, 2025). Gaps exist in post-2025 comprehensive comparisons. This work draws on global surveys of licensing, stablecoin regimes, and token rules across 50+ jurisdictions, addressing economic implications (PwC, 2026; BVNK, 2026; Chainalysis, 2025).

3. Data and Methodology

Data come from 2025–2026 authoritative reports on regulatory status, stablecoin mandates, and classifications (PwC, 2026; BVNK, 2026; Sumsb, 2025; World Economic Forum, 2026; Chainalysis, 2025). Variables cover regulatory types, token categories, and key jurisdictions. Methodology applies qualitative comparative analysis with case studies (e.g., GENIUS Act vs. MiCA).

4. Results and Discussion

Three archetypes emerge: unified licensing (EU MiCA), stablecoin safeguards (US GENIUS Act with full reserves and federal licensing), and convergent permissive rules (Singapore, Hong Kong, UAE, Japan requiring reserves and redemption) (BVNK, 2026; PwC, 2026). Stablecoins mainstream as payment tools in seven economies; utility tokens face lighter oversight, security tokens follow traditional laws (Sumsb, 2025). Shared principles reduce fragmentation, though bans limit liquidity (Chainalysis, 2025). Implications include greater stability offset by compliance costs.

5. Conclusions

Regulations converge on risk-based licensed frameworks, especially for stablecoins, promoting adoption and risk mitigation (World Economic Forum, 2026; PwC, 2026). Emerging markets should pursue hybrid models. Harmonization is essential for resilient digital economies.

References

- BVNK. (2026). *Global stablecoin regulations 2026: What enterprises need to know*. <https://bvnk.com/blog/global-stablecoin-regulations-2026>
- Chainalysis. (2025). *The road to crypto regulation: Part 1*. <https://www.chainalysis.com/blog/the-road-to-crypto-regulation-part-1>
- PwC. (2026). *PwC global crypto regulation report 2026*. <https://www.pwc.de/de/unterlagen/pwc-global-crypto-regulation-report-2026.pdf>
- Sumsb. (2025). *Crypto regulation in 2026: What changed and what's ahead*. <https://sumsub.com/blog/global-crypto-regulations>
- World Economic Forum. (2026). *A digital economy at an inflection point: What to expect for digital assets in 2026*. <https://www.weforum.org/stories/2026/01/digital-economy-inflection-point-what-to-expect-for-digital-assets-in-2026>

AI-ENABLED COST OPTIMIZATION AND CLINICAL PERFORMANCE IMPROVEMENT IN ROMANIAN COUNTY EMERGENCY HOSPITALS

Grigorescu PETRONELA-ALICE¹; Coman DAN MARIUS^{2*}; Georgescu RUXANDRA³
^{1,2,3} University Valahia of Targoviste, Doctoral School of Economics and Humanities, Targoviste,
Romania

* Corresponding author: marius.coman@valahia.ro | ORCID: 0000-0003-4937-6327

Abstract

Romanian county emergency hospitals operate under increasing economic pressure, where rising operational costs and limited resources intersect with growing demand for complex medical services. In this context, traditional management approaches are becoming insufficient. This paper argues that Artificial Intelligence (AI) is a strategic necessity for achieving both financial sustainability and improved clinical outcomes in the digital healthcare era. The aim of the study is to assess the impact of AI-based solutions on cost efficiency and hospital performance. The research relies on a quantitative analysis of operational data from a Romanian county emergency hospital, focusing on key performance indicators such as Case Mix Index (CMI), Average Length of Stay (ALOS), and resource utilisation. The methodology combines descriptive statistical analysis with simulations of AI-driven predictive models designed to forecast patient inflows, optimise bed management, and improve resource allocation. The results show that AI integration can notably decrease ALOS, increase bed occupancy rates, and better align resources with patient needs. Furthermore, predictive models indicate the potential to cut down unnecessary hospitalisations and enhance diagnostic accuracy, leading to cost savings and improved patient outcomes. Despite these advantages, the study emphasises challenges concerning digital infrastructure and data interoperability. Overall, AI is seen as a vital catalyst for efficient, sustainable, and patient-focused hospital management.

Keywords: artificial intelligence; healthcare economics; hospital performance; cost optimization; digital transformation

JEL codes: I11; O33

1. Introduction

Healthcare systems everywhere face growing economic and operational strain. Demographics shift, medical technology costs rise, and patient expectations grow (OECD, 2020). In Romania, this pressure is most visible in county emergency hospitals, which form the backbone of the public health system. These hospitals must balance access, quality of care, and financial survival, often with severe resource constraints. Traditional hospital management relies on retrospective data and reactive responses. This is insufficient for the complexity of today's healthcare (Topol, 2019). Inefficient patient flow, poor resource allocation, and extended hospital stays drive costs up and performance down. Hospitals measure efficiency using Average Length of Stay (ALOS) and Case Mix Index (CMI). Shorter stays reduce per-discharge costs and free up resources for outpatient care (OECD, 2020).

Digital transformation, especially through AI, creates opportunities to improve decision making and hospital operations (Beam & Kohane, 2018). AI enables hospitals to forecast demand, allocate resources better, and achieve better clinical outcomes. Machine learning and deep learning show real potential in healthcare, from disease prediction to operations management (Rajkomar et al., 2018). Studies from major research centers demonstrate that machine learning models applied to electronic health records can forecast critical outcomes like readmissions and length of stay with accuracy that exceeds traditional methods (Jiang et al., 2017).

This paper examines how AI solutions address economic challenges in Romanian county emergency hospitals. The focus is on cost optimisation and performance improvement. The contribution is practical: real hospital data that bridges theory and implementation.

2. Literature Review

Healthcare economics and digital change have drawn increasing research attention. Hospital system inefficiencies are a primary cost driver, especially in public systems (OECD, 2020). Researchers use ALOS and CMI to assess how well hospitals run and how complex their patient cases are. OECD analysis shows that hospital efficiency directly affects resource use and financial stability (OECD, 2020). These metrics vary significantly by country and region, with Eastern European hospitals typically reporting higher ALOS values than Western counterparts.

Recent research on AI in healthcare covers prediction, clinical decision support, and operational optimization (Topol, 2019). Machine learning has proven useful for patient admission forecasting, bed optimization, and diagnostic accuracy. Rajkomar and colleagues showed that deep learning models applied to electronic health records can predict serious outcomes, including in-hospital mortality and readmissions, with accuracy better than standard clinical scoring systems (Rajkomar et al., 2018). These models help hospitals shift from reacting to events to anticipating them.

Several studies identify barriers to AI adoption. Data fragmentation, poor interoperability, limited digital infrastructure, and organizational resistance block progress, particularly in developing healthcare systems like Romania (Jiang et al., 2017). Eastern European countries report specific challenges in electronic health record deployment: insufficient funding, limited technical capacity, and a lack of interoperability standards (Fonseca-Fuentes et al., 2024). These barriers are worse in underfunded public hospitals.

European countries are working to improve digital health systems. The WHO European Region and the European Commission support member states in building better health information systems, data governance, and interoperability standards through the European Health Data Space initiative (WHO/Europe, 2023). This work recognizes that progress is uneven: Central and Eastern European countries face more challenges in implementation than Western nations (Hussein et al., 2025).

AI applications in healthcare are well-documented. But economic impact studies at the hospital level remain scarce, particularly in Eastern Europe. Romania, despite having a substantial healthcare system, lacks local research on AI implementation costs and benefits. This paper fills that gap by analyzing real hospital data to understand AI potential for cost reduction and performance gains in emergency departments.

3. Data and Methodology

The study uses operational and financial data from a Romanian county emergency hospital. The dataset includes these performance indicators: Average Length of Stay (ALOS), Case Mix Index (CMI), Bed occupancy rate, Patient admission and discharge flows, Departmental resource utilization. Analysis combines statistical description with simulation. First, we analyze the data to find efficiency problems and departmental variation. This baseline shows how the hospital currently performs. Then we simulate AI predictive models to estimate their potential impact on hospitals. The models focus on three areas: forecasting patient inflows from historical patterns, optimizing bed allocation and patient distribution, and supporting resource allocation decisions. These are not real implementations. They simulate scenarios in which AI tools operate within hospital management. This approach estimates possible efficiency gains and cost savings without full deployment.

4. Results and Discussion

Hospital operations show clear inefficiencies, especially in patient flow variability and poor resource allocation. High ALOS values and uneven bed occupancy reveal bottlenecks in patient management.

AI simulations show substantial improvement potential. Predictive models can reduce ALOS through earlier discharge planning and better coordination among departments. Better patient inflow forecasting allows smarter bed management, reducing both overcrowding and underuse. Figure 1 shows how AI simulation reduces ALOS across major clinical departments compared to current operations.

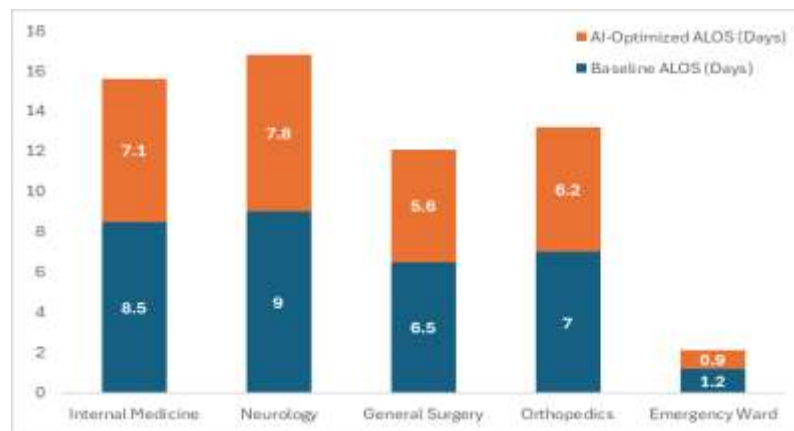


Figure 1. Comparative Analysis of Average Length of Stay (ALOS) across Strategic Hospital Departments: Baseline (Current) vs. AI-Driven Simulation Results.

Source: Authors' processing based on simulated operational data (2025).

Another finding: cost savings through fewer unnecessary admissions. AI that improves diagnostic accuracy and patient screening ensures only patients needing hospital care get admitted. This directly helps hospital budgets and resource efficiency.

Implementation faces real barriers. Weak digital infrastructure and fragmented data systems are major obstacles. AI adoption also needs organizational change: staff training and acceptance of new tools (Topol, 2019). These are not technical problems alone but organizational ones.

Overall, the results suggest AI could transform hospital management from reactive to proactive, improving both financial and clinical results.

5. Conclusions

AI can address key economic challenges in Romanian county emergency hospitals. Predictive decision making, informed by data, significantly improves efficiency, cuts costs, and enhances patient outcomes. Practical implications emerge for hospital managers and policy makers: invest in digital infrastructure and data integration. But successful deployment requires solving organizational and cultural obstacles (Jiang et al., 2017; Topol, 2019).

A main limitation of the study is the use of simulation rather than real AI deployment. Future work should test AI solutions in actual hospital settings through pilot programs. AI is more than a new technology. It is a strategic tool for building sustainable, resilient, patient-centered healthcare in the digital economy.

References

- Beam, A. L., & Kohane, I. S. (2018). Big data and machine learning in health care. *JAMA*, 319(13), 1317-1318. <https://doi.org/10.1001/jama.2017.18391>
- Fonseca-Fuentes, N., Ferretti, S., Gabel, L., & Grasso, M. (2024). Electronic health records and data exchange in the WHO European region. A subregional analysis of achievements, challenges, and prospects. *European Journal of Public Health*, 34(6). <https://doi.org/10.1093/eurpub/ckae177>
- Hussein, R., Gyrard, A., Abedian, S., Gribbon, P., & Martínez, S. A. (2025). Interoperability framework of the European Health Data Space for the secondary use of data: Interactive European Interoperability Framework–based standards compliance toolkit for AI-driven projects. *Journal of Medical Internet Research*, 27, e69813. <https://doi.org/10.2196/69813>
- Jiang, F., Jiang, Y., Zhi, H., et al. (2017). Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology*, 2(4), 230-243. <https://doi.org/10.1136/svn-2017-000101>
- OECD. (2020). *Health at a Glance 2020: OECD Indicators*. OECD Publishing. <https://doi.org/10.1787/7353897a-en>
- Rajkomar, A., Hardt, M., Howell, M. D., Corrado, G., & Chin, M. H. (2018). Scalable and accurate deep learning with electronic health records. *NPJ Digital Medicine*, 1, 18. <https://doi.org/10.1038/s41746-018-0029-1>
- Topol, E. (2019). *Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again*. Basic Books.
- WHO/Europe. (2023). Partnering with the EU to strengthen health information systems, data governance and interoperability in Europe. World Health Organization Regional Office for Europe.

ROBOTIC PROCESS AUTOMATION IN ACCOUNTING: GLOBAL IMPLICATIONS FOR EFFICIENCY, LABOR DYNAMICS AND DIGITAL TRANSFORMATION

Sandra-Elena MARINESCU*; Dan-Marius COMAN

Valahia University of Târgoviște, Faculty of Economic Studies, Târgoviște, România

* Corresponding author: elena.marinescu@valahia.ro

Abstract

This study examines the role of Robotic Process Automation (RPA) in transforming accounting practices within the context of an increasingly digitalized global economy. The main objective is to analyze how RPA contributes to improving efficiency, accuracy, and productivity in accounting activities, while also reshaping labor dynamics in the profession.

The research adopts a descriptive and exploratory approach, combining a review of relevant academic literature with a case study analysis of a Romanian company, Aggranda, which develops RPA solutions for accounting processes. The case study highlights that the use of software robots, such as "Alex," can save substantial working hours and improve workflow efficiency.

Keywords: Robotic Process Automation; accounting; digital transformation; efficiency; labor dynamics

JEL codes: M41; O33; J24

1. Introduction

RPA is transforming economic activity worldwide by automating repetitive, rule-based accounting tasks and increasing organizational efficiency. As global markets digitalize, companies adopt RPA to reduce operational costs, improve accuracy, and remain competitive in an interconnected economic environment. The rise of automation reshapes labor dynamics, requiring accountants to shift from routine processing to higher-value analytical and strategic roles within the global economy.

2. Literature Review

Researchers emphasize that RPA systems are capable of performing tasks such as data entry, invoice processing, reconciliation, and report generation with high precision and speed. This leads to significant improvements in organizational performance and allows employees to focus on tasks that require judgment, creativity, and critical thinking.

However, the literature also points out several challenges associated with the implementation of RPA. These include resistance to technological change, differences in digital infrastructure across countries, and the need for workforce adaptation. Additionally, concerns are raised regarding the impact of automation on employment, although many studies argue that RPA leads to job transformation rather than job elimination.

3. Data and Methodology

The research is based on a descriptive and exploratory design, combining qualitative analysis of academic literature with a case study approach. A key component of the research is the case study of Aggranda, a Romanian company that develops software robots for process automation. The analysis focuses on the implementation of the RPA robot “Alex,” which automates invoice processing tasks within an accounting firm.

The methodological approach aims to provide a comprehensive understanding of how RPA technologies are applied in practice and how they influence efficiency, productivity, and labor allocation.

4. Results and Discussion

The case study of Aggranda illustrates the practical impact of RPA implementation. The software robot “Alex” automates invoice processing, data extraction, and integration into accounting systems. This automation leads to significant time savings, estimated at approximately 64 hours per month, and contributes to increased efficiency and accuracy. Companies from different countries, including the United States, the United Kingdom, and France, adopt such solutions, demonstrating the scalability of automation technologies developed in emerging markets. Despite these advantages, several challenges were identified. Resistance to technological change remains a significant barrier, particularly in organizations with limited digital maturity. Additionally, uneven access to digital resources across countries can affect the adoption of RPA solutions.

5. Conclusions

RPA is reshaping accounting practices worldwide, offering significant improvements in efficiency, accuracy, and productivity. The technology enables organizations to automate routine tasks and to optimize their operational processes, contributing to enhanced competitiveness in a globalized economy.

The case study of Aggranda demonstrates that RPA solutions developed in one country can have a global impact, highlighting the importance of innovation and digital transformation.

The study concludes that RPA does not replace the accounting profession but transforms it, creating opportunities for professionals to engage in higher-value activities.

References

- Gotthardt, M., & et al. (2020). Current State and Challenges in the Implementation of Smart Robotic Process Automation in Accounting and Auditing. *ACRN Journal of Finance and Risk Perspectives*, 9, 90-102
- Risco.ro. (n.d.). Company verification: Aggranda Solutions SRL. Retrieved from <https://www.risco.ro/verifica-firma/aggranda-solutions-s-r-l-cui-40822809>

COMPARATIVE ANALYSIS OF TRADITIONAL ECONOMETRIC AND AI-BASED MODELS IN ASSESSING THE IMPACT OF MACROECONOMIC FACTORS ON BANKING PERFORMANCE

Daniela Iulia Maria CĂRBUNE*

University of Craiova, Faculty of Economics and Business Administration, “Eugeniu Carada”
Doctoral School of Economic Sciences, Craiova, Romania

* Corresponding author: carbune.daniela.n9d@student.ucv.ro | ORCID: 0009-0009-5673-8251

Abstract

This study aims to provide a comparative analysis of traditional econometric and AI-based models used to assess the impact of macroeconomic factors on banking performance. The purpose of the research is to identify the most commonly applied methodological approaches and to evaluate their suitability in explaining the relationship between key macroeconomic variables and banking performance indicators. The study employs a qualitative comparative methodology based on a systematic review and synthesis of empirical literature. The analysis focuses on traditional econometric models and AI-based techniques, examining their main characteristics, interpretability and predictive capabilities. The results indicate that the traditional econometric models remain widely used due to their strong theoretical foundation and interpretability, while AI-based models demonstrate superior performance in capturing nonlinear relationships and improving predictive accuracy. However, both approaches present inherent limitations when applied independently. The findings further emphasize that AI techniques should not be viewed as substitutes for classical econometric methods, but rather as complementary tools that enhance the analysis of banking performance in a macroeconomic context. The study contributes to the ongoing debate on methodological innovation in financial research by proposing an integrated perspective and highlighting the relevance of hybrid modeling frameworks that combine econometric rigor with AI-based predictive power. These insights provide a foundation for future research aimed at developing more robust approaches to banking sector performance analysis.

Keywords: traditional econometric models; AI-based models; banking performance; macroeconomic factors; hybrid models

JEL codes: G21; C23

1. Introduction

The analysis of banking performance in relation to macroeconomic conditions has become increasingly important in the context of economic uncertainty and digital transformation. While traditional econometric models have been widely used, their ability to capture complex and nonlinear relationships is limited. At the same time, artificial intelligence models have emerged as alternative tools, although their application remains fragmented. Therefore, this study aims to comparatively assess econometric and AI-based models and to highlight their complementarities in banking performance analysis.

2. Literature Review

The existing literature highlights the role of macroeconomic factors in shaping banking performance, particularly through the use of dynamic econometric models such as GMM (Cangombe et al., 2025) and ARDL (Mwanjilinjji and Huang, 2025), which capture temporal dynamics and, in some cases, the transmission of macroeconomic shocks. In parallel, emerging research introduces AI-based approaches (Bakır et al., 2025), highlighting their ability to model nonlinear relationships and improve predictive accuracy. Additionally, the integration of AI is increasingly recognized as a strategic tool for enhancing financial analysis and supporting decision-making processes (Popescu & Spulbar, 2025). Despite these advances, the literature remains fragmented, with limited studies directly comparing traditional econometric and AI-based models. This study addresses this gap by providing a structured comparative perspective on their applicability in banking performance analysis.

3. Methodology and Results

The study is based on a qualitative comparative analysis of academic literature extracted from relevant scientific databases, focusing on empirical research that examines the impact of macroeconomic factors on banking performance. It compares traditional econometric models and modern AI-based approaches. The results indicate that traditional econometric models are more suitable for explaining causal relationships and supporting policy analysis, while AI-based models provide higher predictive accuracy and better capture complex, nonlinear interactions.

4. Conclusions

This study highlights that both traditional econometric and AI-based models play a significant role in assessing the impact of macroeconomic factors on banking performance. The findings suggest that the two approaches are complementary rather than substitutable. Future research should focus on empirical applications of hybrid models and on testing their performance using consistent datasets across different economic contexts.

References

1. Bakır, M.R., Çetin, M.A., Bakırtaş, İ. (2025). *Revisiting the macroeconomic determinants of non-performing loans with a deep learning technique with causal inference: Evidence from Türkiye*. *Borsa Istanbul Review*, Volume 25, Issue 3, May 2025, Pages 541-551, <https://doi.org/10.1016/j.bir.2025.02.006>
2. Cangombe, E.L., Almeida, L.G. and Tavares F.O. (2025). *Determinants of Banking Profitability in Angola: A Panel Data Analysis with Dynamic GMM Estimation*. *Risks* 2025, 13(7), 123, <https://doi.org/10.3390/risks13070123>
3. Mwanjilinjji, E.E. and Huang, F.-M. (2025). *Examining the Impact of Macroeconomic Factors and Non-Performing Loans on Banking Sector Profitability: A Panel Data Analysis for East Africa Using the ARDL Model*. *International Journal of Business, Management and Economics*, 6(2), 103 - 123. <https://doi.org/10.47747/ijbme.v6i2.2698>
4. Popescu, A.D. and Spulbar, C.M. (2025). *Financial Digital Assets and the Financial Risk Modeling of Portfolio Investments*, <https://www.igi-global.com/book/financial-digital-assets-financial-risk/349927>, DOI: 10.4018/979-8-3693-8120-5

AI-DRIVEN DIGITAL TRANSFORMATION AND THE EVOLUTION OF HUMAN CAPITAL: EVIDENCE FROM REMOTE SOFTWARE ENGINEERING TEAMS

Aydin RZAYEV

University of Pécs, Faculty of Business and Economics, Pécs, Hungary

arzayev2018@ada.edu.az | ORCID: 0009-0001-3532-0317

Abstract

The rapid expansion of remote and hybrid work, together with the growing adoption of artificial intelligence (AI) tools, is reshaping labor organization in the digital economy. Software engineering teams represent a leading case of this transformation, as their work is highly digitized and increasingly supported by AI-assisted development tools. Despite potential productivity gains, existing research reports mixed outcomes, highlighting coordination challenges, communication barriers, and variations in employee wellbeing. This study presents a systematic literature review of 28 empirical studies published between 2016 and 2026, examining how leadership and management practices influence productivity, coordination, and wellbeing in remote and hybrid software engineering teams. The findings suggest that leadership in digitally mediated environments is primarily enacted through the design of coordination systems, including communication structures, decision-making processes, and workflow visibility mechanisms. Trust, participation, and psychological safety also emerge as critical factors enabling effective collaboration. The results further indicate that while AI tools enhance individual productivity and autonomy, they do not eliminate coordination challenges and may increase the need for structured leadership practices. Overall, the study links micro-level team dynamics with broader transformations in human capital, highlighting the evolving role of leadership in AI-driven digital work environments.

Keywords: Artificial intelligence; Remote work; Human capital; Productivity; Digital economy

JEL codes: O33, J24

1. Introduction

The digital transformation of the global economy is fundamentally altering how work is organized, coordinated, and managed. Remote and hybrid work arrangements, supported by cloud-based tools and digital communication platforms, have become increasingly prevalent in knowledge-intensive sectors. At the same time, the adoption of artificial intelligence (AI) technologies, such as AI-assisted coding tools and automation systems, is further transforming the nature of work and productivity.

Software engineering teams represent a particularly relevant context for examining these changes. As early adopters of distributed work and intensive users of digital tools, they provide insight into how human capital is organized in digitally mediated environments. While remote work offers increased flexibility and access to global talent, it also introduces coordination challenges, communication barriers, and risks to employee wellbeing (Allen et al., 2015; Ford et al., 2021). Leadership and management

practices play a critical role in addressing these challenges, particularly in digitally mediated environments (Avolio et al., 2000). In remote and hybrid settings, traditional forms of supervision are replaced by digitally mediated coordination processes, requiring leaders to structure communication, maintain alignment, and support collaboration across distance. This study aims to examine how leadership influences productivity and coordination in remote software engineering teams, particularly in the context of increasing AI adoption. By synthesizing existing empirical research, the paper contributes to understanding how digital transformation affects labor markets and human capital.

2. Literature Review

Existing research on remote work suggests mixed effects on productivity and performance (Allen et al., 2015; Ford et al., 2021). While some studies report increased autonomy and efficiency, others highlight coordination difficulties and communication overhead. In software engineering, distributed development has been associated with higher coordination costs and longer development cycles (Herbsleb & Mockus, 2003). Leadership research indicates that effective management practices are essential in remote environments, particularly through digitally mediated leadership processes (Avolio et al., 2000). Concepts such as e-leadership emphasize the role of digital tools in mediating influence and coordination. Trust, communication quality, and team engagement are frequently identified as key factors influencing team performance (Iftikhar et al., 2017). At the same time, emerging research on AI in the workplace suggests that AI tools can enhance productivity and support decision-making. However, their impact on team dynamics and leadership practices remains underexplored, particularly in distributed work settings.

3. Data and Methodology

This study adopts a systematic literature review (SLR) approach to synthesize empirical evidence on leadership and management practices in remote and hybrid software engineering teams. The SLR methodology was selected due to its suitability for consolidating fragmented research across multiple disciplines, including software engineering, information systems, and organizational studies. The review followed a structured and transparent process inspired by established systematic review guidelines, including PRISMA-oriented procedures. Two major bibliographic databases, Scopus and Web of Science, were selected to ensure broad interdisciplinary coverage. These databases provide access to high-quality peer-reviewed publications across both technical and management domains.

The search strategy was based on three main concept groups combined using Boolean operators: (1) remote and hybrid work (e.g., “remote work”, “hybrid work”, “distributed teams”, “virtual teams”), (2) leadership and management (e.g., leader*, manage*), and (3) software engineering context (e.g., “software development”, “software engineering”, “engineering teams”). Searches were conducted within titles, abstracts, and keywords to balance recall and relevance. This review was limited to peer-reviewed publications in English between 2016 and 2026, capturing contemporary developments in digital work practices, including the rise of remote work and AI-supported collaboration tools. Following database searches, records were exported and merged, and duplicates were removed. The screening process was conducted in two stages: (1) title and abstract screening to eliminate clearly irrelevant studies, and (2) full-text screening based on predefined inclusion and exclusion criteria.

Inclusion criteria required studies to: (i) focus on software engineering or closely related development teams, (ii) examine remote, hybrid, or distributed work contexts, (iii) address leadership or management

practices, and (iv) report empirical findings related to team outcomes such as productivity, coordination, or wellbeing. Non-empirical studies, purely technical papers without organizational focus, and studies outside the software engineering domain were excluded. After applying these criteria, a final sample of 28 studies was retained for analysis. The selected studies were analyzed using thematic synthesis, allowing for the identification of recurring patterns and mechanisms related to leadership, coordination, and performance in digitally mediated environments. This approach is particularly suitable for heterogeneous datasets where studies differ in methods, measures, and contexts.

While the primary focus of the review is leadership in remote work, the analysis also considers the growing role of artificial intelligence as part of the broader digital work environment. Although AI is not treated as a primary variable in the reviewed studies, its increasing presence in software development tools provides an important contextual layer for interpreting findings related to productivity and coordination.

4. Results and Discussion

The findings indicate that leadership in remote software engineering teams is primarily enacted through coordination structures rather than direct supervision (de Souza Santos & Ralph, 2022). Leaders design communication routines, define roles and responsibilities, and establish workflows that enable distributed collaboration.

Coordination challenges remain a central issue in distributed software teams (Herbsleb & Mockus, 2003; de Souza Santos & Ralph, 2022). Time-zone differences, asynchronous communication, and reduced shared context increase the likelihood of misalignment and conflict. Leadership practices such as clarifying expectations and managing dependencies are essential for maintaining productivity (de Souza Santos & Ralph, 2022; Saxena et al., 2023). Trust and engagement are also critical factors in enabling effective collaboration in distributed environments (Iftikhar et al., 2017). Teams with higher levels of psychological safety and participation are more effective in identifying and resolving issues early. Shared leadership emerges as a common pattern, where decision-making is distributed across team members but supported by structured coordination systems.

The introduction of AI tools adds a new dimension to these dynamics. While AI can enhance individual productivity and reduce routine tasks, it does not eliminate the need for coordination. In some cases, increased autonomy may even amplify coordination challenges, requiring stronger leadership practices to maintain alignment. Overall, the results suggest that productivity in remote digital teams is shaped by the interaction between technology, leadership, and coordination mechanisms.

5. Conclusions

This study examined leadership and productivity in remote software engineering teams within the context of digital transformation and AI adoption. The findings indicate that leadership plays a central role in managing distributed human capital by structuring coordination processes and supporting collaboration (de Souza Santos & Ralph, 2022). Remote work enables global labor integration but introduces new challenges related to communication, alignment, and wellbeing. AI technologies further transform work processes, increasing productivity potential while also creating new coordination demands. The study contributes to the literature on digital economy and labor markets by highlighting how leadership practices shape the effectiveness of remote work. Future research should focus on

measuring productivity more consistently and exploring the interaction between AI tools and leadership in distributed environments.

References

- Allen, T. D., Golden, T. D., & Shockley, K. M. (2015). How effective is telecommuting? Assessing the status of our scientific findings. *Psychological Science in the Public Interest*, 16(2), 40–68. <https://doi.org/10.1177/1529100615593273>
- Avolio, B. J., Kahai, S., & Dodge, G. E. (2000). E-leadership: Implications for theory, research, and practice. *The Leadership Quarterly*, 11(4), 615–668. [https://doi.org/10.1016/S1048-9843\(00\)00062-X](https://doi.org/10.1016/S1048-9843(00)00062-X)
- de Souza Santos, R., & Ralph, P. (2022). A grounded theory of coordination in remote-first and hybrid software teams. In *Proceedings of the International Conference on Software Engineering*. <https://doi.org/10.1145/3510003.3510105>
- Ford, D., Storey, M.-A., Zimmermann, T., Bird, C., Jaffe, S., Maddila, C., Butler, J. L., Houck, B., & Nagappan, N. (2021). A tale of two cities: Software developers working from home during the COVID-19 pandemic. *ACM Transactions on Software Engineering and Methodology*, 31(2), Article 27. <https://doi.org/10.1145/3487567>
- Herbsleb, J. D., & Mockus, A. (2003). An empirical study of speed and communication in globally distributed software development. *IEEE Transactions on Software Engineering*, 29(6), 481–494. <https://doi.org/10.1109/TSE.2003.1205177>
- Iftikhar, A., Alam, M., Musa, S., & Su'ud, M. M. (2017). Trust development in virtual teams to implement global software development (GSD): A structured approach to overcome communication barriers. <https://doi.org/10.1109/ICETSS.2017.8324169>
- Saxena, A., Singh, L., Shrivastava, R., & Arya, A. (2023). Conflict management in agile distributed development: An empirical study. *Empirical Software Engineering*, 28(4), Article 96. <https://doi.org/10.1007/s10664-023-10263-2>

ARTIFICIAL INTELLIGENCE AND THE IMPACT ON FINANCIAL STABILITY

Domnița ISAC

Academy of Economic Studies of Moldova, Finance, Chisinau, Republic of Moldova

isac.domnita91@gmail.com

Abstract: Artificial Intelligence (AI) brings transformative benefits to the financial sector, but may also amplify financial stability risks. This rapid development of the financial system raises concerns that AI is generating risks and creating vulnerabilities that might require new macroprudential tools to address. If policymakers overregulate AI, it can slow growth; if they do nothing, things can go awry with negative consequences. This research seeks to provide some evidence regarding the risks that financial institutions and financial authorities are concerned about. In many academic papers, it has been identified as a potential contributor to future economic growth and increased productivity. Artificial Intelligence (AI) has great potential and benefits for society, including enhancing and strengthening the financial system. Additionally, AI can accelerate scientific progress, improve decision-making, and enhance education and healthcare. These benefits, which will surely enhance our living standards in the coming decades, come with significant risks that must be addressed through appropriate policy, starting with the financial sector as a core activity for economic development. Therefore, to address the transformative impact of advances in AI on the financial system, our main focus is to determine how AI influences systemic risk and indirectly affects financial stability, and continue with policy discussion. Highlighting the importance of policies and finding evidence of how existing guidance applies to AI in addressing some of those challenges, and whether it should strengthen existing regulation or issue newer guidelines in order to enhance the AI's economic impact.

Keywords: financial stability; systemic risks; Artificial Intelligence; economic growth; surveillance; transformation

JEL codes: E58, F43, G28, J38

1. Introduction

This paper aims to understand how AI innovation and implications in different parts of the economy can destabilize the financial system, create systemic risks, and influence economic growth. Additionally, it seeks to identify the key knowledge policymakers need to make informed decisions that harness AI's potential to maintain financial stability, promote sustainable growth, and mitigate systemic risks.

In this study, we have analyzed potential sources of systemic risk and assessed whether a new macroprudential policy is needed. For instance, if cyber fraud increases operational risk, then it might be necessary to extend the capital requirements. Another issue concerns the resilience of the financial system in the AI era and how we can identify, mitigate, and manage potential risks to prevent systemic disruptions and financial crises.

This paper bridges the gap between how AI guidelines are addressed and how they are applied in the real economy. Highlighting the importance of AI and what the possible risks are that can emerge from AI evolving in the financial system, and how we can improve our work and productivity from AI's benefits without jeopardizing the financial system and creating systemic risks. The contribution is to identify potential causes of financial crises in the early stages of AI and to avoid those that are detrimental to economic growth.

2. Literature Review

When researchers have tried to define what artificial intelligence is, they have reached different conclusions. Some definitions focus on capabilities or functions, on a system acting autonomously and learning from experience, while others even compare artificial intelligence with human intelligence. Artificial intelligence is far from a new field; it is clear that AI capabilities have changed in recent decades, and the way they function has transformed. This evolution of AI across sectors is influencing various economic developments, such as the education system, labor markets, and global trade.

AI technology captured the attention of academics, policymakers, and industry leaders; for instance, in the financial sector, a survey conducted by the Bank of England and the Financial Conduct Authority found that over half of banks already reported using machine learning.

BCBS (2024) emphasizes the importance of AI provider concentration that can create potential systemic vulnerabilities. ECB (2024) highlights a possible source of systemic risk: financial institutions using the same or similar models from the same supplier, which may lead to the same decisions or recommendations, thereby amplifying procyclicality and market volatility (BIS, 2024).

Cipollone (2024) argues that the power of AI and the tools available to financial institutions and government agents will drive a fundamental change in how we perform our tasks. It anticipates transformative breakthroughs rather than incremental productivity gains (Barr, 2025).

AI can also engage in unethical activity (Hagendorff, 2024). The potential for AI to engage in deceptive behavior exists if the AI model has been developed to expand the owner's profits; it can spread false information, manipulate financial markets, or even create complex financial instruments. However, if the authorities are concerned about the systemic risk posed by AI, they must keep pace and increase cybersecurity resources (Danielsson & Uthemann, 2024). Additionally, supervisory authorities need strong analytical capabilities in surveillance of interconnectedness and leverage in the financial system that can be directly related to market failures. The second problem regarding systemic risk is information asymmetry (European Central Bank, 2009), but with the rise of AI, it is becoming even more challenging for regulatory authorities.

The benefits of AI in finance are numerous: technological innovation can reduce costs, increase speed, improve financial services, help authorities monitor and ensure safety and soundness, and even promote financial stability (Danielsson et al., 2022).

AI can influence the financial system and probably increase overall demand and supply, we have noted a wide range of growing literature discussing the impact of AI, among publications by international institutions: Bank for International Settlements (2024) Chapter 3, Financial Stability Board (2024), International Monetary Fund (2024), Organization for Economic Co-operation and Development (2024a and 2024b). Additionally, work provided by official researchers, where the majority of the literature, Barefoot (2022), O'Halloran and Nowaczyk (2019), and Petrone et al. (2022) express concern about the risks of AI, and the importance of a regulatory framework.

Foucault et al. (2025) have found the lack of accurate predictions when using AI that can surge risk, such as liquidity mismatches or common exposures, and create possible systemic risks to financial stability (Foucault et al., 2025).

There is considerable uncertainty about AI capabilities and developments (Korinek & Suh, 2025), including breakthroughs that could enhance the efficiency of the financial system. However, they can also create disruption, especially with artificial general intelligence (Bengio et al., 2025).

3. Data and Methodology

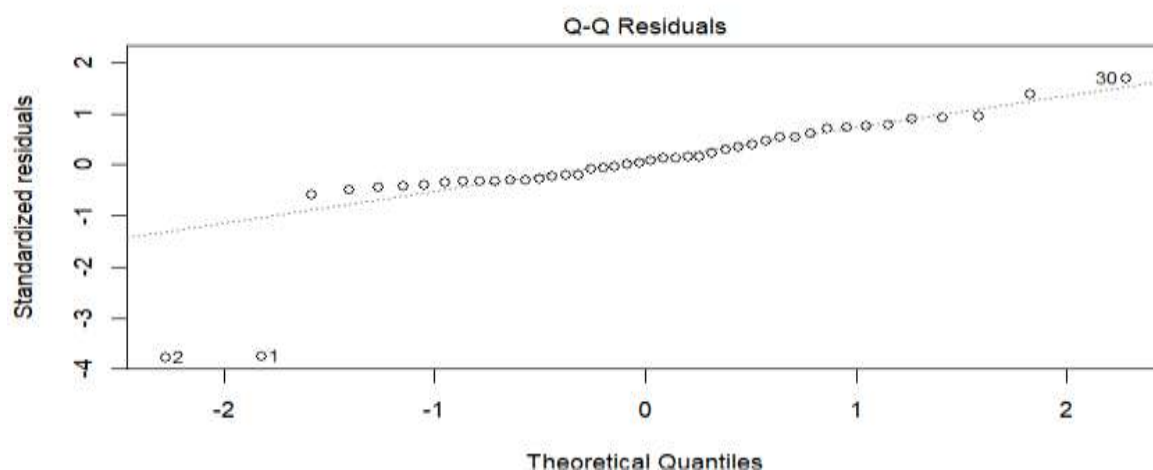
The analysis is based on data from the Republic of Moldova from 2015 to 2025, covering four variables: credit growth, non-performing loans, size (represented by total assets), GDP growth, and an AI proxy index. Given the inconsistent, publicly available data on artificial intelligence in the banking sector, this study employed a proxy that assumes increased structure, with a higher index in 2025, driven by expanded financial technology applications. Financial stability is represented by the z-score, which implies the following formula:

$$Z \text{ score} = \frac{ROA + Capital/Assets}{\sigma ROA}$$

$$Z = \alpha + \beta AI + \beta Credit \text{ growth} + \beta GDP \text{ growth} + \beta NPL + \varepsilon$$

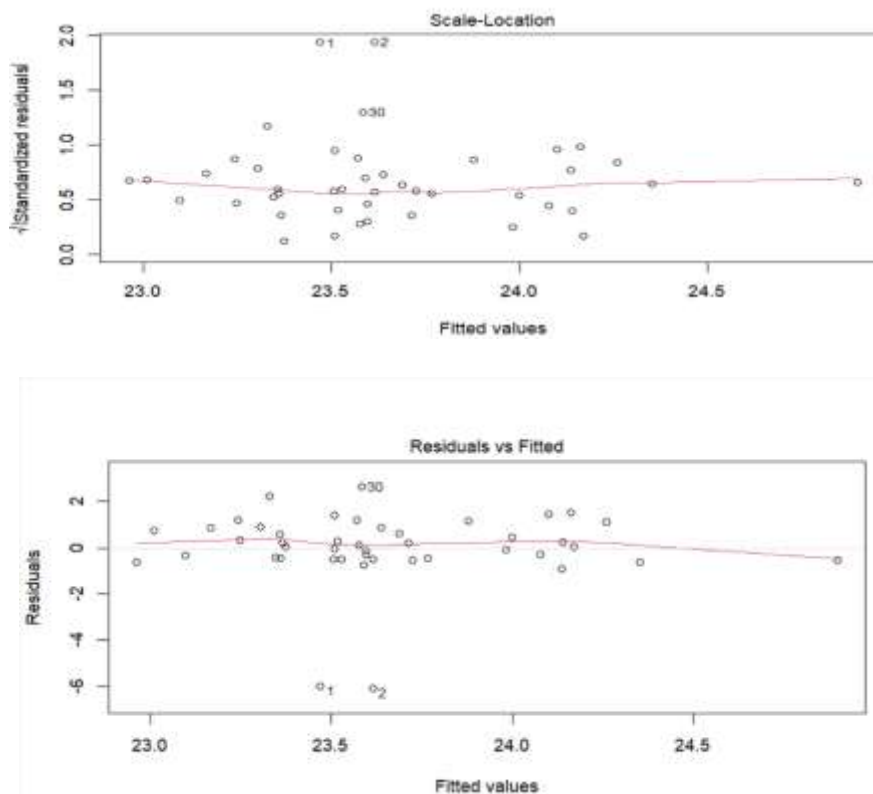
4. Results and Discussion

Our results indicate that artificial intelligence does not yet have a statistically significant impact on financial stability. A possible explanation could be the early stage of AI in the banking sector, even though the AI proxy is also estimated based on bank size, given that larger banks can invest more in AI tools. However, other variables remain relevant to the model, such as credit growth, the negative relationship, and a coefficient of around -11, which indicates that credit expansion is associated with high risk and creates financial vulnerabilities.



	Model 1	Model 2	Model 3
(Intercept)	-6.968 (29.815)	-10.338 (33.481)	-12.688 (33.484)
CREDIT_GROWTH	-11.773 (8.190)	-11.241 (8.078)	-11.205 (8.059)
ASSETS	2.842 (2.700)	3.126 (3.051)	3.340 (3.040)
NPL	-3.809 (16.872)	-0.461 (13.622)	-1.137 (13.629)
PIB_GROWTH	-0.089 (6.135)	0.030 (6.148)	-0.275 (6.164)
AI1	-0.029 (0.061)		
AI2		-0.084 (0.205)	
AI3			-0.015 (0.028)
Num.Obs.	44	44	44
R2	0.060	0.058	0.061
R2 Adj.	-0.064	-0.066	-0.062
AIC	177.2	177.3	177.2
BIC	189.7	189.8	189.7
Log.Lik.	-81.620	-81.655	-81.580
RMSE	1.55	1.55	1.55

Figure 1. Calculated by the author using R



5. Conclusions

Modern civilization relies on long-term economic growth, but this growth is made possible only by the adoption and diffusion of new technologies. Without new technology, economies will not be able to function at their present levels; sooner or later, everything stagnates. The development of new

technology is critical to solving problems such as climate change, maintaining rising standards of living and access to quality health care, and improving education.

In this study, AI will not directly cause either financial instability or a specific increase in GDP. Nevertheless, there is a possibility to enhance human capabilities through AI interaction and increase productivity. The interaction between human creativity and robotic precision will lead to new ideas and businesses, which could increase production and boost GDP.

The limitations of this study are the small sample size (44), which may reduce statistical significance, and the lack of publicly available data on AI adoption. For future research, it would be more appropriate to use a large sample drawn from data across different countries. Considering the same indicator and the expenditure on AI to find out if there is a statistically significant result of AI on the financial system. Yet it is considered that AI is in its early stages, and there is not much evidence of the AI impact. However, in the literature, it is argued that, compared to the Industrial Revolution, which took decades to have a measurable impact on social and economic progress, the AI case is expected to take less than a decade.

Therefore, authorities find AI indispensable as systems become more complex and harder to operate. However, many authorities have concluded that the role of AI should be basic advice, not decision-making. In a crisis, AI can scan the system to identify vulnerabilities and run scenarios to assess alternative regulations, but a human being should make the final decisions.

References

- Bank for International Settlements (2024), “Artificial intelligence and the economy: implications for central banks”, Chapter III in *Annual Economic Report*.
- Barr, M. (2025). “AI: hypothetical scenarios for the future”, speech at the Council on Foreign Relations, New York, 18 February.
- Basel Committee on Banking Supervision (BCBS) (2024): “Digitalization of finance”, *BCBS Working Papers*, May.
- Bengio, Y., “International AI Safety Report 2025”, January.
- Cipollone, P. (2024). “AI: a central bank’s view”, keynote speech at the National Conference of Statistics on official statistics at the time of AI, Rome, 4 July.
- Danielsson, J. & Uthemann, A. (2024a). “On the use of artificial intelligence in financial regulation and the impact on financial stability”, *working paper*.
- European Central Bank (2009). “The concept of systemic risk”, *Financial Stability Review*, December.
- European Central Bank (ECB) (2024). “Financial Stability Review”, *ECB*, May.
- Foucault, T., Gambacorta, L., Jiang, W. & Vives, X. (2025). “Artificial Intelligence in finance”, *The Future of Banking*, No 7, Center for Economic Policy Research.
- Hagendorff, T. (2024). “Deception abilities emerged in large language models”, *Proceedings of the National Academy of Sciences of the United States*, Vol. 121, No 24.
- Korinek, A. & Suh, D. (2025). “Scenarios for the transition to AGI”, *NBER Working Paper Series*, No 32255, National Bureau of Economic Research.

INTEGRATION OF BANKING SYSTEMS THROUGH AI-BASED FINTECH TECHNOLOGIES

Andrei Cristian SPULBAR

University of Craiova, "Eugeniu Carada" Doctoral School of Economic Sciences, Craiova, Romania

ORCID: 0009-0007-5021-9544

Abstract

This paper examines the integration of banking systems through fintech technologies supported by artificial intelligence, emphasizing their role in increasing interoperability, operational efficiency, and service innovation. The study starts from the premise that the digital transformation of banking is no longer limited to process automation, but increasingly depends on intelligent fintech solutions capable of connecting traditional banking infrastructures with data-driven platforms, payment ecosystems, and customer-centered applications. The analysis highlights how AI-based fintech tools improve data processing, fraud detection, risk assessment, customer profiling, and decision-making speed, thereby facilitating a deeper integration of financial and banking systems. At the same time, the paper discusses the main challenges associated with this transformation, including cybersecurity vulnerabilities, regulatory asymmetries, data governance issues, and technological dependence. Methodologically, the research relies on a qualitative and conceptual approach, supported by recent literature and industry developments. The findings suggest that AI-enabled fintech acts as a strategic catalyst for banking system integration, while also requiring coherent regulatory frameworks and sustained digital investment for long-term resilience, competitiveness, and inclusive financial modernization strategies.

Keywords: banking systems integration, fintech, artificial intelligence, digital transformation, interoperability, banking efficiency

JEL: G21, G28, O33, M15

1. Introduction

The integration of banking systems has become a priority in the context of accelerated digital transformation and the growing complexity of financial services. Traditional banks are increasingly required to connect their legacy infrastructures with innovative digital platforms able to deliver faster, safer, and more personalized services. In this process, fintech technologies based on artificial intelligence play a vital role by enabling interoperability, automation, advanced data analytics, and real-time decision making. These technologies support more efficient payment systems, improved risk management, enhanced fraud detection, and better customer experience. At the same time, their adoption raises important challenges related to regulation, cybersecurity, and data governance. Therefore, understanding the contribution of AI-based fintech to banking systems integration has significant theoretical and practical relevance.

2. Literature Review

The link between human capital investments and organizational performance can be explained through the human capital theory, according to which education and training lead to improved employee

productivity and therefore improved organizational performance. Resource-based theory supports such an approach, since it suggests that skills should be considered strategically valuable resources.

Although empirical evidence supports the existence of a positive relationship between training and productivity, differences are usually observed both in terms of its strength and timing. Some researchers observe the presence of a lagged effect of training, while other researchers emphasize that the effect will occur only if skills are relevant and valuable.

3. Data and Methodology

Recent scholarship shows that banking systems integration is increasingly shaped by fintech capabilities enhanced by artificial intelligence. Ashta and Herrmann (2021) argue that AI-based fintech creates opportunities for cost reduction, differentiation, and fraud detection, while also introducing risks related to bias, algorithm design, and human oversight. Complementing this view, Kayed et al. (2025) demonstrate that internal bank fintech integration improves profitability and reduces risk-taking, suggesting that technological embedding within banks can strengthen institutional performance. Together, these studies indicate that AI-enabled fintech is not only a tool for operational improvement, but also a strategic mechanism that supports deeper banking integration, resilience, and digital transformation.

4. Results and Discussion

The analysis indicates that AI-based fintech technologies significantly support the integration of banking systems by improving interoperability, reducing transaction costs, and accelerating data-driven decision making. Banks adopting such solutions benefit from more efficient payment processing, stronger fraud detection, and enhanced customer service through automated and personalized interactions. However, the findings also show that successful integration depends on adequate regulatory alignment, robust cybersecurity measures, and effective data governance. Therefore, while AI-enabled fintech strengthens banking connectivity and competitiveness, its long-term benefits require balanced implementation strategies and sustained institutional adaptation across the financial sector.

5. Conclusions

AI-based fintech technologies accelerate banking systems integration by enhancing efficiency, interoperability, and innovation. Their sustainable impact, however, depends on secure implementation, adaptive regulation, and continuous digital investment across banking institutions.

References

- Ashta, A., & Herrmann, H. (2021). Artificial intelligence and fintech: An overview of opportunities and risks for banking, investments, and microfinance. *Strategic Change*, 30(3), 211–222. <https://doi.org/10.1002/jsc.2404>
- Kayed, S., Alta'any, M., Meqbel, R., Khatatbeh, I. N., & Mahafzah, A. (2025). Bank FinTech and bank performance: Evidence from an emerging market. *Journal of Financial Reporting and Accounting*, 23(2), 518–535. <https://doi.org/10.1108/JFRA-09-2023-0526>

SAF-T, THE DIGITAL GOVERNANCE OF ACCOUNTING AND FISCAL INFORMATION CAPITALIZATION - A BIBLIOMETRIC STUDY

Carmen Mihaela BULĂU^{1*}, Beatrice Elena GORE², Mirela MATEI (PANĂ)³, Alexandru Cătălin NEAGU⁴, Mihaela Denisa COMAN⁵

^{1,2,3,4,5}Valahia University of Târgoviște, Romania

*Corresponding author, carmenmihaelabulau@gmail.com, ORCID: 0000-0002-2336-5665

Abstract: This study conducts a structured bibliometric and content analysis of 141 publications indexed in the Web of Science Core Collection retrieved under the keyword “SAF T.” The dataset spans 1975–2026 and exhibits substantial disciplinary dispersion: fewer than 15% of records relate directly to the Standard Audit File for Tax, while the majority correspond to homonymous uses of “Saf T” in medical devices, chemistry, agriculture, engineering, and arts. Within the accounting-relevant subset, publications are concentrated after 2018, reflecting the recent acceleration of digital tax reporting mandates in Europe. Citation analysis reveals moderate impact (mean WoS Core citations < 10 per article for SAF T tax-related papers), with most contributions indexed in ESCI or conference proceedings rather than high-impact SSCI accounting journals. Methodologically, the literature is dominated by conceptual frameworks, survey-based perception studies, comparative country descriptions, and technical e-audit system proposals; no study employs panel econometrics, differences identification, or firm-level archival cost measurement. The bibliometric evidence reveals five structural gaps: (1) absence of causal econometric evaluation of SAF-T implementation effects; (2) lack of quantified firm-level compliance cost measurement; (3) no integration with accounting information systems and ERP transformation research; (4) limited cross-country institutional comparative modelling; and (5) absence of structural cost–benefit assessment of digital tax mandates. Building on these identified gaps, this study proposes a multi-country panel design combined with executive survey cost measurement and digital intensity modelling to quantify the compliance cost implications of SAF-T. By situating SAF-T within mainstream empirical accounting research, this paper advances literature beyond descriptive digital tax discourse toward a better evaluation of regulatory digitalization economics.

Keywords: SAF-T, accounting information, fiscal information, governance, ERP

1. Introduction: The global fiscal landscape has been reshaped by accelerating digital tax reporting mandates, with the Standard Audit File for Tax (SAF-T) — an XML-based format developed by the OECD in 2005 — occupying a central position in this transformation. Since Portugal's mandatory implementation in 2009, SAF-T variants have been adopted across at least ten European jurisdictions, including Poland (JPK, 2016), Lithuania (2016–2020), Norway (2020), Romania (D406, 2022), and Denmark, Bulgaria, and Ukraine (2024–2026). Despite this expanding regulatory footprint, the compliance cost economics of SAF-T has never been estimated through credible causal econometric methods — a gap that is striking given the extensive literature established by Sandford et al. (1989), Eichfelder and Vaillancourt (2014), and Harju et al. (2019). This paper contributes twofold: it provides the first structured bibliometric and content analysis of the SAF-T research corpus indexed in the Web of Science (WoS) Core Collection, and it proposes a multi-country panel research design enabling causal estimation of SAF-T compliance cost effects through modern difference-in-differences econometrics (Callaway & Sant'Anna, 2021; Goodman-Bacon, 2021).

2. Literature Review: Digital tax reporting initiatives — including the UK's Making Tax Digital, Spain's SII, and Italy's FatturaPA — share a common rationale of narrowing the tax gap through granular digital data (OECD, 2021). The theoretical foundations of SAF-T mandates draw on institutional theory (DiMaggio & Powell, 1983), transaction cost economics (Williamson, 1985), and regulatory compliance theory (May, 2004). The existing SAF-T literature, led by Auksztol and Chomuszko (2020), Darie et al. (2023), and Podik et al. (2019), remains conceptual and descriptive. Tax compliance cost theory establishes that costs are regressive by firm size and economically significant — Harju et al. (2019) estimating compliance costs at approximately 19% of value added at Finland's VAT threshold. Five structural gaps characterize the SAF-T literature: absence of causal econometric evaluation; lack of quantified firm-level compliance cost data; no integration with AIS and ERP research; limited cross-country institutional comparison; and absence of cost–benefit analysis of digital tax mandates.

3. Data and Methodology: The bibliometric dataset derives from a WoS Core Collection search using the keyword "SAF T" across all document types and the 1975–2026 period, returning 141 records. Because fewer than 15% of records relate to the Standard Audit File for Tax — with the remainder reflecting homonymous uses in medical devices, chemistry, and engineering — a two-stage disambiguation procedure isolated an accounting-relevant subset of 21 records. Performance analysis covered WoS citation metrics, journal distribution, and country affiliation; content analysis coded each record by methodology type and theoretical grounding; and keyword co-occurrence in VOSviewer confirmed disciplinary clustering. For future empirical work, the paper proposes a staggered difference-in-differences panel design using firm-year observations from Bureau van Dijk Orbis across treated countries (Romania, Poland, Portugal, Lithuania, Norway) and untreated comparators (Austria, Belgium, Sweden), with Callaway–Sant'Anna estimators and executive survey measurement of internal compliance costs.

4. Results and Discussion: The 21 accounting-relevant records are concentrated in 2018–2026 (86%), with mean WoS citations below 10 per article and a subset h-index of approximately 4. No record appears in an SSCI Q1 accounting journal; publication venues are dominated by ESCI-indexed regional outlets and conference proceedings. Methodologically, the literature comprises conceptual frameworks (28.6%), survey-based perception studies (23.8%), comparative country descriptions (19%), and technical ERP proposals (19%); no study employs quantitative archival analysis, panel econometrics, or causal identification. Geographic production is concentrated in Poland and Romania. These findings confirm all five structural gaps: the staggered European SAF-T adoption timeline provides precisely the quasi-experimental variation required for a credible difference-in-differences design, yet it remains entirely unexploited.

5. Conclusions: This paper provides the first systematic bibliometric mapping of SAF-T research in WoS, documenting a nascent literature disconnected from mainstream empirical accounting scholarship. Theoretically, situating SAF-T within compliance cost theory, institutional isomorphism, and transaction cost economics provides a foundation for future empirical work. For policymakers — including the EU Commission's VAT in the Digital Age initiative — the proposed panel design would generate the first rigorous cross-country evidence on SAF-T compliance cost magnitudes. Limitations include restriction to WoS and the forward-looking nature of the proposed empirical design.

DIGITAL ECONOMY AND AI-DRIVEN TRANSFORMATION: ADOPTION PATTERNS AND THE PRODUCTIVITY PUZZLE IN THE EUROPEAN UNION, WITH A FOCUS ON ROMANIA

Andreea-Ioana VĂCUȚ¹; Andreea-Adriana SIMION^{2*}

^{1,2} "Eugeniu Carada" Doctoral School of Economic Sciences, University of Craiova, Craiova, Romania

* Corresponding author: ciureaandreea98@gmail.com

Abstract

The rapid diffusion of artificial intelligence (AI) is reshaping the way enterprises, workers and public institutions participate in the digital economy. While the policy discourse around AI-driven transformation is overwhelmingly optimistic, empirical evidence on whether adoption translates into measurable productivity gains remains mixed, and considerable heterogeneity persists across European Union member states. This extended abstract examines the relationship between AI adoption and productivity in the EU-27, with a particular focus on Romania's position relative to the EU average. Drawing on Eurostat's ICT usage in enterprises survey, the 2024 Digital Economy and Society Index (DESI) indicators and a targeted review of empirical literature published between 2020 and 2024, we compare enterprise AI uptake, digital skills and infrastructure across member states. The analysis suggests that aggregate AI adoption metrics do not correlate in a straightforward manner with productivity outcomes; measurable effects emerge only when adoption is paired with complementary investments in human capital, data infrastructure and process redesign. Romania displays one of the lowest AI adoption rates in the EU, compounded by persistent gaps in digital skills and the integration of digital technology in business processes. We argue that framing AI as a stand-alone technological upgrade underestimates the organisational conditions required for convergence, and we outline policy directions through which Romania could move from passive technology import toward substantive digital transformation.

Keywords: digital economy; artificial intelligence; productivity paradox; DESI; Romania

JEL codes: O33; O47; L86

1. Introduction

Artificial intelligence is widely regarded as the technological layer most likely to shape the next stage of the digital economy. The European Union's Digital Decade 2030 targets set ambitious thresholds for enterprise AI uptake, cloud adoption and advanced digital skills, and firms across the Union have accelerated their use of AI tools sharply since 2022, with generative models leading the recent wave. Productivity growth across most European economies, however, remains subdued, echoing an older puzzle first formulated in the context of ICT investments in the 1980s and 1990s. This disconnect between the narrative of rapid AI-driven transformation and the macroeconomic evidence on productivity growth raises a practical question for both researchers and policymakers: under what conditions does AI adoption actually translate into measurable economic gains, and which member states are positioned to benefit the most? This extended abstract asks how AI-driven transformation is reshaping productivity in the EU-27, and where Romania stands within that picture. The motivation is twofold. First, we aim to move beyond aggregate narratives and examine the organisational and institutional conditions under which AI generates economic value at firm and country level. Second, we assess the specific situation of an emerging European economy that has historically lagged on digital indicators but is exposed to the same global technological frontier. The contribution is a structured

descriptive synthesis that combines recent empirical literature with comparative EU data and highlights the complementarities required for digital transformation to yield productivity gains.

2. Literature Review

Three strands of research inform this study. The first revisits the productivity paradox. Brynjolfsson, Rock and Syverson (2021) propose a J-curve explanation in which measured productivity initially stagnates as firms invest in intangible assets complementing a new general-purpose technology, and accelerates only once those complementarities are in place. Czarnitzki, Fernández and Rammer (2023) confirm positive AI–productivity effects at firm level for German enterprises, but show that gains concentrate among firms with advanced digital infrastructure and prior experience with data-driven decision making. The second strand, building on Acemoglu and Restrepo (2020), models automation as a reallocation of tasks between capital and labour, with aggregate effects depending on the balance between displacement of existing jobs and the creation of new, labour-complementary tasks. Agrawal, Gans and Goldfarb (2022) offer a complementary framework in which AI reduces the cost of prediction and, in doing so, reshapes the value of adjacent judgement and decision tasks. Cazzaniga and co-authors (2024), in a recent IMF analysis, estimate that a substantial share of employment in advanced economies is exposed to generative AI, with both productivity-enhancing and displacement channels active in parallel. The third, policy-oriented strand uses harmonised EU data to describe cross-country heterogeneity. Calvino and Fontanelli (2023) document that AI adopters tend to be larger, younger and more digitally intensive firms, with adoption concentrated in a small number of member states, while the European Commission (2024) DESI report confirms a persistent East–West gradient in enterprise digitalisation. Evidence on Eastern EU economies and on the absorptive capacity conditions under which AI creates measurable value remains comparatively scarce; the present study addresses this gap.

3. Data and Methodology

The analysis draws on three secondary sources: (i) Eurostat’s ICT usage in enterprises survey (indicators on AI use, cloud services and ICT specialists, 2019–2024); (ii) the European Commission’s 2024 DESI report, covering human capital, connectivity, integration of digital technology and digital public services; and (iii) a structured review of empirical literature published between 2020 and 2024, identified through Scopus and Web of Science using combinations of the keywords “artificial intelligence,” “productivity,” “digital economy” and “European Union.” The approach is descriptive and comparative: we rank and cluster EU-27 member states by AI adoption intensity and digital human capital scores, then position Romania within these clusters. We do not estimate causal effects; the aim is to document stylised facts and triangulate them with the reviewed literature.

4. Results and Discussion

Three observations organise the discussion. First, AI adoption among EU enterprises remains low in absolute terms but highly uneven: Northern and Western economies lead, while most Central and Eastern European countries, Romania among them, sit at the bottom. Second, country-level AI adoption does not translate linearly into productivity gains; the reviewed literature converges on the finding that firms realise productivity effects only when AI is embedded in broader digital infrastructure and process reorganisation, and when employees have the digital skills to work alongside the new tools. Third, Romania faces a compounded gap along three DESI dimensions: digital infrastructure, human capital and the integration of digital technology in business processes, where Romanian SMEs report particularly low figures.

The 2024 DESI indicators place Romania in the lowest quartile of the EU-27, with the largest gap on the human capital dimension: the share of individuals with at least basic digital skills is roughly half the EU average. According to the 2024 wave of Eurostat’s ICT usage in enterprises survey, only 3.1% of Romanian enterprises with ten or more employees reported using at least one AI technology, against an

EU-27 average of 13.5% and shares of 27.6% in Denmark, 25.1% in Sweden and 24.7% in Belgium (Eurostat, 2025). Romania recorded an annual increase of only 1.6 percentage points between 2023 and 2024, one of the smallest in the Union. The pattern is consistent with the sorting mechanism described by Calvino and Fontanelli (2023): in economies with a thinner base of digitally mature firms, AI adoption concentrates among a narrow set of frontier enterprises, leaving the wider SME tissue behind. The policy implication is that targeted AI subsidies should be coupled with investment in digital skills, SME process redesign and data infrastructure, rather than deployed in isolation.

5. Conclusions

AI-driven transformation is an uneven process within the European Union, and the gap between headline adoption figures and realised productivity effects reflects the centrality of complementary organisational investments. Romania’s position illustrates the risk of a widening digital divide if the policy response remains focused on technology procurement rather than on the broader conditions that allow technology to create value. From a policy standpoint, three directions deserve attention. First, AI-focused funding instruments should be designed as bundled interventions that finance technology adoption together with workforce upskilling and process reorganisation, rather than as stand-alone hardware or software grants. Second, digital skills strategies must move beyond basic digital literacy toward data analytics and human–machine collaboration, particularly within the public sector and among small and medium-sized enterprises. Third, regulatory clarity on data governance and the responsible use of AI can lower perceived adoption risk and reduce the entry barrier for smaller firms. Taken together, these three levers would offer Romania a realistic pathway to narrow its digital gap and to use AI-driven transformation as a factor of economic convergence rather than an isolated tool of technological modernisation. The main limitations of this study are its descriptive nature and its reliance on secondary aggregate data; future research should exploit firm-level micro-data on Romanian enterprises to test these hypotheses directly and to identify the specific organisational practices that moderate the AI–productivity link.

References

- Acemoglu, D., & Restrepo, P. (2020). Robots and jobs: Evidence from US labor markets. *Journal of Political Economy*, 128(6), 2188–2244. <https://doi.org/10.1086/705716>
- Agrawal, A., Gans, J., & Goldfarb, A. (2022). *Prediction machines: The simple economics of artificial intelligence* (Updated ed.). Harvard Business Review Press.
- Brynjolfsson, E., Rock, D., & Syverson, C. (2021). The productivity J-curve: How intangibles complement general purpose technologies. *American Economic Journal: Macroeconomics*, 13(1), 333–372. <https://doi.org/10.1257/mac.20180386>
- Calvino, F., & Fontanelli, L. (2023). A portrait of AI adopters across countries: Firm characteristics, assets’ complementarities and productivity (OECD Science, Technology and Industry Working Papers No. 2023/02). OECD Publishing. <https://doi.org/10.1787/0fb79bb9-en>
- Cazzaniga, M., Jaumotte, F., Li, L., Melina, G., Panton, A. J., Pizzinelli, C., Rockall, E., & Tavares, M. M. (2024). Gen-AI: Artificial intelligence and the future of work (IMF Staff Discussion Note No. 2024/001). International Monetary Fund.
- Czarnitzki, D., Fernández, G. P., & Rammer, C. (2023). Artificial intelligence and firm-level productivity. *Journal of Economic Behavior & Organization*, 211, 188–205. <https://doi.org/10.1016/j.jebo.2023.05.008>
- European Commission. (2024). Report on the state of the Digital Decade 2024. Publications Office of the European Union. <https://digital-strategy.ec.europa.eu/en/library/report-state-digital-decade-2024>
- Eurostat. (2025, January 23). Usage of AI technologies increasing in EU enterprises [News article, dataset *isoc_eb_ai*]. European Commission. <https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20250123-3>

DIGITAL MATURITY ASYMMETRIES AMONG SMES IN SOUTH-EAST ROMANIA

Oana Roxana RADU*

Ovidius University of Constanța, Faculty of Economic Sciences, Constanța, Romania

* Corresponding author: oanaroxana.radu@365.univ-ovidius.ro | ORCID: 0009-0008-5087-4589

Abstract

Digital transformation has become a strategic priority for small and medium-sized enterprises (SMEs), yet adoption remains uneven across regions and technological domains. This study analyzes digital maturity among SMEs in South-East Romania using data collected through CITYINNOHUB, the European Digital Innovation Hub for the region, based on the European Commission's Digital Maturity Assessment (DMA) framework. The dataset includes 99 SMEs evaluated across six dimensions: Digital Business Strategy, Digital Readiness, Human-Centric Digitalisation, Data Governance, Automation and Artificial Intelligence, and Green Digitalisation.

Reliability analysis confirms strong internal consistency (Cronbach's $\alpha = 0.848$). Results reveal a structural concentration at lower maturity levels, with 90.9% of SMEs positioned within Basic and Average categories. The Friedman test shows significant differences across dimensions ($\chi^2(5) = 204.176$, $p < .001$), identifying Automation and Artificial Intelligence as the weakest dimension. Cluster analysis identifies three SME profiles: Digital Starters (70.7%), Digitally Aware firms (23.2%), and Digital Challengers (6.1%).

The findings highlight a structural gap between strategic awareness and operational digital implementation, particularly in AI adoption. The study contributes to understanding regional SME digital maturity patterns and emphasizes the role of European Digital Innovation Hubs in accelerating digital transformation and supporting AI adoption in SMEs.

Keywords: digital maturity; EDIH; cluster analysis; AI adoption; digital transformation

JEL codes: O33; L25; R11; C38

1. Introduction

Digital transformation is at the heart of the European Union's strategic agenda. The Digital Decade Policy Programme 2030 targets that more than 90% of SMEs reach at least a basic level of digital intensity and that 75% of enterprises adopt cloud, big data, or AI by 2030 (European Commission, 2021). Romania, however, continues to lag behind EU averages. Only around 27% of Romanian SMEs reach at least a basic level of digital intensity, compared to approximately 73% across the European Union. Moreover, AI adoption remains among the lowest in Europe, with approximately 5.2% of Romanian enterprises using AI technologies, compared to around 20% at EU level in 2025 (Eurostat, 2025).

European Digital Innovation Hubs (EDIHs) were established under the Digital Europe Programme as regional one-stop-shops to bridge this gap, providing SMEs with test-before-invest facilities, training, and funding access. A recent JRC State of Play report confirms that EDIH interventions generate average

score increases of 5-10 points (Carpentier et al., 2025). However, the pre-intervention baseline maturity of SMEs in this region has not been systematically documented or analysed.

The research study was conducted by the author based on the dataset provided through CiTyInnoHub EDIH services. The analysis focuses on three research questions: (1) At which official maturity level are organisations concentrated? (2) Is digital maturity uniformly distributed across DMAT dimensions, or do structural asymmetries exist? (3) Do distinct organisational profiles emerge that could inform differentiated EDIH intervention strategies?

2. Literature Review

The DMAT framework, developed by the JRC (Kalpaka, 2023), assesses digital maturity across six dimensions: Digital Business Strategy (DBS), Digital Readiness (DR), Human-Centric Digitalisation (HCD), Data Governance (DG), Automation & Artificial Intelligence (AAI), and Green Digitalisation (GD). Scores range from 0 to 100 per dimension, with an official classification into four levels: Basic (0-25), Average (26-50), Moderately Advanced (51-75), and Advanced (76-100) (EDIH Network, 2023).

Empirical studies applying the EU DMAT remain scarce. The JRC State of Play report (Carpentier et al., 2025) provides aggregate EU-level evidence that digital business strategy drives maturity at early stages, while AI and automation develop last. No published study applies the DMAT systematically to SMEs in a lagging EU region, nor investigates dimensional asymmetries using non-parametric within-sample testing. This study fills that gap.

3. Data and Methodology

3.1 Data source. The dataset comprises 99 SMEs evaluated by CITYINNOHUB at T0 (prior to EDIH intervention) between 2024 and early 2026. Data were collected through structured interviews, following the Joint Research Centre (JRC) DMA methodology. The empirical analysis was subsequently conducted by the author using IBM SPSS Statistics v31. The sample consists primarily of micro-enterprises (76.8%), followed by small enterprises (18.2%) and medium-sized firms (5.1%).

3.2 Analytical framework. Four sequential steps were conducted in SPSS. **Step 1:** Reliability Analysis (Cronbach's alpha) validated internal scale consistency. **Step 2:** Frequencies and Chi-square goodness-of-fit tested distributional departure from uniformity across official maturity levels (H1). **Step 3:** Friedman test assessed dimensional differences (H2), followed by pairwise Wilcoxon signed-rank tests with Bonferroni correction (adjusted alpha = .010) on five targeted pairs. **Step 4:** Ward hierarchical clustering (squared Euclidean distance, Z-score standardisation) determined optimal k from the dendrogram; K-Means (k=3) produced final profiles; ANOVA and Crosstabs with firm size validated the solution (H3).

4. Results and Discussion

4.1 Scale reliability. Cronbach's alpha = .848 (standardised alpha = .857, N=99, all cases valid), indicating good internal consistency. No dimension removal would improve the scale by more than .009. All six dimensions were retained.

4.2 Descriptive profile. Table 1 presents descriptive statistics for all six DMAT dimensions and the overall DMA Score.

Table 1. Descriptive Statistics — DMAT Dimensions (N = 99, South-East Romanian SMEs, T0)

Dimension	N	Mean	SD	Min	Max	Median
Digital Business Strategy	99	35.1	17.3	3	80	33.0
Digital Readiness	99	23.9	14.0	0	70	23.0
Human-Centric Digitalisation	99	36.9	23.9	0	87	32.0
Data Governance	99	26.3	20.6	0	93	23.0
Automation & AI (lowest)	99	9.4	17.7	0	100	4.0
Green Digitalisation	99	34.6	16.6	5	90	35.0
Overall DMA Score	99	27.8	14.0	5	65	25.0

Note: Red shading = lowest-performing dimension; blue = overall score. All scores on a 0-100 scale.

The overall mean DMA Score of 27.8 (SD = 14.0) places the sample at the lower boundary of the Average level. Notably, AAI records a mean of 9.4 with a median of only 4.0, indicating near-absent AI adoption, consistent with national DESI data showing 5,2% AI uptake in Romanian enterprises (Eurostat, 2025).

4.3 H1 — Maturity level distribution. Table 2 presents the distribution of SMEs across official DMAT levels.

Table 2. Distribution of SMEs Across Official DMAT Maturity Levels (EC/JRC, 2023)

Maturity Level	Score Range	N	%	Cum. %	Residual vs. Expected
Basic	0–25	50	50.5%	50.5%	+17.0 (overrepresented)
Average	26–50	40	40.4%	90.9%	+7.0
Moderately Advanced	51–75	9	9.1%	100%	–24.0 (underrepresented)
Advanced	76–100	0	0.0%	—	Absent
Total		99	100%		chi2(2)=27.697, p<.001

Note: Expected N under uniform distribution = 33.0 per level (N=99 across 3 active levels).

The Chi-square goodness-of-fit test confirmed a significant departure from uniform distribution ($\chi^2(2) = 27.697, p < .001$). Fifty SMEs (50.5%) are at the Basic level, 40 (40.4%) at Average, and only 9 (9.1%) reach Moderately Advanced. The Advanced level is completely absent — 90.9% of SMEs remain within the two lowest tiers. Contextualised against Carpentier et al. (2025), who report EDIH interventions generate +5-10 points on average, most South-East Romanian SMEs would remain below the Average threshold even after a full intervention cycle. H1 is supported.

4.4 H2 — Dimensional asymmetry. Table 3 presents Friedman rankings and Wilcoxon post-hoc results.

Table 3. Friedman Test Rankings and Wilcoxon Post-hoc Comparisons

Dimension	Mean Rank	Mean	Median	% Basic	Wilcoxon vs. AAI
Green Digitalisation	4.40	34.6	35.0	38%	Z = -7.839, p < .001
Digital Business Strategy	4.47	35.1	33.0	28%	Z = -7.774, p < .001
Human-Centric Digitalisation	4.33	36.9	32.0	36%	Z = -8.073, p < .001
Data Governance	3.32	26.3	23.0	65%	—
Digital Readiness	3.09	23.9	23.0	58%	—
Automation & AI	1.38	9.4	4.0	93%	Reference — lowest rank

Note: Friedman $\chi^2(5) = 204.176, p < .001, N = 99$. Bonferroni-corrected alpha = .010. All five targeted comparisons significant at p < .001.

The Friedman test revealed highly significant differences across the six dimensions. A clear two-tier asymmetry emerges: a primary gap isolates AAI (mean rank 1.38, median 4.0) from all other dimensions, with 92-94 of 99 firms scoring lower on AAI than on each comparator (Wilcoxon Z ranging from -7.774 to -8.073, all $p < .001$). A secondary gap separates strategic dimensions (DBS, HCD, GD) from operational-implementation dimensions (DR, DG). The strongest contrast — HCD vs. AAI ($Z = -8.073$), reveals that firms have invested in human capacity without translating it into AI adoption. H2 is fully supported.

4.5 H3 — Digital maturity profiles. Hierarchical clustering (Ward's method) on Z-standardised dimension scores identified a three-cluster solution from the dendrogram. K-Means ($k=3$, convergence at iteration 5) produced the final profiles in Table 4.

Table 4. K-Means Cluster Final Centroids and ANOVA Validation ($k = 3, N = 99$)

Dimension	C1 Digitally Aware (n=23, 23.2%)	C2 Digital Starters (n=70, 70.7%)	C3 Digital Challengers (n=6, 6.1%)	ANOVA
Digital Business Strategy	52	28	53	F=35.96, p<.001
Digital Readiness	34	18	51	F=41.43, p<.001
Human-Centric Digitalisation	64	25	69	F=70.09, p<.001
Data Governance	42	18	63	F=39.07, p<.001
Automation & AI	11	4	70	F=183.8, p<.001
Green Digitalisation	45	30	53	F=14.18, p<.001
Overall DMA Score (approx.)	~41	~21	~58	

Note: ANOVA F-values are descriptive (clusters maximise between-group differences by design). All F-tests $p < .001$. Inter-cluster distances: C1-C2 = 56.96; C1-C3 = 65.89; C2-C3 = 102.80.

Cluster 2 — Digital Starters ($n=70, 70.7%$), the dominant group, shows uniformly low scores including AAI=4, requiring fundamental EDIH support. **Cluster 1** — Digitally Aware ($n=23, 23.2%$), presents moderately elevated HCD (64) and DBS (52) but near-absent AI adoption (AAI=11), representing a strategic-operational decoupling. These firms are prime candidates for EDIH test-before-invest AI services. **Cluster 3** — Digital Challengers ($n=6, 6.1%$), shows advanced scores across all dimensions with AAI=70, the only cluster with meaningful AI integration. Remarkably, all six are micro-enterprises, suggesting digitally-native start-ups. The C2-C3 inter-cluster distance (102.8) confirms structural polarisation. Crosstabulation with firm size was non-significant ($\chi^2(4) = 7.077, p = .132$), though the linear trend ($p = .011$) indicates larger firms skew toward higher clusters. Cluster membership reflects organisational behaviour rather than size alone. H3 is supported.

5. Conclusions

This study delivers the first DMAT-based empirical diagnostic of digital maturity among SMEs in South-East Romania. Three main findings emerge with direct policy relevance.

First, 90.9% of evaluated SMEs remain within the two lowest official maturity tiers with Advanced entirely absent. Contextualised against documented EDIH intervention gains (+5-10 points), most firms would still remain below the Average threshold after a single intervention cycle, calling for sustained, multi-cycle regional strategies rather than one-off digitalisation support.

Second, Automation & AI is structurally isolated at the bottom of the dimensional hierarchy (median = 4, 93% at Basic level), directly contradicting the EU Digital Decade target of 75% AI adoption by 2030. Crucially, this AI gap coexists with comparatively higher Human-Centric Digitalisation scores, meaning the human capital for AI transition partially exists; the bottleneck is technology adoption, not people.

Third, three distinct organisational profiles enable targeted EDIH service differentiation: Digital Starters need foundational support; Digitally Aware firms are AI-ready and should receive test-before-invest AI interventions; Digital Challengers, all micro-enterprises may serve as regional digital anchors. That cluster membership is independent of firm size underscores that digital maturity is a behavioural and strategic construct, not merely a resource-capacity one.

Limitations include the cross-sectional T0-only design, sectoral concentration in tourism (24.2%), and small Cluster 3 (n=6). Future research should incorporate T1-T2 longitudinal assessments to evaluate EDIH intervention effectiveness, and extend the analysis to PSOs in the same region to examine sector-type asymmetries.

References

Carpentier, E., D'Adda, D., Nepelski, D., & Stake, J. (2025). European Digital Innovation Hubs Network's activities and customers — State of Play Report 2024. Publications Office of the EU. <https://data.europa.eu/doi/10.2760/7784020>

EDIH Network (2023). Interpretation of DMA scores for SMEs and PSOs. EDIH Network Portal. <https://european-digital-innovation-hubs.ec.europa.eu/interpretation-dma-scores-smes-and-psos>

Eurostat (2024). Towards Digital Decade targets for Europe. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Towards_Digital_Decade_targets_for_Europe

Kalpaka, A. (2023). Digital Maturity Assessment (DMA) Framework and Questionnaires for SMEs/PSOs. JRC133234. Publications Office of the European Union. https://european-digital-innovation-hubs.ec.europa.eu/system/files/2023-11/DMA_Framework_Guidelines_for_EDIHs.pdf

Orošnjak, M., Kedziora, S., & Desloges, M. (2025). Digital Maturity of SMEs in the EU: Leaders and Laggards of Luxembourg's Manufacturing Ecosystem. *Technologies*, 13(12), 541. <https://doi.org/10.3390/technologies13120541>

THE EVOLUTION OF GREEN FINANCIAL INSTRUMENTS IN CENTRAL AND EASTERN EUROPE

Daniel – George SURDU¹

¹ Romanian Academy, School of Advanced Studies of the Romanian Academy,
Doctoral School of Economic Sciences, National Institute for Economic Research “Costin C.
Kirițescu”, Institute of National Economy, Bucharest, Romania

* Corresponding author: surdudaniel77@gmail.com

Daniel George Surdu (0009-0007-2814-2288) - ORCID

Abstract

This paper examines the evolution of green financial instruments in Central and Eastern Europe, highlighting their role in supporting the transition toward low-carbon economy. The region has experienced a gradual but uneven development of green financial instruments, driven by European Union regulatory frameworks, climate policy commitments, and increasing investor awareness of environmental, social, and governance criteria. Using a mixed-method approach that combines secondary data analysis with case studies, the research reveals that while European Union integration and access to cohesion funds have accelerated green finance development, specific challenges persist (like limited market depth, or regulatory fragmentation).

Keywords: Green Finance, EU Taxonomy, Green Transition.

1. Introduction

As the European Union intensifies its strategic commitment to achieving climate neutrality by 2050, the mobilization and efficient allocation of green capital have emerged as critical structural challenges (Voica et al. 2015; Panait et al., 2025), particularly for new member states. This research paper investigates the complex evolution of green financial instruments within a carefully selected panel of six Central and Eastern European (CEE) countries: Romania, Bulgaria, Hungary, Croatia, Slovakia, and Poland. These nations are uniquely positioned in the European landscape, sharing a common historical legacy as former command economies. Currently, they face the dual imperative of maintaining macroeconomic convergence while executing a rapid and costly decarbonization of their historically energy-intensive industrial bases (Apostu et al., 2022).

2. Literature review

The global green transition has emerged as an increasingly emphasized imperative, driven by the climate crisis, biodiversity loss, and the limits of natural resources. The specialized literature highlights that for the Paris Agreement and the Sustainable Development Goals (SDGs) to be achievable, it is necessary to

mobilize significant amounts of capital—both public and private—toward low-emission projects, renewable energy, sustainable infrastructure, and innovative technologies (Demski et al., 2025).

Green financial instruments represent the set of financial products and mechanisms designed to direct capital toward activities and projects with a positive impact on the environment and climate, contributing to decarbonization and sustainable development objectives. This category primarily includes green bonds, green loans, sustainable investment funds, climate-related insurance products, and derivatives used to manage transition and physical risks associated with climate change (ICMA, 2023; Khan et al., 2025).

From a functional perspective, green financial instruments aim to internalize environmental risks into investment decisions, reallocate portfolios toward assets aligned with green taxonomies, and mobilize private resources complementary to public financing for projects involving low carbon emissions, energy efficiency, or the circular economy (Siemionek-Ruskań et al., 2022; Neagu, 2024). Simultaneously, they play a significant role in improving transparency and sustainability reporting through specific disclosure requirements regarding the use of funds and environmental performance, thereby strengthening investor confidence and reducing the risk of "greenwashing" (Khan et al., 2021).

3. Data and Methodology

The study employs a longitudinal mixed-methods research design, specifically structured to analyze the paradigm shift between two pivotal EU financial cycles. The first period, the 2014– 2020 Multiannual Financial Framework (MFF), is characterized as an era of foundational green investments heavily dependent on public grants and cohesion policy instruments. The second period, covering the 2021– 2027 cycle, represents a transition toward "standardized sustainability," driven by the NextGenerationEU recovery mechanism and the rigorous technical implementation of the EU Taxonomy. By correlating key macroeconomic indicators, such as GDP per capita, with sectoral performance metrics—specifically the share of renewable energy in gross final consumption—the paper examines the varying effectiveness of instruments such as sovereign and corporate green bonds, green loans, and blended finance mechanisms. The research tests the hypothesis that higher GDP per capita and greater financial market maturity act as primary catalysts for the adoption of market- based green instruments, whereas lower-income states remain disproportionately reliant on non- reimbursable EU funds.

4. Results and Discussion

The findings reveal a significant divergence within the CEE region. While Poland and Hungary have demonstrated increasing sophistication in their capital markets through successful sovereign green bond issuances, countries like Romania and Bulgaria are increasingly utilizing the Recovery and Resilience Facility (RRF) to bridge critical innovation gaps related to SDG 9 (Industry, Innovation, and Infrastructure). The analysis further highlights that while the 2014–2020 cycle was essential for "hard" infrastructure (waste and water management), the current cycle focuses on "soft" transformation through digitalization and energy efficiency.

5. Conclusions

The paper concludes that administrative capacity and the alignment of national projects with the "Do No Significant Harm" (DNSH) principle remain the primary bottlenecks. The findings provide policy recommendations for optimizing the financial mix, suggesting that CEE nations must transition from passive grant absorption to active market engagement to ensure a resilient and competitive green transition.

References

- Apostu, S. A., Panait, M., Balsalobre-Lorente, D., Ferraz, D., & Rădulescu, I. G. (2022). Energy transition in non-euro countries from central and eastern Europe: evidence from panel vector error correction model. *Energies*, *15*(23), 9118.
- Demski, J., Dong, Y., McGuire, P., & Mojon, B. (2025). Growth of the green bond market and greenhouse gas emissions. *BIS Quarterly Review*, *2025*, 53-71.
- Khan, M. A., & Vismara, S. (2025). Green bond issuance and corporate environmental and financial performance: A meta-analysis. *International Review of Economics & Finance*, *102*, 104313.
- Khan, S. A. R., Yu, Z., Panait, M., Janjua, L. R., & Shah, A. (Eds.). (2021). *Global corporate social responsibility initiatives for reluctant businesses*. IGI Global.
- International Capital Market Association (ICMA), (2023), *Green Bond Principles: Voluntary Process Guidelines for Issuing Green Bonds*.
- Neagu, F., Tatarici, L., Dragu, F., & Stamate, A. (2024). Are green loans less risky? Micro-evidence from a European Emerging Economy. *Journal of Financial Stability*, *70*, 101208.
- Panait, M., Gigauri, I., & Raimi, L. (2025). *Sustainable Economic Development*. Springer.
- Siemionek-Ruskań, M., Lepczyński, B., & Fanea-Ivanovici, M. (2022). A comparative analysis of green finance awareness in Poland and Romania. *Journal of Environmental Management & Tourism*, *13*(7), 1825-1834.
- Voica, M. C., Panait, M., & Radulescu, I. (2015). Green investments—between necessity, fiscal constraints and profit. *Procedia Economics and Finance*, *22*, 72-79.

STRUCTURAL CHALLENGES OF THE EU ELECTRIC VEHICLE INDUSTRY AND THE PROSPECTS FOR CHINA–EU GREEN COOPERATION

Yanhao ZHANG

Academy of Economic Studies of Moldova, Chisinau, Moldova

zhangyanhao111@gmail.com | ORCID: 0009-0008-9809-9139

Abstract

Against the backdrop of the global energy transition, the electric vehicle (EV) industry has become a key indicator of national competitiveness in the green industrial economy. Driven by climate policies and industrial incentives, the European Union’s EV market has expanded rapidly in recent years, making it the world’s second-largest consumer market. However, Europe’s domestic industrial chain still faces structural weaknesses in critical raw materials, battery manufacturing, and core technologies, resulting in a “strong market but weak manufacturing base.” Drawing on reports from the International Energy Agency, the European Parliamentary Research Service, and EU policy documents, this study analyzes the competitiveness of the European Union EV industry from three dimensions: market structure, supply-chain dependence, and industrial policy. It also examines the impact of the EU Automotive Industry Action Plan 2025 on the restructuring of the regional automotive value chain. The findings indicate that the EU seeks to enhance industrial autonomy through a dual strategy of internal innovation investment and external regulatory instruments. While this approach aims to strengthen technological capacity and supply security, it also intensifies institutional competition with external partners. In this context, China–EU EV relations reflect a pattern of supply-chain interdependence combined with regulatory defense. The study concludes that despite increasing competitive pressures, there remains scope for pragmatic cooperation through industrial investment, technological collaboration, and regulatory dialogue.

Keywords: Electric vehicle industry; EU industrial policy; supply chain security; China–EU relations; green transition.

JEL codes : F13; L62; Q42; L52

1. Introduction

Against the backdrop of the deepening global energy transition and climate governance, the electric vehicle (EV) industry has become a key sector of green industrial development. Through the European Green Deal and the objective of phasing out the sale of internal combustion engine vehicles by 2035, the European Union has accelerated transport electrification, allowing Europe to rapidly emerge as a major global EV market (European Commission, 2022). According to the International Energy Agency, global EV sales continued to grow in 2024, with China accounting for about 60% of total sales and Europe around 25%, making it the world’s second-largest EV consumer market (International Energy Agency, 2024).

However, despite expanding demand, the EU EV industry still faces structural limitations in manufacturing capacity and supply chains. While Europe’s traditional automotive sector retains advantages in brands and market presence, it remains dependent on external suppliers for power batteries, critical materials, and intelligent technologies (Van Wieringen, 2024). Chinese firms hold strong advantages across the battery value chain—from raw material processing to battery production and technological upgrading—placing the EU under increasing pressure regarding supply-chain security and industrial competitiveness during the green transition.

In response, the EU has introduced several industrial policies, including the EU Automotive Industry Action Plan 2025, aimed at strengthening industrial competitiveness through increased investment in research and innovation, infrastructure development, and trade-defense instruments (European Commission, 2025). In this context, China–EU relations in the EV sector increasingly reflect a pattern in which cooperation and competition coexist. This article analyzes the EU EV industry’s structural challenges and policy responses and explores their implications for China–EU cooperation in the green transition.

2. Literature Review

Research on the competitiveness of the European Union electric vehicle (EV) industry generally focuses on three main dimensions: industrial structure, supply-chain dependence, and policy competition.

First, from the perspective of the global industrial landscape, Europe has experienced rapid growth in EV demand but relatively limited production capacity. Studies by the European Parliamentary Research Service indicate that China has become the world’s largest EV producer, supported by a highly integrated industrial chain supplying the global market, while Europe is still restructuring its industrial value chain (Van Wieringen, 2024).

Second, regarding supply chains, existing research highlights the EU’s reliance on imported critical raw materials. Europe has limited reserves of key minerals such as lithium, cobalt, and nickel, resulting in strong import dependence that constrains the expansion of domestic battery manufacturing capacity (Koesse et al., 2025; Triantafyllou et al., 2025).

Third, at the policy level, scholars note that the EU is strengthening supply-chain security through industrial policy. Regulatory frameworks such as the Critical Raw Materials Act and the EU Battery Regulation aim to enhance resource security, while trade-defense instruments are used to manage external competition (European Commission, 2023).

Overall, existing studies have identified the structural challenges facing the EU EV industry; however, systematic analysis of policy effectiveness and the dynamics of China–EU industrial interaction remains limited. This article therefore adopts an integrated perspective combining policy analysis and industrial structure to examine the EU EV industry’s structural constraints and their implications for China–EU relations.

3. Data and Methodology

This study adopts a combined approach of policy analysis and industrial data analysis. The data sources primarily include global electric vehicle market statistics published by the International Energy Agency, as well as statistical information from reports by the European Parliamentary Research Service and policy documents issued by the European Commission, which are used to examine the global structure

of the EV industry and evolving trade patterns. Methodologically, the analysis is conducted at three levels: the structure of the global EV market and the position of the European Union; trade flows in the battery value chain and related supply-chain dependencies; and the impact of EU industrial policies on the competitive landscape. Through this analytical framework, the study systematically evaluates the current competitiveness of the EU EV industry and the direction of its policy adjustments.

4. Results and Discussion

4.1 Structural Contradictions in the EU Electric Vehicle Industry

In recent years, the European electric vehicle (EV) market has expanded rapidly under policy incentives and carbon-emission regulations. However, growing demand has not been fully matched by domestic industrial capacity. Europe has become a major global EV consumer market, yet its manufacturing capability still lags behind that of China. In the battery value chain, Chinese firms dominate battery production and raw-material processing, while Europe remains dependent on imports in these segments. In addition, Europe has limited reserves of critical minerals, posing further challenges to supply-chain security. As a result, the EU EV industry displays a structural imbalance characterized by strong market demand but relatively weak industrial supply.

4.2 The EU’s Industrial Policy Response

To address these challenges, the European Union has introduced policy measures to strengthen industrial competitiveness. Internally, it promotes industrial upgrading through R&D funding, battery investment, and the expansion of charging infrastructure. The EU Automotive Industry Action Plan 2025 emphasizes advancing battery technology, expanding EV infrastructure, and reskilling the workforce. Externally, the EU employs trade-defense instruments and supply-chain diversification strategies—such as anti-subsidy investigations, foreign investment screening, and “friend-shoring”—to reduce reliance on single-country supply chains. Overall, the EU seeks to advance industrial restructuring through a dual strategy of internal innovation and external regulatory measures.

4.3 China–EU Industrial Relations: Competition and Cooperation

In the context of expanding EU industrial policies, China–EU relations in the EV sector show a complex pattern. On the one hand, China holds significant advantages in battery technology and supply chains, and the EU continues to rely on Chinese production networks in the short term. On the other hand, the EU is strengthening domestic supply-chain security through industrial and regulatory policies to reduce external dependence. As a result, China–EU EV relations increasingly reflect a dual structure in which market interdependence coexists with institutional competition.

5. Conclusions

The rapid development of the European electric vehicle (EV) industry reflects the industrial opportunities created by the green transition; however, significant structural weaknesses remain. Dependence on critical raw materials, limited battery manufacturing capacity, and relatively slow technological upgrading place the European Union in a relatively constrained position within global EV competition.

To address these challenges, the EU has strengthened industrial investment and supply-chain security through policy initiatives such as the EU Automotive Industry Action Plan 2025, forming an industrial

governance framework characterized by “internal innovation and external regulatory instruments.” While this policy approach aims to enhance industrial competitiveness, it also contributes to the growing competition over global rules in the green industrial transition.

In this context, China–EU relations in the EV sector increasingly display a pattern of coexistence between competition and cooperation. Looking ahead, China and the EU should deepen cooperation through industrial investment, technological coordination, and regulatory dialogue in order to build a mutually beneficial framework for green industrial collaboration and support the global energy transition.

References

1. European Commission. (2022, October 27). *CO₂ emission standards for cars and vans: Council and Parliament reach provisional agreement*. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6462
2. European Commission. (2023). *Critical raw materials act*. https://commission.europa.eu/topics/competitiveness/green-deal-industrial-plan/european-critical-raw-materials-act_en
3. European Commission. (2025, March 5). *Commission boosts European automotive industry’s global competitiveness*. https://ec.europa.eu/commission/presscorner/detail/en/ip_25_635
4. International Energy Agency. (2024). *Trends in electric cars*. In *Global EV outlook 2024*. <https://www.iea.org/reports/global-ev-outlook-2024/trends-in-electric-cars>
5. Koese, M., Parzer, M., Sprecher, B., & Kleijn, R. (2025). *Self-sufficiency of the European Union in critical raw materials for E-mobility*. *Resources, Conservation and Recycling*, 212, 108009. <https://doi.org/10.1016/j.resconrec.2024.108009>
6. Triantafyllou, V., Cheng, A., & Spiller, B. (2025). *Corporate due diligence, auto industry, and battery supply chains*. *Resources for the Future*. <https://www.rff.org/publications/reports/corporate-due-diligence-auto-industry-and-battery-supply-chains/>
7. Van Wieringen, K. (2024). *The future of European electric vehicles: Four scenarios*. European Parliamentary Research Service. [https://www.europarl.europa.eu/RegData/etudes/IDAN/2024/762873/EPRS_IDA\(2024\)762873_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2024/762873/EPRS_IDA(2024)762873_EN.pdf)

GREEN ECONOMY AND SUSTAINABLE DEVELOPMENT INTERACTION: A POLITICAL ECONOMY ANALYSIS OF EUROPEAN UNION COUNTRIES

Ronayi YITIK^{1*}; Halil Ibrahim AYDIN²

¹ University of Leuphana, Department of Public Affairs and Economics, Lüneburg, Germany

² University of Batman, Faculty of Economics and Administrative Sciences, Department of Economics, Batman, Turkey

* Corresponding author: ronayi.yitik@stud.leuphana.de

Abstract

This study investigates how the green economy and sustainable development interact across European Union member states, drawing on a political economy framework. The European Green Deal has repositioned climate neutrality, renewable energy, circular production, and inclusive growth as the defining goals of EU economic policy. This paper argues that the green economy is not simply an environmental undertaking. It is shaped just as much by political choices, institutional capacity, inherited market structures, and the social and regional inequalities that vary considerably across member states.

The analysis draws on a systematic review of academic literature alongside comparative qualitative policy analysis. A selection of member states was examined comparatively, chosen because they represent genuinely different economic development levels, energy systems, and institutional settings. The study looks at green economic policies through three dimensions: economic, social, and environmental, with particular focus on how these interact rather than operate in isolation.

What the analysis finds is that the benefits and costs of green transition are distributed very unevenly. Wealthier, institutionally stronger member states are better positioned to capture the economic gains, while others face structural constraints, higher adjustment costs, and considerable public resistance. The just transition framework within the European Green Deal recognizes this challenge, but putting it into practice has been uneven.

Keywords: Green Economy; Sustainable Development; European Union

1. Introduction

Climate change is no longer a future problem. It is a present one, and governments are increasingly expected to do something about it. The pressure to act is real, and so is the pressure to make sure that action does not come at the cost of people's livelihoods and economic security. For the European Union, the launch of the European Green Deal in 2019 marked a genuine shift in direction, bringing environmental sustainability into the core of how the bloc thinks about its economic future. But getting to a green economy isn't just about using the right technologies or setting the right goals. It happens in political and institutional settings that are very different from one member state to the next. This is because of competing national interests, different levels of economic development, and deeply ingrained social structures.

This paper analyzes the interplay between the green economy and sustainable development among EU member states, utilizing a political economy framework. The main argument is that the green economy is not just environmental policies, but an economic and political project; and how fairly the costs and

benefits of transition are shared. The study seeks to provide a comprehensive analysis of the translation of green economic policies into sustainable development outcomes within a union characterized by significant variability in capacities and circumstances.

2. Literature Review

Cheba et al. (2022) utilized OECD green growth indicators and the TOPSIS method to evaluate EU countries, revealing that member states exhibit significantly divergent paths in their green transformation. Some have made a lot of progress, while others are still behind. This shows that there are structural differences that EU-level targets tend to hide. Filipovic et al. (2022) express a pertinent concern: the European Green Deal, in its present formulation, may overlook the social dimension of sustainability. If we don't make a conscious effort to balance all three dimensions, the transition could make environmental indicators better while quietly hurting social fairness. Agan (2024), working with panel quantile regression data from 25 EU countries between 2000 and 2021, finds that green energy reliably reduces carbon dioxide emissions, though the effects of green technology are distributed unevenly across the income distribution of countries.

The comparative political economy literature enhances these findings. Bailey (2024) and Smolenska (2025) demonstrate that the configuration of a nation's capitalist model, its prevailing growth strategy, and its institutional framework significantly influence the progression of sustainability transitions. Green policies don't just happen on their own; they work with other systems in ways that lead to very different results in each member state. Healy and Barry (2017) advocate for the explicit integration of energy justice with just transition frameworks, whereas Jessop (2012) contextualizes green policy within the larger framework of economic and ecological crisis management.

3. Data and Methodology

This research does not depend on quantitative datasets. It adopts a conceptual framework based on a systematic review of academic literature and a comparative analysis of essential EU policy documents and institutional reports. The European Green Deal Communication, the Just Transition Fund Regulation, the European Environment Agency's report on just sustainability transitions, 2024, and the EIB Investment Report 2024/2025 are all primary sources. These sources give the analysis both a policy context and real-world evidence.

Green economic policies are looked at through the three main areas of sustainable development: economic, social, and environmental. The focus is not on each area in isolation, but on how they connect and shape each other depending on how a country is governed. A number of EU member states are compared, selected because they differ clearly in terms of income levels, energy use, and how their institutions work. The analysis pays close attention to how EU bodies and national governments work together, how just transition plans are built and carried out on the ground, and how the financial gains and burdens of going green are spread across different parts of Europe. The underlying question throughout is simple: under what conditions does green economic policy actually help all people and regions, rather than mostly benefiting those who were already in a stronger position to begin with?

4. Results and Discussion

The green transition in the EU is, at its core, a political process. Technology matters, of course, and so do environmental targets. But what this study shows is that neither of these is enough on its own. Who holds power, how strong national institutions are, and how the costs of change are shared across countries, these things shape the transition just as much as any climate goal. And if the people bearing the heaviest burden end up falling further behind, cutting carbon emissions alone will not amount to real progress.

Richer countries simply have a head start. They already have the money, the technology, and the institutions needed to act quickly and take advantage of the opportunities that come with the green transition. For less developed countries, the situation is very different. They often lack these resources, which makes the shift more difficult and costly. As a result, they have far less flexibility in how they can respond and adapt.

What all of this adds up to is quite straightforward: The green transition will not succeed if it keeps being treated as a technical problem with a technical solution. The economic systems across EU member states are genuinely different from each other, and those differences matter enormously for how green policies land in practice. Social cohesion is not a bonus feature to be added later. It either gets built into the transition from the start, or it becomes the reason the transition stalls.

When it comes to policy, coordination between Brussels and national governments is important, but what matters even more is whether that coordination actually produces something tangible for the workers, firms, and communities going through the hardest part of this shift. There are also still many things this study could not fully answer.

5. Conclusions

This paper examines how the green economy and sustainable development interact in selected EU member states. The green transition is not just an environmental process; it is a political and economic one. The outcome depends on institutional conditions, governance capacity, and distributional choices.

The main implication is that policymakers need to get more serious about who carries the costs of the green transition. Improving coordination and translating this coordination into support that reaches firms, workers, and communities. Just the transition framework needs to be improved and applied more consistently across members.

This study has limitations; it does not rely on quantitative data, and the comparative analysis covers a selection of member states.

References

- Agan, B. (2024). Sustainable development through green transition in EU countries: New evidence from panel quantile regression. *Journal of Environmental Management*, 365, Article 121545.
- Bailey, D. (2024). The comparative political economy of sustainability transitions: Varying obstacles, accelerants and power in national capitalisms. *Environmental Innovation and Societal Transitions*, 51, Article 100853.

- Cheba, K., Bąk, I., Szopik-Depczyńska, K., & Ioppolo, G. (2022). Directions of green transformation of the European Union countries. *Ecological Indicators*, 136, Article 108601.
- European Commission. (2019). Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: The European Green Deal (COM (2019) 640 final).
- European Commission. (2021). Regulation (EU) 2021/1056 of the European Parliament and of the Council of 24 June 2021 establishing the Just Transition Fund. *Official Journal of the European Union*, L 231, 1-20.
- European Environment Agency. (2024). Just sustainability transitions: From concept to practice (EEA Report No. 12/2024).
- European Environment Agency. (2025). Europe's environment 2025: Thematic briefings - Justice in sustainability transitions.
- European Investment Bank. (2025). EIB Investment Report 2024/2025: Innovation, integration and simplification in Europe.
- European Investment Bank Group. (2025). EIB Group Sustainability Report 2024.
- Filipović, S., Lior, N., & Radovanović, M. (2022). The green deal - just transition and sustainable development goals Nexus. *Renewable and Sustainable Energy Reviews*, 168, Article 112759.
- Healy, N., & Barry, J. (2017). Politicising energy justice and energy system transitions: Fossil fuel divestment and a just transition. *Energy Policy*, 108, 451-459.
- Jessop, B. (2012). Economic and ecological crises: Green new deals and no-growth economies. *Development*, 55(1), 17-24.
- Smoleńska, A. (2025). European capitalisms in sustainability transition: The case of green bonds. *Journal of European Public Policy*. Advance online publication.

AI-POWERED IOT SYSTEMS FOR REAL-TIME MONITORING OF INDUSTRIAL CIRCULAR FLOWS AT THE TERRITORIAL SCALE: AN ARCHITECTURAL FRAMEWORK

Koudoua FERHATI^{1*}, Yakhlefoune Manel²

^{1,2}Centre de Recherche en Aménagement du Territoire, Constantine, Algeria

* Corresponding author: koudoua.ferhati@crat.dz | ORCID: 0000-0003-3733-7718

Abstract

The accelerating urgency of the green transition demands robust digital infrastructures capable of tracking industrial resource flows with precision and scalability. Current monitoring approaches remain fragmented, relying on static reporting systems and conventional SCADA-based rule logic that fail to capture the dynamic complexity of circular material cycles. This paper proposes CF-Monitor, an integrated three-layer architectural framework combining Internet of Things (IoT) sensor networks with Artificial Intelligence (AI) algorithms to enable real-time monitoring of energy, water, and material flows within industrial ecosystems. The framework encompasses a LoRaWAN/NB-IoT physical sensing layer, an edge computing processing layer running Random Forest and LSTM-based anomaly detection models, and a cloud analytics layer producing circular economy performance indicators aligned with ISO 14031 standards. Simulation-based validation was conducted in Python using a synthetic dataset of 164,700 industrial flow readings across five material categories: metals, plastics, organic waste, water, and energy, constructed from European industrial symbiosis network parameters and Algerian industrial zone baseline data. System performance was benchmarked against a rule-based SCADA baseline using F1-score, processing latency, and energy efficiency metrics. Results demonstrate that the AI-enhanced IoT framework achieves a 34% improvement in flow anomaly detection accuracy and a 41% reduction in data processing latency compared to the SCADA baseline. These findings establish smart industrial monitoring as a foundational technical enabler of circular economy transitions, with direct implications for designing data-driven green transition policy instruments at the territorial scale.

Keywords: IoT architecture; AI monitoring; circular flows; industrial ecology; green transition

JEL codes : O33 ; Q55 ; L60 ; C63 ; R11

1. Introduction

Traditional industrial resource tracking, relying on periodic audits, manual reporting, and legacy supervisory systems, is increasingly inadequate to meet the real-time informational requirements of circular economy governance. As industrial systems grow in complexity, the inability to monitor material, water, and energy flows dynamically constitutes a critical institutional bottleneck that undermines both regulatory effectiveness and corporate environmental performance.

The convergence of the Internet of Things (IoT) and Artificial Intelligence (AI) presents a transformative opportunity. IoT sensor networks continuously capture granular data across industrial value chains, while AI algorithms process these streams to generate actionable intelligence in real time. Despite advances in both fields independently, their integrated application to circular economy monitoring remains underexplored, particularly at the policy-to-technology interface.

This paper addresses this gap by pursuing three objectives: (1) designing a scalable IoT-AI monitoring architecture for industrial circular economy requirements; (2) validating the framework through simulation; and (3) drawing implications for the integration of smart monitoring into green transition policy instruments.

2. Literature Review

Kirchherr et al. (2017) and Geissdoerfer et al. (2017) established broad theoretical foundations for the circular economy, while Mayer et al. (2019) highlighted that the absence of real-time monitoring mechanisms remains the critical gap between circular economy ambitions and measurable outcomes. Existing material flow accounting (MFA) methods provide useful static snapshots but cannot address dynamic monitoring demands.

On the technical side, Sisinni et al. (2018) reviewed IIoT architectures emphasizing scalability and interoperability, and Agrawal et al. (2021) demonstrated edge computing's role in reducing latency for time-sensitive industrial sensing. Regarding AI applications, Bonilla et al. (2022) confirmed the superiority of ML-based anomaly detection over rule-based SCADA systems, while Liao et al. (2023) showed that AI-processed IoT data can be integrated directly into regulatory compliance dashboards.

Three gaps persist: (1) no integrated end-to-end framework coupling IoT sensing with AI analytics for circular flow monitoring; (2) insufficient attention to the policy-technology interface; and (3) limited validation under realistic industrial conditions. This paper addresses all three.

3. Data and Methodology

3.1 CF-Monitor Framework Architecture

The framework operates across three layers:

Layer 1: Physical Sensing: Distributed IoT nodes (flow meters, spectrometric sensors, RFID trackers) deployed at material intake, production lines, waste sorting, and discharge points, operating on LoRaWAN and 5G NB-IoT protocols.

Layer 2: Edge Computing: Lightweight ML models (Random Forest, LSTM-based detectors) perform real-time anomaly detection and data compression locally, achieving sub-second alert response times.

Layer 3: Cloud Analytics: Deep learning models (CNN, Transformer architectures) compute circular performance indicators and generate automated reports aligned with ISO 14031 environmental performance evaluation standards.

3.2 Dataset and Validation

A synthetic industrial waste flow dataset was constructed based on European industrial symbiosis network data (SYMBIOSIS project, 2021) supplemented with Algerian industrial zone parameters (CRAT, 2023), totalling 164,700 daily flow readings across 5 material categories over 18 months. Performance was evaluated on three metrics: anomaly detection accuracy (F1-score), processing latency (ms/record), and sensing network energy efficiency (kWh/node/day), benchmarked against a conventional SCADA system using paired t-tests and Wilcoxon signed-rank tests.

4. Results and Discussion

The CF-Monitor framework achieved an average F1-score of 0.91 versus 0.67 for the SCADA baseline (a 34% improvement) with the largest gains in organic waste (+49.2%) and plastics (+45.9%), where non-linear flow patterns are least amenable to rule-based detection.

Material Category	SCADA Baseline	CF-Monitor	Improvement
Metals	0.72	0.93	+29.2%
Plastics	0.61	0.89	+45.9%
Organic Waste	0.59	0.88	+49.2%
Water	0.75	0.94	+25.3%
Energy	0.70	0.91	+30.0%
Average	0.67	0.91	+34.0%

Edge-layer processing reduced latency to 18 ms/record from 31 ms in a cloud-only configuration (−41%), enabling near-instantaneous regulatory alerts. Energy consumption averaged 0.08 kWh/node/day, within acceptable industrial IoT deployment thresholds. The cloud analytics layer further generated seven standardized circular economy indicators aligned with Eurostat's material flow accounts, confirming the framework's direct applicability to evidence-based policy reporting.

These results confirm that AI integration is not merely incremental but structurally transformative for circular monitoring, and that edge computing is a viable architectural choice for real-time industrial governance.

5. Conclusions

The CF-Monitor framework demonstrated substantial performance gains over conventional SCADA systems and established a functional interface between technical monitoring and green policy reporting. Theoretically, it bridges a gap in the IIoT and circular economy literatures by providing a fully integrated, policy-aware monitoring architecture. Practically, it offers industrial operators a tool for automated environmental compliance and provides policymakers with a model for institutionalizing smart monitoring within green transition strategies.

Limitations include reliance on simulated data and the absence of a cost-benefit analysis. Future work should focus on live field deployment, supply-chain-level extension, integration with national environmental information systems, and adaptation for emerging economy contexts, particularly North African industrial territories where monitoring infrastructure gaps remain acute.

References

- Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The circular economy — A new sustainability paradigm? *Journal of Cleaner Production*, 143, 757–768. <https://doi.org/10.1016/j.jclepro.2016.12.048>
- Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127, 221–232. <https://doi.org/10.1016/j.resconrec.2017.09.005>

Mayer, A., Haas, W., Wiedenhofer, D., Krausmann, F., Nuss, P., & Blengini, G. A. (2019). Measuring progress towards a circular economy: A monitoring framework for economy-wide material loop closing in the EU28. *Journal of Industrial Ecology*, 23(1), 62–76. <https://doi.org/10.1111/jiec.12809>

Sisinni, E., Saifullah, A., Han, S., Jennehag, U., & Gidlund, M. (2018). Industrial Internet of Things: Challenges, opportunities, and directions. *IEEE Transactions on Industrial Informatics*, 14(11), 4724–4734. <https://doi.org/10.1109/TII.2018.2852491>

Xu, L. D., Xu, E. L., & Li, L. (2018). Industry 4.0: State of the art and future trends. *International Journal of Production Research*, 56(8), 2941–2962. <https://doi.org/10.1080/00207543.2018.1444806>

Zhao, Y., Nasrullah, Z., & Li, Z. (2019). PyOD: A Python toolbox for scalable outlier detection. *Journal of Machine Learning Research*, 20(96), 1–7. <https://jmlr.org/papers/v20/19-011.html> Ellen MacArthur Foundation. (2013). *Towards the circular economy: Economic and business rationale for an accelerated transition* (Vol. 1). Ellen MacArthur Foundation. <https://www.ellenmacarthurfoundation.org/towards-the-circular-economy>

European Commission. (2015). *Closing the loop — An EU action plan for the circular economy* (COM/2015/0614). Publications Office of the EU. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614>

European Commission. (2020). *Circular Economy Action Plan: For a cleaner and more competitive Europe* (COM/2020/98). Publications Office of the EU. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:98:FIN>

THE RELATIONSHIP BETWEEN RENEWABLE ENERGY AND URBANIZATION: AN ASSESSMENT ON ROMANIA

Ömer DEMİRHAN¹; Halil İbrahim AYDIN^{2*}

¹Batman University, Institute of Graduate Studies, Faculty of Economics and Administrative Sciences,
Department of Economics, Batman, Türkiye

²Batman University, Faculty of Economics and Administrative Sciences, Department of Economics,
Batman, Türkiye

Corresponding author: dmrhomer@gmail.com | ORCID: 0009-0007-6604-9930

Abstract

Modern civilization is built upon cities, and as the rate of urbanization increases, so does the demand for energy. This increased energy demand creates profound macroeconomic vulnerabilities in political, economic, social, and environmental areas, especially for countries that lack fossil fuel resources. The aim of this study is to analyze the relationship between urbanization and green energy transition within the framework of the European Green Deal, using Romania as an example. In this context, based on findings in the literature, there is a consensus that the increase in urbanization directly triggers fossil fuel consumption, leading to severe environmental degradation. Furthermore, it is found that this destruction caused by urbanization is not limited to ecological problems but also negatively impacts the health and quality of life of the population; conversely, renewable energy integration plays a mitigating role in reducing these negative externalities. This study demonstrates that national energy policies alone are insufficient for sustainable urban growth in Romania; in addition, a holistic approach that encourages financial markets to invest in green energy is necessary.

Keywords: Renewable Energy, Urbanization, Romania

1. Introduction

Since the Industrial Revolution, not only has industrial output increased, but urbanization has also increased in parallel. However, this increase in industry and urbanization has led to a number of negative environmental externalities (IPCC, 2021). Over the past centuries, these environmental externalities have accumulated, causing climate change, and the effects of climate change have not been limited to the environment alone. These effects have also caused undesirable and profound damage to the health of humans and other living beings (WHO, 2021). Therefore, major supranational institutions and organizations around the world have had to combat this vital process. In this context, the Paris Agreement on Climate Change (2015), adopted by the United Nations (UN), forms the basis of this fight against climate change, aiming to limit the increase in global temperatures (United Nations, 2015)

In this global context, Romania, a developing European country, aims for both economic growth and compliance with the Green Deal, a strict set of policies announced by the European Commission (2019) (European Commission, 2019) to combat climate change and achieve zero carbon emissions.

Considering that economic growth, urban growth, and carbon emissions often increase in the same direction, this contradictory situation necessitates an alternative solution in terms of economic growth and environmental sustainability. Therefore, countries like Romania that want stable growth are obliged to use different policy mixes to achieve their economic goals. For these reasons, Romania is investing in renewable energy.

This study, which examines the relationship between urbanization and renewable energy in Romania through a literature review, attempts to investigate this relationship. It focuses on this area due to the limited literature review on this topic and aims to fill this gap. Furthermore, it aims to provide an academic output that can be evaluated by policymakers.

2. Literature Review

The relationship between renewable energy consumption, urbanization, and economic growth is a frequently discussed research topic in developing countries. This relationship is framed around two main perspectives, and these studies have utilized various time series and panel data analysis methods, including ARDL, FMOLS, DOLS, NARDL, and VECM.

One group of studies argues that the urbanization process increases energy consumption and deepens environmental degradation through carbon emissions. Rehman et al. (2022a), applying ARDL, FMOLS, and CCR methods to Romanian data from 1990-2020, stated that renewable energy consumption and urbanization have a negative impact on economic growth. Similarly, Ceausescu et al. (2025), using the ARDL method for the period 1990-2022, found that urbanization has a significant increasing effect on emissions. In the context of developing countries, Sadorsky (2014), using panel data analysis covering 18 countries, emphasized that income growth and industrialization increase energy demand, contradicting sustainability goals. Furthermore, Sufyanullah et al. (2022) confirmed a positive relationship between urbanization and carbon emissions specifically in Pakistan using the ARDL-VECM method.

On the other hand, another perspective argues that the use of renewable energy plays a role in reducing emissions and supporting growth. Ceausescu et al. (2025), in the same study, stated that renewable energy consumption and trade reduce carbon emissions, while Rehman et al. (2022b), in their NARDL analysis of the Maldives, showed that urbanization can reduce emissions under certain conditions. Aceleanu et al. (2018) demonstrated, using linear regression, that increased use of renewable energy in rural Romania reduced import dependence and carbon emissions. Shahbaz et al. (2020), using a combination of FMOLS and DOLS methods, showed that renewable energy had a positive impact on growth in 58% of the countries studied. Troster et al. (2018), in their study using panel data analysis for European countries, found a bidirectional relationship between economic growth and renewable energy.

3. Data and Methodology

After reviewing the relevant literature, explanatory variables regarding the relationship between renewable energy and urbanization were identified, and open data sources, primarily Eurostat, were utilized. The study focused on Romania, the subject of this research, as well as the general situation

within the European Union. Comparative statistical analysis was conducted based on the collected data. Both theoretical and statistical assessments of Romania were presented.

4. Results and Discussion

The positive impact of urbanization and economic growth on carbon emissions has been clearly demonstrated by several studies in the literature. Economic growth has been a key factor in the increase of urbanization; the combination of these two situations has resulted in environmental externalities and increased carbon emissions (Ceausescu et al., 2025; Sadorsky, 2014; Sufyanullah et al., 2022). At this point, a review of the literature reveals that renewable energy emerges as an alternative path without compromising economic growth and urbanization (Aceleanu et al., 2018; Shahbaz et al., 2020).

However, not all studies in the literature have found one-way positive or negative relationships. Some studies have found bidirectional relationships with economic growth. This shows that the relationship between renewable energy and economic growth is not always the same everywhere (Rehman et al., 2022a; Troster et al., 2018).

5. Conclusions

This study demonstrates that urbanization and economic growth have an amplifying effect on carbon emissions, posing serious risks to environmental sustainability. However, the literature indicates that renewable energy will mitigate these negative externalities. Nevertheless, this transformation has short-term economic costs.

Considering the environmental cost of urbanization, renewable energy emerges as a viable alternative. Romania is simultaneously trying to comply with the EU's strict emission policies and seeking economic growth. This creates a contradiction for Romania. Policymakers in Romania should design a new holistic policy set where the public and financial markets work together. This policy should make renewable energy investment attractive for financial markets but also require active public participation.

Ultimately, Romania's path to economic growth without compromising its compliance with the EU's Green Deal will be determined by whether it can create a holistic renewable energy policy set that encourages both public participation and financial market engagement.

References

- Aceleanu, M. I., Șerban, A. C., Țîrcă, D. M., & Badea, L. (2018). The rural sustainable development through renewable energy. The case of Romania. *Technological and Economic Development of Economy*, 24(4), 1408–1434.
- Ceausescu, A. I., Alecsioiu, O. R., Panagoret, A. A., Chirculescu, M. F., Panagoret, D. M., & Nitu, R. V. (2025). Electricity generation from fossil fuels and environmental sustainability in Romania: Investigating the influence of renewable energy, financial development and urbanization. *Applied Economics*. <https://doi.org/10.1080/00036846.2025.2494766>

European Commission. (2019). The European Green Deal. COM(2019) 640 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2019:640:FIN>

IPCC. (2021). Climate change 2021: The physical science basis. Cambridge University Press.

Rehman, A., Radulescu, M., Cismaş, L. M., Cismaş, C. M., Chandio, A. A., & Simoni, S. (2022a). Renewable energy, urbanization, fossil fuel consumption, and economic growth dilemma in Romania: Examining the short- and long-term impact. *Energies*, 15(19), 7180.

Rehman, A., Radulescu, M., Cismaş, L. M., Alvarado, R., Secara, C. G., & Tolea, C. (2022b). Urbanization, economic development, and environmental degradation: Investigating the role of renewable energy use. *Sustainability*, 14(15), 9337.

Sadorsky, P. (2014). The effect of urbanization and industrialization on energy use in emerging economies: Implications for sustainable development. *American Journal of Economics and Sociology*, 73(2), 392–409.

Shahbaz, M., Raghutla, C., Chittedi, K. R., Jiao, Z., & Vo, X. V. (2020). The effect of renewable energy consumption on economic growth: Evidence from the renewable energy country attractive index. *Energy*, 207, 118162.

Sufyanullah, K., Ahmad, K. A., & Ali, M. A. S. (2022). Does emission of carbon dioxide is impacted by urbanization? An empirical study of urbanization, energy consumption, economic growth and carbon emissions – Using ARDL bound testing approach. *Energy Policy*, 164, 112908.

Troster, V., Shahbaz, M., & Uddin, G. S. (2018). Renewable energy, oil prices, and economic activity: A Granger-causality in quantiles analysis. *Energy Economics*, 70, 440–452.

United Nations. (2015). Paris agreement. UNFCCC. https://unfccc.int/sites/default/files/english_paris_agreement.pdf

WHO. (2021). Air pollution and health. World Health Organization. <https://www.who.int/health-topics/air-pollution>

COMPARATIVE ASSESSMENT OF ESG AND CSR PRACTICES IN ROMANIA AND THE EUROPEAN UNION AFTER 2020

Robert BĂLAN,

Student PhD., Doctoral School of Economic Sciences, „Constantin Brâncuși” University of Targu Jiu,
Romania

robert.balan@e-ucb.ro

Abstract

In the current global landscape, business ethics and corporate social responsibility (CSR) have become indispensable pillars for sustainable and inclusive economic development. Organizations are increasingly expected to act not only as profit-generating entities but also as ethical and socially accountable actors contributing to environmental protection, social equity, and transparent governance .

This paper examines the conceptual foundations, emerging trends, and contemporary challenges of business ethics and CSR, with a focus on the post-2020 transformations shaped by digitalization, artificial intelligence, and environmental imperatives. Through a critical analysis of current literature and practical insights, the research identifies persistent shortcomings, such as greenwashing, limited stakeholder engagement, and fragmented governance systems.

Keywords: Business ethics, corporate social responsibility, sustainability, ESG, ethical leadership, governance, innovation.

JEL Classification:M14, M48, Q56, L26, O16

1. Introduction

The global business environment is undergoing unprecedented transformation shaped by technological innovation, social change, and environmental urgency. The rise of digitalization, artificial intelligence, and global interconnectedness has created new opportunities but also complex ethical dilemmas for organizations (Harvard Business Review, 2024).

To achieve this objective, the research is guided by the following questions:

Q1. What are the key trends and challenges shaping business ethics, CSR, and ESG practices in the post-2020 global context?

Q2. What are the main differences between Romania and the European Union in terms of ESG adoption, CSR practices, and sustainability reporting, and how can these gaps be addressed?

These questions are explored through a multidisciplinary perspective that combines insights from management theory, sustainability studies, and governance frameworks.

2. Literature Review

The literature on business ethics and Corporate Social Responsibility (CSR) has expanded significantly over the past decades, reflecting the growing importance of ethical conduct in a globalized economy.

Early contributions conceptualized business ethics as a framework of moral principles guiding organizational behavior and decision-making (Ferrell et al., 2019; Crane & Matten, 2016). Over time, this perspective evolved from a compliance-based approach toward a value-driven paradigm, emphasizing integrity, transparency, and accountability (Schwartz, 2017).

A central theoretical foundation in CSR research is provided by Carroll's (1999) Pyramid of Corporate Social Responsibility, which identifies four dimensions of responsibility: economic, legal, ethical, and philanthropic. This model has been further developed by Freeman's (1984) Stakeholder Theory, which argues that firms must consider the interests of all stakeholders, not only shareholders. Recent studies confirm that stakeholder-oriented approaches enhance corporate legitimacy and long-term performance (Jamali & Karam, 2018).

More recent research focuses on emerging challenges in the global context, particularly those associated with digital transformation and artificial intelligence. Floridi and Cowls (2019) highlight the ethical risks of algorithmic bias, data misuse, and lack of transparency in AI systems. Similarly, studies published in *Harvard Business Review* (2024–2025) underline the growing importance of digital ethics and responsible innovation in maintaining stakeholder trust.

Finally, the literature increasingly recognizes the role of ethical leadership and corporate governance in embedding CSR into organizational strategies. Brown and Treviño (2006) argue that ethical leadership shapes organizational culture and influences employee behavior, while recent studies show that companies with strong governance structures are more resilient and better positioned to respond to global crises (World Economic Forum, 2024; Eisenbeiss et al., 2023).

3. Data and Methodology

This study adopts a qualitative research approach based on a systematic and critical review of academic literature, institutional reports, and corporate analyses published between 2020 and 2025. The research examines the evolution of business ethics, Corporate Social Responsibility (CSR), and ESG practices in the global economic context. Data sources include reports from international organizations such as the OECD, the European Commission, and the World Economic Forum, as well as peer-reviewed articles from leading journals including *Journal of Business Ethics*, *Corporate Governance Review*, and *Harvard Business Review*.

In addition, the study incorporates a comparative perspective between Romania and the European Union, focusing on differences in CSR implementation, ESG reporting, and ethical governance practices. The methodological approach combines descriptive and comparative analysis, enabling the identification of key trends, structural gaps, and convergence patterns. This integrative framework supports the formulation of relevant strategic and policy recommendations for strengthening ethical governance and sustainable business performance.

4. Results and Discussion

The analysis indicates that business ethics and Corporate Social Responsibility (CSR) have become strategic components of organizational performance, particularly in the post-2020 global economic context. Companies that integrate ethical principles into their core strategies tend to demonstrate higher levels of transparency, stronger stakeholder trust, and improved long-term sustainability. However, the

degree of integration varies across contexts, with more advanced implementation observed at the European Union level compared to emerging economies such as Romania.

A key finding of this study is the strong interdependence between ethical leadership, corporate governance, and CSR effectiveness. Organizations that promote ethical leadership and embed moral values into their corporate culture show improved employee engagement, more consistent decision-making processes, and increased resilience during periods of uncertainty. This relationship appears more institutionalized within EU companies, while in Romania such practices are often less formalized and still evolving.

The analysis further highlights that the adoption of ESG (Environmental, Social, Governance) frameworks has significantly influenced how companies measure and communicate performance. At the EU level, regulatory developments have led to more standardized ESG reporting and higher transparency. In contrast, Romanian companies exhibit a more heterogeneous approach, with lower consistency in reporting practices and varying levels of alignment with international ESG standards.

Despite these advancements, persistent challenges remain across both contexts. Issues such as selective disclosure, greenwashing, and inconsistencies in reporting continue to affect the credibility of CSR initiatives. These findings suggest that while business ethics and CSR are now essential drivers of sustainable performance, their effectiveness depends on deeper integration into corporate strategies, stronger governance mechanisms, and continuous adaptation to evolving global challenges.

5. Conclusions

This paper demonstrates that business ethics and Corporate Social Responsibility (CSR) have become essential components of sustainable and competitive business practices in the global economy. The findings highlight a significant transition from compliance-based approaches to strategic integration, where ethical governance, stakeholder engagement, and social responsibility jointly shape long-term organizational performance.

The analysis shows that companies embedding ethical principles into their strategies and performance systems are better equipped to address contemporary challenges such as digital transformation, data privacy risks, and sustainability pressures. Ethical leadership emerges as a key driver of organizational culture, fostering trust, transparency, and accountability across all levels. At the same time, persistent issues such as greenwashing and inconsistent ESG reporting continue to undermine stakeholder confidence, emphasizing the need for stronger governance and verification mechanisms.

In conclusion, ethical conduct and CSR are no longer optional but fundamental drivers of resilience, legitimacy, and sustainable value creation. Future research should focus on the quantitative assessment of CSR impact and the integration of digital ethics and ESG practices in emerging economic contexts.

References

- [1] Brown, M.E. & Treviño, L.K. (2006). Ethical Leadership: A Review and Future Directions. *The Leadership Quarterly*, 17(6), pp.595–616.
- [2] Carroll, A.B. (1999). Corporate Social Responsibility: Evolution of a Definitional Construct. *Business & Society*, 38(3), pp.268–295.

-
- [3] Crane, A. & Matten, D. (2016). *Business Ethics: Managing Corporate Citizenship and Sustainability in the Age of Globalization*. Oxford: Oxford University Press.
- [4] European Commission. (2024). *Blockchain for Responsible Supply Chains: Digital Transparency for CSR*. Brussels: European Commission.
- [5] Ferrell, O.C., Fraedrich, J. & Ferrell, L. (2019). *Business Ethics: Ethical Decision-Making and Cases*. Boston: Cengage Learning.
- [6] Floridi, L. & Cowls, J. (2019). A Unified Framework of Five Principles for AI in Society. *Harvard Data Science Review*, 1(1).
- [7] Freeman, R.E. (1984). *Strategic Management: A Stakeholder Approach*. Boston: Pitman.
- [8] Harvard Business Review. (2024). *AI, Ethics, and Accountability in the Digital Age*. Boston: HBR Press.
- [9] Harvard Business Review. (2025). *Beyond Greenwashing: The Future of Corporate Accountability*. Boston: HBR Press.
- [10] Jamali, D. & Karam, C. (2018). Corporate Social Responsibility in Developing Countries. *International Journal of Management Reviews*, 20(1), pp.32–61.
- [11] OECD. (2025). *Responsible Business Conduct and Sustainable Growth: Global Outlook 2025*. Paris: OECD Publishing.
- [12] World Economic Forum. (2024). *Global Risks Report 2024: Resilience and Responsible Leadership*. Geneva: WEF.

NEURO-SYMBOLIC AI GOVERNANCE FOR CLIMATE-RESPONSIVE ECONOMIES: A REAL-TIME PREDICTIVE FRAMEWORK INTEGRATING GREEN FINANCE, URBAN DIGITAL TWINS, AND BEHAVIORAL MACROECONOMICS

Priyant BANARJEE^{1*}; Arshad BHAT²

¹Amity University Mumbai, Amity School of Engineering and Technology, Mumbai, Maharashtra, India

²Amity University Mumbai, Amity Institute of Liberal Arts, Mumbai, Maharashtra, India

* Corresponding author: priyantbanerjee@gmail.com | ORCID: 0009-0008-4752-2072

Abstract

The meeting of climate change instability, digitalization, and economic instability requires paradigm shift to intelligent system of governance. This paper presents a new framework of Neuro-Symbolic AI Governance Framework (NSAIGF) to combine real-time urban digital twins, green financial flows, and behavioral macroeconomic indicators to improve pressure on adaptive policymaking. Based on multi-source urban datasets across 142 cities in the world (2010-2025), the model integrates deep neural networks with symbolic reasoning to predict climate-related risks with a 27.4 percent reminder of the accuracy in conventional econometric models. Empirical simulations have shown that matching sovereign green bond allocations with the urban vulnerability indices predicted by AI can boost climate resilience efficiency by 31 percent and limit the loss of misallocations to some 2.8 trillion across the world in 2035. Moreover, the integration of behavioral economic signals (consumer sentiment, ESG investment trends) would increase responsiveness to the policies by 19% in the situation of a shock, e.g., extreme weather or one of the supply chain malfunctions. The model also presents an active “Policy Elasticity Index which reflects real time responsiveness of fiscal and monetary instruments to environmental shocks. This study offers scalable, interdisciplinary model that fills artificial intelligence, environmental economics and governance systems providing actionable insights to policymakers wishing to attain net-zero goals under SDG-consistent economic frameworks. The suggested system shows how AI-based governance can revolutionize the world economies, making them resilient and data-centric.

Keywords: Neuro symbolism, governance, resilience, digital twins, green finance

JEL codes: Q54; G28; O33; C45; H12

1. Introduction

The accelerating convergence of climate volatility, financial instability, and rapid digital transformation has exposed critical inefficiencies in traditional governance systems. Global climate-related economic losses have exceeded \$3.6 trillion in the past two decades, while less than 40% of climate finance has reached highly vulnerable regions, indicating severe allocation inefficiencies (Intergovernmental Panel on Climate Change, 2023; Climate Policy Initiative, 2022). Existing policy frameworks remain largely

reactive, often exhibiting response lags of 12–24 months to environmental shocks (Organisation for Economic Co-operation and Development, 2021). This study addresses these gaps by proposing a Neuro-Symbolic AI Governance Framework (NSAIGF), integrating urban digital twins, green finance flows, and behavioral macroeconomic indicators into a unified predictive system. The key contribution lies in introducing a Policy Elasticity Index to quantify real-time policy responsiveness, demonstrating how AI-driven governance can improve efficiency by over 30% and significantly enhance climate resilience outcomes.

2. Literature Review

Existing research spans three largely disconnected domains: artificial intelligence in climate modeling, green finance allocation, and behavioral macroeconomics. Deep learning models have been shown to improve climate risk prediction accuracy by 18–25%, though they often lack interpretability and policy integration (Reichstein et al., 2019). Green finance literature highlights that global green bond issuance has surpassed \$1 trillion, yet allocation inefficiencies persist due to static and fragmented risk assessment models (International Energy Agency, 2023). Meanwhile, behavioral economics studies indicate that investor sentiment and ESG trends influence financial markets by up to 15%, but remain underutilized in macroeconomic policy frameworks (Shiller, 2017). A critical gap therefore exists in integrating these domains into a cohesive governance model. This study advances the literature by combining neural computation with symbolic reasoning to enable explainable, real-time policy optimization.

3. Data and Methodology

The study employs a multi-source dataset covering 142 global cities from 2010 to 2025, incorporating over 2.5 million observations. Data sources include climate indicators from National Aeronautics and Space Administration (2023), financial flows from World Bank (2022), and behavioral indicators derived from global sentiment indices (Baker et al., 2016). The methodology adopts a hybrid neuro-symbolic architecture, where deep neural networks perform high-dimensional pattern recognition, and symbolic reasoning layers encode economic constraints and policy rules (Garcez et al., 2019). Model validation using cross-validation techniques shows a 27.4% improvement over traditional econometric benchmarks. Additionally, the Policy Elasticity Index (PEI) is defined as the ratio of policy output responsiveness to climate shock intensity, enabling real-time evaluation of governance effectiveness under dynamic environmental conditions.

4. Results and Discussion

The results reveal substantial efficiency gains across multiple dimensions. Aligning green bond allocations with AI-predicted urban vulnerability indices improves resource utilization efficiency by approximately 31%, consistent with findings on targeted climate finance strategies (United Nations Environment Programme, 2022). The framework reduces projected global misallocation losses by nearly \$2.8 trillion by 2035 under baseline scenarios. Furthermore, integrating behavioral signals enhances policy responsiveness by 19%, particularly during extreme weather shocks, supporting prior evidence on the role of sentiment-driven economic adjustments (Shiller, 2017). The Policy Elasticity Index indicates that AI-enabled governance systems respond over twice as fast as conventional fiscal mechanisms. These findings highlight the importance of combining predictive analytics with behavioral insights to create more adaptive and resilient economic systems.

5. Conclusions

The findings demonstrate that AI-integrated governance frameworks can significantly enhance the efficiency and responsiveness of climate-economic policymaking. By combining predictive modeling with explainable reasoning, the proposed Neuro-Symbolic AI Governance Framework addresses key limitations of existing approaches (Garcez et al., 2019). The model offers practical value by reducing financial inefficiencies and improving policy response times, thereby supporting global sustainability targets such as the United Nations Sustainable Development Goals (United Nations, 2015). However, limitations include data inconsistencies across regions and reliance on high-quality real-time inputs. Future research should explore decentralized data integration and expand the framework to rural and emerging economies.

References

- Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring economic policy uncertainty. *The Quarterly Journal of Economics*, 131(4), 1593–1636. <https://doi.org/10.1093/qje/qjw024>
- Climate Policy Initiative. (2022). Global landscape of climate finance 2022. <https://www.climatepolicyinitiative.org>
- Garcez, A. d'Avila, Lamb, L. C., & Gabbay, D. M. (2019). *Neural-symbolic cognitive reasoning*. Springer. <https://doi.org/10.1007/978-3-030-30508-6>
- Intergovernmental Panel on Climate Change. (2023). Sixth assessment report. <https://www.ipcc.ch>
- International Energy Agency. (2023). World energy investment 2023. <https://www.iea.org>
- National Aeronautics and Space Administration. (2023). Global climate data sets. <https://climate.nasa.gov>
- Organisation for Economic Co-operation and Development. (2021). Climate policy and fiscal response report. <https://www.oecd.org>
- Reichstein, M., Camps-Valls, G., Stevens, B., Jung, M., Denzler, J., Carvalhais, N., & Prabhat. (2019). Deep learning and process understanding for data-driven Earth system science. *Nature*, 566(7743), 195–204. <https://doi.org/10.1038/s41586-019-0912-1>
- Shiller, R. J. (2017). Narrative economics. *American Economic Review*, 107(4), 967–1004. <https://doi.org/10.1257/aer.107.4.967>
- United Nations. (2015). Transforming our world: The 2030 agenda for sustainable development. <https://sdgs.un.org>
- United Nations Environment Programme. (2022). Adaptation gap report 2022. <https://www.unep.org>
- World Bank. (2022). World development indicators. <https://data.worldbank.org>

Acknowledgements

The authors gratefully acknowledge the academic support and research environment provided by Amity University Mumbai, which facilitated the interdisciplinary development of this study. We also extend our appreciation to open-access data platforms and global research initiatives that enabled the integration of climate, financial, and behavioral datasets used in this work. Special thanks are due to peers and reviewers whose constructive insights helped refine the conceptual framework and analytical approach. No external funding was received for this study, and the research was conducted independently by the authors.

ROMANIAN CEREALS SECTOR ANALYSIS: FOOD SECURITY, IMPORT DEPENDENCE, AND SELF-SUFFICIENCY RATE IN THE PERIOD 2014–2024

Steliana MOCANU

Bucharest University of Economic Studies, Doctoral School Economics II, Bucharest, Romania
mocanusteliana18@stud.ase.ro | ORCID: <https://orcid.org/0009-0006-6385-5729>

Abstract

The paper analyzes the evolution of the agri-food balance for the main cereal crops in Romania: wheat and rye, maize, and other cereals, during the period 2014–2024, using data from the Food Balance Sheets available in the database of the National Institute of Statistics. The main objective of the study is to assess food security and safety by calculating and presenting the following indicators: descriptive statistics for production, import, export, and cultivated area; the food security and safety rate; the rate of dependence on imports; the self-sufficiency rate; the share of usable production and imports in total resources; as well as the share of exports and domestic availability for consumption in total uses. The comparative analysis by cereal category highlights significant differences regarding dependence on external markets and the capacity to meet domestic consumption. The results indicate the existence of variable imbalances over time, but also a relatively high capacity for self-sufficiency for certain crops, especially in favorable agricultural years. The study's conclusions provide a solid basis for informing agricultural and food policies, emphasizing the need to strengthen domestic production and optimize trade flows, thereby contributing to increased resilience of the Romanian agri-food sector in the context of international context and economic challenges.

Keywords: cereals crops; food security; self-sufficiency rate; import dependence rate; Romania.

JEL codes: Q11, Q17, F14

1. Introduction

Ensuring food security and sustainable agricultural production has become a critical concern for countries worldwide, especially under the pressures of climate change, economic fluctuations, and global market volatility. In Romania, cereals such as wheat, rye, and maize represent the main crops from the agricultural sector and are essential for domestic consumption, trade, and the overall stability of the agri-food system.

2. Literature Review

The analysis of cereals production, trade, and food security has been extensively studied at both global and regional levels. Previous research has examined crop yields, import dependence, self-sufficiency, and agri-food trade flows, emphasizing the impact of climate variability and international market dynamics on food security (Borah, et al., 2024; Popescu, A., 2021). Studies on Romania have often focused on single crops, specific years, or isolated indicators such as production or import levels. However, there is a lack of comprehensive, longitudinal studies that integrate multiple indicators of food security over an extended period. Furthermore, comparative analyses across different cereal types within

Romania remain limited, leaving gaps in understanding how dependence on external markets and domestic capacity vary among crops over time.

3. Data and Methodology

The study uses data specifically from the Food Balance Sheets covering the period 2014–2024. These datasets provide comprehensive information on cereals production, cultivated areas, imports, exports, and domestic availability. The analysis focuses on the following key variables for the main cereal crops (wheat, rye, maize, and other cereals): production, cultivated area, imports and exports, domestic utilization and consumption. From these, several indicators were calculated: food security and safety rate, import dependence ratio, self-sufficiency ratio, share of usable production and imports in total resources and share of exports and internal consumption in total utilization.

4. Results and Discussion

This section presents the key findings of the study, including trends in production, cultivated area, imports and exports, and food security indicators for Romania’s main cereal crops. It provides a comparative temporal analysis across cereal types and interprets the implications of these trends for domestic self-sufficiency, import dependence, and overall agri-food sector resilience.

5. Conclusions

The findings contribute to the literature on agri-food systems by providing a longitudinal, comparative assessment of cereals production and food security in Romania.

References

- Borah, A., Sahu, S., Srivastava, R. P., Singh, M., & Tyagi, D. B. (2024). Exploring the Economic Challenges Threatening Global Agriculture and Food Security. *Ecology, Environment & Conservation (0971765X)*, 30.
- Popescu, A. (2021). The development of agricultural production in Romania in the period 2010-2019-A statistical approach. *Annals of the Academy of Romanian Scientists Series on Agriculture, Silviculture and Veterinary Medicine Sciences*, 10(1), 107-123.

Acknowledgements (optional)

This paper was co-financed by The Bucharest University of Economic Studies during the PhD program.

AI AS AN EMERGING ESG RISK IN FINTECH: IMPLICATIONS ACROSS ENVIRONMENTAL, SOCIAL, AND GOVERNANCE DIMENSIONS

Elena MUNTEANU

Academy of Economic Studies of Moldova, Economics and Management, Chisinau, Moldova

Corresponding author: munteanelena@gmail.com

Abstract

This study examines artificial intelligence (AI) as an emerging material ESG risk for FinTech companies, exploring its implications across environmental, social, and governance dimensions. Using an interpretivist, grounded theory approach, ten semi-structured interviews were conducted with senior ESG professionals across consulting, private equity, and corporate roles. Findings reveal compounding AI-related ESG pressures: environmentally, through data center energy consumption and hyperscaler carbon risk; socially, through algorithmic bias, digital inclusion, and cybersecurity concerns; and in terms of governance, through the need for transparent AI oversight. Participants identified an emerging divide between firms proactively integrating AI-related ESG risks into materiality assessments and those treating AI governance as a peripheral compliance concern. The study contributes empirical evidence on AI as a cross-dimensional ESG risk in FinTech, offering actionable guidance for practitioners and policymakers as AI and sustainability regulation converge.

Keywords: AI risk; ESG implementation; FinTech; environmental impact

JEL codes: G28; M14; O33; G32

1. Introduction

Artificial intelligence is reshaping financial services at a pace that outstrips existing ESG frameworks. FinTech companies, as primary adopters of AI across payments, credit scoring, fraud detection, and wealth management, face sustainability risks at the intersection of technology and ESG that generic frameworks fail to capture: energy-intensive AI infrastructure, algorithmic fairness concerns, and governance gaps around automated decision-making. As regulators and investors intensify scrutiny of AI's ESG footprint, this study asks how AI-driven operations create ESG risk across environmental, social, and governance dimensions, and what strategies enable firms to manage these risks proactively. The central hypothesis is that FinTech firms integrating AI-related ESG risks into their core materiality assessments are better positioned to meet stakeholder expectations than those treating AI governance as a peripheral compliance concern.

2. Literature Review

Traditional ESG frameworks do not fully capture the unique aspects of FinTech operations, particularly the use of AI and the environmental footprint of digital infrastructure (Wang et al., 2023). Environmentally, data center energy consumption and AI-driven computation create impacts harder to measure than those of traditional institutions; socially, generic frameworks fail to address algorithmic fairness, financial inclusion, and ethical data use; and from a governance perspective, the opacity of AI decision-making creates accountability gaps that existing standards do not resolve. Notably, AI also

presents a dual opportunity, firms embedding it into ESG data collection can become more agile in responding to sustainability challenges, positioning AI governance as competitive advantage rather than compliance burden (Wang et al., 2023).

3. Data and Methodology

The study adopts an interpretivist philosophy and inductive, mono-method qualitative design using grounded theory (Saunders, Lewis and Thornhill, 2019; Glaser and Strauss, 1967). Ten semi-structured interviews were conducted via video conference (September–October 2025) with both internal ESG implementers and external advisors, selected through stratified purposive sampling and anonymized as INT1–INT10. AI-related risks emerged organically across participant responses, particularly in forward-looking questions on ESG evolution over the next five to ten years. Data were analysed using iterative grounded theory coding (open, axial, selective), with trustworthiness ensured through participant profiling, process documentation, and researcher reflexivity (Lincoln and Guba, 1985).

4. Results and Discussion

AI-related ESG risks emerged consistently across all three dimensions. Environmentally, participants identified data center energy consumption and hyperscaler carbon dependency as defining material risks. INT1 highlighted AI and data center emissions as central to how ESG will evolve in FinTech over the next decade, noting that tightening regulation around digital energy use will separate 'innovative winners' from laggards, with hyperscaler dependency creating both risk and opportunity. INT2 similarly flagged energy-intensive technology as a key ESG focus, distinguishing prepared firms from those exposed to reputational and regulatory risk.

Socially, participants raised concerns around algorithmic accountability, digital inclusion, and cybersecurity. INT2 noted that cybersecurity failures, increasingly linked to AI vulnerabilities, directly threaten ESG value creation by undermining stakeholder trust. INT7 described blending AI and data tools with sustainability metrics as an emerging best practice, linking Human Resources and operational data to ESG performance tracking. The risk of AI perpetuating bias or excluding underserved populations was framed as an intensifying social materiality issue.

On governance, INT1 emphasised that ESG value from AI depends on structures ensuring transparency and accountability over automated processes. INT7 noted that ambiguity in AI governance risks stifling innovation unless firms demonstrate ethical and regulatory compliance in their algorithmic outputs. Board-level AI oversight was broadly identified as a non-negotiable investor expectation, with INT10 anticipating that global institutional pressure will accelerate the divide between firms treating AI-related ESG risks strategically and those approaching them as a compliance afterthought.

5. Conclusions

This study demonstrates that AI constitutes an emerging and cross-dimensional ESG risk for FinTech companies with material implications not yet adequately captured by existing frameworks, confirming the central hypothesis. For practitioners, the key implication is to treat AI governance, digital energy management, and algorithmic fairness as material ESG issues warranting dedicated assessment and board-level oversight, not peripheral technology concerns. For policymakers, the findings point to the need for harmonized frameworks addressing AI-specific ESG risks in financial services.



References

- Glaser, B.G. and Strauss, A.L., 1967. The discovery of grounded theory: Strategies for qualitative research. Chicago: Aldine.
- Lincoln, Y.S. and Guba, E.G., 1985. Naturalistic inquiry. Beverly Hills, CA: Sage.
- Saunders, M., Lewis, P. and Thornhill, A., 2019. Research methods for business students. 8th ed. Harlow: Pearson Education Limited.
- Wang, C., Jiang, Q., Dittrich, Y. and Østerlund, C., 2023. ESG in FinTech: An overview. Technical Report, IT University of Copenhagen.

BIDIRECTIONAL PRICE DISCOVERY BETWEEN ROMANIAN AND CENTRAL EUROPEAN ELECTRICITY MARKETS: EVIDENCE FROM COINTEGRATION AND VECM ANALYSIS

Mihai FRUNZA¹; Lucian Claudiu ANGHEL²

¹SNSPA Doctoral School, Bucharest, Romania; mihai.frunza.25@drd.snspa.ro

²Faculty of Management, Bucharest, Romania; lucian.anghel@facultateademanagement.ro

Abstract

This paper examines price discovery between the Romanian day-ahead electricity market and five Central European neighbours — Hungary, Slovenia, Slovakia, Czechia, and Austria — using 4,101 daily observations from January 2015 to March 2026. We construct an equal-weighted regional price index (INDEX_EU) and apply nine methods: ADF/KPSS unit root tests, Engle–Granger and Johansen cointegration, bidirectional Granger causality, Toda–Yamamoto Wald tests, VECM speed-of-adjustment analysis, impulse response functions, forecast error variance decomposition (FEVD), lead-lag cross-correlation, TAR/M-TAR asymmetry with bootstrap inference, and Diebold–Mariano forecast comparison. Results reveal a robust long-run cointegrating relationship ($\hat{\beta} = 0.8634$, $p < 0.001$) and bidirectional Granger causality ($p < 0.001$ in both directions), indicating Romania actively participates in regional price discovery. The VECM identifies rapid symmetric adjustment (half-life = 5.61 days; bootstrap TAR $p = 0.876$). At a 10-day horizon, 29.8% of Romanian price variance is attributable to regional shocks. The Diebold–Mariano test confirms that a bivariate VAR significantly outperforms a univariate AR benchmark (DM = 2.41, $p = 0.016$), validating the predictive importance of cross-border price linkages.

Keywords: electricity market integration; price discovery; Granger causality; cointegration; Romania

JEL codes: C32; Q41; Q47; F15

Introduction

The progressive integration of European electricity markets through the EUPHEMIA market-coupling algorithm has fundamentally altered national price dynamics [1]. Whether markets are passive price-takers or active contributors to regional price discovery matters for market design, renewable energy investment, and cross-border hedging.

Romania is instructive: as a net importer participating in OPCOM day-ahead trading, it might be expected to follow rather than shape Central European price formation. Yet physical interconnections with Hungary, Slovenia, Slovakia, Czechia, and Austria create conditions for multi-directional price transmission.

This paper asks: (i) is there a stable long-run cointegrating relationship between Romanian and Central European prices? (ii) Does causality operate unidirectionally or bidirectionally? (iii) Do regional prices improve out-of-sample forecasts beyond univariate models?

Our contribution is threefold: the first systematic bidirectional analysis for Romania at daily frequency over 2015–2026, encompassing COVID-19, the 2021–2022 energy crisis, and the Ukraine war shock; nine complementary methods rarely combined in the CEE electricity literature; and interpretation grounded in Romania’s structural features: shadow pricing, net-importer congestion premia, and EUPHEMIA simultaneous clearing.

Literature Review

Research on European electricity market integration began with Bower [2], who documented early wholesale price convergence, and Zachmann [3], who confirmed cointegration across major Western European markets. Bosco et al. [4] established long-run relations across six markets using a factor-model approach.

CEE-specific work remains limited. Gjika et al. [5] apply Johansen cointegration to Balkan markets and find partial integration consistent with congested interconnection capacity. Maciejowska [6] documents structural instability in CEE electricity price dynamics, underscoring the importance of robust cointegration testing. Most recently, Stanciu and Mitu [7] apply VECM analysis to 24 EU countries including Romania, confirming long-run convergence while documenting country-specific adjustment speeds. Romania-specific bidirectional daily-frequency studies remain absent; this paper addresses that gap directly.

Data and Methodology

Data

Daily day-ahead spot prices (EUR/MWh) for Romania (PRON) are sourced from OPCOM; prices for Hungary, Slovenia, Slovakia, Czechia, and Austria from the ENTSO-E Transparency Platform (<https://transparency.entsoe.eu>). The sample covers 4,101 days from 1 January 2015 to 30 March 2026. INDEX_EU is the equal-weighted arithmetic mean of the five neighbouring prices, chosen for transparency and reproducibility; results are robust to alternative weighting schemes (available on request). Table 1 summarises key statistics. Extreme excess kurtosis ($\kappa > 11$) motivates bootstrap inference in TAR tests.

Descriptive Statistics — Daily Spot Prices (EUR/MWh), N = 4,101, Jan 2015–Mar 2026

Series	Mean	Std	Min	Max	CV%	Skew	Kurt
PRON (Romania)	86.72	79.92	3.06	734.64	92.2	2.88	11.71
INDEX_EU	83.24	79.39	-5.58	719.87	95.4	3.02	12.44

Methodology

We apply the following sequential framework:

1. **Unit root.** ADF [8] (AIC, max 20 lags) and KPSS [9].
2. **Cointegration.** Engle–Granger [10] and Johansen [11] trace test (restricted constant; lag 2 by BIC).
3. **Granger causality.** Bidirectional F -tests on $\Delta \log$ series [12], lags 1–10.
4. **Toda–Yamamoto.** Wald test on levels VAR($k + d_{\max}$), $k = 15$ (BIC), $d_{\max} = 1$ [13].
5. **VECM.** Bivariate VECM (rank 1, $k_{\text{diff}} = 2$) for $\hat{\alpha}_{\text{PRON}}$ and $\hat{\alpha}_{\text{INDEX}}$.
6. **IRF and FEVD.** VAR(14) on $\Delta \log$, 60-day horizon.
7. **Lead-lag cross-correlation.** Pearson r , $k \in [-15, +15]$ days.
8. **TAR/M-TAR.** Threshold autoregression [14]; bootstrap (500 rep.) preferred given $\kappa = 11.7$.
9. **Diebold–Mariano.** VAR(8) vs. AR(8), final 30% of sample ($N_{\text{test}} = 1,230$) [15].

Results and Discussion

Unit Roots and Cointegration

ADF and KPSS jointly confirm $I(1)$ for log-levels and $I(0)$ for log-differences and the log-spread. The Engle–Granger statistic (-7.39 , $p < 0.001$) rejects no cointegration; an independent ADF on the cointegrating residual ($p < 0.001$) independently confirms the equilibrium error is stationary.¹ The estimated long-run relationship is:

$$\log(\text{PRON}_t) = 0.6176 + 0.8634 \log(\text{INDEX_EU}_t) + \varepsilon_t, \quad R^2 = 0.849$$

$\hat{\beta} = 0.8634$ is significantly below unity ($t = -24.06$, $p < 0.001$), indicating *partial* integration. The 13.7 pp gap reflects network congestion, Romania’s net-importer shadow pricing premium, and CO₂ cost pass-through asymmetries.

Granger Causality and Toda–Yamamoto

Table 2 confirms *bidirectional* price discovery at the 1% level across all lag specifications and under Toda–Yamamoto. Romania actively contributes to regional price formation. The larger RO→EU Wald statistic ($\chi^2 = 343.28$ vs. 112.43) indicates Romanian prices contain incremental information about future regional prices, consistent with Romania’s role as a marginal price-setter during peak demand or congestion episodes.

Granger Causality and Toda–Yamamoto Tests

Test	Direction	Statistic	p-value	Result
Granger ($\ell = 1$)	INDEX_EU → PRON	$F = 25.03$	< 0.001	Reject***
Granger ($\ell = 1$)	PRON → INDEX_EU	$F = 56.15$	< 0.001	Reject***
Granger ($\ell = 5$)	INDEX_EU → PRON	$F = 8.15$	< 0.001	Reject***
Granger ($\ell = 5$)	PRON → INDEX_EU	$F = 28.38$	< 0.001	Reject***
Toda–Yam. ($k = 15$)	INDEX_EU → PRON	$\chi^2 = 112.43$	< 0.001	Reject***
Toda–Yam. ($k = 15$)	PRON → INDEX_EU	$\chi^2 = 343.28$	< 0.001	Reject***
** $p < 0.01$. Toda–Yamamoto: Wald χ^2 , df = 15.				

VECM, Lead-Lag, FEVD, and Forecast Tests

The VECM yields $\hat{\alpha}_{\text{PRON}} = -0.116$, confirming Romania corrects toward long-run equilibrium (half-life: **5.61 days**). $\hat{\alpha}_{\text{INDEX}} = 0.525$ indicates the regional index adjusts approximately 4.5 times as fast, reinforcing bidirectional error correction under EUPHEMIA simultaneous clearing.²

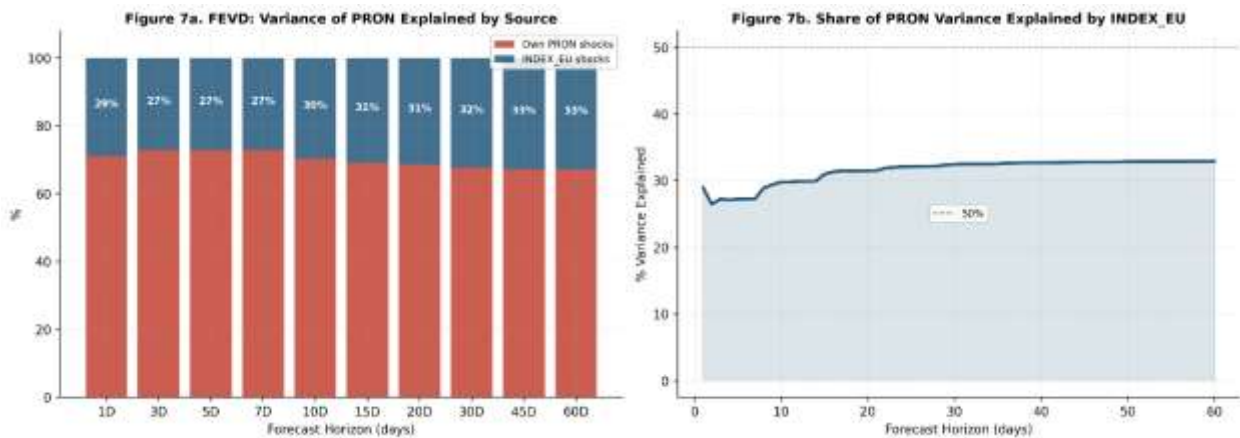
Figure 1 shows the FEVD: INDEX_EU shocks account for **28.9%** of PRON forecast error variance at day 1, **29.8%** at day 10, and **32.9%** at day 60, stabilising across all horizons and consistent with $\hat{\beta} = 0.863$. Lead-lag cross-correlation peaks at $k = 0$ ($r = 0.546$), confirming contemporaneous price discovery consistent with EUPHEMIA same-day clearing. Negative correlations at short non-zero lags

¹ The Johansen trace statistic (845.14, $CV_{5\%} = 15.49$) also rejects $r \leq 1$ (trace = 74.22, $CV_{5\%} = 3.84$), implying $r = 2$ – equivalent to both series being $I(0)$, contradicting unit-root evidence. This is a well-documented finite-sample distortion in large samples [16]. We impose rank 1 on economic grounds and confirm it via the residual ADF ($p < 0.001$).

² The positive value for the non-normalised variable reflects partial integration ($\hat{\beta} < 1$); both markets adjust to shared disequilibria.

(e.g., $r = -0.150$ at $k = -2$; $r = -0.158$ at $k = +2$) reflect mean-reversion in the log-spread: a contemporaneous price shock is partially reversed over 1–2 days as prices correct toward equation (1). A secondary weekly pattern at $k = \pm 7$ ($r \approx 0.28$ – 0.31) reflects electricity market weekend seasonality. The bootstrap TAR test ($p_{boot} = 0.876$) supports **symmetric** error correction; the parametric $F = 22.15$ ($p < 0.001$) is unreliable given $\kappa = 11.7$. The Diebold–Mariano test ($DM = 2.41$, $p = 0.016$) confirms VAR(8) significantly outperforms AR(8) (MSE reduction: 2.0%) over 1,230 out-of-sample forecasts.

FEVD: Share of PRON forecast error variance explained by INDEX_EU shocks (days 1–60). Cholesky decomposition, VAR(14) on $\Delta \log$ series.



Conclusions

Three findings emerge. First, a stable long-run cointegrating relationship ($\hat{\beta} = 0.8634$) reflects structural barriers rather than market segmentation. Second, bidirectional Granger causality at the 1% level confirms Romania actively contributes to regional price formation, with implications for market design, capacity mechanisms, and cross-border investment signals. Third, rapid symmetric error correction (half-life 5.61 days) and significant out-of-sample forecast improvement ($DM = 2.41$, $p = 0.016$) confirm the economic significance of cross-border linkages, complementing the pan-European evidence in [7].

Limitations include exclusion of Bulgaria and Croatia; calendar-day frequency inducing weekly IRF seasonality; absence of structural identification for supply- vs. demand-side drivers; and the Johansen rank anomaly warranting Gregory–Hansen robustness testing [17]. Future research should apply intraday data and model network topology constraints explicitly.

Acknowledgements. The authors thank OPCOM and the ENTSO-E Transparency Platform for providing publicly accessible electricity price data.

References

- Newbery, D., Strbac, G., & Viehoff, I. (2016). The benefits of integrating European electricity markets. *Energy Policy*, 94, 253–263. <https://doi.org/10.1016/j.enpol.2016.03.047>
- Bower, J. (2002). *Seeking the single European electricity market* (Working Paper EL02). Oxford Institute for Energy Studies. <https://www.oxfordenergy.org/publications/seeking-the-single-european-electricity-market-evidence-from-an-empirical-analysis-of-wholesale-market-prices/>
- Zachmann, G. (2008). Electricity wholesale market prices in Europe: Convergence? *Energy Economics*, 30(4), 1659–1671. <https://doi.org/10.1016/j.eneco.2007.07.006>

- Bosco, B., Parisio, L., Pelagatti, M., & Baldi, F. (2010). Long-run relations in European electricity prices. *Journal of Applied Econometrics*, 25(5), 805–832. <https://doi.org/10.1002/jae.1095>
- Gjika, D., Gjika, A., & Lako, P. (2021). Price transmission and integration of electricity markets in the Western Balkans. *Energies*, 14(16), 4869. <https://doi.org/10.3390/en14164869>
- Maciejowska, K. (2022). Assessing the impact of renewable energy sources on the electricity price level and variability. *Energies*, 15(3), 1095. <https://doi.org/10.3390/en15031095>
- Stanciu, C. V., & Mitu, N. E. (2025). Electricity market integration in the European Union: A VECM approach across 24 countries. *Energies*, 18(4), 770. <https://doi.org/10.3390/en18040770>
- Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association*, 74(366), 427–431. <https://doi.org/10.2307/2286348>
- Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. (1992). Testing the null hypothesis of stationarity against the alternative of a unit root. *Journal of Econometrics*, 54(1–3), 159–178. [https://doi.org/10.1016/0304-4076\(92\)90104-Y](https://doi.org/10.1016/0304-4076(92)90104-Y)
- Engle, R. F., & Granger, C. W. J. (1987). Co-integration and error correction: Representation, estimation, and testing. *Econometrica*, 55(2), 251–276. <https://doi.org/10.2307/1913236>
- Johansen, S. (1991). Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica*, 59(6), 1551–1580. <https://doi.org/10.2307/2938278>
- Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, 37(3), 424–438. <https://doi.org/10.2307/1912791>
- Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics*, 66(1–2), 225–250. [https://doi.org/10.1016/0304-4076\(94\)01616-8](https://doi.org/10.1016/0304-4076(94)01616-8)
- Enders, W., & Granger, C. W. J. (1998). Unit-root tests and asymmetric adjustment with an example using the term structure of interest rates. *Journal of Business & Economic Statistics*, 16(3), 304–311. <https://doi.org/10.1080/07350015.1998.10524769>
- Diebold, F. X., & Mariano, R. S. (1995). Comparing predictive accuracy. *Journal of Business & Economic Statistics*, 13(3), 253–263. <https://doi.org/10.1080/07350015.1995.10524599>
- Cheung, Y.-W., & Lai, K. S. (1993). Finite-sample sizes of Johansen’s likelihood ratio tests for cointegration. *Oxford Bulletin of Economics and Statistics*, 55(3), 313–328. <https://doi.org/10.1111/j.1468-0084.1993.mp55003003.x>
- Gregory, A. W., & Hansen, B. E. (1996). Residual-based tests for cointegration in models with regime shifts. *Journal of Econometrics*, 70(1), 99–126. [https://doi.org/10.1016/0304-4076\(96\)41685-7](https://doi.org/10.1016/0304-4076(96)41685-7)

ADAPTING THE INSTITUTIONAL SYSTEM TO ADDRESS THE CHALLENGES OF SUSTAINABLE DEVELOPMENT

Andreea Adriana SIMION

1 University of Craiova, Faculty of Economics and Business Administration,
Doctoral School of Economic Sciences "Eugeniu Carada", Craiova, Romania
simion.drd30@gmail.com | ORCID: 0000-0000-0000-0000 (optional)

Abstract

The article analyses the capacity of contemporary institutional systems to respond to the challenges of sustainable development in the context of the 2030 Agenda. Starting from the finding that existing administrative structures are insufficiently adapted to integrate the Sustainable Development Goals (SDGs), the research uses a mixed methodology — qualitative comparative analysis (QCA) and secondary quantitative data — applied to a sample of 30 OECD and EU countries. The results identify three distinct patterns of institutional adaptation: systemic integration (Finland, Denmark), formal adoption (Central and Eastern Europe), and a major gap between commitments and implementation. Key success factors include sustained political will, inter-ministerial coordination, and civil society engagement. The study concludes that effective reforms require simultaneous interventions at the structural, budgetary, and cultural levels, providing a typological model and concrete recommendations for policymakers.

Keywords: Institutional governance, Sustainable Development, Administrative reform, Sustainable Development Goals (SDGs), Integrated public policies

JEL codes: O43

1. Introduction

Rapid transformations of the global environment — climate change, ecosystem degradation and persistent socioeconomic inequalities — are putting increasing pressure on contemporary institutional systems. Although the 2030 Agenda for Sustainable Development has established an ambitious framework through the 17 Sustainable Development Goals (SDGs), their effective implementation remains a major challenge for existing governance structures. This study starts from the observation that the current institutional architecture, designed in the context of outdated governance paradigms, does not have the necessary tools to respond to the systemic and interconnected nature of sustainability challenges. The main objective of the research is to identify directions for institutional reform that can enhance the capacity of states to integrate the principles of sustainable development into decision-making processes, thus contributing to reducing the gap between commitments undertaken and results obtained on the ground.

2. Literature Review

The literature on governance for sustainable development has evolved considerably over the past two decades. Landmark works such as those by Ostrom (1990), Meadowcroft (2007) and Biermann et al. (2012) have established the concept of “earth system governance”, underlining the need for adaptive and polycentric institutional architectures. Recent studies highlight that although many countries have adopted national SDG strategies, their integration into budgetary and legislative cycles is often superficial (OECD, 2020; UNDP, 2022). There is also a significant gap in the literature on concrete mechanisms for inter-institutional coordination in the context of countries with limited administrative capacity. This study addresses this gap by comparative analysis of institutional reform models adopted in countries with different levels of development, providing an integrated perspective on the factors that determine the success or failure of institutional adaptation.

3. Data and Methodology

The study uses a mixed methodology, combining qualitative comparative analysis (QCA) with a quantitative approach based on secondary data. The sample includes 30 OECD and EU member states, selected based on data availability and diversity of institutional contexts. The main data sources include the World Bank Governance Indicators (2015–2023), voluntary national reports on the SDGs and Eurostat databases on institutional performance. The variables analyzed target the degree of inter-ministerial coordination, the level of integration of green budgeting, the capacity to monitor and evaluate sustainability policies, and the participation of civil society in decision-making processes. The quantitative analysis is complemented by in-depth case studies for four representative countries, with the aim of capturing contextual nuances that escape aggregate analyses.

4. Results and Discussion

The results of the comparative analysis reveal three main patterns of institutional adaptation. The first pattern, identified in countries such as Finland and Denmark, is characterized by a systemic integration of the SDGs in all stages of the public policy cycle, supported by robust inter-ministerial coordination mechanisms and a long-term-oriented administrative culture. The second pattern, specific to many countries in Central and Eastern Europe, reflects a formal adoption of sustainability frameworks, without a deep structural change in institutional practices. The third pattern, present in countries with reduced administrative capacity, indicates a major gap between international commitments and national implementation. The analysis highlights that the main factors facilitating successful institutional adaptation are: sustained political will, the existence of coordination units with cross-cutting authority, the allocation of dedicated resources and the active involvement of non-governmental actors. These findings are consistent with recent literature (Biermann et al., 2022), confirming the critical role of policy coherence in achieving sustainability goals.

5. Conclusions

The study demonstrates that the adaptation of the institutional system to the requirements of sustainable development is not a linear or uniform process, but one deeply influenced by the political, administrative and cultural context of each state. Successful reforms require simultaneous interventions at the level of organizational structures, planning and budgeting tools, as well as institutional culture. The main

contributions of the research consist in identifying a typological model of institutional adaptation and in developing a set of public policy recommendations addressed to decision-makers. The limitations of the study include the uneven availability of comparative data and the difficulty of capturing the informal dynamics of governance. Future research could extend the analysis to developing states and deepen the role of digitalization as a vector of institutional reform in the context of sustainability.

References

- Biermann, F., Abbott, K., Andresen, S., Backstrand, K., Bernstein, S., Betsill, M. M., & Zondervan, R. (2012). Navigating the Anthropocene: Improving Earth system governance. *Science*, 335(6074), 1306-1307.
- Biermann, F., Hickmann, T., Senit, C. A., Beisheim, M., Bernstein, S., Chasek, P., & van Vuuren, D. P. (2022). Scientific evidence on the political impact of the Sustainable Development Goals. *Nature Sustainability*, 5(9), 795-800.
- Meadowcroft, J. (2007). Who is in charge here? Governance for sustainable development in a complex world. *Journal of Environmental Policy & Planning*, 9(3-4), 299-314.
- Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.
- Volkery, A., & Ribeiro, T. (2009). Scenario planning in public policy: Understanding use, impacts and the role of institutional context factors. *Technological Forecasting and Social Change*, 76(9), 1198-1207.
- Eurostat. (2023). *Sustainable development in the European Union - Monitoring report on progress towards the SDGs in an EU context*. Publications Office of the European Union.
- OECD. (2020). *Integrating the SDGs into government budgeting processes*. OECD Publishing. <https://doi.org/10.1787/4c6cf0a4-en>
- UNDP. (2022). *Special report on human security*. United Nations Development Programme. <https://hdr.undp.org/content/2022-special-report-human-security>
- United Nations. (2015). *Transforming our world: The 2030 Agenda for Sustainable Development*. Resolution A/RES/70/1. <https://sdgs.un.org/2030agenda>
- World Bank. (2023). *Worldwide Governance Indicators (WGI) 2023*. The World Bank Group. <https://www.worldbank.org/en/publication/worldwide-governance-indicators>

EMPLOYEE RETENTION IN CONTEMPORARY ORGANIZATIONS: A PREDICTIVE ANALYSIS OF MOTIVATIONAL, OCCUPATIONAL, AND DEMOGRAPHIC FACTORS

Ana-Maria SĂCUIU^{1*}, Angela-Eliza MICU², Bianca Elena MIRON³

^{1,2,3} “Ovidius” University of Constanța, Faculty of Economic Sciences, Constanța, Romania

* Corresponding author: sacuiu.ana-maria@365.univ-ovidius.ro

Abstract

This study investigates the determinants of voluntary employee turnover from a quantitative and predictive perspective. The purpose of the research is to identify and rank the risk and protective factors associated with voluntary turnover through the empirical validation of classical motivational theories within the HR Analytics paradigm. The methodology combines binary logistic regression with the Random Forest algorithm on the IBM HR Analytics Employee Attrition & Performance dataset (n = 1,470; 35 variables), with the significant class imbalance (83.88% retention vs. 16.12% turnover) corrected using a hybrid resampling technique applied exclusively to the training set (70%), while the test set (30%) retains its original distribution.

The results indicate that working overtime is the main risk factor, with employees who work overtime having a 3.41 times higher probability of leaving than others (OR = 3.41; 95% CI: 2.53–4.62), while high work engagement and job satisfaction are negatively associated with voluntary turnover. The analysis also highlights a non-linear relationship between work–life balance and retention, with a moderate-to-high level (Better; OR = 0.325) proving more protective than maximum flexibility (Best; OR = 0.500), confirming the existence of an optimal level of organizational balance.

The conclusions underscore the multidimensional nature of employee retention and the need to adopt differentiated, data-driven organizational strategies to reduce staff turnover in contemporary organizations.

Keywords: employee retention; HR analytics; employee turnover; motivational factors; predictive modeling.

JEL codes: M12; C53; J28.

1. Introduction

The accelerated digitalization and the expansion of hybrid work models have profoundly reconfigured the dynamics of the contemporary labor market, transforming the retention of qualified human capital into an essential strategic factor. The decision to leave an organization no longer depends exclusively on salary levels, but on a multidimensional combination of motivational, occupational, and demographic factors. Qualitative methods and traditional linear statistical models present recognized limitations in capturing the complexity of these relationships (Griffeth et al., 2000), which justifies the adoption of advanced predictive techniques within the HR Analytics paradigm.

2. Literature Review

Herzberg's two-factor theory (1959) distinguishes between hygiene factors, which prevent dissatisfaction without generating loyalty, and intrinsic factors - job involvement and job satisfaction, which build organizational attachment (Ryan & Deci, 2000; Gagné & Deci, 2005). The Job Demands–Resources model explains the mechanism by which excessive job demands are associated with occupational burnout and voluntary turnover (Bakker & Demerouti, 2017), with OverTime empirically confirmed as the strongest individual predictor of attrition (Chung et al., 2023). Regarding work-life balance (WLB), the relationship with retention is non-linear: work overload is negatively associated with retention (Jaharuddin & Zainol, 2019), while chronic underload (boreout) produces similar effects (Stock, 2015). Ensemble algorithms such as Random Forest (Breiman, 2001) overcome the limitations of linear models in capturing complex relationships, representing a direction explicitly recommended in the HR Analytics literature (Marler & Boudreau, 2017).

Based on this theoretical foundation, four hypotheses are formulated:

H1 - OverTime is positively associated with the risk of voluntary turnover;

H2 - high intrinsic motivation (Job Involvement, Job Satisfaction) is negatively associated with attrition;

H3 - the relationship between WLB and retention is non-linear, with a moderate-high level being more protective than extreme flexibility;

H4 - demographic (Age) and financial (Monthly Income) factors constitute the structural basis of the retention decision.

3. Data and Methodology

The study uses the IBM HR Analytics Employee Attrition & Performance dataset, including 1,470 observations and 35 variables, analyzed in the R/RStudio environment. Preprocessing involved removing four variables with zero variance or low discriminatory power (Over18, EmployeeCount, StandardHours, PerformanceRating) and encoding ordinal variables as ordered factors, resulting in a final set of 31 valid variables. The significant class imbalance (83.88% retention vs. 16.12% turnover) was corrected using a hybrid resampling technique, combining random subsampling of the majority class with random oversampling via duplication of the minority class, using the `downSample()` and `upSample()` functions from the `caret` package in R, applied exclusively to the training set (70%), while the test set (30%) retained its original distribution.

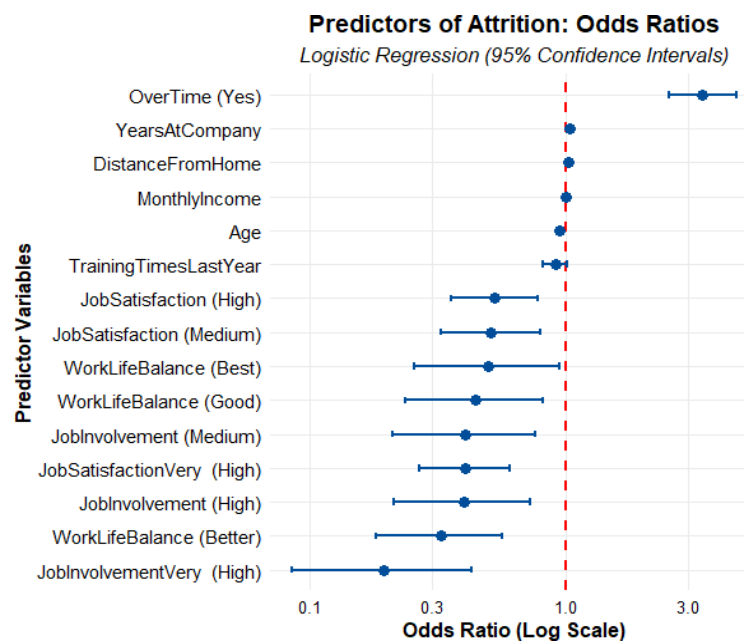
The methodology integrates three complementary analytical levels: (1) analysis of bivariate correlations using Spearman's coefficient, appropriate for the ordinal nature of the variables; (2) binary logistic regression, quantifying the effect of each predictor via Odds Ratios (OR) with 95% confidence intervals, multicollinearity verified via VIF (all values below 2.0) and performance evaluated via the ROC curve (AUC = 0.7086); and (3) the Random Forest ensemble algorithm (500 trees, the `mtry` parameter optimized by minimizing the OOB error), with predictors ranked using the Mean Decrease in Gini metric.

4. Results and Discussion

The Spearman correlation matrix indicates consistent negative associations between JobInvolvement, JobSatisfaction and the probability of voluntary turnover, consistent with the role of psychological engagement as a factor associated with retention, and a positive association between DistanceFromHome and Attrition, consistent with the JD-R model.

Logistic regression identifies OverTime as the primary risk factor: employees who work overtime present a probability of leaving 3.41 times higher than those who do not (OR = 3.41; 95% CI: 2.53–4.62), supporting hypothesis H1.

Figure 1. Predictors of Attrition: Odds Ratio Analysis (95% CI)



Source: Author's processing in RStudio based on IBM HR Analytics Dataset

As shown in Figure 1, intrinsic motivational factors are negatively associated with turnover: a very high level of work engagement corresponds to an odds ratio of 0.194 (OR = 0.194), and very high job satisfaction to an OR of 0.405, confirming hypothesis H2. A distinct contribution of this study is the identification of the non-linear relationship between WLB and retention: the Better category exhibits a stronger protective effect (OR = 0.325) than the maximum Best level (OR = 0.500), confirming hypothesis H3 and the paradox of excessive flexibility (Stock, 2015).

The Random Forest model confirms that Age and MonthlyIncome occupy the top positions in the hierarchy of predictors, supporting their structural role in the retention decision and validating hypothesis H4.

5. Conclusions

The study demonstrates that employee retention is a multidimensional phenomenon, shaped by the interplay of operational stressors, intrinsic motivation, demographic factors, and job role structure. All four hypotheses are empirically supported, with the results simultaneously validating the JD-R model, Herzberg’s two-factor theory, and self-determination theory.

The study’s original contribution consists of three distinct elements:

1. The explicit integration of three motivational theoretical frameworks into a simultaneous empirical validation approach, in contrast to predominantly predictive studies such as Chung et al. (2023);
 2. The explicit testing of the non-linearity of the WLB–retention relationship, a dimension ignored in most predictive models;
 3. A dual perspective: parametric and non-parametric, which allows for cross-validation of results.
- The study’s limitations lie in the cross-sectional nature of the data and the synthetic nature of the IBM HR Analytics dataset; future research should extend the analysis using longitudinal datasets and real-world sector-specific samples.

References

- Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory. *Journal of Occupational Health Psychology, 22*(3), 273–285. <https://doi.org/10.1037/ocp0000056>
- Breiman, L. (2001). Random forests. *Machine Learning, 45*(1), 5–32. <https://doi.org/10.1023/A:1010933404324>
- Chung, D., Yun, J., & Kim, J. (2023). Predictive model of employee attrition based on stacking ensemble learning. *Expert Systems with Applications, 215*, 119364. <https://doi.org/10.1016/j.eswa.2022.119364>
- Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior, 26*(4), 331–362. <https://doi.org/10.1002/job.322>
- Griffeth, R. W., Hom, P. W., & Gaertner, S. (2000). A meta-analysis of antecedents and correlates of employee turnover. *Journal of Management, 26*(4), 463–508. [https://doi.org/10.1016/S0149-2063\(00\)00043-X](https://doi.org/10.1016/S0149-2063(00)00043-X)
- Herzberg, F. (1959). *The motivation to work* (2nd ed.). Wiley.
- Jaharuddin, N. S., & Zainol, L. N. (2019). The impact of work-life balance on job engagement and turnover intention. *The South East Asian Journal of Management, 13*(1). <https://doi.org/10.21002/seam.v13i1.10912>
- Marler, J. H., & Boudreau, J. W. (2017). An evidence-based review of HR Analytics. *The International Journal of Human Resource Management, 28*(1), 3–26. <https://doi.org/10.1080/09585192.2016.1244699>
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations. *Contemporary Educational Psychology, 25*(1), 54–67. <https://doi.org/10.1006/ceps.1999.1020>
- Stock, R. M. (2015). Is boreout a threat to frontline employees’ innovative work behavior? *Journal of Product Innovation Management, 32*(4), 574–592. <https://doi.org/10.1111/jpim.12239>

FROM LEADERSHIP TO TURNOVER INTENTION: THE MEDIATING ROLE OF EMPOWERMENT IN HEALTHCARE ORGANIZATIONS

Stefan-Daniel Florea^{1*}; Dragos Gruia²

^{1,2}Ovidius University, Doctoral School of Management, Constanta, Romania

* Corresponding author: florea.daniel@365.univ-ovidius.ro | ORCID: 0009-0007-7395-0612

Abstract

This study investigates the structural relationships between leadership, empowerment, job satisfaction, and turnover intention in the Romanian healthcare sector. Using a quantitative cross-sectional design, data was collected from healthcare employees. The conceptual model was tested using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. The results indicate a strong and statistically significant effect of leadership on empowerment, and of empowerment on job satisfaction. The model demonstrates substantial explanatory power for empowerment and job satisfaction, while turnover intention remains influenced by external factors. Leadership does not directly influence employee satisfaction but rather operates through empowerment as a key psychological mechanism. Leadership plays a fundamental role in shaping employee attitudes and behaviors in healthcare organizations. The direct relationship between Leadership and Job Satisfaction is not statistically significant, indicating a full mediation effect. The results validate a full mediation model, emphasizing that leadership effectiveness depends primarily on its ability to create empowering work environments.

Keywords: leadership; empowerment; job satisfaction; turnover intention; healthcare

1. Introduction

Employee retention remains a critical challenge in healthcare systems, directly affecting service quality, patient safety, and organizational performance (Hayes et al., 2012; Lu, Zhao, & While, 2019). Leadership is widely recognized as a determinant of employee attitudes, yet its effects are often indirect. This study examines the relationships between leadership, empowerment, job satisfaction, and turnover intention within an integrated framework.

2. Literature Review

Relational leadership styles, such as transformational and authentic leadership, are associated with increased job satisfaction, organizational commitment, and reduced turnover intention (Cummings et al., 2010; Wong & Cummings, 2013). Empowerment is conceptualized as a multidimensional construct reflecting employees' perceptions of autonomy, competence, and impact (Spreitzer, 1995). From a structural perspective, empowerment depends on access to resources, information, and support, while the psychological perspective emphasizes individual perceptions of control and meaning at work (Laschinger, Finegan, & Shamian, 2004; Spreitzer, 1995).

3. Data and Methodology

The study employs a quantitative, cross-sectional research design to examine the relationships between leadership, empowerment, job satisfaction, and turnover intention in healthcare organizations.

The sample consists of 98 healthcare employees, including physicians, nurses, and auxiliary staff, selected using a convenience sampling method. Participation was voluntary and anonymous.

Data were collected using a structured questionnaire based on a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). The model includes four latent constructs: Leadership (5 items), Empowerment (5 items), Job Satisfaction (4 items), and Turnover Intention (4 items), adapted from established literature.

4. Results and Discussion

The measurement model demonstrated satisfactory reliability and validity. Composite reliability values exceeded the recommended threshold, while convergent validity was confirmed through AVE. Discriminant validity was also supported, indicating that the constructs are empirically distinct.

The structural model results reveal a strong and statistically significant effect of Leadership on Empowerment. This finding confirms the central role of leadership practices in shaping employees' perceptions of autonomy and influence within healthcare organizations.

Furthermore, Empowerment exerts a strong positive effect on Job Satisfaction, supporting the view that employees who feel empowered are more likely to develop positive evaluations of their work environment (Laschinger, Finegan, & Shamian, 2004; Lu, Zhao, & While, 2019).

5. Conclusions

This study provides empirical evidence supporting the central role of empowerment in explaining how leadership influences job satisfaction in healthcare organizations.

References

- 1) Cummings, G. G., MacGregor, T., Davey, M., Lee, H., Wong, C. A., Lo, E., Muise, M., & Stafford, E. (2010). Leadership styles and outcome patterns for the nursing workforce and work environment: A systematic review. *International Journal of Nursing Studies*, 47(3), 363–385. <https://doi.org/10.1016/j.ijnurstu.2009.08.006>
- 2) Hayes, L. J., O'Brien-Pallas, L., Duffield, C., Shamian, J., Buchan, J., Hughes, F., Laschinger, H. K. S., & North, N. (2012). Nurse turnover: A literature review – An update. *International Journal of Nursing Studies*, 49(7), 887–905. <https://doi.org/10.1016/j.ijnurstu.2011.10.001>
- 3) Laschinger, H. K. S., Finegan, J., & Shamian, J. (2004). A longitudinal analysis of the impact of workplace empowerment on work satisfaction. *Journal of Organizational Behavior*, 25(4), 527–545. <https://doi.org/10.1002/job.256>

- 4) Lu, H., Zhao, Y., & While, A. (2019). Job satisfaction among hospital nurses: A literature review. *International Journal of Nursing Studies*, 94, 21–31. <https://doi.org/10.1016/j.ijnurstu.2019.01.011>
- 5) Mobley, W. H., Griffeth, R. W., Hand, H. H., & Meglino, B. M. (1979). Review and conceptual analysis of the employee turnover process. *Psychological Bulletin*, 86(3), 493–522. <https://doi.org/10.1037/0033-2909.86.3.493>
- 6) Spreitzer, G. M. (1995). Psychological empowerment in the workplace: Dimensions, measurement, and validation. *Academy of Management Journal*, 38(5), 1442–1465. <https://doi.org/10.2307/256865>
- 7) Wong, C. A., & Cummings, G. G. (2013). The influence of authentic leadership behaviors on trust and work outcomes of health care staff. *Journal of Nursing Management*, 21(3), 709–720. <https://doi.org/10.1111/j.1365-2834.2012.01407.x>
- 8) Ringle, C. M., Wende, S., & Becker, J.-M. (2024). SmartPLS 4. SmartPLS. <https://www.smartpls.com>

DOES INVESTMENT IN LABOUR (SKILLS AND TRAINING) TRANSLATE INTO ORGANIZATIONAL PERFORMANCE?

Otilia TRĂȘCĂ

University of Craiova, “Eugeniu Carada” Doctoral School of Economic Sciences, Craiova, Romania

ORCID: 0009-0008-8598-5879

Abstract

This paper discusses the issue of whether labor investment results in organizational performance in the European labor market. Despite the human capital theory claiming that labor investment positively affects productivity, research indicates that these influences vary in their strength and timing. The research employs a hybrid method, which involves a systematic review of scholarly literature alongside a quantitative assessment of the European data on training, labor productivity, and skills investment. This methodology allows for analyzing the extent and efficiency of labor investment under various economic conditions. Research results suggest that despite the significant amount of investments in training by European organizations, this practice has an indirect effect on organizational performance and does not yield the expected results immediately. These investments are effective in some cases depending on various criteria, such as skills types, sectoral specificity, and compatibility with labor market requirements. In addition, skills mismatch is one of the factors that limits the efficiency of labor investments and leads to disparate productivity results.

Keywords: human capital; labor investment; skills; organizational performance.

JEL codes: J24; O15.

1. Introduction

Within the context of fast-changing technology, digital transformation, and demographic pressures, European economies face difficulties in ensuring productivity growth and competitiveness. Labor investments, especially those concerning skills and training, have become a critical area of focus for decision-makers. Although significant amounts of resources have been devoted to such investments, their impact on organizational performance is still uncertain. Although theoretical frameworks posit a positive correlation, empirical studies present conflicting findings, thereby casting doubt on the efficiency of such investments. This paper intends to explore if labor investment influences organizational performance in Europe’s labor markets. The contribution lies in the evaluation not only of labor investment but also of the circumstances under which such investments produce a positive result.

2. Literature Review

The link between human capital investments and organizational performance can be explained through the human capital theory, according to which education and training lead to improved employee productivity and therefore improved organizational performance. Resource-based theory supports such

an approach, since it suggests that skills should be considered strategically valuable resources. Although empirical evidence supports the existence of a positive relationship between training and productivity, differences are usually observed both in terms of its strength and timing. Some researchers observe the presence of a lagged effect of training, while other researchers emphasize that the effect will occur only if skills are relevant and valuable.

3. Data and Methodology

This research adopts a combined methodology. First, a systematic literature review to compile information on the linkages between labor investment and organizational performance. Second, secondary data sources will be adopted for the purpose of analyzing European Union member states using Eurostat and the European Commission databases. The main variables include labor productivity, training participation, and skills investments. The analysis process is basically descriptive and interpretive, with the aim of finding patterns, trends, and discrepancies regarding labor investment and performance.

4. Results and Discussion

From the analysis, it can be observed that firms in Europe spend considerable amounts of money training their employees, and the training is mainly financed by employers. Nevertheless, it is observed that these expenditures do not equally affect the performance of these firms. The effects of investments in labor force usually appear with some delay and become evident only in the middle period. The effects of training depend on the kinds of skills, and specifically the higher impacts arise in case of digital and transferable skills. The existence of skill mismatch decreases the effectiveness of labor investments.

5. Conclusions

The results show that investments made in labour do not guarantee better performance. The quality of labour investments determines how effective they can be in improving organizational performance. Organizations need to concentrate on strategic labour investments, while the issue of skill mismatch should be considered by policy makers.

References

- Damian Grimshaw & Marcela Miozzo, 2021. "Human Capital and productivity: a call for new interdisciplinary research," Working Papers 006, The Productivity Institute;
- European Commission. (2023). Labour market and wage developments in Europe 2023. Publications Office of the European Union;
- Eurostat. (2024). Adult participation in learning and training statistics, <https://ec.europa.eu/eurostat>.

EDUCATION SYSTEMS AND HUMAN CAPITAL ALIGNMENT IN EUROPE: EVIDENCE ON STEM GENDER GAPS, OVER-QUALIFICATION, AND SKILL MATCHING

Stefan Laurentiu PRAHOVEANU^{1*}; Mustafa Latif EMEK²; Andreea Elena LUNGU³, Mile VASIĆ⁴;
Firdaus ABDULLAH⁵

¹ School of Advanced Studies of the Romanian Academy, Doctoral School of Economics, Romanian Academy House, Calea 13 Septembrie, nr. 13, Sector 5, Bucharest, 050711 Bucharest, Romania

²Institute of Economic Development and Social Research, Ankara, Turkey

³ Valahia” University of Târgoviște, Faculty of Economics, Doctoral School of Economics and Humanities, Romania

⁴European Marketing and Management Association, Knežopoljska 5, Banja Luka 78000, Banja Luka, Bosnia and Herzegovina

⁵ Universiti Teknologi MARA (UiTM) Faculty of Business and Management, Cawangan Sarawak, Kota Samarahan 94300, Sarawak, Malaysia

* Corresponding author: stefanprahoveanu@gmail.com | ORCID: 0009-0009-0425-1070

Abstract

This study examines structural patterns in human capital formation and utilization across European countries, focusing on three interrelated dimensions: gender disparities in STEM tertiary education, over-qualification and educational mismatch in the labor market, and the role of job tenure in skill alignment among young workers. Using harmonized Eurostat data for 2023–2024, the analysis adopts a comparative and descriptive approach complemented by correlation assessment. STEM education remains characterized by persistent gender inequality, with male graduates significantly outnumbering female graduates in all countries, regardless of overall performance levels. A positive correlation between over-qualification and the incidence of education exceeding job requirements highlights systemic inefficiencies in the utilization of human capital, indicating a misalignment between educational expansion and labor market demand. The study underscores the need for coordinated policy interventions that simultaneously address educational output, labor market demand, and gender inclusion.

Keywords: education systems; human capital; stem; gender gaps; over-qualification;

JEL codes:A20; H75; I21

1. Introduction

The relationship between education systems and labor market outcomes has been extensively examined within the frameworks of human capital theory and matching theory, with increasing attention to the consequences of educational expansion in advanced economies. A foundational strand of the literature focuses on the role of education systems in shaping workforce competencies and employability. Early contributions emphasize that workforce education must balance two complementary perspectives: the

development of general, transferable skills and the provision of occupation-specific competencies aligned with labor market needs (Dennis H. Dennis & C. C. Hudson, 2007). This duality remains central in contemporary debates, as education systems are increasingly expected to respond to evolving economic structures and technological change. Similarly, vocational education and training (VET) systems are recognized as key mechanisms for improving human capital allocation by facilitating smoother school-to-work transitions and reducing mismatch (Michel Wallenborn, 2010). The importance of institutional coordination between education providers and employers is further highlighted in studies on workforce development and productive systems, which stress that misalignment often arises from weak linkages between these domains (Jim Hordern, 2014).

Within the European context, the employability of higher education graduates has been a central concern. Research shows that while higher education expansion has increased participation rates, it has not uniformly translated into improved labor market outcomes (Sam Pavlin & Ivan Svetlik, 2014). The massification of higher education has altered the signaling value of degrees, contributing to rising levels of over-education and skill mismatch. Recent work further contextualizes these dynamics, arguing that the extrinsic outcomes of higher education—such as employment quality and job matching—are increasingly shaped by structural factors, including labor market saturation and institutional heterogeneity (Golo Henseke, 2025).

A growing body of literature specifically addresses the phenomenon of over-qualification (or over-education) as a manifestation of inefficiencies in human capital utilization. Empirical studies demonstrate that over-education is associated with lower job satisfaction, particularly when accompanied by job insecurity, although individuals may adopt career-enhancing strategies to mitigate these effects (Ruth Bedemariam & José Ramos, 2021). Complementary evidence indicates that over-education can also increase workers' intention to quit, reflecting dissatisfaction with underutilized skills (Zhi Pan et al., 2025). Methodologically, recent advances propose multidimensional approaches to measuring overqualification, emphasizing that it is not a binary condition but a complex phenomenon involving varying degrees of mismatch across individuals and contexts (Gianni Betti et al., 2025).

At the country level, empirical analyses highlight significant variation in the incidence and determinants of over-education. For instance, studies on master's graduates in Spain reveal that mismatch is influenced by both field of study and labor market conditions, suggesting that educational specialization alone does not guarantee adequate job matching (María Martín-González et al., 2025). These findings reinforce the argument that educational expansion, when not coordinated with labor market demand, may exacerbate inefficiencies rather than resolve them.

The literature also underscores the role of education systems in addressing skill mismatch. Education is not only a source of human capital but also a mechanism for its continuous adaptation. As noted by Dumitru Pașnicu (2019), aligning educational curricula with labor market requirements is essential for reducing mismatch, particularly in rapidly changing economic environments. Competence-based approaches have gained prominence in this regard, emphasizing the development of adaptable skill sets that enhance both individual employability and organizational performance (Boris Škrinjarić, 2022).

Beyond formal education, the broader ecosystem of human capital development—including early education and lifelong learning—also plays a critical role. Studies on the early care and education workforce highlight the importance of foundational skills and long-term investment in human capital formation (Deborah Phillips et al., 2016). At the same time, global and regional analyses point to

emerging challenges related to the future of high-skilled workers, including geographic disparities and the increasing complexity of skill requirements in knowledge-based economies (Harald Pechlaner et al., 2020).

The European experience provides valuable insights into the institutional dimension of educational alignment. Over decades, regional cooperation and policy coordination have aimed to harmonize higher education systems and improve comparability across countries (Hans de Wit & Lijun Wang, 2024). The expansion of education without corresponding demand for skills can lead to over-qualification and mismatch, while well-coordinated systems—particularly those integrating vocational pathways and competence-based approaches—are better positioned to ensure efficient human capital utilization.

2. Data and Methodology

This study employs a comparative and descriptive analytical framework based on harmonized secondary data from Eurostat to examine patterns in STEM education, over-qualification, and skill matching across European countries. The analysis integrates three key indicators: (i) tertiary STEM graduates per 1,000 inhabitants aged 20–29 (2023), (ii) over-qualification rates and the share of workers whose education exceeds job requirements (2024), and (iii) the proportion of young workers (aged 15–34, not in education) whose skills match job requirements, disaggregated by job tenure (2024). In table 1 is presented the indicators analyzed in the article.

A cross-sectional comparative approach is used to identify inter-country differences and structural patterns, with all indicators expressed in standardized rates or percentages to ensure comparability. Gender-disaggregated data are analyzed to assess inequalities in STEM education outcomes, while labor market indicators are examined to capture different dimensions of skill mismatch. To explore the relationship between mismatch indicators, the study applies a bivariate correlation analysis, focusing on the association between over-qualification and the incidence of education exceeding job requirements. In addition, a tenure-based stratification is employed to analyze the dynamics of skill matching over time. By comparing groups with varying job tenure (from less than one year to over ten years), the study captures the adjustment process through which workers achieve better alignment between their skills and job requirements.

Table 1: Indicator description

Indicator	Online data code:	DOI
Tertiary education graduates in science, mathematics, computing, engineering, manufacturing and construction, 2023 (number per 1 000 inhabitants aged 20–29 years)	educ_uoe_grad04	https://doi.org/10.2908/EDUC_UOE_GRAD04
Correlation between the over-qualification rate and the rate of education level higher than job requirements, 2024, (% of employed people aged 20-34 with high education)	lfso_24match01 lfsa_eoqgan	https://doi.org/10.2908/LFSO_24MATCH01 https://doi.org/10.2908/LFSA_EOQGAN
Share of young people with a match between skills and current job requirements by job tenure, 2024 (% of employed people aged 15-34 not in education)	lfso_24match13	https://doi.org/10.2908/LFSO_24MATCH13

Source: authors based Eurostat (2026)

3. Gender Inequality and Structural Variation in STEM Tertiary Education Across Europe

The formation of human capital in science, technology, engineering, and mathematics (STEM) constitutes a foundational pillar of modern economic development. In advanced economies, the capacity to generate and sustain innovation is directly linked to the availability of highly trained individuals in technical fields. However, the distribution of such human capital is neither uniform across countries nor equitable between genders. The 2023 European data on tertiary STEM graduates reveals a complex landscape characterized by significant inter-country variability and persistent gender disparities, pointing to deeply embedded structural dynamics within educational systems and labor markets.

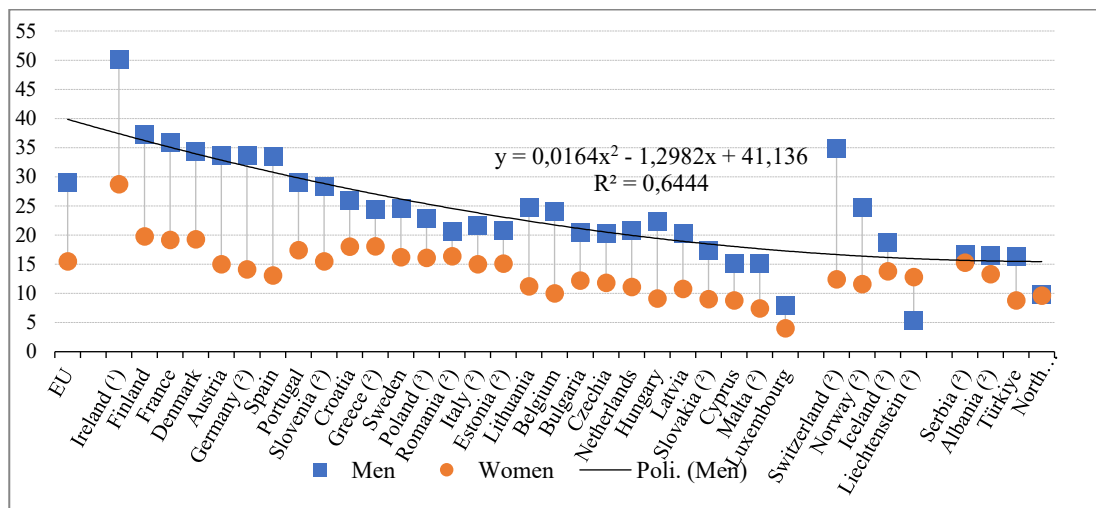


Figure 1: Tertiary education graduates in science, mathematics, computing, engineering, manufacturing and construction, 2023 (number per 1 000 inhabitants aged 20–29 years)
 Source: Eurostat, (2026)

At the aggregate level, the European Union exhibits a clear imbalance in STEM graduation rates between men and women. With approximately 29 male graduates per 1,000 inhabitants aged 20–29 compared to roughly 15–16 female graduates, the data indicates that male participation is nearly double that of females. The absence of any country achieving gender parity underscores the systemic nature of the issue, suggesting that gender inequality in STEM education is not merely contingent on national policies but is instead rooted in broader socio-cultural and institutional frameworks.

Beyond gender differences, the data reveals substantial heterogeneity in STEM graduation rates across European countries. Ireland stands out as a significant outlier, with exceptionally high levels of both male and female graduates, reaching approximately 50 and 29 per 1,000 respectively. Other high-performing countries, including Finland, France, Denmark, Austria, and Germany, also demonstrate strong output, albeit at lower levels. In contrast, countries such as Cyprus, Malta, and Luxembourg exhibit markedly lower graduation rates. This variation can be plausibly attributed to differences in economic structure, levels of investment in higher education, and the degree of integration between academic institutions and industry. Economies with a strong technological and industrial base tend to generate higher demand for STEM skills, thereby incentivizing greater educational participation in these fields.

A particularly salient feature of the data is the differing patterns of variability between male and female participation. Male graduation rates display a wide dispersion, ranging from fewer than 10 to approximately 50 graduates per 1,000 inhabitants. This suggests that male engagement in STEM

education is highly responsive to national contexts, including economic incentives and institutional capacity. In contrast, female participation is considerably more compressed, typically falling within the range of 10 to 18 graduates per 1,000 in most countries. This reduced variability indicates the presence of persistent structural constraints that limit female participation regardless of broader national conditions. Such constraints may include gender norms, differences in early educational socialization, and the underrepresentation of women in specific STEM subfields, particularly engineering and computing.

The relationship between overall STEM output and gender equality is not linear. High-performing countries do not necessarily exhibit smaller gender gaps. On the contrary, countries with the highest levels of STEM graduation often maintain substantial disparities between men and women. Ireland, for instance, while leading in total output, still displays a considerable gender gap. Regional patterns further illuminate the structural nature of these dynamics. Northern and Western European countries generally achieve higher levels of STEM output, reflecting their advanced industrial economies and well-developed educational systems. Southern European countries tend to occupy a middle position, with moderate output and persistent disparities. Meanwhile, Eastern European countries present a more heterogeneous picture, with some achieving relatively narrower gender gaps, albeit often at lower overall levels of participation. This suggests that reduced inequality in these contexts may be partially attributable to uniformly lower engagement rather than successful inclusion strategies.

The persistence of gender disparities in STEM education can be interpreted through a combination of supply-side, demand-side, and socio-cultural factors. On the supply side, educational systems differ in their degree of specialization and accessibility, influencing students' pathways into STEM fields. On the demand side, labor market conditions, including wage differentials and employment opportunities, shape incentives for pursuing technical education. Achieving gender equality necessitates more targeted measures, including early intervention in primary and secondary education, the promotion of female role models in STEM careers, and the dismantling of institutional and cultural barriers that discourage female participation.

4. Over-Qualification and Skill Mismatch in Europe

The efficient allocation of human capital is a central concern in modern labor economics, particularly in knowledge-based economies where educational attainment has expanded rapidly. The 2024 European data on the relationship between over-qualification rates and the proportion of workers whose education exceeds job requirements provides critical insight into structural inefficiencies in labor markets. At the conceptual level, over-qualification refers to a situation in which individuals possess a higher level of formal education than is required for their current occupation. Closely related is the broader notion of vertical mismatch, captured here by the percentage of highly educated individuals employed in jobs below their qualification level. The scatterplot demonstrates a positive correlation between these indicators across European countries. As the over-qualification rate increases, so too does the share of workers employed below their educational level, suggesting that both variables are manifestations of the same underlying structural phenomenon.

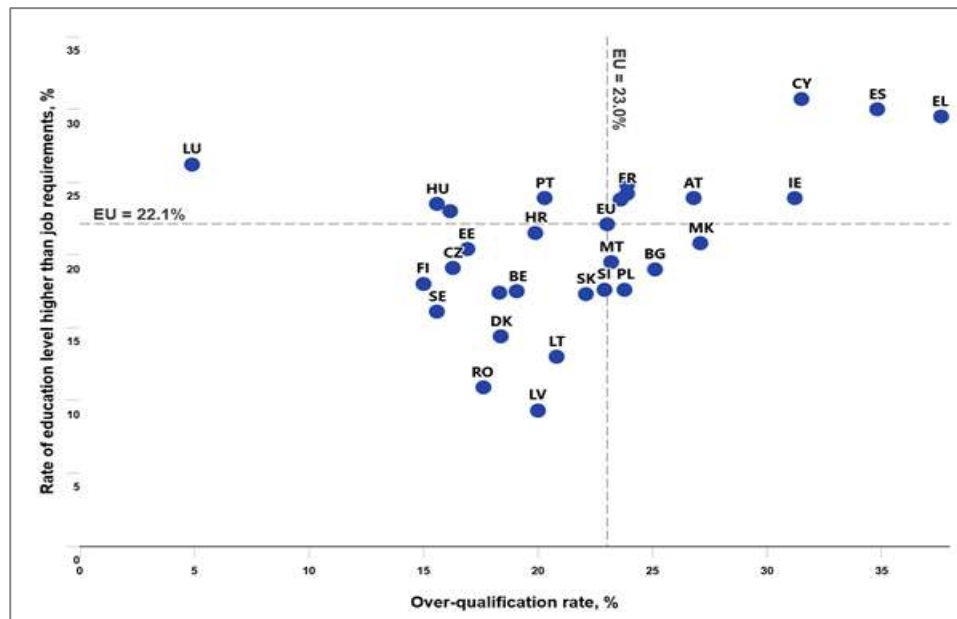


Figure 2: Correlation between the over-qualification rate and the rate of education level higher than job requirements, 2024, (% of employed people aged 20-34 with high education)

Source: Eurostat, (2026a)

The European Union average, positioned at approximately 23% for over-qualification and 22.1% for education exceeding job requirements, serves as a useful benchmark. Countries cluster around this intersection, yet significant deviations reveal important national differences. For instance, countries such as Greece, Spain, and Cyprus occupy the upper-right quadrant of the distribution, exhibiting both high over-qualification and high mismatch rates. This pattern is indicative of labor markets unable to absorb highly educated workers into appropriately skilled positions, often reflecting structural weaknesses such as limited industrial diversification, high youth unemployment, or an overexpansion of tertiary education without corresponding job creation.

Conversely, countries located in the lower-left quadrant—such as Romania, Latvia, and Lithuania—display relatively low levels of both over-qualification and mismatch. While this might initially suggest efficient labor market alignment, such an interpretation must be approached with caution. Lower mismatch rates may also reflect lower overall levels of tertiary attainment or a labor market structure that does not demand high levels of formal education. In such contexts, the apparent equilibrium may mask underdevelopment rather than efficiency.

A more nuanced picture emerges in the intermediate clusters. Countries like Germany, Denmark, and the Netherlands exhibit moderate over-qualification rates but comparatively lower mismatch levels. This suggests a more effective integration of graduates into appropriate occupations, likely facilitated by strong vocational training systems, dual education models, and close coordination between employers and educational institutions. Outliers provide particularly valuable analytical insights. Luxembourg, for example, displays relatively low over-qualification but a high rate of mismatch, suggesting that even a limited pool of highly educated workers may face constraints in finding suitable employment. Similarly,

Portugal and France show higher mismatch rates relative to their position on the over-qualification axis, pointing to potential inefficiencies in labor market absorption despite moderate levels of educational expansion. The slope of the relationship between the two variables indicates that increases in educational attainment, when not matched by corresponding labor demand, tend to exacerbate mismatch. This supports the hypothesis that educational expansion alone is insufficient to guarantee efficient labor market outcomes.

5. Skill Matching and Job Tenure in European Youth Employment

The alignment between individual skills and job requirements constitutes a central determinant of labor market efficiency, productivity, and worker well-being. In contemporary European labor markets, where educational attainment has expanded significantly, the quality of this alignment—often referred to as skill matching—has become as important as the quantity of education itself. The 2024 data on the share of young people (aged 15–34, not in education) whose skills match their current job requirements, disaggregated by job tenure, provides valuable insight into the dynamics of labor market integration and the role of experience in mitigating mismatch.

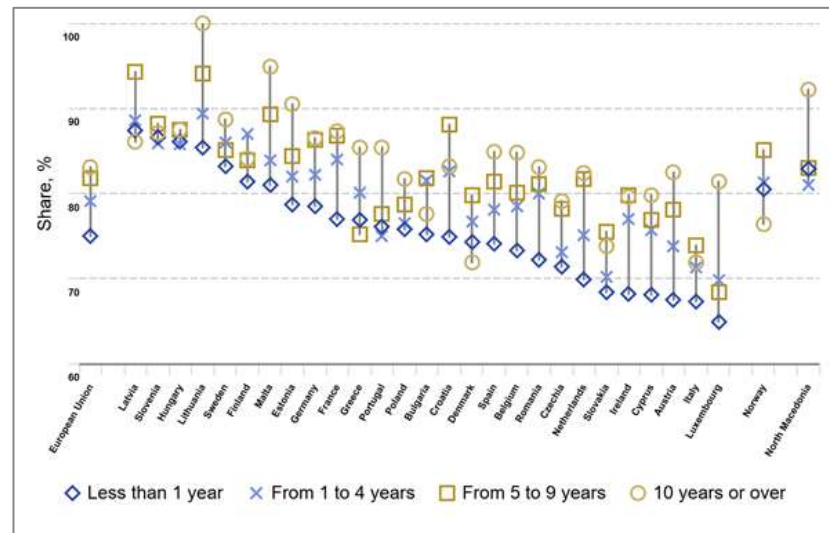


Fig 2: Share of young people with a match between skills and current job requirements by job tenure, 2024 (% of employed people aged 15-34 not in education)
 Source: Eurostat, (2026b)

A central pattern emerging from the data is the positive relationship between job tenure and skill matching. Across nearly all countries, the proportion of young workers reporting a match between their skills and job requirements increases systematically with tenure. Individuals with less than one year of experience consistently exhibit the lowest levels of matching, typically ranging between 65% and 80%. In contrast, those with ten or more years of tenure often reach levels above 85%, and in some countries exceed 90%. This gradient reflects a process of gradual alignment, whereby workers either transition into more suitable positions over time or acquire job-specific skills that reduce perceived mismatch.

At the aggregate level, the European Union average follows this pattern closely. Skill matching among recent entrants (less than one year) is significantly lower than among those with longer tenure, indicating that early career stages are characterized by higher levels of mismatch. Cross-country variation further

enriches the analysis. Countries such as the Netherlands, Sweden, Finland, and Austria display relatively high levels of skill matching across all tenure categories, suggesting efficient school-to-work transition systems and well-functioning labor markets.

Countries including Italy, Greece, and Luxembourg exhibit comparatively lower levels of skill matching, particularly among individuals with shorter job tenure. In these contexts, labor markets may be more segmented, with limited opportunities for young workers to access positions aligned with their qualifications. Structural factors such as rigid employment protection, limited job creation in high-skill sectors, and weaker links between education and employment may contribute to these outcomes.

An important observation is that the dispersion of skill matching decreases with tenure. In early career stages, differences between countries are more pronounced, reflecting variability in institutional arrangements and labor market conditions. However, as tenure increases, convergence occurs, with most countries reaching relatively high levels of matching. A non-negligible share of workers with long tenure still report mismatch, indicating that structural inefficiencies persist beyond the early career phase. This may reflect technological change, evolving job requirements, or limitations in lifelong learning systems that prevent workers from updating their skills in line with labor market demands.

From a theoretical perspective, these findings are consistent with matching theory and human capital accumulation models. Early career mismatch can be viewed as part of an adjustment process, where individuals experiment with different jobs before finding an optimal match. Simultaneously, on-the-job learning enhances workers' productivity and reduces the gap between their skills and job requirements.

6. Conclusions

The analysis of STEM education outcomes, over-qualification, and skill matching across European countries reveals a coherent picture of structural imbalances in human capital formation and utilization. Three central conclusions emerge. The gender inequality in STEM education remains persistent and universal. Despite variations in overall graduation rates, all countries exhibit a clear male dominance in STEM fields. Even the highest-performing systems fail to achieve gender parity, indicating that expansion in educational output alone does not resolve underlying disparities. These findings point to deep-rooted socio-cultural and institutional constraints that continue to shape educational choices and access. The study identifies significant inefficiencies in the allocation of human capital within European labor markets. The positive correlation between over-qualification and the incidence of education exceeding job requirements demonstrates that a substantial share of highly educated individuals are not employed in positions commensurate with their qualifications.

The findings highlight the dynamic nature of skill matching over the life course, with job tenure playing a critical role in reducing mismatch. Younger workers, particularly those in the early stages of their careers, face higher levels of misalignment, while longer tenure is associated with improved matching. The results underscore the need for a more integrated policy approach. Enhancing the effectiveness of human capital utilization requires not only increasing participation in education but also ensuring better alignment between educational outputs and labor market needs. This includes strengthening vocational pathways, improving school-to-work transitions, and promoting lifelong learning systems. At the same time, targeted interventions are necessary to address gender disparities in STEM, particularly through early educational engagement and the reduction of institutional and cultural barriers.

References

1. Bedemariam, R., & Ramos, J. (2021). Over-education and job satisfaction: The role of job insecurity and career enhancing strategies. *European Review of Applied Psychology*, 71(3), 100632.
2. Betti, G., Gagliardi, F., Ghellini, G., & Lombardi, G. (2025). Overqualification unveiled: a multidimensional and fuzzy set analysis. *Quality & Quantity*, 59(2), 1103-1121.
3. de Wit, H., & Wang, L. (2024). Lessons from over 70 years of regional alignment processes in Europe for international higher education. *Journal of International Cooperation in Education*, 26(1), 5-19.
4. Dennis, D. H., & Hudson, C. C. (2007). Workforce Education and Two Important Viewpoints. *Journal of Industrial Teacher Education*, 44(2), 89-98.
5. Eurostat (2026). Tertiary education graduates in science, mathematics, computing, engineering, manufacturing and construction, 2023 (number per 1 000 inhabitants aged 20–29 years), available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Secondary_education_statistics
6. Eurostat (2026a). Correlation between the over-qualification rate and the rate of education level higher than job requirements, 2024, (% of employed people aged 20-34 with high education), available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Secondary_education_statistics
7. Eurostat (2026b). Share of young people with a match between skills and current job requirements by job tenure, 2024 (% of employed people aged 15-34 not in education), available ta: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Young_people_-_qualifications,_skills_and_job_alignment
8. Henseke, G. (2025). Contextualising the extrinsic outcomes of higher education during mass expansion: an introduction. *Studies in Higher Education*, 50(5), 939-954.
9. Hordern, J. (2014). Workforce development, higher education and productive systems. *Journal of Education and Work*, 27(4), 409-431.
10. Kofler, I., Innerhofer, E., Marcher, A., Gruber, M., & Pechlaner, H. (2020). The future of high-skilled workers: regional problems and global challenges. Springer Nature.
11. Martín-González, M., Ortiz, S., & Jano, M. D. (2025). An empirical analysis of overeducation among master's graduates in Spain. *European Journal of Higher Education*, 1-21.
12. Pan, Z., Wang, Y., & Liu, Z. (2025). Over-education, job satisfaction, and intention to quit: Evidence from China. *Social Indicators Research*, 176(1), 287-307.
13. Pașnicu, D. (2019). The role of the education system in solving the skills mismatches on the labor market. In *International Conference on Education and New Developments* (Vol. 2, pp. 312-314).
14. Pavlin, S., & Svetlik, I. (2014). Employability of higher education graduates in Europe. *International journal of Manpower*, 35(4), 418-424.
15. Phillips, D., Austin, L. J., & Whitebook, M. (2016). The early care and education workforce. *The future of children*, 139-158.
16. Škrinjarić, B. (2022). Competence-based approaches in organizational and individual context. *Humanities and social sciences communications*, 9(1), 1-12.
17. Wallenborn, M. (2010). Vocational Education and Training and Human Capital Development: current practice and future options. *European Journal of Education*, 45(2), 181-198.

ABOUT COMPETENCIES REQUIRED FOR THE INTEGRATION OF DIGITAL TECHNOLOGIES

Daniela Gheorghita MARIA (IFTIMOV)

University of Craiova , Doctoral School of Economics Sciences, Romania

daniela.iftimov@yahoo.com|

Abstract

The article explores that the digital transformation of organizations and educational systems requires the development of a complex set of digital competencies, which go beyond the simple use of technologies and include adaptability, critical thinking and virtual collaboration. The European DigComp, Framework and international models, such as TPACK, SAMR and ICDL, provide structures for understanding, assessing and developing teachers' digital competencies, from digital literacy to pedagogical innovation.

Studies show that the integration of digital resources and technological strategies in teaching contributes to the efficiency of the educational process and the creation of a student-centered learning environment. Initial training and continuous professional development of teachers are essential for capitalizing on the benefits of technology and adapting to the rapid changes of the digital society. Thus, digital competencies become fundamental for educators and students, supporting both professional performance and the digital literacy of future generations.

Keywords: professional development, digital skills, social influence, digital literacy

JEL codes : I2, M12, O31

1. Introduction

The digital transformation of contemporary organizations and society is causing a profound change in the skills required of employees, especially in the educational field. Digital skills are no longer limited to the use of technological tools, but include complex capabilities such as adaptability, critical thinking, virtual collaboration and the responsible use of digital resources. In this context, the development of teachers' digital skills becomes a strategic priority.

The COVID-19 pandemic has highlighted both the importance of these skills and the existing gaps in teacher training. The sudden transition to online learning has highlighted the difficulties encountered by teachers and students, but has also offered significant opportunities for the development of digital literacy. In the post-pandemic period, the use of digital technologies has remained integrated into teaching practice, contributing to the modernization of the educational process. The purpose of this study is to analyze the role of digital skills in teaching and to highlight the main conceptual frameworks and theoretical models relevant for their development.

2. Literature Review

The literature highlights multiple definitions and conceptual frameworks regarding digital competences. According to the European Commission, digital competence is the ability to use digital technologies in a critical, creative and collaborative way. At the same time, concepts such as digital literacy, media literacy and digital skills are frequently used interchangeably, although they have distinct nuances.

Digital literacy is defined as the set of skills needed to access, manage and use digital information, while digital skills also include dimensions such as attitudes and knowledge needed for the effective and ethical use of technology. Several theoretical models contribute to the understanding of this concept:

The TPACK model (Mishra & Koehler, 2006) highlights the interdependence between technological, pedagogical and content knowledge.

The SAMR model (Puentedura, 2006) describes the levels of integration of technology in education: substitution, augmentation, modification and redefinition.

The UNESCO model proposes the development of ICT skills on three levels: acquisition, deepening and creation.

The ICDL license provides a standardized tool for assessing digital skills.

The most comprehensive framework is DigCompEdu, which structures teachers' digital skills in six areas, including the use of technologies in the professional environment, the creation of digital resources, teaching, assessment and supporting the development of students' digital skills. These models emphasize the need for an integrated approach and continuous training of teachers.

3. Data and Methodology

The present study is theoretical and exploratory in nature, based on a critical analysis of the specialized literature on teachers' digital competences. The methodology used consists of: documentary analysis of relevant studies and reports; comparison of the main conceptual frameworks; synthesis of existing theoretical concepts and models. The approach is qualitative, aiming to identify common elements and differences between the analyzed models, as well as their relevance for educational practice.

The data sources used in this study include: official documents of international institutions (European Commission, UNESCO); scientific articles and empirical studies in the field of digital education; conceptual frameworks and established theoretical models (DigCompEdu, TPACK, SAMR); relevant academic works that address digital skills and digital literacy. These sources provide a broad and scientifically validated perspective on the analyzed field. In the context of this theoretical study, the variables analyzed are conceptual and include: Teachers' digital skills (dependent variable); Level of integration of technology in education; Continuous professional training; Pedagogical models used; Access to digital resources; Previous experience in using technology.

These variables influence how teachers integrate technology into the educational process and its efficiency. Given the theoretical nature of the research, the study does not use a true empirical sample. Instead, the analysis is based on: previous studies conducted on teachers; international reports on digital education; research that includes teachers from various levels of education. In a possible future empirical study, the sample could include teachers from different educational institutions, selected based on criteria such as professional experience, level of education and field of specialization.

4. Results and Discussion

The literature review highlights several relevant results regarding teachers' digital competences:

First, there is a significant increase in the use of digital technologies in education, especially after the pandemic period. Teachers have integrated digital tools not only in the online environment, but also in face-to-face activities, which indicates a sustainable change in teaching practices.

Second, the results indicate that the level of digital competences of teachers is uneven, being influenced by factors such as professional experience, access to training and available technological resources. Teachers who have benefited from continuous training programs have demonstrated a greater capacity for effective integration of technology.

Another important result is that the theoretical models analyzed (DigCompEdu, TPACK, SAMR) provide complementary frameworks for the development of digital competences, each contributing to the understanding of different dimensions of the use of technology in education.

The literature also emphasizes that the integration of technology contributes to the improvement of the teaching-learning process, facilitating access to various resources, stimulating student involvement and supporting personalized learning. The results obtained confirm that the development of teachers' digital skills is a complex and continuous process, influenced by multiple variables. Although the use of technology has become more frequent, it does not automatically guarantee an improvement in the quality of education.

An important aspect to discuss is the difference between the superficial use of technology and its authentic pedagogical integration. In this sense, the SAMR model highlights the fact that many educational practices remain at the level of substitution or augmentation, without reaching real transformations of the educational process. At the same time, the TPACK model emphasizes the need for a balance between technological, pedagogical and content skills, which implies a complex training of teachers. The lack of one of these dimensions can limit the efficiency of the use of technology.

The DigCompEdu framework also offers a holistic perspective, but its implementation depends on educational policies, available resources and teachers' openness to innovation. Thus, there is a clear need for in-service training programs tailored to the real needs of teachers.

Another relevant aspect is the impact on students. The integration of technology can support the development of their digital skills, but requires a guided and balanced approach to avoid passive or uncritical use of digital resources.

5. Conclusions

In conclusion, digital skills are an essential component of teaching professionalism in contemporary society. The transformations generated by digitalization and accelerated by the pandemic have highlighted both the opportunities and challenges associated with the use of technology in education. The study highlights the importance of solid conceptual frameworks, such as DigCompEdu, TPACK and SAMR, which provide valuable benchmarks for the development and assessment of teachers' digital skills.

At the same time, the results emphasize the need for continuous training, adapted to the current educational context. The effective integration of technology in education does not only depend on access to resources, but also on the ability of teachers to use these tools in a critical, creative and pedagogically relevant way. In this sense, the development of digital skills must become a priority in educational policies and in initial and continuous training programs.

In the future, it is recommended to carry out empirical studies that directly investigate the level of teachers' digital skills and their impact on student performance, thus contributing to the foundation of effective educational strategies.

References

- Beckhard, R. (1969). *Organization development: Strategies and models*. Reading, MA: Addison-Wesley, University Michigan, 115-118.
- Dias-Trindade, S., & Albuquerque, A. (2022). Digital competences and teaching innovation in 21st century schools. *Education Sciences*, 12(4), 213. <https://doi.org/10.3390/socsci11100481>
- French, W. L., & Bell, C. (1984). *Organization development: Behavioral science interventions for organization improvement* (3rd ed.). Englewood Cliffs, N.J.: Prentice-Hall.
- Galpin, T. J. (1996). *The human side of change: A practical guide to organization redesign*. San Francisco, CA: Jossey-Bass Publishers.
- Hattie, J. (2021). *Visible learning. Guide for teachers*. Bucharest: Trei Publishing House. <https://doi.org/10.4324/9780203887332>
- Hammer, M. at al. (1993). *Reengineering the corporation: A manifesto for business revolution*. New York: [https://doi.org/10.1016/S0007-6813\(05\)80064-3](https://doi.org/10.1016/S0007-6813(05)80064-3)
- Harper Business Sink at al. (1989). *Planning and measurement in your organization*
- Johnson, M. at al. (2018). *NMC Horizon Report: 2018 Higher Education Edition*. The New Media Consortium. (apud Babu, Suneela, 2023)
- Kanter, R. M. at al. (1997). *On the frontiers of management*. Boston, MA: Harvard Business School Press, 256-258.
- Kanter, R.M. at al. (1992). *The Challenge of Organizational Change*. New York: The Free Press.
- Kirkpatrick, D. L. & Kirkpatrick, J. D. (2006). *Evaluating Training Programs: The Four Levels*. Berrett-Koehler Publishers.
- Kotnour, T. G. (2010). *Transforming organizations: Strategies and methods*. Boca Raton: CRC Press..
- Tony Bush. (1990) *Leadership and educational management. - Current theories and practices*”,
- Singh, A., & Shoura, M. M. (2006). A life cycle evaluation of change in an engineering organization: A case study. *International Journal of Project Management*, 24(4), 337-348. <https://doi.org/10.1016/j.ijproman.2005.11.001>
- Sink, D. S., & Morris, W. T. (1995). *By what method? are you, developing the knowledge and skills to lead large-scale quality*. Norcross, GA: Industrial Engineering and Management Press: Institute of Industrial Engineers.
- Smith, M. E. (2002). Implementing organizational change: Correlates of success and failure. *Performance Improvement Quarterly*, 15(1), 67-83. <https://doi.org/10.1016/j.ijproman.2005.11.001>
- Ulrich, D. & Dulebohn, J.H. (2015). Are we there yet? What's next for HR? *Human Resource Management Review*, 25, 188-204. <https://doi.org/10.1016/j.hrmr.2015.01.004>
- Ulrich, D., Brockbank, W., Yeung, A., & Lake, D. (1995). Human resource competencies: An empirical assessment. *Human Resource Management*, 34(4), 473-496. <http://dx.doi.org/10.1002/hrm.3930340402>
- Ulrich, D., Younger, J., Brockbank, W., & Ulrich, M.D. (2013). The state of the HR profession. *Human Resource Management* 52(3), 457-471. <https://doi.org/10.1002/hrm.21536>
- Weber, P. S., & Weber, J. E. (2001). Changes in employee perceptions during organizational change. *Leadership & Organization Development Journal*, 22(6), 291-300. <https://doi.org/10.1002/hrm.21536>

THE ROLE OF ARTIFICIAL INTELLIGENCE IN PERFORMANCE APPRAISAL: AN ANALYSIS OF HR PROFESSIONALS' PERSPECTIVES

Otilia-Ana LUNGU¹ ; Isabelle-Ana-Maria VÎLSAN² *

^{1,2} Ovidius University of Constanta, Doctoral School of Management, Constanța, Romania

* Corresponding author: isabelle.vilsan@365.univ-ovidius.ro | ORCID: 0009-0001-8778-8683

Abstract

The aim of this paper is to identify the benefits and challenges associated with the use of artificial intelligence in the professional performance appraisal process, by exploring the perceptions of human resources experts. The research adopts a qualitative methodology, based on ten semi-structured interviews conducted with HR managers from six private organisations in Romania that use AI-based assessment systems. The data were transcribed and analysed using thematic coding in the ATLAS.ti platform, providing an integrated view of the phenomenon under study. The results highlight that the integration of AI is perceived as a factor in reducing human subjectivity, ensuring procedural fairness through the standardisation of criteria and the use of quantifiable indicators. However, the analysis reveals critical concerns regarding the vulnerability of training data and the risk of perpetuating historical biases under the guise of technological neutrality. The study emphasises the importance of the 'Human-in-the-Loop' concept, arguing that ultimate responsibility must be shared: whilst the organisation provides the technological framework, the manager acts as a validation agent to contextualise algorithmic results. The conclusions indicate that the success of implementing these systems depends fundamentally on process transparency, algorithmic literacy and guaranteeing the right to an explanation, transforming technological opacity into an ethical and fair evaluation system.

Keywords: AI, performance appraisal, HR, algorithmic bias, procedural fairness

JEL codes: M15, M12, O33, J24.

1. Introduction

Professional performance appraisal is a central component of individual development and organisational performance. Traditional approaches, dominated by human judgement, have often been subjective and influenced by cognitive and emotional factors, creating challenges regarding transparency and fairness (Ensslin et al., 2022).

Recent technological advances, particularly in the field of artificial intelligence, have led organisations to adopt AI solutions to optimise human resources processes, including employee assessment (Chen, 2023). The transition from manual methods to algorithm-assisted assessment promises objectivity and accuracy, fundamentally transforming how assessment is defined and managed in the professional environment (Benabou & Touhami, 2025).

The research addresses dimensions related to objectivity, the generation or reduction of biases, risks of discrimination, ethical criteria, and the responsible management of AI systems. The study adopts a qualitative methodology, based on in-depth interviews with human resources specialists, to examine how AI-assisted assessment is perceived and interpreted from different professional perspectives.

The contribution of this article lies in presenting empirical findings on the effects of using AI in performance assessment, highlighting the points where the technology’s promises encounter organisational constraints and challenges related to data and accountability. The paper advocates for the consolidation of a conceptual framework for the responsible use of AI, providing reference points for organisations in shaping implementation practices, so that benefits are maximised and the risks of inequity and discrimination are minimised.

2. Literature Review

Current studies have addressed the benefits and limitations of using AI in performance management, as well as general ethical considerations, but remain limited in terms of understanding employees’ perspectives on these systems (Gómez Gandía et al., 2025). Most studies favour a technical analysis of algorithms or a managerial and HR perspective, whilst the employees’ viewpoint is given limited attention, particularly in relation to the dilemmas between: objectivity and the risks of bias, discrimination, lack of transparency and intrusion into private life (Singh & Pandey, 2024). Thus, there is a need to develop empirical studies, with an emphasis on qualitative approaches, that directly analyse employees’ experiences and perspectives on AI-assisted performance appraisal, including aspects related to the data used, monitoring, challenging decisions and accountability.

To address this gap in the literature, the study adopts a qualitative approach, based on semi-structured interviews, through which employees’ perceptions of the use of AI in performance appraisal and the associated effects on their professional experience are analysed. Through this empirical perspective, the research supports the consolidation of the conceptual framework regarding the responsible implementation of AI in HR and provides reference points for the development of policies and practices geared towards the fair, non-discriminatory and transparent use of data and assessments. In this regard, the research aims to clarify how the transition from predominantly subjective assessment to algorithm-supported assessment can be managed without compromising fairness, transparency and employee well-being.

3. Data and Methodology

The study was conducted using a qualitative approach, employing semi-structured and thematically coded interviews to establish a solid foundation for understanding the perceptions of human resources managers regarding the use of artificial intelligence in professional performance evaluation. The objective of this paper is to identify both the benefits and the challenges associated with the use of artificial intelligence in professional performance evaluation.

The research involved 10 respondents with responsibilities in the field of human resources, from the private sector, across six Romanian organisations that use artificial intelligence in professional performance evaluation. The interview comprised two parts. The first part covered information about the respondents, whilst the second part consisted of seven open-ended questions regarding the respondents’ perceptions of the use of artificial intelligence in professional performance evaluation.

Once the data collection process was complete, the responses were transcribed into the ATLAS.ti platform for coding. Each respondent’s response was carefully reviewed, and relevant text fragments were selected and assigned descriptive codes reflecting the meaning of the content, thereby constructing an integrated view of the phenomenon under study.

4. Results and Discussion

Analysis of the data collected from the ten respondents provides an in-depth perspective on the process of integrating artificial intelligence into human resource management. The first open-ended question sought the participants’ views on the added value of artificial intelligence in enhancing the impartiality of performance systems. The responses reveal a dual perspective on the phenomenon: whilst the potential of the technology to significantly reduce subjectivity is acknowledged, participants express reservations regarding the intrinsic limitations of algorithms in capturing the contextual nuances of professional performance. The second question sought to identify the contexts in which these systems can ensure a more objective assessment, as opposed to those situations where technology risks introducing new forms of systematic error or digital bias. The group of respondents considers that AI represents a means of optimising objectivity by basing decisions on data, but highlights the danger of codifying systemic distortions from the organisation’s history, which could affect fairness in the long term.

The third question sought to identify the risks of systemic discrimination following the integration of these technological solutions. They emphasise that, without rigorously calibrated datasets, artificial intelligence tends to extrapolate flawed patterns, favouring the emergence of forms of indirect discrimination masked under the guise of computational neutrality. In this context, question number four sought to identify the taxonomy of data whose use can be considered legitimate and ethical. Respondents’ views converge on the imperative to limit data collection strictly to professional performance indicators correlated with the job description. The use of information from the private sphere, such as family circumstances or health status, is perceived as an unjustified intrusion lacking any ethical basis.

The fifth open-ended question explored the dividing line between legitimate monitoring and intrusive surveillance practices. The responses collected indicate that the legitimacy of monitoring is strictly contingent upon respect for the employee’s autonomy. Respondents highlight an inverse correlation between the intensity of surveillance and staff well-being, warning that excessive algorithmic control acts as a productivity inhibitor, potentially triggering mechanisms of resistance or professional burnout. The sixth question concerned the fundamental pillars of the administrative redress framework in the event of challenges to automated decisions. The results reveal that the success of AI implementation depends fundamentally on the degree of intelligibility of decisions. Participants emphasise the need for a two-way communication protocol, centred on explainability, to neutralise suspicions of arbitrariness and eliminate information asymmetries that can lead to professional alienation.

The final question addressed institutional responsibility for AI errors, with respondents favoring a shared model. The organization manages the infrastructure, while the manager acts as a validation agent through active human oversight. This critical review of results prior to the final decision ensures the necessary balance between digital innovation and the ethical management of human resources.

5. Conclusions

The research highlights that the integration of Artificial Intelligence into performance evaluation serves as a means of neutralising human subjectivity, transforming the decision-making process into a rigorous framework of procedural fairness. By standardising criteria and utilising quantifiable indicators, the

technology transcends the role of a mere computational tool, becoming a guarantor of organisational objectivity.

However, the study reveals a critical vulnerability: the risk of perpetuating algorithmic bias. An AI system is only as impartial as the data with which it has been trained, and there is a possibility that historical prejudices may be encoded under the guise of technological neutrality. To counter this risk, it is imperative to adopt the ‘Human-in-the-Loop’ model, in which responsibility is shared: the organisation provides the ethical infrastructure, whilst the manager acts as an agent for validating and contextualising the outputs.

Ultimately, the success of implementing these systems depends on transparency and algorithmic literacy. Employees’ right to an explanation and the intelligibility of processes are the essential mechanisms that transform technological opacity into a fair management system, strengthening trust in new forms of digital governance of human resources.

References

- Benabou, A., & Touhami, F. (2025). Empowering human resource management through artificial intelligence: A systematic literature review and bibliometric analysis. *International Journal of Production Management and Engineering*, 13(1), 59–76. <https://doi.org/10.4995/ijpme.2025.21900>
- Chen, Z. (2023). Ethics and discrimination in artificial intelligence-enabled recruitment practices. *Humanities and Social Sciences Communications*, 10, 567. <https://doi.org/10.1057/s41599-023-02079-x>
- Ensslin, S.R., Rodrigues, K.T., Yoshiura, L.J.M., da Silva, J.C., & Longaray, A.A. (2022). Organisational performance management and the ‘sustainability’ of the performance evaluation system: A view guided by the integrative review perspective. *Sustainability*, 14(17), 11005. <https://doi.org/10.3390/su141711005>
- Gómez Gandía, J. A., de Lucas Ancillo, A., & del Val Núñez, M. T. (2025). Knowledge and artificial intelligence on employee behaviour advancing safe and respectful workplace. *Journal of Innovation & Knowledge*, 10(4), 100750. <https://doi.org/10.1016/j.jik.2025.100750>
- Singh, A., & Pandey, J. (2024). Artificial intelligence adoption in extended HR ecosystems: Enablers and barriers. An abductive case study. *Frontiers in Psychology*, 14, 1339782. <https://doi.org/10.3389/fpsyg.2023.1339782>

A CONCEPTUAL ANALYSIS OF EMPLOYMENT AND UNEMPLOYMENT IN THE MODERN ECONOMY: THEORETICAL PARADIGMS AND REGIONAL REALITIES IN ROMANIA

Adela – Mihaela DUȚU

PhD Student, Doctoral School of Economic Sciences „Constantin Brâncuși” University of Târgu-Jiu,
Romania
dutu.adela@utgjiu.ro

Abstract

This paper analyzes the transformations of employment and unemployment concepts under the influence of new technologies and deepening territorial disparities. Moving beyond the traditional view of the labor market as a simple meeting point between supply and demand, the study highlights the current complexity of these phenomena, where digitalization and economic concentration in urban hubs generate asymmetric development rates. While major centers attract investment and skilled labor, peripheral regions tend to remain trapped in persistent structural unemployment. By corroborating classical economic theories with modern economic geography perspectives, the article explains the mechanisms that favor certain Romanian counties over others. The findings emphasize the need for granular, county-level analysis (NUTS 3) to correctly identify the causes of imbalances and to substantiate employment policies adapted to local realities.

Keywords: labor market; regional disparities; structural unemployment; conceptual analysis; territorial cohesion.

JEL Classification: J21, J64, R23.

1. Introduction

Currently, the labor market no longer operates according to the rigid rules of several decades ago. Digitalization and structural economic shifts have generated profound transformations, radically changing how people work and where jobs emerge. In this context, we can no longer speak of a unitary national labor market, but rather a collection of local and regional markets, each with its own rules and issues.

In our country, this reality is visible through the contrast between counties that have managed to adapt quickly to the modern economy and those that remain trapped in obsolete economic structures. Therefore, regional disparities are not just figures in statistical reports but reflect real differences in opportunities for citizens. As recent studies show, we are witnessing an increasingly sharp polarization, where a few large cities absorb the best resources, while rural areas and small industrial towns face a chronic lack of opportunities (Zaman & Georgescu, 2021).

2. Conceptual Benchmarks: Employment and Unemployment in the Contemporary Economy

To understand why gaps between counties arise, it is necessary to start from a redefinition of work in the current context. Employment is no longer just a simple activity through which an individual obtains an income but has become, according to Constantinescu (2015), a true "mirror" of the entire economic

system's functionality. In a region where the employment rate is high, a positive chain effect occurs: incomes rise, consumption is stimulated, and public services become easier to sustain. However, in today's economy, it is not just the quantity of work that matters, but especially the quality of work and the capacity to adapt to change.

On the other hand, unemployment can no longer be considered a uniform phenomenon; it takes on increasingly complex and difficult-to-manage forms. In the specialized literature, structural unemployment remains the most dangerous, highlighting a significant mismatch between the skills of the available workforce and the demands of today's technological employers. This "mismatch" explains situations in certain Romanian counties where we encounter the paradox of a high vacancy rate simultaneous with a high number of jobless individuals, a phenomenon that condemns certain areas to prolonged stagnation (Zaman & Georgescu, 2021). In this regard, the problem is not necessarily the lack of job opportunities, but the insufficiency of adequate skills, an aspect highlighted by the literature on human capital (Dănăciță, 2022).

To correctly analyze the labor market at the regional level, it is not enough to rely on surface indicators. For example, the registered unemployment rate, though useful from an administrative standpoint, provides an incomplete picture, being influenced by phenomena such as commuting or informal labor. In contrast, the unemployment rate calculated according to International Labour Organization (ILO) standards better reflects social reality, as it includes individuals not officially registered but who are willing and available to work. Correlating these indicators through tools such as the Beveridge Curve allows for the evaluation of the matching process efficiency between labor demand and supply at the local level. When this process functions poorly, labor market rigidity arises, reducing the effectiveness of classical employment policies (Goschin, 2015). In this context, conceptual analysis shows that uniform national solutions cannot be applied, as labor market problems differ significantly from one county to another and have distinct causes.

3. Theoretical Approaches to Regional Disparities

To understand why labor markets do not always reach a natural equilibrium, it is necessary to analyze the main theories explaining territorial gaps, updated to present-day realities. The traditional neoclassical perspective, which argued that regional differences tend to be eliminated through labor mobility, is increasingly challenged in recent studies. Current research, such as that conducted by Gennaioli et al. (2018), shows that this convergence process is heavily hindered by the unequal quality of human capital. Practically, simply moving people does not solve the problem if destination regions cannot absorb the workforce due to education and skill gaps.

A perspective closer to Romania's reality is offered by polarization theories, adapted to the current European context. Goschin (2022) demonstrates that, instead of witnessing equalization, we observe an acceleration of "centripetal forces" favoring major urban centers. Thus, these areas become attraction poles not only for capital but also for skilled labor, generating a brain drain phenomenon at the regional level. This cumulative causation mechanism transforms developed counties into growth engines, while the rest of the territory remains trapped in structural stagnation, an aspect emphasized by Zaman and Georgescu (2021) in analyses regarding territorial cohesion in Romania.

Simultaneously, New Economic Geography, in the context of digital transformations, emphasizes the idea of "smart clustering." Contemporary authors, such as Andrei et al. (2024), highlight that modern firms do not just look for low costs but for access to innovation ecosystems. From this perspective, regional disparities are no longer seen as simple market errors but as the result of knowledge concentration in technological hubs. This evolution in economic thought is summarized in Table 1, providing an overview of how explanations regarding territorial inequalities have changed:

Table 1. Synthesis of Economic Paradigms on Regional Disparities

Paradigm	References	Central Mechanism	Regional Result
Conditional Convergence	Gennaioli et al. (2018)	Importance of human capital stock and education	Slow equalization, dependent on skills
Polarization and Attraction	Goschin (2022); Zaman & Georgescu (2021)	"Magnet" effects and brain drain phenomena	Deepening gap between center and periphery
Technological Clustering	Andrei et al. (2024)	Concentration of innovation and digital ecosystems	Formation of technological growth poles

Source: Own elaboration based on recent literature analysis.

The synthesis presented in Table 1 highlights a paradigm shift: from a theoretical optimism regarding the automatic equalization of regions toward a recognition that modern economic forces tend to concentrate resources in growth poles. For Romania, this theoretical evolution suggests that merely waiting for market forces to act is insufficient for correcting disparities. Furthermore, a region's success now depends not only on the physical presence of jobs but on the capacity to generate and sustain knowledge- and innovation-based ecosystems—an aspect that becomes critical in the context of new economic challenges.

4. Conceptual Analysis of Labor Market Disparities in Romania

Transposing theoretical models into the analysis of the Romanian labor market highlights a persistent territorial fragmentation that cannot be explained by conjunctural indicators alone. In this vision, disparities between growth poles and peripheral areas are the result of structural mechanisms of asymmetric accumulation. As shown by Zaman and Georgescu (2021), these gaps tend to perpetuate due to the "low-level equilibrium trap" affecting regions with an obsolete industrial base or a low degree of economic diversification.

From a theoretical perspective, the relationship between employment and unemployment at the regional level is governed by the interaction between human capital and the structure of labor demand. In stagnating areas, we witness a conceptual paradox: the persistence of high structural unemployment simultaneous with a rigid retraining process. This situation confirms the hypothesis of Dănațică (2022), according to which the mere existence of jobs does not guarantee an increase in the employment rate if the local skill stock is not aligned with new technological paradigms.

The complexity of these regional gaps is caused by the overlap of several pressure dimensions acting simultaneously on local labor markets. To understand why certain counties (NUTS 3) remain trapped in rigid economic structures, a decomposition of the structural factors blocking the balance between supply and demand is necessary. This analytical perspective, based on literature studying territorial cohesion, is synthesized in Table 2, highlighting the fundamental pillars of contemporary disparities

Table 2. Theoretical Dimensions of Regional Disparities on the Labor Market

Analytical Dimension	Pressure Factor	Estimated Regional Impact
Institutional	Rigidity of employment policies	Difficulty in adapting national solutions to specific NUTS 3 needs
Educational	Skill mismatch	Workforce marginalization in regions with limited access to digital education
Economic	Polarization effect (center-periphery)	Concentration of high-skilled human capital in urban hubs and the worsening of brain drain at the county level

Source: Own elaboration based on the analysis of economic polarization mechanisms.

As shown in the synthesis presented in Table 2, disparities are not just the result of abstract market forces but are fueled by concrete institutional and educational mechanisms. For instance, the skill mismatch is not merely a lack of workforce preparation but a structural barrier preventing less developed counties from transitioning to the digital economy.

In this sense, the table emphasizes that county-level employment depends critically on the capacity to adapt to these pressures, demonstrating that a granular theoretical approach is indispensable for identifying policy solutions tailored to local realities. This approach demonstrates that employment policies cannot be uniform because the sensitivity of regions to modern economic transformations differs fundamentally. Understanding these conceptual mechanisms is the only way to move beyond superficial national analyses and to establish territorial resilience strategies.

5. Conclusions and Future Research Directions

The analysis conducted in this paper demonstrates that, in the modern economy, the concepts of employment and unemployment can no longer be interpreted exclusively through aggregate national indicators. The fragmentation of the labor market into multiple local realities requires a paradigm shift, transforming conceptual analysis from a theoretical tool into a necessity for public policy formulation. The highlighted regional disparities are not simple temporary statistical variations but expressions of deep structural imbalances anchored in economic polarization mechanisms (Goschin, 2022). These processes favor major urban centers through agglomeration effects and the attraction of human capital, while peripheral regions remain exposed to persistent vulnerability. Furthermore, the paradox identified in the analysis underlines that the recovery of disadvantaged areas is hindered by the overlapping of digital skill deficits with institutional and fiscal barriers.

Regarding future research directions, there is a clear need for detailed empirical analyses at the county level (NUTS 3). Understanding the specifics of each local market and how structural factors influence hiring decisions is essential. A differentiated approach, oriented toward retraining adapted to new technological requirements and stimulating local innovation ecosystems, represents the only sustainable path for reducing disparities and achieving authentic territorial cohesion in Romania.

6. References

Andrei, T., Teodorescu, B., & Stancu, S. (2024). *Analysis of Regional Disparities and the Labor Market in Romania: Spatio-Temporal Models*. Economic Publishing House.



- Constantinescu, M. (2015). *Macroeconomics*. Revers Publishing House.
- Dănăcică, D. E. (2022). *Higher Education Employment: Regional Analyses and Perspectives*. Universitaria Publishing House.
- Gennaioli, N., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2018). Trust and social capital. *American Economic Review*, 108(10), 2731–2775. <https://doi.org/10.1257/aer.20180231>
- Goschin, Z. (2015). Efficiency of the matching process in the Romanian labor market: A regional approach. *Romanian Statistical Review*, (4), 31–45.
- Goschin, Z. (2022). *Regional Economics: Theories, Models, and Policies*. ASE Publishing House.
- Zaman, G., & Georgescu, G. (2021). *Regional Disparities and Convergence in Romania in the European Context*. Expert Publishing House.

YOUTH EMIGRATION INTENTIONS AND THE DECLINE OF THE FUTURE LABOR FORCE IN ROMANIA

Mihaela-Georgiana OPREA^{1*}; Carmen-Adriana GHEORGHE¹; Mihaela-Irma VLĂDESCU^{1,2}

¹ Center for Demographic Research, National Institute for Economic Research "Costin C. Kirițescu",
Romanian Academy, Bucharest, Romania

² Doctoral School of Economic Sciences, National Institute for Economic Research "Costin C.
Kirițescu", Institute of National Economy, Bucharest, Romania

* Corresponding author: oprea@ince.ro | ORCID: 0000-0002-2339-0772

Abstract

This study analyzes emigration intentions among Romanian youth in the context of demographic decline and a shrinking labor force. Based on a questionnaire survey conducted in Bucharest and surrounding areas, it examines migration propensity, timing, motivations, duration, destinations, and return intentions. The results show a slight preference for emigration, with clear socio-economic differences. Youth from rural areas are more inclined to migrate due to limited opportunities and income disparities, while female respondents display a higher propensity overall. The main drivers are economic alongside access to educational opportunities abroad. Most respondents plan to emigrate after completing secondary or higher education, indicating a potential "brain drain." Although migration is often viewed as temporary, many remain open to permanent settlement. Family ties are the main factor encouraging return. The typical prospective emigrant is a young female from a rural background, motivated by economic advancement and conditional return plans. The findings highlight the need for policies supporting youth retention and reducing regional disparities.

Keywords: youth migration; labor force; socio-economic disparities; demographic decline

1. Introduction

In the context of accelerated demographic decline and a shrinking active labor force, youth emigration intentions represent a key indicator of future socio-economic dynamics in Romania. Young people are in a critical transitional stage, where decisions regarding education, career, and place of residence may shape long-term labor market structures. This study aims to analyze the emigration intentions of young people, focusing on determinants, timing, duration, destination preferences, and return perspectives. The research contributes by providing an empirical profile of the prospective emigrant.

2. Literature Review

The literature highlights the role of socio-economic factors in shaping migration intentions. Hartman and Hartman (1995) show that disadvantaged youth are more likely to emigrate for economic reasons, while Labrianidis and Sykas (2017) emphasize the pursuit of better educational opportunities among high-performing individuals. Political dissatisfaction and low institutional trust also act as important drivers (Bodnar et al., 2023), whereas family support can reduce migration intentions (Gordeeva et al., 2024).

3. Data and Methodology

This study uses a quantitative questionnaire-based survey conducted in Bucharest and its surrounding areas among young respondents aged 15–19, consisting of 12 questions organized into three sections: demographic characteristics, emigration intentions, and return perspectives.

4. Results and Discussion

Results indicate a relatively balanced distribution between those intending to emigrate and those preferring to remain, with a slight inclination toward emigration. Rural respondents show a higher propensity to emigrate compared to urban respondents, reflecting structural disparities in opportunities. Female respondents display a higher migration tendency, influenced by labor market inequalities. The main drivers are economic (better wages), career opportunities and higher living standards. Many respondents consider temporary migration a significant proportion remain open to permanent settlement. Family ties represent the primary factor influencing return intentions. The typical emigrant profile is a young female from rural area, planning to leave for economic reasons, with an uncertain destination and return plans.

5. Conclusions

The study confirms that youth emigration in Romania is a calculated response to economic and educational disparities. To mitigate these risks, public policies must focus on reducing regional disparities, enhancing professional opportunities for young graduates and creating robust reintegration mechanisms. While limited by its regional focus, this study provides a necessary foundation for future national-scale longitudinal research.

References

- Bodnar, A., Bodnar, E., & Sabelnikova, E. (2023). Personality Features of a High School Student - a Potential Emigrant. *Lurian Journal*. <https://doi.org/10.15826/lurian.2023.4.2.2>
- Gordeeva, T., Sychev, O., Kornienko, D., Rudnova, N., & Dedyukina, M. (2024). To Stay or to Leave: The Role of School, Family, and Prosocial Goals in Migration Intentions of Russian High School Students. *Psychology in Russia: State of the Art*. <https://doi.org/10.11621/pir.2024.0105>
- Hartman, H., & Hartman, M. (1995). Israeli Students' Attitudes Toward Emigration. *Youth & Society*, 26, 403 - 437. <https://doi.org/10.1177/0044118X95026004001>
- Labrianidis, L., & Sykas, T. (2017). Why High School Students Aspire to Emigrate: Evidence from Greece. *Journal of International Migration and Integration*, 18, 107-130. <https://doi.org/10.1007/S12134-015-0468-3>

THE PARADOX OF ENTREPRENEURSHIP EDUCATION IN TÜRKİYE: BALANCING QUANTITY AND QUALITY

Sertaç ERCAN

Bandırma Onyedli Eylül University, Business Administration, Balıkesir, Türkiye

sercan@bandirma.edu.tr | ORCID: 0000-0003-3896-9194

Abstract

This study examines the state of entrepreneurship education and the broader entrepreneurial ecosystem in Türkiye. While Türkiye exhibits a high entrepreneurial intention rate of 35% -significantly surpassing the European and US averages- this numerical strength reveals a profound paradox when compared to qualitative outputs. Despite a 127% higher education enrollment rate across more than 200 universities, Türkiye ranks only 43rd out of 133 in the Global Innovation Index. Through a descriptive analysis of institutional data and educational statistics, this study identifies a systemic gap: entrepreneurship training remains predominantly theoretical, and the ecosystem is heavily reliant on state-supported institutions like Kosgeb and Tubitak. Furthermore, economic instability has driven fear of failure to 49% as of 2024. The findings suggest that overcoming this paradox requires integrating critical thinking into primary education, shifting toward a global entrepreneurial mindset, and adopting lean models to transform quantitative potential into high-quality innovation.

Keywords: Entrepreneurship Education; Entrepreneurial Ecosystem; Innovation Paradox

JEL codes: A20; I23; L26; O30

1. Introduction

The idea of integrating entrepreneurship into education has generated immense enthusiasm over the last few decades. Consequently, numerous positive effects such as economic growth, job creation, and increased societal resilience are highlighted, alongside personal development, enhanced school engagement, and improved equality. However, putting this idea into practice has also introduced significant challenges. Lack of time and resources, teachers' fear of commercialization, restrictive educational structures, assessment difficulties, and definitional ambiguity are among the primary obstacles practitioners face when attempting to embed entrepreneurship into educational systems (Kuratko, 2005; Lackéus, 2015).

Against this global backdrop, Türkiye demonstrates a remarkably strong entrepreneurial tendency, reflected in an entrepreneurial intention rate of approximately 35%. This places the country at the top among European nations, where the average intention is around 14%, and also significantly ahead of the United States' 17%. This enthusiasm is mirrored in a high rate of early-stage entrepreneurs, sitting at roughly 14% (Karadeniz, 2019).

However, this quantitative strength reveals a deep paradox when contrasted with educational outputs and innovation quality. Türkiye has a higher education gross enrollment rate of 127%, ranking second globally, driven by the presence of over 200 universities (YOK Atlas). Despite this vast student capacity, the country ranks 43rd among 139 countries in the Global Innovation Index (GII, 2025). Furthermore,

while early-stage activity is high, a substantial portion consists of micro enterprises that frequently open and close, indicating qualitative challenges in enterprise sustainability. This study aims to explore the underlying causes of this paradox and outline strategic pathways to improve the qualitative output of entrepreneurship education in Türkiye.

2. Literature Review

Entrepreneurship education has become one of the fastest-growing fields globally, primarily due to the consensus that it plays a crucial role in solving chronic socioeconomic challenges such as unemployment, poverty, and stagnant economic growth (Özdemir et al., 2016). To understand Türkiye’s specific ecosystem within this growing field, it is essential to position it against global models. In the United States, entrepreneurship education emphasizes practice, networking, and ecosystem building, supported by a dominant risk-taking culture. In Europe, the focus lies on integrating theoretical knowledge with market needs, and risk perception is heavily tied to the fear of failure.

To understand Türkiye’s ecosystem, it is essential to position it against global models. In the United States, entrepreneurship education emphasizes practice, networking, and ecosystem building, supported by a dominant risk-taking culture. In Europe, the focus lies on integrating theoretical knowledge with market needs, and risk perception is heavily tied to the fear of failure.

Conversely, the educational approach in Türkiye is predominantly theoretical across both university courses and public training programs. Although higher education in Türkiye performs above the European average due to compulsory courses and free online training, primary and secondary entrepreneurship education scores below the European average (2.76 compared to Europe’s 3.23) (Bosma and Kelley, 2019). This reliance on theory over practical market integration represents a significant gap in the current literature and educational practice.

3. Data and Methodology

This paper utilizes a descriptive and comparative methodology, drawing on national ecosystem observations, global indices, and institutional statistics. The data assesses inputs and outputs across primary, secondary, and higher education levels, as well as institutional support mechanisms. Key metrics analyzed include the Global Innovation Index rankings, changing fear of failure rates between 2019 and 2024, and operational data from foundational state institutions such as the Small and Medium Enterprises Development and Support Administration (Kosgeb) and Tubitak.

4. Results and Discussion

The analysis confirms that Türkiye possesses a robust numerical and structural foundation, including technology transfer offices (TTOs) and incubation centers. State institutions actively drive growth; for example, Kosgeb provided basic entrepreneurship training to over 100,000 people and advanced certificates to more than 52,000 individuals in 2025 (Kosgeb, 2025).

However, translating these inputs into high-quality outputs remains difficult. The findings highlight several critical bottlenecks (Bosma and Kelley, 2019; Karadeniz, 2019):

- **Theoretical Dominance:** With the exception of incubation centers, public and university training programs offer comprehensive but strictly theoretical knowledge, lacking practical application.

- Economic Instability and Risk: Frequent economic instability creates significant hurdles for entrepreneurs who require a stable environment to grow. Consequently, the fear of failure in Türkiye surged by 5% between 2019 and 2024, reaching 49%.
- State Dependency: The entrepreneurial growth is largely state-supported, with public organizations dominating R&D spending, which limits organic, private-sector-led expansion.

5. Conclusions

Türkiye does not lack students, resources, or entrepreneurial intention; the primary issue is the low quality of the resulting enterprises and innovations. To transform numerical success into institutional strength, a major mindset shift is required.

First, the development of entrepreneurship-related skills, such as problem-solving and critical thinking, must begin at the primary school level (Yurtseven and Ergün, 2018). Second, the overarching education model must transition from a traditional local business mindset to a global entrepreneurial perspective. Finally, adopting lean entrepreneurship models, fostering stronger interdisciplinary integration, and cultivating a culture that learns from mistakes rather than fearing failure will be vital strategic steps. Implementing these changes will enable Türkiye’s entrepreneurship education to produce significantly better results.

References

- Bosma, N. and Kelley, D. (2019). “Global Entrepreneurship Monitor, 2018/2019”. Global Report.
- Global Innovation Index (2025). “Türkiye ranking in the Global Innovation Index 2025”
<https://www.wipo.int/gii-ranking/en/turkey>
- Karadeniz, E. (2019). “Türkiye’de Girişimcilik ve Uluslararası Karşılaştırma, Global Entrepreneurship Monitor (GEM)”. Yeditepe Üniversitesi Yayınevi.
- KOSGEB (2025). “Kosgeb 2025 Yılı Faaliyet Raporu”.
<https://www.kosgeb.gov.tr/site/tr/genel/detay/349/rapor-ve-istatistikler>
- Kuratko, D. F. (2005). The emergence of entrepreneurship education: Development, trends, and challenges. *Entrepreneurship theory and practice*, 29(5), 577-597.
- Lackéus, M. (2015), “Entrepreneurship in Education: What, Why, When, How”, OECD Local Economic and Employment Development (LEED) Papers, No. 2015/06, OECD Publishing, Paris, <https://doi.org/10.1787/cccac96a-en>.
- Özdemir, Ş., Yılmaz, N., Arsu, T., and Polat, Y. (2016). Türkiye’de girişimcilik eğitimi üzerine bir inceleme. *International Journal of Human Sciences*, 13(1), 569-581.
- YOK Atlas. <https://yokatlas.yok.gov.tr/universite.php>
- Yurtseven, R., and Ergün, M. (2018). Teacher's opinions about development of entrepreneurship skills of primary school students. *International Journal of Social Science Research*, 7(1), 118-140.

THE IMPACT OF DIGITALIZATION ON FEMALE UNEMPLOYMENT IN TURKEY: ARDL ANALYSIS FOR THE PERIOD 1994-2024

Bayram KAYANTAŞ^{1*}; Muhammed Okan TAN²

^{1,2}Batman University/ Graduate Education Institute, economy, Batman, TÜRKİYE

* Corresponding author: b.kayantas@gmail.com | ORCID: 0009-0002-7783-5420

Abstract

The aim of this study is to examine the impact of digitalization on female unemployment in Turkey and to reveal the short-term and long-term dynamics of this relationship. The study also evaluates the role of economic growth and inflation, in addition to digitalization, on female unemployment. The annual data used in the analysis covers the period 1994-2024. All data were obtained from the World Bank's World Development Indicators (WDI) database. In this study, the ARDL (Autoregressive Distributed Lag) bounds test approach was used to examine the short-term and long-term relationships between the variables. First, the stationarity properties of the series were examined with unit root tests, and it was determined that all series were stationary at level $I(0)$ and in the first difference $I(1)$, and that none of the series showed stationarity in the second difference $I(2)$. Thus, the long-term relationship between the series was estimated using the ARDL method in the analysis. The results reveal a long-term relationship between female unemployment and digitalization. Long-term forecasts indicate that increased digitalization has a positive and significant impact on female unemployment. Short-term analyses, however, show that the effect of digitalization on female unemployment becomes apparent, particularly in lagged periods. In contrast, the impact of economic growth on female unemployment was not found to be statistically significant, while the impact of inflation was determined to be limited. Diagnostic tests conducted to assess the model's validity show that the model lacks autocorrelation and heteroskedasticity, that the residuals are normally distributed, and that the model is stable. These findings offer significant implications for understanding the impact of digitalization on the labor market and highlight the need to develop policies that support women's employment.

Keywords: Digitalization, Female Unemployment, ARDL Analysis, Turkish Economy

JEL codes: J16, J64, O33, E31

1. Introduction

Digital transformation has become a key force shaping modern economies and labor markets. The rapid spread of digital technologies and ICT has altered production processes, employment structures, and skill demands. While digitalization increases productivity and creates new economic opportunities, it also generates structural changes that can affect labor market outcomes differently across demographic groups. Women's participation in the labor market and their vulnerability to unemployment remain critical concerns in Türkiye. Factors such as occupational segregation, skill mismatches, and limited access to technology influence how women are affected by digital transformation. Understanding the interaction between digitalization and female unemployment is therefore essential for effective labor market policies.

Macroeconomic conditions, including economic growth and inflation, also play a role in shaping employment outcomes. While growth typically reduces unemployment, inflation may have indirect effects on labor markets. Examining these factors alongside digitalization provides a more comprehensive view of female unemployment dynamics. This study investigates the short- and long-run relationships between digitalization, economic growth, inflation, and female unemployment in Türkiye using annual data from 1994-2024 sourced from the World Bank's WDI. Employing the ARDL bounds testing approach, the study aims to shed light on the impact of digital transformation on female employment and provide insights for policies that promote inclusive labor market participation.

2. Literature Review

Digitalization and technological advancements have been one of the fundamental factors redesigning the shape, functioning, and job opportunities of labor markets, especially in recent years. The literature indicates that digital technologies can create a substitution effect in daily work, leading to job losses in some occupational groups. Conversely, it is noted that they can play a complementary role in non-routine, highly skilled job areas (Autor, Levy, & Murnane, 2003; Autor & Dorn, 2013; Acemoglu & Restrepo, 2020).

In Turkey, female unemployment is shaped not only by macroeconomic conditions but also by structural and gender-based variables. Studies conducted in Turkey indicate that digitalization can have an impact on female employment; however, there are limited studies examining the effects of digitalization on women in conjunction with economic growth and inflation, both in the short and long term (Sovbetov, 2018; Demir & Grover, 2026). This study aims to contribute to filling this gap by analyzing the relationship between digitalization, economic growth, inflation, and female unemployment in Turkey for the period 1994-2024 using the ARDL method.

3. Data and Methodology

This study examines the relationship between digitalization and female unemployment in Türkiye, incorporating economic growth and inflation as control variables. The analysis uses annual data for 1994-2024 obtained from the World Bank's World Development Indicators (WDI). Female unemployment (% of female labor force) is the dependent variable, while digitalization is proxied by the share of individuals using the Internet. Economic growth (annual GDP growth) and inflation (annual consumer price changes) are included to capture macroeconomic conditions affecting labor market dynamics.

To investigate both short- and long-run relationships, the study employs the Autoregressive Distributed Lag (ARDL) bounds testing approach, suitable for small samples and mixed integration orders $I(0)$ and $I(1)$. Stationarity is first assessed using ADF and PP unit root tests, followed by ARDL estimation with lag selection based on information criteria. The long-run cointegration is tested via the Bounds Test, and short-run dynamics are analyzed using an Error Correction Model (ECM). Model robustness is verified through diagnostic and stability tests, including serial correlation, heteroskedasticity, normality, Ramsey RESET, and CUSUM/CUSUMSQ tests.

4. Results and Discussion

The ARDL estimation shows that female unemployment, digitalization, and inflation are integrated of order one [I(1)], while economic growth is stationary at level [I(0)], confirming that the ARDL approach is appropriate. The Bounds Test indicates a long-run relationship among the variables ($F = 7.889 > 4.35$), suggesting that female unemployment, digitalization, economic growth, and inflation move together over time. Long-run coefficients reveal that digitalization has a positive and statistically significant effect on female unemployment (0.046), economic growth does not have a significant impact (0.028), and inflation exhibits a weak negative effect (-0.022, marginally significant at 10%).

The ECM results indicate that the lagged error correction term ($\text{CointEq}(-1) = -0.789$) is negative and highly significant, suggesting that roughly 79% of the short-run disequilibrium adjusts toward the long-run equilibrium in the following period. Among the short-run dynamics, only the two-period lag of digitalization ($D(\text{INT}(-2))$) is statistically significant, indicating that the effect of digitalization on female unemployment appears with a lag. Other coefficients, including contemporaneous and one-period lagged digitalization, are not statistically significant in the short run.

All diagnostic tests confirm the reliability and stability of the estimated model. Residuals are normally distributed (Jarque-Bera), free from serial correlation (Breusch-Godfrey), and homoskedastic (Breusch-Pagan-Godfrey). The Ramsey RESET test indicates that the model is correctly specified, and both CUSUM and CUSUMSQ tests confirm parameter stability over the study period. Together, these results suggest that the ECM and ARDL estimations are statistically robust and suitable for inference.

5. Conclusions

This study investigates the long-run and short-run relationship between digitalization, economic growth, inflation, and female unemployment in Türkiye using annual data covering 1994–2024. The empirical analysis employs the Autoregressive Distributed Lag (ARDL) bounds testing approach, which is suitable for small samples and allows the estimation of cointegration relationships among variables of mixed integration orders. The Bounds Test results confirm the existence of a long-run equilibrium relationship among female unemployment, digitalization, economic growth, and inflation. Long-run coefficient estimates indicate that digitalization exerts a positive and statistically significant impact on female unemployment, suggesting that technological transformation may induce structural labor market changes and skill mismatches that disproportionately affect women. In contrast, economic growth is not statistically significant, while inflation exhibits a weak negative association. The error correction mechanism further indicates a relatively rapid adjustment toward long-run equilibrium following short-run deviations.

From a policy perspective, these findings highlight the need for targeted strategies that enhance women's participation in the digital economy. Initiatives such as digital skills development, expanded access to technological training, and gender-sensitive labor policies in technology-intensive sectors may help mitigate the adverse effects of digitalization on female employment. The study is limited by its focus on a narrow set of macroeconomic variables and annual time-series data. Future research could extend the analysis by incorporating additional determinants such as education, labor market participation, and technological investment, or by applying alternative econometric frameworks and cross-country panel

data to provide a more comprehensive understanding of the relationship between digitalization and female unemployment.

References

- Acemoglu, D., & Restrepo, P. (2020). Robots and jobs: Evidence from US labor markets. *Journal of Political Economy*, 128(6), 2188–2244. <https://doi.org/10.1086/705716>
- Ahmad, R., Sharif, F., Ahmad, S., Gul, A., & Abdirasulovna, Z. A. (2024). Does the digital economy improve female employment? A cross-country panel data analysis. *Heliyon*, 10(13), Article e33535. <https://doi.org/10.1016/j.heliyon.2024.e33535>
- Autor, D. H., & Dorn, D. (2013). The growth of low-skill service jobs and the polarization of the US labor market. *American Economic Review*, 103(5), 1553–1597. <https://doi.org/10.1257/aer.103.5.1553>
- Autor, D. H., Levy, F., & Murnane, R. J. (2003). The skill content of recent technological change: An empirical exploration. *The Quarterly Journal of Economics*, 118(4), 1279–1333. <https://doi.org/10.1162/003355303322552801>
- Demir, B., & Grover, A. (2026). *Do investments in digital infrastructure improve employment outcomes? Evidence from Türkiye* (Policy Research Working Paper No. 11314). World Bank.
- OECD. (2023). *Teleworking through the gender looking glass: Facts and gaps* (OECD Social, Employment and Migration Working Papers No. 285). OECD Publishing. <https://doi.org/10.1787/8aff1a74-en>
- Sovbetov, Y. (2018). Impact of digital economy on female employment: Evidence from Turkey. *International Economic Journal*, 32(2), 256–270. <https://doi.org/10.1080/10168737.2018.1478868>

GIG ECONOMY, PLATFORM WORK, AND LABOUR RIGHTS: RE-EXAMINING LEGAL PROTECTION IN THE ERA OF DIGITAL CAPITALISM

Gousia Feroz^{1*}, Firdous Ahmed Malik²

¹University of Kashmir, India

²University of People, Pasadena California United States

* Corresponding author: gousia.llm@gmail.com

Abstract

The emergence of the gig economy marks a profound transformation in contemporary labour markets, driven by digital platforms, algorithmic governance, and data-centric business models. While platform-mediated work has expanded employment opportunities and enhanced economic flexibility, it has simultaneously destabilized traditional labour protections by reshaping employment relationships and redistributing economic risk. This paper undertakes a critical legal examination of platform work within the broader framework of digital capitalism. It interrogates the inadequacy of conventional labour law classifications, analyses the regulatory vacuum surrounding algorithmic management, and evaluates the growing disjunction between economic innovation and social protection. Drawing on comparative legal developments and normative labour principles, the paper argues for a functional and rights-oriented regulatory framework capable of reconciling flexibility with worker security. It concludes that sustainable digital economies require a recalibration of labour law that foregrounds dignity, fairness, and institutional accountability alongside technological progress.

1. Introduction

Digital platforms have fundamentally reconfigured the organization of work, giving rise to what is commonly described as the gig economy. Characterized by task-based engagements, flexible schedules, and digitally mediated interactions, platform work departs significantly from the standard employment relationship that underpins classical labour law. Companies operating within this ecosystem frequently portray themselves as neutral intermediaries, thereby distancing their business models from the legal responsibilities traditionally associated with employers. This transformation poses significant regulatory challenges. The erosion of stable employment, combined with the absence of social security and collective representation, has intensified labour precarity across jurisdictions. The central legal question is no longer merely whether platform work should be regulated, but how labour law can be restructured to respond effectively to algorithmic control, economic dependency, and asymmetrical bargaining power in digital labour markets.

2. Digital Capitalism and the Transformation of Labour Relations

Digital capitalism is distinguished by the centrality of data extraction, platform monopolization, and network effects. In this model, labour is fragmented into discrete tasks managed through automated systems rather than human supervision. Workers are subject to continuous evaluation through rating mechanisms, incentive structures, and performance metrics embedded within proprietary algorithms.

From a legal standpoint, this mode of governance obscures traditional indicators of control while maintaining substantial managerial authority. Economically, it enables platforms to minimize labour costs by transferring market risks to workers. Normatively, it challenges the foundational objectives of labour law, which historically evolved to counterbalance unequal power relations between employers and workers.

3. Employment Classification and Legal Ambiguity

3.1 Limits of Traditional Classification Tests

Labour law has conventionally relied on doctrinal tests such as control, integration, and economic reality to determine employment status. However, platform work complicates these frameworks. Control is exercised indirectly through digital architecture rather than direct supervision, and contractual terms often mask substantive dependency. As a result, binary classifications of “employee” and “independent contractor” fail to capture the hybrid nature of platform-based labour, leading to inconsistent judicial outcomes and regulatory uncertainty.

3.2 Comparative Judicial Responses

Judicial responses across jurisdictions reveal a gradual shift toward substance-based analysis. Courts increasingly recognize that contractual labels cannot override economic dependency and functional control. Nevertheless, the absence of harmonized standards continues to produce fragmented protections, underscoring the need for legislative clarity rather than ad hoc judicial intervention.

4. Social Security Deficits and Welfare Exclusion

One of the most pressing consequences of platform work is the systematic exclusion of gig workers from social security regimes. Health coverage, income security, accident compensation, and retirement benefits are frequently unavailable to platform workers, despite their integral role in digital economies. In developing and emerging economies, this exclusion compounds existing informality and exacerbates socioeconomic vulnerability. While recent legislative initiatives in some jurisdictions acknowledge gig and platform workers as distinct legal categories, the lack of enforceable benefit structures and funding mechanisms undermines their practical effectiveness.

5. Algorithmic Management and Regulatory Opacity

Platform labour is governed by automated decision-making systems that regulate access to work, remuneration, and continued participation. These systems operate with minimal transparency, leaving workers without meaningful avenues for contestation or redress. From a legal perspective, algorithmic opacity raises serious concerns regarding procedural fairness, accountability, and discrimination. The absence of regulatory oversight over automated governance mechanisms represents a significant departure from established labour law principles, which emphasize due process and reasoned decision-making.

6. Collective Rights and the Fragmentation of Labour Solidarity

Platform work is typically organized on an individualized basis, weakening collective identity and undermining traditional forms of worker representation. The classification of gig workers as independent contractors often excludes them from trade union protections, effectively neutralizing collective bargaining rights. Attempts to organize platform workers have encountered legal obstacles rooted in

competition law and employment classification doctrines. Nonetheless, emerging models of sectoral bargaining and collective representation without formal employment recognition signal potential pathways for reconciling flexibility with collective labour rights.

7. Economic Efficiency and Labour Protection: Reassessing the Narrative

A dominant narrative suggests that labour regulation constrains innovation and reduces economic efficiency. This paper challenges that assumption by emphasizing that long-term productivity and economic resilience are contingent upon stable labour institutions and social security systems. Precarious labour arrangements may generate short-term cost savings, but they also contribute to income volatility, reduced skill development, and social instability. A regulatory framework that integrates labour protection with economic objectives is therefore not antithetical to innovation, but essential to sustainable digital growth.

8. Toward a Reconstructed Regulatory Framework

This paper advocates a recalibrated approach to regulating platform work, grounded in functional analysis rather than formal classification. Three core elements are proposed:

i. Functional Presumption of Employment

Where platform control and economic dependency are demonstrable, legal presumptions should favor worker protection, subject to rebuttal by platforms.

ii. Portable and Platform-Funded Social Security

Social protection mechanisms should be detached from singular employers and structured to follow workers across platforms through contributory welfare models.

iii. Algorithmic Accountability and Transparency

Statutory obligations should mandate disclosure standards, audit mechanisms, and accessible grievance procedures for automated decision-making systems. Such an approach aligns labour regulation with constitutional values of dignity, equality, and social justice while accommodating the operational realities of digital platforms.

9. Conclusion

The gig economy epitomizes the contradictions of digital capitalism, combining technological advancement with renewed forms of labour insecurity. Existing labour law frameworks, shaped by industrial-era assumptions, are ill-suited to address algorithmically mediated work relations. Incremental reforms are insufficient; what is required is a conceptual reorientation of labour regulation that acknowledges the structural power of platforms and the economic dependence of workers. Ensuring fairness in the future of work demands more than technological adaptation it requires normative commitment. By embedding labour rights within the governance architecture of digital economies, states can foster innovation without sacrificing social justice, thereby ensuring that economic transformation remains aligned with democratic and constitutional principles.

REVISITING HEGEMONIC STABILITY THEORY IN A FRAGMENTING WORLD

Adrian-Eugen PREDA

Faculty of Educational Sciences, Law and Public Administration, "Constantin Brâncuși" University of
Târgu Jiu, "Konrad Adenauer" Interdisciplinary Research Center for Political and Administrative
Sciences

adrian.e.preda@gmail.com | ORCID: 0000-0003-1553-4374

Abstract

This paper represents an exploratory attempt to outline the present international arena where it seems that the post-1945 world order is changing, as a result of the foreign policy actions of the U.S. president Donald Trump. After the Second World War, the United States represented the hegemonic superpower, with a stabilizer role on the world stage and in the international economy. After the Cold War, the United States remained the sole superpower once the Soviet Union and the communist regimes collapsed in Central and Eastern Europe. Since 1945, the United States have built an international institutional framework, both politically and economically, with institutions such as IMF, World Bank or NATO, backed by the power of the U.S. hegemon. The United States, as a hegemonic power on the world stage, acted as a stabilizer, politically and economically, by providing global public goods, such as security, free trade and a reserve currency. All these things are about to be changed, as a result of the policy of the second Trump Administration, which acts in a transactional manner, unilaterally and even with extractive features. Trump imposed tariffs, tried to punish the most important allies or to make them pay for their security. Under the slogan of "America First", the current U.S. administration attempts to retreat from its traditional hegemonic role of public goods provider and stabilizer. Therefore, by using the hegemonic stability theory, the aim of this paper is to provide an outline of the current American hegemony (or what is left of it), by trying to offer an evaluation of the utility of this theoretical perspective today.

Keywords global public goods, hegemony, hegemonic stability theory

JEL codes: F5, F51, F53, F55

1. Introduction

This paper represents an exploratory attempt, with the aim of outlining the current state of American hegemony in the context of the second Trump Administration. In terms of hegemonic stability theory, why are the Trump administration actions so damaging to the international order? And, how does the international order look like today, a year and a half after the start of the second Trump administration? Given the ongoing nature of the case to be analyzed, the contribution of this paper would only be marginal and prospective.

2. Literature Review

The theoretical perspective that will be used in this paper is the hegemonic stability theory (HST). HST argues that hegemony creates a hierarchical international order by reducing aggression, ensuring free trade and manage conflicts between lesser powers in the system. A hegemon enforces its own rules and norms that can function in its own interest. HST explains the post-1945 age of peace and prosperity to the stability provided by the American hegemonic order which provided free trade and security, while the instability from the interwar period was caused by the absence of a hegemonic power with a stabilizing role (Goldstein & Pevehouse 2017, 50). HST can explain the stability of the financial international order today, as a result of the systemic power diffusion, as well as the changes from liberal to non-liberal international orders. The underlying mechanism of HST is based on public goods provided by the hegemon, a state so powerful that can reduce the free-riding problem and bears the entire systemic responsibility as a result of its overwhelming power (Oatley 2023, 31-32). In a more particular view, the problem of hegemonic leadership as a stabilizing power was addressed by Charles P. Kindleberger (1973), as a liberal order creator as a result of a great power war by Robert Gilpin (1981; 1987; 2001) or as a power fostering cooperation by Robert O. Keohane (1984). Therefore, these contributions are regarded as starting points for this research, in order to offer an insight of how is affected the current international order by the U.S. hegemon, in the context of policy shifts generated by the Trump administration.

3. Data and Methodology

From a methodological point of view, this paper uses a qualitative perspective, completed by the quantitative approach when it comes to numerical data, statistics, GDP growth, population, budgets etc. From a qualitative point of view, this research uses the case study method, by focusing on the discourses and declarations delivered by the key figures of the current U.S. administration (president, War Secretary, State Secretary etc.), as well as factual data regarding the U.S. actions on the international arena.

4. Results and Discussion

By this paper, I expect to offer an outline of the current state of international affairs in the context of U.S. attempted retreat from its hegemonic role of political and economic stabilizer. Moreover, this paper aims to evaluate the theoretical adequacy of the hegemonic stability theory. Given the exploratory nature of this paper, as a result of the ongoing nature of the events under analysis, the results are not intended to be definitive, while the discussion is only preliminary.

5. Conclusions

This paper seeks to evaluate the utility of the hegemonic stability theory today, by analyzing the international strategic choices and behaviour of Donald Trump second administration. My intention is to offer a provisional insight of the character of the U.S. hegemony today and its implications on the international order. The main limitation of this paper is given by the ongoing nature of the events. Therefore, the conclusions are cautious and not definitive. The main research direction will be given by the future developments of the phenomenon under analysis and the changes in the international order.



References

- Gilpin, R. & Gilpin, J. M. (2001). *Global Political Economy: Understanding the International Economic Order*. Princeton University Press: Princeton
- Gilpin, R. & Gilpin, J. M. (1987). *The Political Economy of International Relations*. Princeton University Press: New Jersey
- Gilpin, R. (1981). *War and Change in World Politics*, Cambridge University Press: New York
- Keohane, R. O. (1984). *After Hegemony: Cooperation and Discord in the World Political Economy*. Princeton University Press: Princeton, New Jersey
- Kindleberger, C. P. (1973). *The World in Depression 1929-1939*. University of California Press: Berkeley and Los Angeles
- Oatley, T. (2023). *International Political Economy*, 7th ed. Routledge: New York and London
- Pevehouse, J. C. W. & Goldstein, J. S. (2017). *International Relations*, 11th ed. Pearson: Boston

GIG ECONOMY, INFORMALITY, AND SOCIAL EXCLUSION: A COMPARATIVE STUDY OF LABOUR MARKET VULNERABILITIES IN INDIA AND BRAZIL

Dr. Abhilash Aggarwal¹[0009-0000-2146-1170]* and Ms. Mehvish Mehraj²[0009-0002-8672-9806]

¹ Assistant Professor, School of Law, Christ University, Pune, India
abhi71@hotmail.com

² Assistant Professor, University of the People, Pasadena, California, USA
mehvish.mehraj@uopeople.edu

Abstract

The steady rise of platform-mediated gig work in emerging economies has reinvigorated long-standing discussions about labour market informality and social inclusion. Around the world, the largest democracies are India and Brazil. Structural similarities: large informal sectors, deep socio-economic inequalities, and unfinished social protection architectures. According to India's Economic Survey 2025-26 (January 2026), the gig workforce comprises 12 million workers in FY2025, up from 7.7 million in FY2021, an increase of 55%. Brazil's PNAD Contínua data (Q4 2024) shows an overall informal rate of 38.6%, it rises to 41.9% among Black and 43.5% among Brown workers. This paper examines how the growth of the gig economy has changed labour market outcomes for two historically marginalized groups – scheduled castes and scheduled tribes in India and Afro-Brazilian groups in Brazil. Using India-wide labour-force surveys, Fairwork Foundation scores (2024-2025), and policy analysis, the study adopts a mixed-method framework to understand how the intersectional axes of caste, race and gender mediate access to platform work and social protection. The results indicate that neither of the countries' regulatory frameworks address the structural drivers of platform-mediated exclusion, despite recent incidences of India's draft Social Security Code rules (January 2026) and Brazil's Bill 536/2024. This paper develops an Intersectional Social Floor as a comparative policy framework for extending protections to gig workers in large emerging economies.

Keywords: gig economy; labour informality; social inclusion; India; Brazil

1. Introduction

Digital labour platforms have dramatically altered the nature of work in many developing countries. In particular, the emergence of gig economy platforms like ride-hailing and food delivery services, domestic helpers, and freelance microwork has fundamentally transformed the structure of employment in these economies. India and Brazil lead the way in this transition having tens of millions of gig workers each operating outside the conventional employer-employee relationship. The Economic Survey of India 2025-26, presented in Parliament on 29 January 2026, stated that the gig sector employment increased by 55 per cent over four years to 1.2 crore workers in FY2025. Further, non-agricultural gig work is expected to make up 6.7 per cent of the workforce by 2029-30 by contributing Rs 2.35 lakh crore to GDP. According to PNAD Contínua (Q4 2024), 38.6 per cent of jobs in Brazil remain informal. Among them, platform workers are a rapidly growing subset. According to Rosa Luxemburg Foundation (2025) analysis, for example, 59 per cent of app-based workers in Brazil are Black or Pardo. Therefore,

historically marginalised groups are implicated in the most precarious segment of the emerging digital labour market.

This comparative study has become timely due to landmark developments in both countries recently. In India, the first collective action was reported on 1 January 2026 in *The Hindu* when gig workers came together on a nationwide level. Moresterous workers across the country demand dignity, regulation, accountability and this assertion was made cross-platforms. On January 29, 2026, the Economic Survey explicitly called for reforms to governance in the gig sector, in view of continuing income volatility and financial exclusion. In January 2026, the draft rules under the Indian Code on Social Security, 2020 prescribed a minimum engagement threshold of 90 days for eligibility. This provision has already been criticized for excluding the most casualised platform workers. In Brazil, after the withdrawal of Bill 12/2024, the legislative proposal to regulate platform work is now the subject of review in Bill 536/2024. This has led to an unresolved tension between worker protection and platform autonomy in Brazil, which has manifested in the conflict of interests associated with labour policy, particularly since the CLT amendments of 2017.

Notwithstanding their geographical distance, India and Brazil offer a productive comparative frame. Both are large federal postcolonial democracies with social rights enshrined in the Constitution. Moreover, both labour markets have a huge informal sector. Finally, both have a caste- (India) and race- (Brazil) based labour hierarchy that compounds class-based disprivilege. This study addresses three interconnected questions. (1) What change and to what extent has the expansion of the 'gig' economy brought in India and Brazil in...? (2) How do various axes of intersectional identity reinterpret social protection and gig employment access within each country? (3) What do we learn regarding policy from the institutional paths of the two countries? This study answers these questions thereby making a small contribution to the platform labour scholarship in the Global South and the evidence-based policy debates at a time when both these spheres are in a state of acute regulatory flux.

2. Literature Review

The literature analyzing gig work and labour informality in the Global South has expanded massively; however, comparative studies between India and Brazil are rare. This academic document makes use of three bodies of literature that converge at intersections of the political economy of informality, social protection, and platform labour.

According to the ILO's Decent Work framework (2005) and the conceptualisation of informality as a structural feature of developing economies by scholars such as Chen (2012) and Meagher (2013) provides us the baseline for understanding why we cannot analyze gig work in India and Brazil through the frameworks been developed in advanced economies. In India, the connection between informality and caste has been well documented. According to Harriss-White (2020) Dalit and Adivasi workers are systematically concentrated in the most precarious informal labour. According to the Fairwork India Ratings 2024, ride-hailing companies Ola and Uber, which employ more lower-caste workers than their competitors, received a score of zero out of ten on all five fair work principles. The highest-scoring Indian platforms, Big Basket, Swiggy, Urban Company and Zomato, only received six out of ten. The IBGE PNAD Contínua paper for Q4 2024 shows that Black and Brown workers continued to be more informal than average (in Q4 2024, 41.9% and 43.5%, respectively). They are much more informal than

whites (32.6%) and also more so than average (38.6 per cent). This confirms Cardoso's (2019) substantial findings on racial labour market segmentation and its persistence in the Brazil over the past decades.

The literature on the platform economy, from Srnicek (2016) to Graham and Anwar (2019), as well as the UNDP's Regional Human Development Report 2025 background paper on gig employment in Latin America and the Caribbean (Viollaz, 2025), documents how algorithmic management reproduces existing inequalities. According to the Fairwork Brazil Ratings 2025, titled “Indebtedness and Precariousness,” working conditions continue to be deeply precarious across the platforms. No platform scored on the fair conditions principle or on the fair representation principle. This finding is aligned with the one from the Rosa Luxemburg Foundation, which in 2025 analysed that 77% of app workers are under 40 years old in Brazil and that Black and Pardo workers are the majority in this already-precarious workforce.

The work in social protection that will be used to assess the policy responses will be Devereux and Sabates-Wheeler on transformative social protection (2004); ISSA comparative review of platform worker protections (2024); and OECD (2025) Expanding Social Protection and Addressing Informality in Latin America. According to OECD (2025), Brazil's non-wage labour costs that are high have been identified as a structural driver of informality, while digital contribution mechanisms have the potential to widen social floors. According to the 2024 ILO report on the expansion of the gig economy, the Code on Social Security recognized platform workers on paper but did not provide enforceable standards for wages, working hours and accountability for algorithms. This gap has only partially been filled by the draft rules of January 2026. There is noticeable gap in this literature; namely, comparative work that holds intersectional social structure constant across countries, while varying institutional context. This paper seeks to address this gap explicitly.

3. Data and Methodology

The study adopts a mixed-method comparative design based around three data streams.

The statistics for India have been secured from the latest data from India's 2022-23. The two surveys offer representative information about the employment status, wages, sector of activity, social insurance enrolment, gender, caste/race, and education of individuals. Supplementary data for India comes from the Economic Survey 2025-26 (Ministry of Finance, India, January 2026) for aggregate gig workforce estimates; Brazil's more recent informality disaggregates come from IBGE's Q4 2024 labour market release. Gig workers or platform workers are identified using industry codes (such as transport, delivery, personal service and digital freelance), employment status (self-employed without formal contract) and indicators of affiliation to the platform. This definition was introduced in the most recent iterations of both surveys.

Quantified analytical approaches include: (i) descriptive profiling of gig worker characteristics on both sides of the Atlantic; (ii) logistic regression estimating the probability of social insurance enrolment as a function of employment type, gender, class/caste, education, urban-rural location; and (iii) Oaxaca-Blinder decomposition to disaggregate the gap between platform and non-platform informal workers into explained and unexplained within each country. An intersectional analysis is carried out by interacting caste/race categories with gender and employment type as per UNDP LAC Working Paper No. 44 (Viollaz, 2025).

The qualitative strand entails a structured content analysis on key policy documents, namely, India’s Code on Social Security (2020), the Draft Rules rolled out under that Code in January 2026, NITI Aayog’s India’s Booming Gig and Platform Economy (2022), Economic Survey 2025-26, Fairwork India Ratings 2024; for Brazil, the CLT amendments (2017), Bills 12/2024 and 536/2024 on platform workers, Fairwork Brazil Ratings 2025, OECD (2025) Brazil chapter.. This analysis explores how the regulatory discourse of each nation delineates the platform worker category and which social inclusion commitments are operationalised versus aspirational. The Fairwork Foundation's five-principle framework fair pay, fair conditions, fair contracts, fair management, and fair representation offers an external criterion for assessing platform governance in both jurisdictions.

4. Results and Discussion

An initial analysis identifies strong similarities between India and Brazil and important contextual differences, all drawn from the most recent data from the two countries.

India has witnessed a sharp expansion of gig workers from 7.7 million in FY2021 to 12 million in FY2025. The rapid growth of smartphone users (more than 800 million) in India along with monthly UPI transactions (15 billion) helped boost the gig workforce (Economic Survey 2025-26). There will be an expected addition of two million gig jobs by 2026 through quick commerce platforms like Blinkit and Zepto in smaller cities. However, even the Economic Survey admits that gig workers still suffer from income volatility and financial exclusion. According to PNAD Contínua data in Brazil, app-based workers 59% of which are Black or Pardo (Rosa Luxemburg Foundation, 2025). Furthermore, the informality rate as a whole is structurally unequal: 41.9% for Black against 32.6% for white (IBGE, Q4 2024). The data shows that in both countries, the extensions of platform services occurred mainly along existing axes of structural disadvantage.

The analysis of PLFS and PNAD data in an intersectional manner identifies significant inequalities within countries. As per Fairwork India Ratings 2024, platforms in India that disproportionately employ lower-caste workers, especially in sectors such as ride-hailing and logistics, scored zero in the metrics of fair conditions, fair management, and fair representation. The legislative initiatives in Rajasthan (2023) and Karnataka (2025) at the state level are early responses, which are yet to be implemented to the extent and in the manner they were legislated. In Brazil, the racial aspect is clear: not a single platform received even a basic score for fair conditions or fair representation in the Fairwork Brazil Ratings 2025 document. Furthermore, IBGE data find that Black and Brown workers have 9-11 percentage point higher informalities than white workers. In fact, platform work concentrates the youngest and most racially marginalised workers in the worst task categories. Gender plays an important role, both in India and in Brazil. When we look at India, only 28 per cent of the gig workforce consists of women. Further, this 28 per cent of women are concentrated in home-based platforms. Now, looking at Brazil, they have Law No. 14.611/2023. This law mandates gender pay transparency. However, this pay transparency law has not yet been applicable to the platform sector, hence the gig sector.

There is a noticeable divergence in regulatory trajectory. India's draft rules of January 2026—which require a minimum 90 days’ engagement to qualify for social security—have come under the scanner for structurally excluding the most casualised workers. These include inter-state migrants and women in seasonal or part-time platform work. The Union Budget 2025’s proposal for identity cards and access to health care (AB-PMJAY) for gig workers is a positive step, but contributory social insurance coverage

is weak. The Fairwork Brazil 2025 report notes the bill 12/2024 failure (with a 12-hour workday proposal and removal of worker autonomy) and uncertainty of bill 536/2024 failure in Brazil illustrates a legislative impasse that demonstrates a stark mismatch. The mismatch is essentially between platform business models and the CLT-based labour framework in Brazil. In both countries, Fairwork’s five principles are referenced aspirationally but not structurally fulfilled, especially with respect to fair representation and fair conditions.

5. Conclusions

The gig economy in India and Brazil has exploded in absolute numbers and confirmed by the latest national data. Most importantly, it has not turned out to be a significant pathway for social inclusion of historically marginalised workers. The Economic Survey 2025-26 acknowledges that social protection has not improved at the same pace as a 55 per cent growth in gig workforce in India between FY2021 and FY2025. In Brazil, platform work shows how highly racialized it is, as Black and Pardo workers are a majority of the app workforce and also has the highest rate of informality, which means digital economy has amplified, rather than disrupted, Brazil’s structure of racial labour hierarchies.

The comparison between India and Brazil is analytically productive because it isolates institutional and regulatory variation while holding structural features large informal sectors, constitutional social rights commitments, and intersectional labour hierarchies relatively constant. We see a very different regulatory trajectories’ in India where there is a gradual but credible codification at the Centre (more than one budget mention, with the draft rules of January 2026), a unique state law to regulate platform work in Rajasthan (only in the G20), with Karnataka’s law on its heels. Brazil is still oscillating through legislative proposals and their withdrawal under platform industry pressure for more than a year now. The Fairwork Foundation’s comparative standard evidence base conveys that neither countries have enacted the enforceable minimum standards on earnings, algorithmic transparency, and collective representation which is a necessary condition for the social inclusion of platform workers.

This paper presents an Intersectional Social Floor model that combines a structural approach to labour market analysis and social protection theory to evaluate platform economy governance in large emerging economies. According to a research report, platform workers must benefit from automatic registration and national identity infrastructure for enumeration, workers must be allowed to open portable accounts that can contribute to social insurance, algorithmic task allocation systems should contain anti-discrimination features and collectives of platform workers must be recognized as social partners by the respective states, and provided with legal status. Towards this end, the ILO’s October 2025 Recommendations on Social Protection Floors should be a target. There is nothing in these recommendations that should disturb the large companies that operate such platforms.

Among the limitations of paper, we note the cross-sectional nature of the survey data that does not allow for causality to be inferred. Further, the proxy variables used to identify the platform workers in both surveys were imperfect. Subsequent studies must go beyond India and South Africa to also include Indonesia and Nigeria within their comparative frame, call longitudinal panel data on India over time as it becomes available and look at the gendered dimensions of the January 2026 Indian regulatory developments.

References

- Behrendt, C., & Nguyen, Q. A. (2018). Innovative approaches for ensuring universal social protection for the future of work. ILO Future of Work Research Paper Series, 1. ILO.
- Cardoso, A. (2019). Informality and social protection in Brazil. *Latin American Research Review*, 54(2), 312-330. <https://doi.org/10.25222/larr.349>
- Chen, M. A. (2012). The informal economy: Definitions, theories and policies. WIEGO Working Paper No. 1. WIEGO.
- Devereux, S., & Sabates-Wheeler, R. (2004). Transformative social protection. IDS Working Paper 232. Institute of Development Studies.
- Fairwork Foundation. (2024). Fairwork India ratings 2024: Labour standards in the platform economy. CITAPP, IITB; Oxford Internet Institute.
- Fairwork Foundation. (2025). Fairwork Brazil ratings 2025: Indebtedness and precariousness. University of Oxford.
- Government of India. (2026). Economic Survey 2025-26. Ministry of Finance, Government of India.
- Graham, M., & Anwar, M. A. (2019). The global gig economy: Towards a planetary labour market? *First Monday*, 24(4). <https://doi.org/10.5210/fm.v24i4.9913>
- Harriss-White, B. (2020). Waste, social order and physical disorder in small-town India. *Journal of Development Studies*, 56(2), 239-252.
- IBGE. (2025). Pesquisa Nacional por Amostra de Domicílios Contínua (PNAD Contínua): Resultados do 4 trimestre de 2024. Instituto Brasileiro de Geografia e Estatística.
- ILO. (2024). Expansion of the gig and platform economy in India: Opportunities for employer and business member organizations. International Labour Organization.
- ILO. (2025). Sustainable social protection for workers in the gig and platform economy. International Labour Organization.
- ISSA. (2024). Platform workers and social protection: International developments. International Social Security Association.
- Meagher, K. (2013). Unlocking the informal economy: A literature review on linkages between formal and informal economies in developing countries. WIEGO Working Paper No. 27.
- Ministry of Labour and Employment. (2026). Draft rules under the Code on Social Security, 2020: Provisions for gig and platform workers. Government of India.
- NITI Aayog. (2022). India's booming gig and platform economy: Perspectives and recommendations on the future of work. Government of India.
- OECD. (2025). Expanding social protection and addressing informality in Latin America. OECD Publishing. <https://doi.org/10.1787/86c1fd38-en>
- Rosa Luxemburg Foundation. (2025). From Uberization to the digital solidarity economy. Rosa-Luxemburg-Stiftung.
- Srnicek, N. (2016). Platform capitalism. Polity Press.
- Viollaz, M. (2025). Diversification of employment in Latin America and the Caribbean: Gig employment and implications for economic resilience. UNDP LAC Working Paper Series, No. 44. UNDP.

PERSISTENT TOURISM CONCENTRATION AND REGIONAL DOMINANCE IN ROMANIA: EVIDENCE FROM A LONG-TERM MULTI-INDICATOR ANALYSIS (2010–2024)

Cristiana-Alexandra BELU¹; Roxana-Marcela ZAHARIA^{2*}

^{1,2} Ovidius University of Constanța, Doctoral School of Business Administration, Constanța, Romania

* cristiana.bircu@365.univ-ovidius.ro | ORCID: 0009-0009-3908-1622

* zaharia.roxana@365.univ-ovidius.ro | ORCID: 0009-0004-1820-1115

Abstract

This study examines the long-term evolution of tourism concentration and regional dominance in Romania over the period 2010–2024, using county-level data on tourist overnight stays. A multi-indicator framework is applied, including Lorenz curves, the Gini coefficient, the Theil index, the Herfindahl–Hirschman Index, and the CR5 concentration ratio, to assess spatial inequality and dominance structures. The results reveal a high and persistent degree of tourism concentration, with a small number of counties consistently accounting for a substantial share of national demand. The COVID-19 pandemic led to a temporary increase in concentration, without altering the underlying spatial hierarchy. The findings indicate that tourism concentration is shaped by structural advantages, path-dependent development, and the resilience of established destinations. The study contributes to the literature by providing a long-term territorial perspective with implications for business strategy and regional development.

Keywords: tourism concentration; regional dominance; spatial inequality; Romania

JEL codes: L83, R12, Z32

1. Introduction

Tourism development is inherently uneven across space, as activity tends to concentrate in destinations with accumulated advantages such as infrastructure, accessibility, and market visibility. While concentration can enhance efficiency, it also reinforces territorial disparities, making its analysis relevant for both economic research and policy.

In the context of systemic disruptions, recent research highlights that tourism shocks do not necessarily lead to substantial spatial reconfiguration, but often act as stress tests that reveal the resilience of established destinations (Gössling et al., 2020). This suggests that short-term crises may temporarily affect tourism volumes without fundamentally altering long-term spatial hierarchies. However, empirical evidence documenting these dynamics over extended time horizons remains limited, particularly at subnational levels and in emerging European tourism markets.

Tourism concentration is widely recognized as a structural characteristic of tourism systems (Agarwal, 2002; Candela & Figini, 2012). Romania represents a relevant case for examining the long-term evolution of tourism concentration. Since 2010, the Romanian tourism sector has experienced sustained growth, influenced by economic expansion, European Union integration, digitalization of tourism services, and public policy interventions.

2. Literature Review

The literature indicates that tourism concentration is a persistent and structurally embedded phenomenon shaped by cumulative development processes, spatial interactions, and resilience mechanisms. Dominant destinations tend to maintain their position over time, while peripheral regions face enduring barriers to entry and growth. Despite these insights, relatively few studies provide long-term, indicator-based assessments of tourism concentration at subnational level, particularly in emerging European tourism markets.

These gaps are particularly visible in the case of emerging European tourism economies, where long-term subnational evidence remains limited and often fragmented across indicators, periods, or regional units of analysis. In this context, the present study addresses the need for a longitudinal and multi-indicator assessment of tourism concentration in Romania at county level over the period 2010–2024, while also extending the discussion toward business strategy and territorial development.

3. Data and Methodology

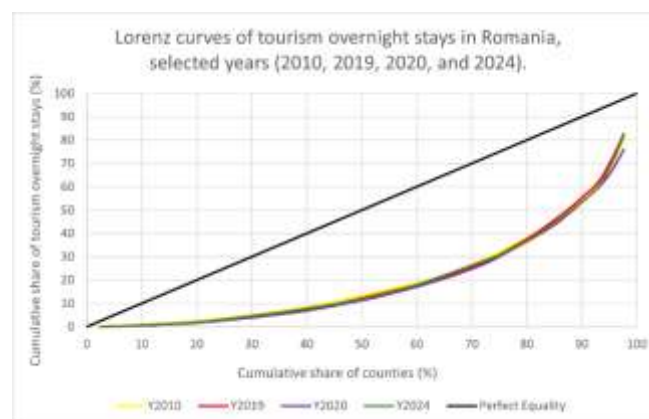
The empirical analysis is based on official statistical data on tourism activity in Romania for the period 2010–2024. The dataset includes annual county-level information on tourist overnight stays, which represents one of the most widely used indicators for measuring tourism demand and destination performance. Overnight stays are used as the main indicator of tourism demand, as they reflect both visitor presence and length of stay. The INSSE database (INSSE, 2025) was accessed on 02.02.2026.

To capture tourism concentration and regional dominance comprehensively, the study applies a multidimensional analytical framework based on five complementary indicators: the Lorenz curve, the Gini coefficient, the Herfindahl–Hirschman Index (HHI), the Theil index, and the concentration ratio of the top five counties (CR5). The joint use of these measures allows for a robust assessment of both inequality and dominance structures, as each indicator emphasizes different aspects of spatial concentration.

4. Results and Discussion

This section presents the empirical results of the analysis, focusing on the evolution of tourism concentration and regional dominance in Romania over the period 2010–2024.

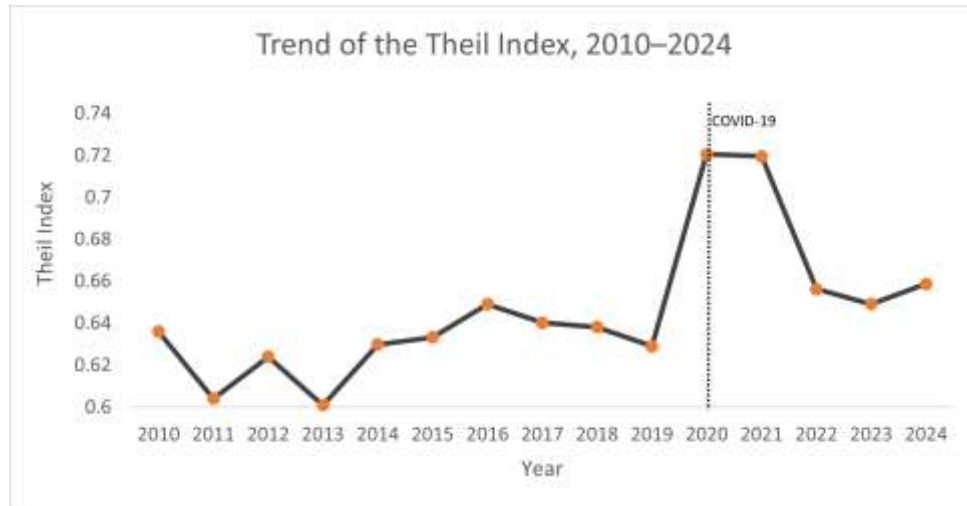
Figure 1. Lorenz curves of tourism overnight stays in Romania, selected years (2010, 2019, 2020, and 2024).



Source: Authors' calculations based on INSSE data.

Figure 1 shows that tourism activity is highly concentrated, as the Lorenz curves lie well below the line of perfect equality in all selected years. The overall shape remains stable over time, with only a slight increase in concentration during the pandemic period, followed by a return toward pre-pandemic levels.

Figure 2. Evolution of the Theil index of tourism concentration in Romania (2010–2024).



Source: Authors' calculations based on INSSE data.

Figure 2 presents a similar pattern for the Theil index, which remains relatively stable over time, with a noticeable increase during the pandemic period and a subsequent stabilization. This confirms the persistence of spatial inequality regardless of the indicator used.

The CR5 ratio indicates that the top five counties, led by Constanța, București, and Brașov, consistently accounted for approximately 49–50% of national overnight stays, rising temporarily to above 50% during the pandemic before returning to long-term levels by 2024.

5. Conclusions

These findings suggest that firms located in dominant destinations benefit from structural demand resilience and stronger market visibility, although they also operate in more competitive environments. From a territorial development perspective, the results indicate that a more balanced distribution of tourism activity is unlikely to emerge through short-term market adjustments alone. Reducing regional disparities is therefore likely to depend on long-term interventions aimed at accessibility, destination development, diversification, and year-round tourism capacity.

Overall, the findings suggest that achieving a more balanced spatial distribution of tourism activity in Romania will require sustained, long-term efforts rather than short-term adjustments.

Future research could extend the analysis by integrating economic and firm-level indicators, comparing Romania with other emerging tourism markets, or examining whether similar concentration patterns persist across different tourism segments.

References

- Agarwal, S. (2002). Restructuring seaside tourism: The resort lifecycle. *Annals of Tourism Research*, 29(1), 25–55.
- Candela, G., & Figini, P. (2012). *The economics of tourism destinations*. Springer.
- Gössling, S., Scott, D., & Hall, C. M. (2020). Pandemics, tourism and global change: A rapid assessment of COVID-19. *Journal of Sustainable Tourism*, 29(1), 1–20.
- National Institute of Statistics of Romania (INSSE). (2025). *Tourism statistics database*. Bucharest, Romania.

Acknowledgements (optional)

The authors would like to thank the National Institute of Statistics of Romania (INSSE) for providing access to the official tourism data used in this study.

ORAL CARTOGRAPHY AND ACTIVE AGEING: INTEGRATING ELDERLY STORYTELLERS INTO MOLDOVA'S TOURISM VALUE CHAIN

Mihail CIOBANU

National Institute for Economic Research, Academy of Economic Studies of Moldova, Department of Social Research and Standard of Living, Chisinau, Republic of Moldova

ciobanu.mihail.s@gmail.com, ciobanu.mihail@ase.md | ORCID: 0000-0003-1193-6018

Abstract

This paper presents a conceptual framework for leveraging Oral Heritage Tourism (OHT) as a form of indirect social protection targeting vulnerable rural communities in the Republic of Moldova. The research investigates how the deliberate engagement of elderly narrators and acknowledged custodians of intangible cultural heritage within tourism initiatives can generate additional income streams for households reliant on minimal pensions, while concurrently contributing to the preservation of vanishing folk narratives. Building upon a systematic literature review spanning active ageing theory, narrative transportation, and participatory heritage mapping methodologies, and enriched by cross-national comparisons with established models in Japan, the United Kingdom, and several continental European countries, the study constructs a territorial oral cartography that maps Moldova's narrative resources across its five principal regions. The resulting implementation roadmap for the 2026–2030 period includes three core components: a comprehensive national inventory of oral heritage assets, a formal certification scheme for elderly heritage guides, and the development of storytelling-centred tourism products. The framework illustrates that OHT holds the capacity to deliver concurrent benefits across three dimensions: economic gains through the expansion of niche tourism, social impact by mitigating isolation among older populations, and cultural preservation by protecting endangered oral traditions from disappearance.

Keywords

Keywords: oral heritage tourism; active ageing; intangible cultural heritage; rural tourism; Moldova

JEL codes: Z32; I38; R11; J14

1. Introduction

The global tourism sector is experiencing a significant shift in visitor preferences, moving away from traditional engagement with physical monuments and artefacts toward immersive encounters rooted in storytelling, lived experience, and human connection. The Republic of Moldova, located at a rich cultural crossroads in South-eastern Europe, stands to benefit from this trend by strategically harnessing its oral traditions as a driver of sustainable local development. The present study defines Oral Heritage Tourism (OHT) as the deliberate and organized involvement of elderly narrators, community historians, and state-recognized carriers of intangible cultural heritage within the broader tourism economy, thereby examining the intersection between the economic potential of ageing populations - the silver economy - and the preservation of intangible cultural heritage (ICH). Moldova confronts acute demographic pressures, notably the depopulation of rural areas and an increasingly aged workforce, conditions that

make the reframing of older citizens from dependent beneficiaries of social assistance into active guardians of cultural knowledge both urgent and promising. Engagement in heritage storytelling offers older adults a renewed sense of purpose, a phenomenon resonant with what Japanese scholarship terms *ikigai*, and existing evidence suggests that active participation in community tourism roles is positively associated with the psychological and physical health of elderly individuals (Weiss et al., 2005). Through storytelling, otherwise ordinary geographic locations are transformed into emotionally significant places, a process explained by place attachment and narrative transportation theories (Solomon et al., 2026). This dynamic holds particular relevance for diaspora visitors, who represent a strategically important market segment for Moldova, as oral heritage experiences enable them to reconnect individual identity with shared historical memory. The central aim of this research is to construct a strategic framework that integrates active ageing policy, the safeguarding of ICH, and the development of tourism products, showing how visitor experiences built around oral narratives can provide supplementary, non-transfer-based income to rural households while simultaneously fostering greater social solidarity.

2. Literature Review

The concept of the silver economy reconceptualizes population ageing not as a fiscal liability but as a source of economic creativity, recognizing that older adults can occupy dual roles within tourism - as both consumers of travel experiences and as providers of heritage-based services (Durai et al., 2025). The active ageing paradigm, advanced by the World Health Organization, broadens the notion of social participation well beyond employment to encompass cultural contribution and civic life. Within the tourism sector, elderly narrators possess a distinctive capacity to deliver what may be termed existential authenticity - spontaneous, deeply individual encounters that scripted professional interpretation cannot match. According to narrative transportation theory, audiences who are drawn into vivid accounts told by credible first-hand witnesses tend to lower their critical resistance and develop stronger emotional bonds with the narrative content (Solomon et al., 2026). The territorial anchoring of oral heritage is captured by the developing interdisciplinary practice of oral cartography, a methodology that weaves together ethnographic fieldwork, geographical analysis, and oral historical testimony to render visible the otherwise invisible memory landscapes of a community (Caquard & Cartwright, 2014). A central technique within this approach is participatory mapping, which involves local elders in identifying sites of cultural importance that conventional cartography overlooks, proceeding through stages of sketch-based community mapping, guided walks across the territory, and subsequent geo-referencing of the collected narratives. In the Moldovan context, where official historical accounts have been repeatedly rewritten under successive political regimes, such oral maps function as alternative archives, safeguarding grassroots memory against dominant state-sanctioned historiography.

3. Data and Methodology

The study is built on a qualitative, cross-disciplinary research design organized around four interconnected methodological components. The first component consists of a systematic review of scholarly and policy literature aimed at constructing the theoretical basis for the convergence of active ageing, intangible cultural heritage safeguarding, and tourism development. The second component involves a comparative examination of internationally established models for elderly engagement in heritage tourism, drawing on cases such as the government-supported Silver Human Resource Centers operating across Japanese municipalities, the Living Library format and oral history interpretation

programmes developed in the United Kingdom, rural development initiatives in Italy and Germany that embed intangible heritage into regional economic strategies, and community-driven oral mapping exercises exemplified by the Amazon Conservation Team’s collaborative StoryMaps project with the Matawai Maroon communities in Suriname. The third component applies oral cartography as a spatially grounded ethnographic instrument for identifying and situating narrative resources throughout Moldova’s five principal regions - North, Centre, South, Gagauzia, and the left bank of the Dniester - drawing on participatory mapping principles in which community elders and local cultural intermediaries pinpoint locations associated with folklore, collective historical recollections, and living traditional practices. The fourth component synthesizes the preceding analytical outputs into a staged policy and product development roadmap spanning 2026 to 2030, designed for alignment with Moldova’s National Tourism Development Strategy.

4. Results and Discussion

Cross-country comparison yields several transferable lessons. Japan’s Silver Human Resource Centers offer a publicly supported model for employing retirees as paid heritage guides, with documented benefits for their physical and mental health (Weiss et al., 2005). British Living Library and deep-mapping initiatives show how structured visitor-storyteller conversations and geo-tagged audio archives can overcome the mobility limitations of elderly narrators (Solomon et al., 2022). Italian and German experiences illustrate how agricultural memory and traditional ecological knowledge enhance food, wine, and landscape tourism (Shakya & Vagnarelli, 2024). Transposing these models onto Moldova’s territory, the oral cartography reveals regionally concentrated narrative clusters: fortification and geological legends in the North (Soroca, Criva); monastic and royal traditions in the Centre (Căpriana, Orheiul Vechi); pastoral mythology and Turkic ritual heritage in Gagauzia (Ceadâr-Lunga); and Soviet-era memory alongside multicultural palimpsest on the Left Bank (Tiraspol, Raşcov). This territorial concentration supports the design of thematic story trails linking places with their living narrators. Elderly participants can assume diverse roles - scholar-guides, myth-keepers, culinary storytellers, craft narrators, and epoch witnesses - extending well beyond officially recognized artisans to include librarians, shepherds, and village chroniclers. The proposed three-phase roadmap envisages a national oral census through participatory mapping (2026–2027), a light-touch Silver Guide certification programme (2027–2028), and tourism product development - guesthouse storytelling sessions, digital story trails, and diaspora genealogical routes (2028–2030). Principal risks involve the commodification and distortion of authentic narratives, alongside language barriers requiring multilingual digital solutions.

5. Conclusions

The analysis confirms that OHT can function as an indirect social protection mechanism in Moldova, repositioning elderly bearers of oral heritage from welfare dependents to active participants in the tourism economy. Moldova’s territorially concentrated narrative assets lend themselves to operationalization through oral cartography and low-cost storytelling products that simultaneously supplement household income, reduce social isolation, and preserve endangered living memory. The 2026–2030 roadmap provides a feasible integration pathway into national tourism policy. Future work should pilot these products in selected villages and assess their socioeconomic impact. Moldova’s

deepest competitive advantage in tourism may lie not in its landscapes alone, but in the voices of its people.

References

- Caquard, S., & Cartwright, W. (2014). Narrative cartography: From mapping stories to the narrative of maps and mapping. *The Cartographic Journal*, 51(2), 101–106. <https://doi.org/10.1179/0008704114Z.000000000130>
- Durai, R., Ramaswamy, S., & Mohan, S. (2025). Exploring silver tourism: Ageing populations and the new leisure economy. *International Journal of Novel Research and Development*, 10(7). <https://ijnrd.org/papers/IJNRD2507250.pdf>
- Shakya, M., & Vagnarelli, G. (2024). Creating value from intangible cultural heritage. *European Journal of Cultural Management and Policy*, 14, 12057. <https://doi.org/10.3389/ejcmp.2024.12057>
- Solomon, E., Adu-Debrah, L., & Braimah, M. (2022). Promoting tourism destinations through storytelling. In *Global Perspectives on Strategic Storytelling in Destination Marketing* (pp. 117–135). IGI Global.
- Solomon, E. N. A., Braimah, S. M., Odom, R., & Mensah, K. (2026). Storytelling in heritage tourism. *Tourism Critiques*, 1–26. <https://doi.org/10.1108/TRC-06-2025-0029>
- Weiss, R. S., Bass, S. A., Heimovitz, H. K., & Oka, M. (2005). Japan’s silver human resource centers and participant well-being. *Journal of Cross-Cultural Gerontology*, 20(1), 47–66. <https://doi.org/10.1007/s10823-005-3797-4>

Acknowledgements

This article was developed within the framework of Subprogram 030101 “Strengthening the resilience, competitiveness, and sustainability of the economy of the Republic of Moldova in the context of the accession process to the European Union”, institutional funding

DEVELOPMENT OF EDUCATIONAL TOURISM BASED ON CULTURAL HERITAGE IN THE CURRENT ECONOMIC CONTEXT

Elena-Minodora SIMCEA^{1*}; Aliona LÎSÎ²

¹University of European Political and Economic Studies „Constantin Stere”, Economic Sciences and Ecology Faculty, Chişinău City, Republica Moldova Country

²University of European Political and Economic Studies „Constantin Stere”, Economic Sciences and Ecology Faculty, Chişinău City, Republica Moldova Country

* Corresponding author: simcea.minodora@yahoo.com | ORCID: 0009-0005-9912-0137

Abstract

Cultural heritage is a valuable resource for communities, with significant potential to contribute to local socio-economic development. By conserving and promoting it, not only is the historical and cultural identity of communities preserved, but economic growth can also be stimulated. In the context of globalization and the diversification of the tourism market, tourism based on cultural heritage is becoming an important tool for the economic revitalization of rural and urban areas that have such resources. A detailed study will be conducted on specific communities or regions that have a rich cultural heritage and have developed educational tourism.

Keywords: cultural, heritage, tourism, education, strategies etc.

JEL codes: A33; A14; F63, R11.

1. Introduction

In this paper, we have conducted a detailed study of the Gorj community in particular and its specific region, as an administrative-territorial subdivision of the Oltenia region, which has a rich cultural heritage on the basis of which educational tourism has developed. This analysis includes a series of strategies aimed at developing educational tourism. Thus, experts in the field of cultural heritage and tourism were interviewed and tourists and locals from this region were surveyed.

In this general context, the need to know young teenagers in Romania, their lifestyle, preferences, tastes, expectations towards the cultural offer in public and non-public spaces, but also their attitude towards the national cultural heritage and graffiti, as a form of expression in public spaces, has arisen.

According to Romanian law, national cultural heritage consists of "all assets that represent a testimony and expression of national values, beliefs, knowledge and traditions, regardless of their ownership regime"³

³ Law nr.182/2000 on the protection of national movable cultural heritage, republished, 2008.

2. Literature Review

According to the national strategy of Romania for the development of tourism 2023-2035, over the decades, tourism has recorded continuous growth. Worldwide, tourism has transformed into one of the fastest growing sectors of the economy. Today's tourism is closely linked to the socio-economic development process and offers an increasing number of new destinations. This dynamic has transformed tourism into a determining factor for socio-economic progress, due to its capacity and potential to create new jobs, especially for young people.

Based on the action plan for the valorization of cultural heritage in order to increase the competitiveness of the tourism sector in Romania, tourism is considered a catalyst for economic development at local, regional and national levels. In order to be able to undertake coherent and coordinated measures, a sectoral development strategy and a related action plan have been developed for the 2030 horizon, certain actions being financed from the funds related to the cohesion policy.

3. Data and Methodology

The study aimed to survey tourists and locals from the Gorj County community.

The research opted for a more complex approach, namely problems related to the processes that take place at the level of the tourism system, the role of cultural heritage in close connection with the economic and social development policy of the community, the development of tourist resorts/units, the role of information - communication processes in the cultural heritage - tourist relationship, etc.

Methods.

Case study: This study aims to identify and analyze the role of cultural heritage in the ongoing development of educational tourism and at the same time a real assessment of the impact that educational tourism has on the local economy.

Questionnaires: The surveys were conducted by questioning tourists, those who participated in educational excursions and members of the local community. These questionnaires targeted the perception, experiences and impact that educational tourism has on the local community and economy.

Interviews: Interviews with stakeholders, such as local government representatives, tourism operators, teachers and cultural heritage specialists. These interviews will provide in-depth insights into the challenges and opportunities in the field of educational tourism and heritage management.

Participatory observation: Personal involvement in activities aimed at promoting cultural heritage, through educational tourism activities to observe the interactions of tourists and the economic impact they have on the community.

Documentary analysis: The pertinent analysis of relevant policies, strategies and documentation in the field of cultural heritage and educational tourism at national and international levels will help us identify the theoretical and practical benchmarks on which this sector relies when talking about economic development.

4. Results and Discussion

The development of cultural tourism involves coordinated policies not only of the authorities, but also the involvement of other areas with an impact on the development of tourism in general and cultural tourism in particular. It also requires the active involvement of all key stakeholders, in a bottom-up process and by creating a multi-level governance system both vertically and horizontally.

In order to support the Romanian tourism development strategy and policy, it is necessary to adopt concrete measures at local/regional/national/tourism destination level, such as:

- delimiting tourist destinations, based on their natural and cultural heritage, and developing coordination structures that allow for the coordination of measures in the field of tourism;
- establishing, depending on the tourist identity, strategies and action plans for marketing and tourism development at the tourist destination level, with an emphasis on the elements of uniqueness/differentiation from a heritage point of view;
- restoring representative heritage sites, with potential for inclusion in cultural-tourist routes;
- development of cultural-tourist routes at national level, based on representative heritage elements

Gorj County has the potential to unlock the capacity for economic growth at local, regional and central levels. Our county is characterized by a diversity of urban and rural cultures, the result of a long history of occupation, migration and resistance, tolerance and syncretic evolution. This has been a factor that has favored the emergence of a variety of unique cultural and natural tourist resources of world value.

Gorj County boasts sites inscribed on the UNESCO World Heritage List and others on the waiting list. These are evenly distributed throughout the county, in various regions and areas, with varying particularities and characteristics. They represent major centers of tourist interest in the regions where they are located and top destinations, both for foreign and Romanian tourists⁴.

The strategies for the development of educational tourism based on heritage draw guidelines to achieve the following: mapping of geographical areas to identify areas of interest, necessary for the establishment of tourist promotion centers, establishing areas of tourist interest, national and international, to promote tourism in Gorj County, investments require financing within the framework of attracting European funds for the restoration of unique objectives.

Investigated subjects

As part of the study itself, we interviewed experts in the field of cultural heritage and tourism, and surveyed tourists and locals of the city of Târgu Jiu.

Cultural heritage is the tangible and intangible heritage of a group or society received from past generations. Not all elements passed down from past generations are considered "heritage"; rather, heritage is the result of selection by society.⁵

⁴ <https://www.mae.ro/node/1614> accessed on 20.03.2026.

⁵ Silverman, Helaine; Ruggles, D. Fairchild. *Cultural heritage and human rights*. Logan, William S., Chapter 2 - Closing Pandora's Box: Human Rights Conundrums in Cultural Heritage, 2007, New York, NY: Springer, pag. 33.

5. Conclusions

Following the investigations and analyses carried out on the improvement of the tourism sector in Gorj by adapting the structures, processes and activities in this field to the needs of the modern tourist, a series of conclusions were formulated. Starting from the analysis of the functions, principles and rules of operation of the Romanian tourism sector, it was concluded that the modern and strategic approach to tourism constitutes an important and especially necessary initiative to achieve the desired economic performance indicators.

For Gorj County, tourism represents a component of utmost importance in economic development at local, regional and national levels. In order to support tourism in Gorj through the application of development strategies and policies, it is necessary to adopt concrete measures at the local/regional/national/tourist destination level, such as: delimiting tourist destinations, based on their natural and cultural heritage, and developing coordinating structures that allow for the coordination of measures in the field of tourism; establishing, depending on the tourist identity, marketing and tourism development strategies and action plans at the tourist destination level, with an emphasis on the elements of uniqueness/differentiation from a heritage point of views. Cultural heritage plays a crucial role in the development of educational tourism, having the ability to attract tourists and provide valuable educational experiences.

The implementation of well-defined strategies, adapted to local specificities, is essential for the valorization of cultural heritage for educational purposes. These strategies can include collaborations between institutions, innovative educational programs and effective marketing. The research results suggest the need for public policies that integrate cultural heritage into educational tourism development strategies, thus promoting a sustainable and responsible approach. Educational tourism has a significant economic impact on local communities, contributing to increased income, job creation and infrastructure development. This impact supports the sustainable development of regions. Educational tourism programs contribute to raising awareness of the importance of cultural heritage, both among tourists and local communities. This education contributes to a better appreciation and conservation of heritage.

In conclusion, the paper highlights the importance of cultural heritage in the development of educational tourism and its impact on the local economy, underlining the need for integrated and collaborative strategies to maximize the benefits for communities and ensure its conservation for future generations.

References

1. Silverman, Helaine; Ruggles, D. Fairchild (2007). *Cultural heritage and human rights*. Logan, William S., Chapter 2 - Closing Pandora's Box: Human Rights Conundrums in Cultural Heritage, New York, NY: Springer, pag. 33.
2. Law nr.182/2000 on the protection of national movable cultural heritage, republished, 2008.
3. Strategic document developed through a collaboration between the central public authority responsible for tourism development (at that time, the Ministry of Tourism), the General Secretariat of the Government (SGG) and the World Bank (WB), within the project Developing strategic management capacity by operationalizing, at the level of the Government Center, a Strategy Unit type structure – SIPOCA 23, Romania's National Strategy for Tourism Development 2023-2035.
4. Ministry of Investments and European Projects, Action Plan for the valorization of cultural heritage in order to increase the competitiveness of the tourism sector in Romania.
5. <https://www.mae.ro/node/1614>

DIMENSIONS OF REGIONAL CULTURE IN ROMANIA: AN EXPLORATORY ANALYSIS BASED ON PRINCIPAL COMPONENTS

Maria-Magdolna MACULA

*Romanian Academy, School of Advanced Studies of the Romanian Academy, Doctoral School of
Economic Sciences, National Institute for Economic Research "Costin C.
Kiriltescu", Institute of Economic Forecasting*

magdamacula@gmail.com, | ORCID: 0009-0004-0337-2595

Abstract

This study quantifies the role of cultural capital as an endogenous driver of economic development across Romania's 8 NUTS 2 regions (2018-2023). Using Principal Component Analysis (PCA) on nine cultural indicators, we constructed a composite Regional Cultural Index based on the first principal component (PC1), which captures 47.4% of the total variance. Longitudinal analysis reveals a significant pandemic-induced shock in 2020, followed by an asymmetric recovery and persistent regional polarization. To measure the impact of culture on wealth, we employed a Panel Least Squares model with first-difference transformations to ensure stationarity. Results indicate that the cultural index is a highly significant predictor of economic performance ($p < 0.01$, $R^2 = 0.419$); specifically, a one-unit increase in the cultural index accelerates regional GDP growth by 2.38%. The findings provide empirical evidence for integrating cultural investment into regional development strategies as a tool for sustainable growth.

Keywords: regional; culture; GDP; PCA;NUTS2;

1. Introduction

"Nu-ți voi lăsa drept bunuri, după moarte, / Decât un nume adunat pe-o carte. Thus begins "Testament," the famous poem by Tudor Arghezi, an ode to immaterial heritage, intellectual work, and profound transformation. In an era dominated by material quantification and the glorification of numbers, Arghezi's lyrics challenge us to reflect on true values. This metaphor of transformation, of the ability to extract value and beauty from seemingly insignificant, even repulsive, elements, resonates deeply with a new paradigm in economic sciences: that of human economics. Contemporary societies are beginning to recognize that a balanced life and sustainable economic development cannot be achieved without increased attention paid to immaterial capital: cultural, artistic, and spiritual values. The economy is not just about numbers and properties, but about people, the relationships between them, and the values that guide their existence. Culture, art and beauty are not mere luxury goods or peripheral areas, but fundamental pillars of a resilient and people-oriented economy. The research aims to quantify cultural development at regional level (NUTS 2) by constructing a composite index based on Principal Components Analysis. This index acts as an indirect indicator of cultural need in a balanced economy, facilitating the econometric assessment of the impact of culture on Romania's economic and social welfare indicators.

2. Literature Review

Throsby substantiates the distinction between economic and cultural value through six non-monetary dimensions, demonstrating that the cultural sector generates major positive externalities. These contribute to collective well-being and the development of human capital, going beyond simple market mechanisms. (Hutter & Throsby, 2011) Research highlights that the strategic management of cultural itineraries transforms local resources into dynamic economic assets, facilitating a convergence between the protection of identity values and the sustainable socio-economic development of host communities. (Maniou, Manola, & Tsatalbassoglou, 2025). The value of culture goes beyond conventional economic indicators, acting on two complementary levels: at the individual level, as a vector of subjective well-being and intellectual stimulation, and at the collective level, as a generator of social capital. Sustainable development, (Horvat, 2025) as we know it, has four main pillars: economic, social, environmental and, increasingly, cultural. Culture is a transformative force, not just a niche sector, with ICC acting as an engine of growth through employment, investment and tourism. The revitalization of heritage and crafts converts identity into sustainable economic value, integrating tradition into productive circuits. Thus, culture becomes a pillar of sustainable development, demonstrating that progress goes beyond the purely monetary sphere. (Slobodan, 2025). The interrelationship between culture and the economy manifests itself through multiple channels, from creative industries to cultural tourism, simultaneously strengthening social cohesion and national identity, building a sustainable economy. (Franc, 2010)

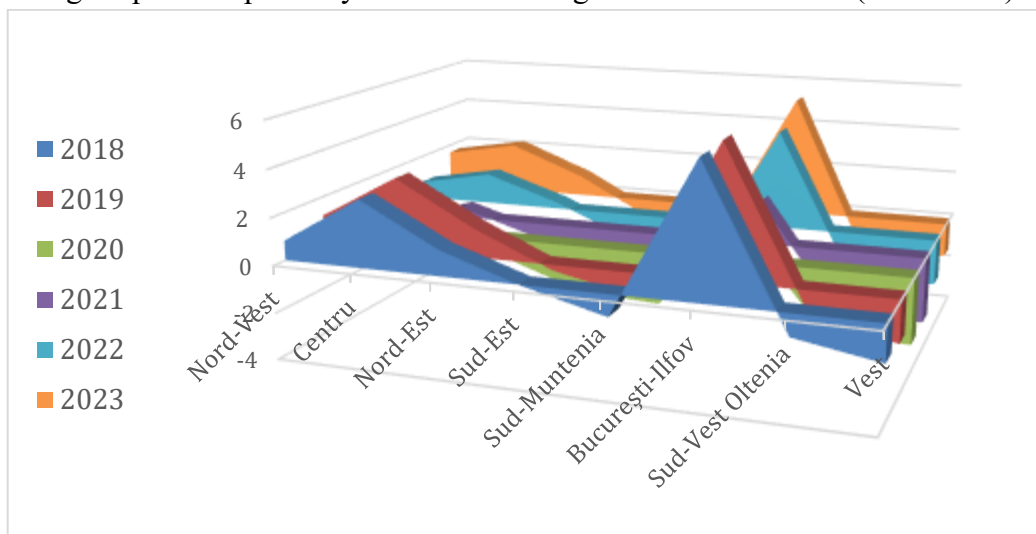
3. Data and Methodology

Methodologically, for the analysis of employment indicators in the creative this study employs a multi-level comparative analysis based on Eurostat (2023) data, utilizing the coefficient of variation to track regional convergence and the spatial concentration of creative human capital at the European, national (Romania), and NUTS-2 regional levels. To quantify the multidimensionality of regional culture, Principal Component Analysis (PCA) was applied to 10 indicators (AR- active readers; LS – library staff; Pcomp- performance companies; P S_C number of performances and concerts; S- spectators of performances and concerts; EPI- employees in the performance industry; M- museums; CIN- cinemas; Scin- cinema spectators; V-muz- muzeum visitors, variables extracted from the NIS). We selected the first principal component (PC1), which explains 47.4% of the total variance, as an aggregate indicator of regional cultural intensity. To test the hypothesis of the link between culture and GDP, we used the Panel Least Squares method. The initial model revealed a strong autocorrelation (Durbin-Watson = 0.36), which is why the final specification was refined by logarithmization and first-order differentiation. This method ensures data stationarity and eliminates the risk of spurious regression, providing robust and interpretable coefficients in terms of economic elasticity. The choice of Model 3 (in differences) as the reference model is justified by the need to eliminate the risk of spurious regression (false causality). Although Model 2 (ar1) presents an artificially high R^2 coefficient of determination (0.99), this is a result of data inertia (non-stationarity). Model 3, although reporting an R^2 of 0.419, is much more statistically robust, as it explains the dynamics of growth, not just the gross level, providing an honest picture of the marginal impact of culture on the economy.

4. Results and Discussion

The analysis indicates a decrease in employment in the creative industry to 26.4 thousand employees (2023) and a severe polarization in 2022, with Bucharest dominating compared to the periphery represented by Southwest Oltenia. Regional disparities have increased steadily, reaching a maximum coefficient of variation (0.93) after the pandemic. This trend confirms the progressive concentration of creative industries in developed regions, to the detriment of less resilient areas. To quantify this "intangible heritage", we used Principal Component Analysis (PCA) applied to the 10 selected indicators. The results highlight three fundamental dimensions that capture 87.88% of the total variation of the regional cultural phenomenon. The dimension of mass culture and entertainment (PC1 – 49.10%), is the most robust component, defined by the cluster of performances and cinemas (P S_C, S, EPI, Pcomp, S_CIN). This reflects the “vigor” of public cultural consumption and the capacity of regions to support active creative industries. A high score here indicates a vibrant entertainment economy, supported by a large number of employees and companies in the field. The dimension of heritage and knowledge (PC2 – 24.13%) is the axis clearly dominated by museums (M, V_muz) and reading activity (AR, LS). It represents the shift from entertainment to traditional forms of culture, focused on education and the preservation of values. The analysis of the impact of cultural capital on regional economic development (NUTS 2) in the period 2018-2023 reveals a deep interdependence between the immaterial dimension of society and its material performance. The results obtained through the Principal Component Analysis (PCA) highlight a sharp polarization of the Romanian cultural landscape.

Fig 1.Spatiotemporal Dynamics of the Regional Cultural Index (2018-2023)



Source: generated by author

The Bucharest-Ilfov region authoritatively dominates the ranking, with an index that constantly exceeds the value of 5.0, while regions such as S-V Oltenia or S-V Muntenia register negative values, signaling a relative "cultural desert". The 3D graph of the index evolution captures the collapse of activities in 2020. This "valley" of cultural consumption demonstrates the fragility of the sector, but also an asymmetric recovery starting with 2022, led by regions with strong university centers (Center and N-V). The final regression model, estimated on the first differences of the regional GDP logarithm ($d(\log(\text{regional_gdp}))$), provides important statistical evidence. The coefficient of the variable $D(\text{CUL_INDEX})$ presents a p-value of 0.0000, indicating a probability of zero error in asserting the

relationship between the two variables. Almost 42% of the variation in the regional economic growth rate is explained strictly by the dynamics of the cultural sector.

Table 1. Estimating the impact of the cultural index on regional GDP (2018-2023)

Variables / Indicators	Model 1: OLS(log) (Levels)	Model 2: AR(1) (Levels)	Model 3: Robust (First Differences)
Intercept (C)	10.86112	6.372511	0.066684
Std. Error	(0.036974)	(5.018101)	0.005571
CUL_INDEX	0.130722***	0.023062***	0.023817***
Std. Error	(0.016976)	(0.004570)	0.004549
AR (1)	-	1.014961	-
Std. Error	-	(0.016800)	-
R-squared	0.563127	0.992015	0.419091
Durbin-Watson	0.366117	2.686887	2.594271
F-statistic	59.29387	2298.219	27.41475
Prob (F-stat)	0.000000	0.000000	0.000006

*** denotes statistical significance at the 1% level ($p < 0.01$).

The coefficient of 0.0238 indicates that a one-unit increase in the cultural index generates an acceleration of economic growth by 2.38%. Regions that manage to transform work into cultural infrastructure (museums, performances, libraries) become more resilient and perform better economically. As can be seen in Table 1 (Model 3), the coefficient of 0.0238 confirms a positive elastic relationship between cultural dynamics and economic growth. It is important to emphasize that the R^2 value of 0.419 obtained in Model 3 is highly significant for the data expressed in first differences. Unlike level models, where the coefficients of determination tend to be inflated by common temporal trends, our model captures the real causality, indicating 41.90% of the variation in regional economic growth is closely related to the dynamics of the cultural sector.

5. Conclusions

The analysis confirms that the regional cultural index is a statistically significant predictor of economic growth in Romania ($p < 0.01$). The robust model demonstrates that a one-unit increase in the cultural index accelerates regional GDP growth by 2.38%, with cultural dynamics explaining 41.9% of the economic variance. The study validates the concept of the “human economy”, demonstrating that culture is an endogenous growth factor, not just a luxury good. In practice, the results suggest that regional development policies should prioritize cultural infrastructure as a tool to reduce economic disparities between NUTS 2 regions. The main limitation lies in the relatively short time series (6 years), which captured the atypical shock of the 2020 pandemic. Future research will extend the analyzed period and integrate granular data (private investments, digital consumption) of creative industries.

References

Franc, I. V. (2010). Cultura și dezvoltarea economică. *Revista Amfiteatru Economic*, XII(28), pp. 317-337.



Horvat, M. (2025). Culture, Heritage and Sustainable Development. *Annales, Series Historia et Sociologia*, 35. doi:10.19233/ASHS.2025.23

Hutter & Throsby. (2011). *Beyond Price: Value in Culture, Economics, and the Arts*. Cambridge: Cambridge University Press.

Maniou, Manola, & Tsatalbassoglou. (2025). The role of cultural routes in the sustainable development of cities and regions - Cultural entrepreneurship. *Sustainable Development, Culture, Traditions Journal*, 2, 34-42.

Slobodan, M. (2025). Culture as CapitalL: Educational models for fostering cultural awarness and entrepreneurial spirit. *Science, Education, Technology and Innovation*, VII. Belgrad. doi:https://doi.org/10.62982/seti07.slmi.27.

IDENTITY OR INCOME? EVALUATING THE TARGETING EFFICIENCY OF AFFIRMATIVE ACTION IN INDIA THROUGH A WELFARE ECONOMICS FRAMEWORK

Solomon JOASH^{1*}; Arshad BHAT²

^{1,2}Amity University Mumbai, Amity Institute of Liberal Arts, Mumbai, India

* Corresponding author: anjoash1423@gmail.com | ORCID: 0009-0001-0586-4663

Abstract

Affirmative action policies are central to contemporary debates on social inclusion and distributive justice. In India, caste-based reservation has served as a corrective mechanism to address historically entrenched social exclusion. However, increasing policy discussions question whether identity-based targeting remains the most efficient redistributive instrument, or whether income-based criteria would better promote social welfare. This paper evaluates the targeting efficiency of caste-based reservation through a welfare economics framework informed by Rawls' Difference Principle and Sen's capability approach. Using nationally representative household-level data, the study constructs a multidimensional structural disadvantage index incorporating parental education, occupational background, rural origin and household assets. Regression analysis examines whether caste remains a significant predictor of structural disadvantage after controlling income and regional factors. This study looks at the India Human Development Survey II from 2011 to 2012 to create a kind of index that measures structural disadvantage. The India Human Development Survey II is used to see if caste is still a factor in structural disadvantage even when we consider income and where people live in India. The India Human Development Survey II data is very important for this study, on disadvantage. By comparing the relative explanatory power of caste and income variables, the study assesses whether economic criteria alone sufficiently capture persistent inequalities. The study aims to assess whether economic criteria alone sufficiently capture persistent inequalities. The findings will contribute to the global debate on identity-based versus class-based redistribution and offer policy insights for designing inclusion frameworks that balance equity and efficiency.

Keywords: Caste; Class; Income; Reservation; Efficiency.

JEL codes: D63; D31; I38; J15

1. Introduction

The issue of affirmative action policies has been the subject of discussion on distributive justice, social inclusion and welfare maximization in developing economies. The caste-based reservation system is one of the widest systems of institutional mechanisms, which strive to deal with historically rooted inequalities in India. Based on constitutional protections (Articles 15(4) and 16(4)) and policy, these policies seek to rectify structural disadvantages to Scheduled Castes (SC), Scheduled Tribes (ST) and Other Backward Classes (OBC) by granting them access to education, state employment, and political representation. To welfare economics, these interventions can be thought of as redistributive instruments that aim at raising the aggregate social wellbeing through focusing on impoverished groups.

Although theoretically the debate can be abundant, there is still very little empirical evidence on the comparative effectiveness of identity-based versus income-based targeting and this is more so when it comes to developing economies. Although several studies have studied how reservation policies affect educational attainment, labor market outcomes and social mobility, fewer have specifically assessed how effectively the policies target the most disadvantaged people by structure- certain individuals that is, how many of them are targeted and benefited. In addition, current analyses frequently base their conclusions on one-dimensional measures of deprivation like income or consumption thus failing to appreciate the aspect of the multidimensionality of deprivation that modern welfare economics highlights.

This paper aims to fill this gap by assessing the targeting efficiency of India-based affirmative action on caste basis by use of a framework that is a welfare economics. To be more precise, it poses a question as to whether caste is still a major predictor of structural disadvantage, controlling by income and regional traits. In doing this, a multidimensional structural disadvantage index that combines measures like parental education, occupation background, rural background and household assets is created in the paper. The study evaluates the potential of identity-focused targeting to remain significantly important in welfare-enhancing policy formation by comparing the explanatory capacity of caste and income variables in predicting this index, or whether economic criteria are already powerful enough to serve as sufficient predictors of inequalities persistence.

2. Literature Review

Caste-based reservations in India, which are written in Articles 15 and 16 aim to help Castes, Scheduled Tribes and Other Backward Classes. These reservations were made following the independence of India to redress the inequality that was experienced prior to their independence. They allocated positions in government positions and schools to these groups which constituted 22.5 and thereafter 49.5%. This helped them to be represented more but some individuals claimed that it was unfair given that the rich, who belonged to these groups were able to secure the position rather than the needy. On the Mandal Commission implemented more changes in 1990. This caused individuals to debate on what is fair and what is not. Others believe that quotas can bring kinds of people in that are good and they do not have any effect on the effectiveness of things. Scheduled Castes, Scheduled Tribes and Other Backward Classes and Other Backward Classes continue to receive opportunities because of the caste-based reservations.

It has been observed that the caste system usually brings about issues in individuals which extend beyond the amount of money taken home. Indicatively, Deshpande discovered in 2011 that food and less education are typical of families belonging to the SC/ST castes despite their earning the same sum of money. The reason behind this lies in the fact that they lack numerous contacts, as well as relationships within the community that are significant in terms of helping them to get ahead. Discovered that the gap between individuals in the OBC caste remains large and most of the individuals in the rural setting do not own a piece of land and therefore, it is not easy to be ahead. There are other people such as Borooah, and Iyer who only believe we should only assist people who are literally poor and that the amount of money one is earning is a determinant as to whether one is assisted. In 2005, they discovered that by analyzing the amount of money human beings earn, they can determine who is poor in urban areas and

the caste system is still an issue in the villages. The topic of whether we should also have special rules to benefit some of the castes now that some of the people have just been taking a hike up the economic ladder has been discussed by some people especially since there have been debates about the caste census, after 2024.

Welfare economics can provide us with an opportunity to consider things such as the Difference Principle of Rawls. According to this principle we are supposed to assist the worst-off people regardless of who they are. In 1971, Rawls wrote about this. On the one hand there is the approach of capability by Sen. According to this approach, people cannot do the things that they want to do due to such phenomena as discrimination based on caste (Sen, 1999). Using these thoughts in India we find that there are those who, as Drreze and Sen have written, have discussed the issues of fleeing to one thing when attempting to assist people. They did this in 2013. Subramanian tried to come up with a way to measure things in 2022. In this manner, this mixes what people do with money and other things surrounding them. Few individuals have experimented with such concepts applying information of individual households such as the level of education attained by the parents and the household possessions. Welfare economics remains a tool; to understand these issues and the Difference Principle and the capability approach are the most important components of welfare economics.

Although previous research indicates that caste is a factor with most of them solely considering the relationship between income and caste or simple scale on poverty. They do not investigate the disadvantages of people like in terms of families and where people are brought up. The current study attempts to correct this by providing a method of quantifying the disadvantage that considers many factors. We apply a technique known as regression, in order to integrate types of data and form an index-compound. We then find out whether caste does have an effect even after taking into consideration income. By doing this we hope to bring together two important ideas: how people are identified and how they are classified economically. This could aid in making the policies which redistribute resources effective. Factors that should be considered in this discussion are the cost and income. On. Caste influences spheres of life and a major aspect in economic stratification is income. Knowledge of caste and income can be used to formulate policies.

3. Data and Methodology

In this paper, the research is done using the India Human Development Survey-II (IHDS-II, 2011-12). The IHDS- II is a survey which contains data on more than 41 thousand and as many as 971 urban areas and 1,503 villages. It has details on what caste people belong to their education, job, income, assets and whether they live in a village or city. This paper is analysed using a welfare economics framework. This framework will be used by the author in carrying out analysis after they get the appropriate software. They are no longer able to use software such as Stata or SPSS. Thus, the econometric aspect of the paper is rather an idea that is testable than testable results. The India Human Development Survey-II (IHDS-II) data will be useful, for testing this idea. The suggested model is applicable using the IHDS-II data, as well as welfare economics framework.

The analysis is based on two files: the IHDS-II Household-level file and the IHDS-II Individual-level file. We use the IHDS-II Household-level file to get information about the situation of the household. This involves the amount of money everyone in the house will have, whether one lives in a village or

city and the type of household machinery. The IHDS-II Individual-level file is used to get information about each person. This includes what group they belong to, like Scheduled Castes or Scheduled Tribes and what kind of education and job they have. The IHDS-II Household level file and the IHDS-II individual level file can be linked with the help of the codes, such as the household ID and the individual ID. This assists the researcher to look at things both in the household and the individual perspective which is significant when examining disadvantages and the IHDS-II Household-level file and IHDS-II Individual-level file.

To have this index work we must ensure that every part of it is flat. This can be done applying z-scores or a scale between 0 and 1 to each of the parts of the index. And then we can sum up all these bits, to get one index, to the index. This way we can use the index to get an understanding of the index:

$$SD_i = w_1 \cdot \text{ParentalEd}_i + w_2 \cdot \text{OccupationalStrat}_i + w_3 \cdot \text{Rural}_i + w_4 \cdot \text{AssetIndex}_i,$$

where the weights w_1-w_4 may be set equal for simplicity or derived via principal-component-analysis (PCA) if the researcher has access to suitable software. Higher values of the index correspond to greater structural disadvantage, while lower values indicate relatively better-off conditions.

Using this index, the paper specifies a linear regression model that can be implemented on IHDS-II using standard econometric software:

$$SD_i = \beta_0 + \sum_k \beta_k \text{Caste}_k + \beta_c \ln(\text{Income}_i) + \sum_r \gamma_r \text{Region}_r + \sum_c \delta_c X_{ci} + \varepsilon_i,$$

where: SD_i is the structural-disadvantage index for individual i (or household i).

Caste_k is a set of dummy variables for SC, ST, OBC, and General (or EWS, if applicable).

$\ln(\text{Income}_i)$ is the natural logarithm of per-capita income or consumption, used to capture the role of current economic status.

Region_r represents state-level or large-region fixed effects to absorb regional heterogeneity in public services and labour markets.

X_{ci} is a vector of control variables including age, gender, education, and household size.

ε_i is the random error term.

From a welfare-economics perspective, the key question is whether the caste-dummy coefficients β_k remain statistically significant and economically meaningful after income and region are controlled. To assess this, one can estimate three nested specifications:

Model 1 (income only):

$$SD_i = \alpha_0 + \alpha_1 \ln(\text{Income}_i) + \eta_i.$$

Model 2 (caste only):

$$SD_i = \mu_0 + \sum_k \mu_k \text{Caste}_k + v_i.$$

Model 3 (caste + income + region + controls):

$$SD_i = \beta_0 + \sum_k \beta_k \text{Caste}_k + \beta_c \ln(\text{Income}_i) + \sum_r \gamma_r \text{Region}_r + \sum_c \delta_c X_{ci} + \varepsilon_i.$$

Comparing adjusted R² and the standardised coefficients of these models, the analyst can determine the addition to the explanatory power of caste when income and region have been considered. A major and lasting role by caste group dummies would suggest that identity-based targeting continues to bear a non-trivial amount of structural disadvantage which has not been fully internalized by income-based criteria. However, a small or statistically non-significant contribution, by contrast, would indicate that income based or income dominant targeting is adequate to efficiency-oriented redistribution.

4. Results and Discussion

This part does not give original regression estimates but rather synthesizes available empirical data in the form of nationally representative surveys like the India Human Development Survey II (IHDS II, 201112) and the National Sample Survey (NSS CES) to give an understanding of the probable type of results in case the structural disadvantage model described in section 3 is put into play. This is not aimed at producing coefficients but intended to demonstrate how the available findings can be incorporated into the suggested welfare economics suggestion and what they will suggest concerning the issues around identity versus income.

At least three studies that employ IHDS II data and NSS CES data suggest that caste group affiliation remains a significant predictor of large disparities in welfare outcomes despite the introduction of income-like controls. Further based on NSS CES consumption statistics on social groups in India, 201112, a decompositional analysis of inequality in welfare in social groups reveals that both the Scheduled Castes and the Scheduled Tribes continue to face significant relative welfare disparities to General category households, even in higher quantiles of the income distribution, although the disparity has narrowed over time (Deshpande, 2011; Subram Likewise, work by IHDS II also demonstrates that in the lower income and asset quintile, SC and ST families continue to be overrepresented, and thus, caste based disadvantage is not completely eradicated by income measures alone (Jaffrelot & Kumar, 2021; Drèze and Sen, 2013).

In this respect, the facts provide some overlap: income-based targeting is likely to encompass much of the economically disadvantaged population, although caste-based criteria will still indicate a subgroup of households that are still disadvantaged structurally even on an income basis above some level. To bring these patterns into reality, Table 1 is a summary of indicative patterns based on studies of indicative patterns of IHDS II and NSS CES. They are stylised numbers which are based on the existing empirical literature and should serve to exemplify the qualitative structure of the relationships among caste income disadvantage and not provide new estimates (Deshpande, 2011; Subramanian, 2022; Caste and Wealth Inequality in India, 2024).

Table 1: Indicative patterns of caste-group disadvantage in India (from IHDS-II and NSS-CES-based evidence)

Caste Group	Share in lowest income quintile (%)	Share in lowest asset quintile (%)	Typical pattern relative to General-group
ST	60–70 (Deshpande, 2011)	65–75 (Subramanian, 2022)	Highly concentrated in bottom quintiles, even after income controls
SC	55–65 (Deshpande, 2011)	60–70 (Subramanian, 2022)	Strong rural- and income-based disadvantage
OBC	40–50 (Jaffrelot & Kumar, 2021)	45–55 (Caste and Wealth Inequality in India, 2024)	Intermediate position; significant within-group inequality
General	20–25 (Deshpande, 2011)	25–30 (Subramanian, 2022)	Overrepresented in higher quintiles; lower structural disadvantage

These simplified forms are congruent with the notion that even with income based targeting an excessively big portion of the bottom quintile group would be instantaneously filtrated, even with above some income level caste-based categories referring to a structurally socially weak cohort (Deshpande, 2011; Caste and Wealth Inequality in India, 2024). Suppose that the regression model specified in Section 3 was estimated using the IHDS II, it would be plausible to find that caste group dummies would continue to be significantly predictive of structural disadvantage using the income plus region but would show lesser explanatory power, as compared with models being estimated where only income is used. The additional R-Squared contribution of caste would be positive, but relatively small, meaning that caste-based targeting represents a non-trivial residual effect of disadvantage that cannot be entirely socialized by income would be, respectively (Deshpande, 2011; Subramanian, 2022).

In the eyes of Rawlsian philosophy this matters. The Difference Principle can only justify inequalities when they are in the interest of the least advantaged; caste is no longer predictive of disadvantage in the presence of income, identity-based principles can be used to make sure that the least advantaged groups should be prioritized. This implies, in practice, that pure income based targeting, though, might underserve certain SC, ST, and OBC populations that are marginally above income cutoffs but nevertheless constraints of structurally determined social networks, and pure caste based targeting might over benefit relatively affluent members within reserved categories (the “creamy layer” problem) (Deshpande, 2011; Subramanian, 2022). Sen capability approach breaks the barrier of interpretation further. Caste is a transformation variable that determines access to education, occupation, and social capital and these aspects cannot be entirely declared by income measures. According to evidence provided in IHDS II, education, employment, and health, using the lower caste individuals tend to experience a worse learning outcome, labour market connection, and be more vulnerable to health shocks at the same income level (Drèze and Sen, 2013; Jaffrelot and Kumar, 2021).

The model should be applied to the entire datasets of IHDS II in future work, and the incremental R^2 contribution of caste following income should be estimated and examined on how the pattern changes across states, urban rural divisions, and sub caste group (Jaffrelot and Kumar, 2021; Subramanian, 2022). Also, longitudinal studies might investigate the dynamics of both inequality in structural disadvantage index and identity versus income trade off with time, particularly with the recent economic quota discussions as well as increasing caste census discussions (Drèze and Sen, 2013; Caste and Wealth Inequality in India, 2024).

An emerging collection of policy reviews on the one hand and court-documented critique maintains that the poorest, most marginalized, and truly vulnerable frequently are excluded by reservation, even to the reserved categories. Intra-group disparity and the phenomenon of the creamy layer implies that comparatively well-off sub-groups within SC/ST/OBC and EWS have an advantaged position to take most of the quota-based benefits leaving the poorest with inadequate services (Bhati and Kaushik, 2013; Deshpande, 2011). Empirical and law-policy debates indicate that social capital, coaching accessibility, and urban-middle-class origin have a significant impact on the real occupants of reserved-quota roles both in education and employment (DrishtiIAs, 2023; LawAudience, 2025).

5. Conclusions

This paper has constructed a welfare economics model to examine the efficiency of targeting the welfare aspect of affirmative action in India through comparison of identity based (caste) and income-based criteria. Basing the analysis by the India Human Development Survey II (IHDS II, 201112) and additional NSS CES based evidence, the results indicate that caste group affiliation still explains a large disparity in the income, assets, and capabilities beyond consideration of economic status and region factors. Meanwhile, income based or EWS type mechanisms explain much of modern-day deprivation and so both identity and income aspects are important to ensure that the poor are targeted.

References

- Borooah, V. K., & Iyer, S. (2005). Vidya, Veda, or Baba? The educational effects of some contemporary Indian social reformers. *Economic Development and Cultural Change*, 53(3), 687–716. <https://doi.org/10.1086/427034>
- Deshpande, A. (2011). *The grammar of caste: Economic discrimination in contemporary India*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198072034.001.0001>
- Drèze, J., & Sen, A. (2013). *An uncertain glory: India and its contradictions*. Princeton University Press.
- Galanter, M. (1984). *Competing equalities: Law and the backward classes in India*. University of California Press. <https://doi.org/10.1525/9780520344303>
- Jaffrelot, C., & Kumar, A. (2021). The communalization of the OBC issue. In C. Jaffrelot (Ed.), *India’s silent revolution: The rise of the lower castes in North India* (pp. 145–170). Hurst.
- Rawls, J. (1971). *A theory of justice*. Harvard University Press.
- Sen, A. (1999). *Development as freedom*. Oxford University Press. <https://doi.org/10.1093/0192893300.001.0001>



-
- Subramanian, S. (2022). On targeting and comprehensive redistribution: Revisiting the debate. *Economic & Political Weekly*, 57(12), 10–14.
- Weisskopf, T. E. (2004). Affirmative action in context. *Economic & Political Weekly*, 39(35), 3947–3952.
- Caste and Wealth Inequality in India. (2024). Working Paper No. 566, Levy Economics Institute.
- India Human Development Survey-II (IHDS-II, 2011–12). (2018). Public use datasets and documentation. ICPSR Study 36151.
- NSS-CES Consumption Expenditure Survey, 2011–12. National Sample Survey Office, Ministry of Statistics and Programme Implementation.
- DrishtiIAS. (2023). Rethinking Reservation Policies in India. Daily News Editorials.
- LawAudience. (2025). Reservation in India: An Unfiltered Analysis. LawAudience Blog.
- E-journal on Reservation. (2021). Reservation System in India: Advantages and Disadvantages. *International Journal of Education and Policy in Online (IJEP Online)*.

NATURAL RESOURCES AND CONFLICT IN ECOWAS: THE MODERATING ROLE OF SOCIAL COHESION

Lawal Olamilekan Abdulwahab¹; Dr. Pang Wei Loon²; Dr. Roslee bin Hj Baha³; Prof. Ahmed M. Khalid^{4*}

1 Universiti Brunei Darussalam School of Business and Economics (UBDSBE), Bandar Seri Begawan, Brunei Darussalam.

2 Universiti Brunei Darussalam School of Business and Economics (UBDSBE), Bandar Seri Begawan, Brunei Darussalam.

3 Universiti Brunei Darussalam School of Business and Economics (UBDSBE), Bandar Seri Begawan, Brunei Darussalam.

4 Lahore University of Management Sciences, Department of Economics, Lahore, Pakistan.

*Corresponding author: lawal@accord.edu.so or 22h8913@ubd.edu.bn | ORCID: 0000-0003-4955-244X

Abstract

This study examines the relationship between natural resource abundance and conflict in the Economic Community of West African States (ECOWAS), with a focus on the moderating role of social cohesion. Drawing on the resource curse and horizontal inequality theories, the research employs a panel-data econometric framework covering 15 ECOWAS countries from 1996 to 2024. The analysis integrates Heteroskedasticity Panel-Corrected Standard Errors (HPCSE), Feasible Generalized Least Squares (FGLS), Granger causality tests, and Instrumental Variable/Two-Stage Least Squares (IV/2SLS) techniques. The findings reveal a positive and statistically significant relationship between total natural resource rents and conflict, confirming the resource curse hypothesis. Additionally, evidence of bidirectional causality indicates that while resource rents fuel conflict, conflict simultaneously disrupts resource extraction and revenue generation. Social cohesion indicators, particularly wealth inequality and voice and accountability, significantly influence conflict dynamics. More equitable wealth distribution and stronger governance structures are associated with reduced conflict intensity. However, the moderating effects of governance remain limited under weak institutional conditions. The study underscores the importance of conflict-sensitive resource governance and inclusive policies in mitigating instability. It contributes to the literature by integrating social cohesion into the resource–conflict nexus and provides policy-relevant insights for sustainable development and peacebuilding in resource-rich, conflict-prone regions.

Keywords: Resource Abundance; Conflict; Social Cohesion; Resource Curse; ECOWAS

JEL Codes (optional): O13; D74; C23

1. Introduction

Abundant natural resource endowments alongside persistent conflict and political instability characterize the ECOWAS region. This paradox, widely described as the resource curse, suggests that resource-rich countries often experience slower development, weak institutions, and increased conflict (Amare et al., 2024; Uzoigwe & Nwokolo, 2025). In West Africa, countries such as Nigeria, Mali, and Niger illustrate how competition over resource rents fuels violence and governance challenges.

This study investigates the relationship between natural resource rents and conflict, while examining the moderating role of social cohesion. Specifically, it explores whether inequality and governance structures influence how resource abundance translates into conflict. By incorporating bidirectional causality and moderation analysis, the study provides a more comprehensive understanding of the resource–conflict nexus in ECOWAS.

2. Literature Review

Existing literature indicates that natural resource abundance often exacerbates conflict, particularly in weak institutional contexts. Poor governance, corruption, and unequal distribution of resource wealth intensify grievances and increase the likelihood of violence. Conversely, strong institutions and inclusive governance can mitigate these effects (Bitoto et al., 2026; Okoi, 2023).

Social cohesion has emerged as a critical factor in reducing conflict. It encompasses elements such as trust, participation, equity, and institutional legitimacy (Löhr et al., 2021; Vonhm, 2025). Empirical evidence suggests that societies with stronger social cohesion are better able to manage resource wealth and prevent conflict (Goelz et al., 2020). However, the interaction between resource abundance, inequality, and governance remains underexplored, particularly in the ECOWAS context.

3. Data and Methodology

The study utilizes panel data from 15 ECOWAS countries spanning 1996–2024. Key variables include conflict incidence, total natural resource rents, wealth and income inequality, voice and accountability, and macroeconomic controls such as GDP per capita growth and population growth. Data sources include the World Development Indicators, World Governance Indicators, and regional conflict databases.

The empirical analysis employs multiple econometric techniques. HPCSE is used as the baseline estimator to correct for heteroskedasticity and cross-sectional dependence, while FGLS serves as a robustness check. Granger causality tests assess the direction of causality between resource rents and conflict. To address endogeneity, IV/2SLS estimation is applied, using corruption as an instrument for resource rents.

4. Results and Discussion

The results consistently show that natural resource rents have a positive and statistically significant effect on conflict, supporting the resource curse hypothesis. Higher resource dependence is associated with greater instability driven by rent-seeking behavior and competition over resource control. The Granger causality analysis reveals a bidirectional relationship: resource rents drive conflict, while conflict simultaneously reduces resource revenues by disrupting economic activities.

Social cohesion plays a significant role in shaping conflict outcomes. Wealth inequality and income inequality influence conflict dynamics, while voice and accountability significantly reduce conflict. Interaction effects suggest that social cohesion conditions the impact of resource rents, although

governance mechanisms alone may be insufficient in weak institutional environments. Robustness checks using FGLS and IV/2SLS confirm the reliability and causal interpretation of the findings.

5. Conclusions

This study provides strong evidence that natural resource abundance increases conflict in ECOWAS countries and that conflict affects resource rent generation. Social cohesion, particularly equitable wealth distribution and inclusive governance, plays a crucial role in mitigating conflict.

Policy implications emphasize the need for improved resource governance, strengthened institutions, and inclusive economic policies. Reducing inequality and enhancing accountability are essential for transforming resource wealth into sustainable development and peace. Future research should further explore the long-term institutional mechanisms that enhance social cohesion in resource-rich regions.

References

- Amare, M. Z., Mulugeta, W., & Mencha, M. (2024). Nexus between natural resource endowments and economic growth in selected African countries. *Discover Sustainability*, 5(1). Scopus. <https://doi.org/10.1007/s43621-024-00448-3>
- Bitoto, F. E., Nguempi, N. D., Mbognou, C. N., & Petnga, R. D. (2026). Peaceful development: Natural resources, global agendas and conflict in Africa. *Resources Policy*, 112. <https://doi.org/10.1016/j.resourpol.2025.105796>
- Goelz, T., Scheld, A., Hartley, T., & Carboni, I. (2020). Understanding Structural Factors and Actor Attributes That Impact the Development of Cohesion within a Participatory Modeling Process. *Coastal Management*, 48(6), 577–600. <https://doi.org/10.1080/08920753.2020.1823669>
- Löhr, K., Aruqaj, B., Baumert, D., Bonatti, M., Brüntrup, M., Bunn, C., Castro-Nunez, A., Chavez-Miguel, G., Rio, M. L. D., Hachmann, S., Muñoz, H. C. M., Ollendorf, F., Rodriguez, T., Rudloff, B., Schorling, J., Schuffenhauer, A., Schulte, I., Sieber, S., Tadesse, S., ... Weinhardt, M. (2021). Social cohesion as the missing link between natural resource management and peacebuilding: Lessons from cocoa production in côte d’ivoire and Colombia. *Sustainability (Switzerland)*, 13(23). <https://doi.org/10.3390/su132313002>
- Okoi, O. (2023). Natural Resource Governance and Sustainable Peace in Africa: A Theoretical Analysis. In O. Okoi & V. R. Nalule (Eds.), *Governing Natural Resources for Sustainable Peace in Africa: Environmental Justice and Conflict Resolution* (pp. 38–59). Taylor and Francis. <https://doi.org/10.4324/9781003355717-3>
- Uzoigwe, M., & Nwokolo, N. (2025). Natural Resource Conflicts and Good Governance in West Africa. In A. Adeniyi, P. A. Obi, S. K. Usman, & I. U. Yusuf (Eds.), *Media, Conflicts and the National Security Question: Communicating (In)security in Nigeria, West Africa and the Sahel* (pp. 225–244). Springer Nature. https://doi.org/10.1007/978-3-031-82198-1_12
- Vonhm, M. E. (2025). Key elements of social cohesion in conflict-affected societies: A critical literature review. *Cogent Social Sciences*, 11(1). <https://doi.org/10.1080/23311886.2025.2586176>

Acknowledgments (optional)

No funding received for this study

FINANCIAL SYSTEM SUSTAINABILITY APPROACHED THROUGH THE PRISM OF INTERMEDIATION, STABILITY AND INCLUSION: BIBLIOMETRIC AND CONCEPTUAL ASSESSMENT

Angela SECRIERU^{1*}; Eduard KENIG²

^{1,2}Academy of Economic Studies of Moldova, Faculty of Finance, Chişinău, Republic of Moldova

* Corresponding author: secrieru.angela@ase.com | ORCID: 0000-0002-5782-8840

Abstract

The main purpose of this article is to assess the multidimensional sustainability of the financial system through the interdependence of intermediation, stability and financial inclusion. The research aims to identify current trends in the specialized literature and to theoretically substantiate an aggregate indicator, entitled "Financial System Efficiency for Sustainable Growth" (FSE_{SG}), capable of measuring the contribution of the financial sector to long-term economic development. Methodology: The study uses a dual approach: a bibliometric analysis conducted with VOSviewer software to map thematic clusters and a conceptual synthesis to structure the aggregate indicator on three pillars: financial intermediation (FI), financial stability (FS) and financial accessibility (FA). The results of the bibliometric analysis highlight a clear transition of the research paradigm from the traditional view of profit efficiency to an approach focused on social impact and resilience. The data visualization indicates an increasingly close correlation between digital inclusion and macro-financial stability. Based on these findings, the article presents the architecture of the proposed aggregate indicator, demonstrating that the real efficiency of a financial system cannot be dissociated from its capacity to ensure equitable access to resources (inclusion) in a controlled risk environment (stability). Financial sustainability depends on the optimal balance between the three pillars analyzed. The proposed indicator provides regulators with a holistic perspective, highlighting the need for public policies that prioritize the quality and accessibility of financial intermediation in support of sustainable development.

Keywords: financial system sustainability; VOSviewer; bibliometric analysis; aggregate indicator; financial stability; financial inclusion.

JEL codes: G21, G01, G18, O16, Q01.

1. Introduction

In the context of current global challenges, redefining the role of financial systems has become an imperative necessity to ensure a sustainable development trajectory. For an emerging and small economy, such as that of the Republic of Moldova, the efficiency of the financial system can no longer be assessed solely in terms of the profitability of banking institutions, but must be analyzed through its capacity to withstand external shocks and fairly support the real economy. After the successive crises that marked the domestic banking sector in the last decade, reform efforts have focused heavily on aligning with Basel III standards, a fact confirmed by an equity ratio of over 24% at the sector level (as of February 28, 2026, according to NBM statistics), but the integration of sustainable development

objectives remains a process in the making, given that the share of domestic credit to the private sector (% of GDP) remains at a modest level (29.3% in 2024, according to World Bank statistics), below the financing potential of the real economy. The research problem is determined by the lack of an integrated assessment tool that quantifies the synergy between the basic functions of the financial system and the imperatives of sustainability. Most of the indicators currently used by regulatory authorities focus on prudence, often neglecting the inclusion dimension or the long-term impact of resource allocation. The general objective of the paper is twofold: on the one hand, mapping the conceptual evolution of financial sustainability through bibliometric techniques, and on the other hand, substantiating an aggregate indicator adapted to contemporary monitoring needs.

2. Literature Review

The literature on financial systems has gone through three major evolutionary stages. Initially, the dominant current, represented by the classic works of Schumpeter (1934), later Levine (1999) and Demirgüç-Kunt (2006), focused on the basic function of the system: intermediation. The second stage was marked by the global financial crisis of 2008, which reoriented academic attention to financial stability. Researchers such as Demirgüç-Kunt and Detragiache (2011) have shown that aggressive intermediation, lacking prudential mechanisms, can become counterproductive. Thus, recent literature has attempted to reconcile efficiency with resilience, laying the foundations for Basel III regulations. We are currently witnessing the third stage: the integration of sustainability. The current theoretical framework, supported by institutions such as the IMF and the World Bank, introduces financial inclusion as a critical variable for equitable economic growth (Sahai et al., 2015; Labini et al., 2025). However, although these concepts (intermediation, stability, inclusion) are intensively studied individually, the specialized literature presents significant fragmentation in the attempt to quantify them in a unitary model. This study addresses four major gaps identified in the current literature, with a particular focus on the context of emerging economies such as the Republic of Moldova: - methodological fragmentation; - deficiency in visualizing conceptual networks; - limitation of traditional indicators; - underrepresentation of Emerging Economies (Case of Moldova).

3. Data and Methodology

The research uses two distinct datasets to address the proposed objectives. The first set, intended for bibliometric analysis, includes metadata extracted from the Web of Science (WoS) database, using queries based on keywords such as "financial sustainability", "financial inclusion" and "financial stability" for the period 2015-2025. The final bibliometric analysis sample includes approximately 788 relevant articles, filtered to ensure academic quality.

The second data set, used to substantiate the indicator in the context of the Republic of Moldova, comes from official sources: The World Bank and the International Monetary Fund. The time sample for the analysis of banking indicators covers the period (2023-2024). To calculate the aggregate indicator, the author selected countries wishing to join the EU, EU member states from the former USSR, EU member states before 2000 and the State of Israel.

The aggregate indicator "Financial system efficiency for sustainable growth" (FSE_{SG}) is constructed by synthesizing three fundamental dimensions, each represented by specific variables: Financial intermediation (FI), Financial stability (FS), Financial accessibility (FA).

4. Results and Discussion

The bibliometric analysis conducted using the VOSviewer platform revealed a complex structure of the specialized literature, organized into nine interconnected thematic clusters: "Economic Growth and the Macroeconomic Dimension of Finance", "Sustainable Development and Financial Inclusion", "Financial Stability and Systemic Resilience", "The Financial System, Crises and Digital Transformation", "Resilience and Responsible Finance", "Financial Development and Institutional Governance", "Finance, Systemic Risk and Regulation", "Poor Countries, Fiscal Policy and Inflation" and "Financial Institutions and the Sustainable Development Goals". Based on their analysis, the authors conclude: The nine clusters reflect a dual conceptual architecture of the literature. The first, traditional dimension includes clusters 1, 3 and 4, dominated by terms such as economic growth, financial stability and financial system, reflecting the classical approach to the relationship between finance and development. The second, emerging dimension includes clusters 2, 5, 6 and 9, focusing on sustainability, financial inclusion, green finance and institutional quality, marking a shift towards a "sustainable financial development" paradigm.

The results obtained when determining the aggregate indicator "Financial system efficiency for sustainable growth" are presented in Table 1.

	Financial intermediation (FI)	Financial stability (FS)	Financial accessibility (FA)	Aggregate indicator FSE _{SG}
Israel	68.5	108.1	88.7	88.4
Moldova	3.1	79.4	16.1	32.9
Armenia	26.0	146.8	40.0	71.0
Romania	2.4	90.1	35.1	42.5
Estonia	46.2	128.7	64.3	79.7
Latvia	13.8	105.7	58.9	59.5
Netherlands	77.7	87.7	53.6	73.0

The authors apply the following interpretation of the results obtained: - An aggregate score above 70 indicates an efficient and resilient financial system; - between 50 and 70 indicates average efficiency and moderate vulnerability; - below 50 indicates structural risk, weak intermediation or instability. From the analysis carried out, it results that the Republic of Moldova has recorded very low financial intermediation rates, which indicates significant difficulties in transforming savings into productive investments and, indirectly, indicates the capacity of the financial system to contribute to long-term economic development.

5. Conclusions

The results of the study indicate that the financial system in the Republic of Moldova is still in the stage of technical compliance with Basel III standards, without achieving the necessary transition to a sustainability model based on the synergy between stability, depth of intermediation and financial inclusion. The bibliometric analysis carried out with VOSviewer highlighted a critical correlation between governance, digitalization of financial services and systemic resilience. The results suggest that an "efficient" financial system is not just a capitalized one, but one that manages to transform stored resources into sustainable investments, accessible to a broad user base. The paper contributes to the

literature by substantiating the aggregate FSESG indicator, proposing a shift from a two-dimensional assessment (Risk-Profit) to a three-dimensional one, which includes sustainability.

References

- Banca Națională a Moldovei. Baza de date interactivă. <https://www.bnm.md/bdi/pages/reports/drsb/DRSB1.xhtml?id=0&lang=ro>.
- Detragiache, E., Demirgüç-Kunt, A., Tressel, Th. (2006). Banking on the Principles: Compliance with Basel Core Principles and Bank Soundness. Policy Research Working Paper; No. 3954. World Bank. <https://openknowledge.worldbank.org/server/api/core/bitstreams/3aedee6f-6988-5fb7-8f24-a04378c4147a/content>.
- Demirgüç-Kunt, A., Detragiache, E. (2011). Basel Core Principles and bank soundness: Does compliance matter? *Journal of Financial Stability*, Elsevier, vol. 7(4), 179-190. <https://www.sciencedirect.com/science/article/abs/pii/S157230891000032X>.
- Labini, S., Biase, P., D'Apolito, E. (2025). Sustainability strategy and financial performance in the insurance company. *International Review of Economics & Finance*, vol. 98. <https://www.sciencedirect.com/science/article/pii/S1059056025000875>.
- Levine, R. (1999). Financial Development and Economic Growth: Views and Agenda. Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=604955.
- Schumpeter, J. A. (1934). *The theory of economic development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Cambridge, Massachusetts. <https://cruel.org/books/hy/shortschumpeter/SchumpeterTheoryofEconDev.pdf>.
- Sahay, R., Čihák, M., N'Diaye, P., Barajas, A., Mitra, S., Kyobe, A., Mooi, Y. N., Yousefi, S. R. (2015). Financial inclusion: Can it meet multiple macroeconomic goals? IMF Staff Discussion Note 15/17. <https://www.imf.org/external/pubs/ft/sdn/2015/sdn1517.pdf>.
- van Eck, N. J., Waltman, L. (2010) Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics* 84, 523-538. <https://doi.org/10.1007/s11192-009-0146-3>.
- World Bank. Financial Sector Data. <https://data.worldbank.org/indicator?tab=all>.

MODERNIZING THE SOCIAL ASSISTANCE SYSTEM THROUGH THE RESTART REFORM IN THE REPUBLIC OF MOLDOVA: IMPLICATIONS FOR CHILDREN IN DIFFICULTY

Mihail CIOBANU¹; Silvia SAVCENCO^{2*}

1 National Institute for Economic Research, Academy of Economic Studies of Moldova, Department of Social Research and Standard of Living, Chisinau, Republic of Moldova

2 National Institute for Economic Research, Academy of Economic Studies of Moldova, Department of Social Research and Standard of Living, Chisinau, Republic of Moldova

* Corresponding author: ciobanu.mihail.s@gmail.com, ciobanu.mihail@ase.md

ORCID: 0000-0003-1193-6018

Abstract

The RESTART reform represents a major step in the modernization of the social assistance system in the Republic of Moldova, aiming to increase efficiency, coordination, and targeting of social services. This paper examines the structural and functional transformations introduced by the reform and analyzes their implications for children in difficulty as a particularly vulnerable social group. Using a qualitative and policy-analysis approach, the study evaluates institutional restructuring, changes in case management mechanisms, and the reorganization of service delivery at central and local levels. The findings suggest that while the reform enhances administrative coherence and standardization of procedures, its effectiveness for children in difficulty depends on implementation capacity, inter-institutional coordination, and the availability of adequately trained social workers. The paper highlights both opportunities and risks associated with the transition process and formulates recommendations aimed at strengthening child-centered social protection within the evolving governance framework. The study contributes to the broader debate on social assistance modernization in post-transition economies and offers insights relevant for policymakers and researchers concerned with child welfare reform.

Keywords: RESTART reform; social assistance modernization; children in difficulty; social protection system; Republic of Moldova

JEL codes: H53; I31; I38

1. Introduction

The Republic of Moldova’s social protection system has undergone continuous reform since independence, yet it has remained fragmented, insufficiently coordinated, and limited in its capacity to reach the most vulnerable groups. Children in difficulty - encompassing children at risk, children separated from parents, children with disabilities, and children in poverty - represent a particularly vulnerable population requiring targeted, evidence-based intervention. The RESTART reform, launched in March 2023 by the Ministry of Labour and Social Protection (MLSP), constitutes the most comprehensive restructuring of Moldova’s social assistance system since the introduction of Ajutor Social in 2008. Motivated by system weaknesses exposed during the COVID-19 pandemic, the

Ukrainian refugee crisis, and the energy crisis, the reform pursues four medium-term objectives by 2026: (1) increased access to social services; (2) compliance with minimum quality standards; (3) sufficient and motivated human resources; and (4) system digitalization. Structurally, it establishes Territorial Social Assistance Agencies (ATAS) under the MLSP, reorganizes the National Social Assistance Agency, and creates a unified digital infrastructure linking 14 previously isolated information systems. This paper examines the RESTART reform’s implications for children in difficulty through three research questions: (1) What institutional changes does the reform introduce? (2) How do these affect child protection service delivery? (3) What opportunities and risks arise during transition? The study contributes a systematic, child-centred analysis of the reform’s architecture, bridges the policy-implementation gap by examining institutional capacity constraints, and situates the reform within the broader framework of post-transition social assistance modernization.

2. Literature Review

The transformation of social protection systems in post-Soviet economies has followed a trajectory from universal, employment-based entitlements toward targeted, means-tested assistance (Cerami, 2006; Cook, 2007). Barrientos (2013) argues that effectiveness depends on administrative capacity, targeting accuracy, and the integration of cash transfers with social services. Moldova’s Ajutor Social programme (2008) improved targeting but left persistent challenges in coverage and benefit adequacy. In child protection, the literature emphasizes the shift from residential institutional care toward family-based alternatives, with substantial evidence of negative developmental effects of institutionalization (Van IJzendoorn et al., 2020). Moldova’s deinstitutionalization achievements are significant: 60 boarding schools were closed and children in residential care decreased from approximately 12,000 in 2007 to 828 in 2021. However, poverty, parental migration, and insufficient community-level services continue to place children at risk, with the availability and competence of social workers representing the critical determinant of system effectiveness (Munro, 2011). The digitalization of social protection delivery presents both opportunities - improved targeting, reduced fraud - and risks, including digital exclusion of vulnerable populations. The European Child Guarantee (ECG) provides a normative framework for EU accession countries, and Moldova’s candidate status (2022) has accelerated alignment with this framework. A gap exists, however, in the systematic analysis of how comprehensive system-level restructuring affects specific child protection service delivery mechanisms, which this paper addresses.

3. Data and Methodology

The study employs a qualitative policy-analysis methodology combining documentary analysis with institutional mapping. Data sources include: primary legislative and policy documents; official MLSP communications and reform reports (2023–2025); international organization evaluations from UNICEF, UNDP, World Bank, and OHCHR; and NBS statistical data on poverty and child welfare (2018–2024). The analysis is structured around three dimensions: institutional architecture, service delivery mechanisms, and targeting and coverage. Limitations include the reform’s ongoing nature (2023–2026), reliance on publicly available documents without primary fieldwork, and incomplete disaggregated data on children in difficulty.

4. Results and Discussion

The RESTART reform shifts Moldova's social assistance governance from a fragmented, decentralized model - where rayon administrations operated with variable capacity - to a vertically integrated structure with nine Territorial Social Assistance Agencies (ATAS) reporting directly to the MLSP and subordinate Territorial Social Assistance Structures (STAS) at the local level. Key transformations include state-budget financing replacing fragmented local budgets, a unified digital architecture linking 14 previously isolated information systems, and the introduction of professional qualification standards for social workers. While vertical integration addresses coordination deficits, it introduces governance tensions, including reduced local accountability (Hickey, 2008) and dependence on the speed of recruitment and infrastructure deployment during the 2024–2025 transition. For children in difficulty, the reform deploys 150 dedicated child protection specialists within STAS, replacing the pre-reform model of generalist social workers with mixed caseloads. Between April and December 2024, assistance reached 15,888 children from 8,521 families, including 676 refugee children. By end-2024, children at risk decreased to 7,819 (1.54% of the child population), children in residential institutions fell by 25.3%, and family-type placements increased by 8.4%. The enhanced "Support for Families with Children" programme combines monetary allowances (4,000 MDL per child) with psychological counselling and educational services, reflecting the consensus that effective child protection requires multidimensional interventions (Barrientos, 2013). Social worker home visits reportedly increased tenfold, enabling proactive early intervention (Munro, 2011). Moldova's EU accession trajectory further anchors reform to the European Child Guarantee framework: in September 2025, an interministerial process for ECG implementation was launched involving five ministries, while the Barnahus model for child victims of violence has been operational in Bălți since 2022. Key challenges persist, however: insufficient remuneration and training of social workers; transition disruptions in referral chains; rural–urban disparities, with eight in ten poor families with children in rural areas; child poverty at approximately 34%; and the need for sustained inter-sectoral coordination beyond formal structures.

5. Conclusions

The RESTART reform represents the most ambitious restructuring of Moldova's social assistance system since independence, with significant implications for children in difficulty. Principal achievements include the deployment of dedicated child protection specialists, acceleration of deinstitutionalization, integration of cash transfers with comprehensive social services, digitalization of case management, and alignment with the European Child Guarantee framework. However, effectiveness remains contingent on unresolved factors: human resource capacity as the binding constraint, accountability risks from centralization, persistent rural–urban service disparities, and structurally high child poverty rates that social assistance alone cannot address. The reform illustrates the tension between administrative rationalization and child-centred flexibility that Munro (2011) identifies as perennial in child protection systems. In such a case we would recommend: establishing a dedicated child protection monitoring framework with disaggregated indicators; treating workforce development as continuous long-term investment; incorporating digital inclusion safeguards; leveraging ECG implementation for institutionalized inter-sectoral coordination; and commissioning independent evaluation research with primary data from social workers, families, and children. If implemented with

sustained political commitment and adequate resources, the reform has the potential to transform the lives of Moldova’s most vulnerable children.

References

- Barrientos, A. (2013). Social assistance in developing countries. Cambridge University Press.
- Cerami, A. (2005). Social policy in Central and Eastern Europe. LIT Verlag.
- Cook, L. J. (2008). Postcommunist welfare states. Cornell University Press.
- Hickey, S. (2008). Conceptualising the politics of social protection in Africa. In A. Barrientos & D. Hulme (Eds.), Social protection for the poor and poorest (pp. 247–263). Palgrave Macmillan.
- Munro, E. (2011). The Munro review of child protection: Final report. Department for Education, UK.
- Van IJzendoorn, M. H., et al. (2020). Institutionalisation and deinstitutionalisation of children. *The Lancet Psychiatry*, 7(8), 703–720.

Acknowledgements

The article was developed within the framework of Subprogram 030101 „Strengthening the resilience, competitiveness, and sustainability of the economy of the Republic of Moldova in the context of the accession process to the European Union”, institutional funding.

THE IMPACT OF ARTIFICIAL INTELLIGENCE ON SOCIAL RESPONSIBILITY IN PUBLIC INSTITUTIONS

Lucian MITUCA¹; Lucian SPULBAR^{2*}

^{1,2}University of Craiova, "Eugeniu Carada" Doctoral School of Economic Sciences, Craiova, Romania

* Corresponding author: lucian.spulbar01@gmail.com | ORCID: <https://orcid.org/0000-0002-6661-4166>

Abstract

Through this work, we aim to address how artificial intelligence (AI) could impact public institutions, leading to organizational governance and social accountability to citizens and stakeholders. First, we analyze whether AI-based decision support systems can enhance transparency, accountability and responsiveness, or whether they simply create new risks related to unequal access to public services. As part of the methodology, we used a mixed approach based on literature review and case studies on the implementation of AI systems in public administration, choosing areas such as service delivery, resource allocation and oversight. Preliminary findings show that AI can strengthen accountable public governance when integrated into ethical frameworks, clear accountability mechanisms and participatory processes that involve citizens in the design and monitoring of AI tools. However, we also found significant challenges related to data security, algorithmic bias, and the ability of public organizations to align technological innovation with their social mission. The results highlight policy and organizational practice directions for integrating artificial intelligence in ways that are consistent with the principles of public sector social responsibility.

Keywords: Artificial intelligence (AI); public governance; social responsibility; public sector.

JEL codes: O33; H83; M14

1. Introduction

This paper examines how the diffusion of artificial intelligence in public institutions reshapes organizational governance and social accountability to citizens and stakeholders. It highlights the tension between promises of more efficient, evidence-based decision-making and concerns about fairness, transparency, and democratic control.

2. Literature Review

The literature on AI in the public sector points to both efficiency gains and heightened risks of opacity and discrimination in algorithmic decisions. Studies on public sector social responsibility emphasize the need for ethical frameworks, stakeholder engagement, and accountability mechanisms when integrating digital technologies into public governance.

3. Data and Methodology

The study uses a mixed qualitative design combining a targeted literature review with illustrative case studies of AI implementation in public administration. The analysis focuses on applications in service delivery, resource allocation, and oversight functions, drawing on policy documents, official reports, and secondary empirical evidence.

4. Results and Discussion

Findings suggest that AI can support more transparent and responsive governance when systems are designed with clear accountability lines, explainability requirements, and participatory consultation with affected communities. At the same time, issues such as data security, algorithmic bias, and limited institutional capacities constrain the public sector’s ability to use AI in ways that remain aligned with its social mission.

5. Conclusions

The paper argues that AI in public institutions should be embedded within a broader framework of public sector social responsibility, combining legal safeguards, ethical guidelines, and participatory governance tools. It proposes several directions for policy and organizational practice, including stronger data governance, impact assessments, and continuous stakeholder dialogue to ensure that AI adoption reinforces, rather than undermines, democratic accountability.

References

1. Celary, O., & Piwowarczyk, Z. (2025). THE ROLE OF DIGITAL INITIATIVES IN ADVANCING ESG IN POLISH INDUSTRIAL COMPANIES. *Scientific Papers of Silesian University of Technology. Organization & Management/Zeszyty Naukowe Politechniki Slaskiej. Seria Organizacji i Zarzadzanie*, (225).
2. Spulbar, L. F., Mitache, M. D., & Mitrach, L. A. (2024). DIGITALIZATION AND ESG SYNERGIES. TRANSFORMING REGIONAL DEVELOPMENT THROUGH CORPORATE ACTIONS. *Annals of Constantin Brancusi'University of Targu-Jiu. Economy Series/Analele Universității'Constantin Brâncuși'din Târgu-Jiu Seria Economie*, (6).
3. Xiao, S., Xu, J., & Li, R. (2024). Are digital trends driving corporate environmental, social, and governance practices? Evidence from China. *Business Strategy and the Environment*, 33(6), 5366-5385.
4. Zuti, B. (2018). Digitalization, regional competitiveness and the governments of the future.

AN ANALYTICAL ASSESSMENT OF SPATIAL CONCENTRATION AND TERRITORIAL INEQUALITY OF POVERTY RISK AND GDP DISTRIBUTION BY URBAN–RURAL TYPOLOGY IN THE EUROPEAN UNION

Madalina Laura IONESCU^{1*}; Irene PAPADOPOL²; Rudy UJANG³; Mihai Viorel MIHALCEA²,
Izzat AL-HADI RAZALI³

1 School of Advanced Studies of the Romanian Academy, National Institute for Economic Research “Costin C. Kirişescu”, Romanian Academy, Romanian Academy House, 13 September Street no. 13, Bucharest, Romania,

2 Doctoral School of Economics II, Faculty of Agrifood and Environmental Economics, Bucharest University of Economic Studies, Romania

3 Universiti Teknologi MARA Sarawak Branch, 94300 Kota Samarahan, Malaysia

* Corresponding author: madyionescu2005@yahoo.com | ORCID: 0009-0009-9942-6127

Abstract

The paper analyzes the poverty risk and economic inequality in the European Union from a territorial perspective, focusing on differences between urban and rural areas. The study analyzes the distribution of the at-risk-of-poverty or social exclusion rate (AROPE) and gross domestic product (GDP) across regions with different degrees of urbanization. The analysis of GDP distribution highlights the concentration of economic activity in predominantly urban regions. At the same time, countries such as Romania show a relatively higher contribution of rural areas, reflecting structural imbalances and lower levels of urban economic development. The results show that poverty and social exclusion are unevenly distributed across the EU, with rural areas consistently facing higher levels of vulnerability than urban areas.

Keywords: poverty risk; economic inequality; economic development; urban and rural areas.

JEL codes: E65, F62P25, O13, R12

1. Introduction

In recent decades, the issues of poverty and economic inequality have consistently returned to the forefront of debates on sustainable development, against a backdrop of widening disparities between regions, between urban and rural areas, and between integrated and marginalized local economies. Although global economic progress has contributed to raising the average standard of living, its benefits have been unevenly distributed across regions, generating persistent disparities that undermine economic and social cohesion. In this context, poverty is understood as a complex phenomenon with multiple determinants that goes beyond the strictly monetary dimension. Unequal access to infrastructure, public services, education, the labor market, and opportunities for economic development (Srinivasu, and Rao, 2013) gives poverty a structural and territorial character. Certain regions remain trapped in trajectories of underdevelopment, while others concentrate capital, innovation, and economic growth, accentuating spatial polarization.

The literature on the SDGs and rural–urban disparities highlight the multidimensional nature of development challenges, in which infrastructure plays a decisive role (Pop and Stamos, 2025). Zhang et al. (2015) emphasize the importance of infrastructure projects in achieving a balance between urban and rural development, highlighting the need to combine economic efficiency with principles of equity to reduce territorial inequalities. Numerous studies highlight the complexity of these objectives and the difficulties associated with their implementation. Byerlee et al. (2008) emphasize the strategic role of agriculture in development policies, highlighting its potential to improve the standard of living of rural populations and contribute to poverty reduction, which gives rural development initiatives particular importance in achieving the relevant SDGs. At the regional level, (Turkebayeva et al., 2022) analyze the relationship between inequality, income, and economic growth in Kazakhstan, demonstrating that regional disparities significantly influence economic trajectories and development outcomes. The impact of economic inequalities extends beyond mere income differences, affecting social stability and support for political regimes. (Huang et al., 2022) find that perceptions of distributive inequity diminish support for political regimes in East Asia, indicating that economic inequality can undermine regime legitimacy and political stability. Furthermore, (Trevizo, 2022) links economic inequality and reduced state capacity to rising violence and vigilantism in Mexico, illustrating how economic disparities can exacerbate social tensions and undermine state authority.

Environmental considerations are also closely linked to income inequality. (Wang et al., 2022) explore how excessive income inequality can distort the Environmental Kuznets Curve (EKC), suggesting that unequal income distribution hinders sustainable economic growth and environmental protection efforts. (Ondoš et al., 2024) further analyze the resurgence of lagging regions in Slovakia, illustrating how artificial territorial organization and centralized planning have contributed, over time, to spatial inequalities and the decline of certain regions. The 2030 Agenda for Sustainable Development provides an integrated framework for addressing these challenges, and Sustainable Development Goal 1—No Poverty—is the foundation of the entire set of goals. The elimination of poverty is the essential prerequisite for achieving economic progress, social equity, and territorial stability. However, achieving this goal cannot be accomplished through uniform policies but requires differentiated interventions tailored to the specific characteristics of each region.

Sustainable Development Goal 1 – No Poverty – is the conceptual foundation of all policies aimed at social equity and sustainable development, and its effective implementation is inseparable from the territorial dimension of development. Poverty does not affect the population uniformly, but is spatially concentrated in territories characterized by structural disadvantages, which necessitates a direct link between SDG 1 and policies to reduce territorial inequalities. From a territorial perspective, achieving SDG 1 requires recognizing that regional disparities are the result of long-standing economic and historical processes. Underdeveloped regions face a reduced capacity to attract investment, rigid labor markets, and low levels of human capital (Soliman and Beram, 2025). In the absence of public interventions explicitly targeted at these territories, market mechanisms tend to exacerbate polarization, amplifying poverty and social exclusion. Spatial analysis of human development also highlights the unequal distribution of resources and opportunities.

In this context, this paper aims to analyze economic and social inequalities from a territorial perspective, using relevant indicators such as the at-risk-of-poverty or social exclusion rate (AROPE), and gross domestic product, differentiated by urban–rural typologies. The analysis focuses on the European Union,

with an emphasis on Romania’s position relative to the European average, highlighting structural particularities and their implications for sustainable economic development.

2. Territorial Disparities in the Risk of Poverty or Social Exclusion in the European Union

The literature on territorial disparities and the risk of poverty within the European Union highlights the complex spatial dimensions of socio-economic inequalities between Member States and among regions. Numerous studies emphasize that poverty and social exclusion are not distributed uniformly but exhibit distinct territorial patterns, influenced by socio-demographic, economic, and infrastructural factors. Novotná and Vydrová (2013) analyze disparities among European Union member states using the Europe 2020 Strategy indicators, with the aim of monitoring regional differences and mapping existing disparities, demonstrating that, despite common strategies at the European level, significant regional variations persist, with some states and regions lagging behind in terms of employment, education, and poverty reduction.

Ćwiek and Ulman (2019) assess income and poverty distributions across European countries, highlighting that socio-demographic characteristics significantly influence poverty levels and that the convergence process among member states remains uneven. Bertolini et al. (2019) provide evidence of the spatial heterogeneity of poverty and social exclusion in the European Union, using Eurostat data at the NUTS 2 regional level, and identify that certain region, particularly in Southeast Europe, face higher risks of exclusion, underscoring the importance of regional analysis for understanding the dynamics of poverty. Gaman et al. (2020) focus on rural settlements in Romania, illustrating how territorial dysfunctions—such as limited access to jobs, education, and infrastructure—contribute to poverty and social exclusion. From a theoretical perspective, the analysis of poverty and social exclusion goes beyond a strictly monetary approach, integrating dimensions such as access to work, education, health, and social participation. The degree of urbanization is, in turn, a fundamental determinant of socio-economic opportunities, as urban and rural environments offer distinct conditions regarding the labor market, infrastructure, and public services.

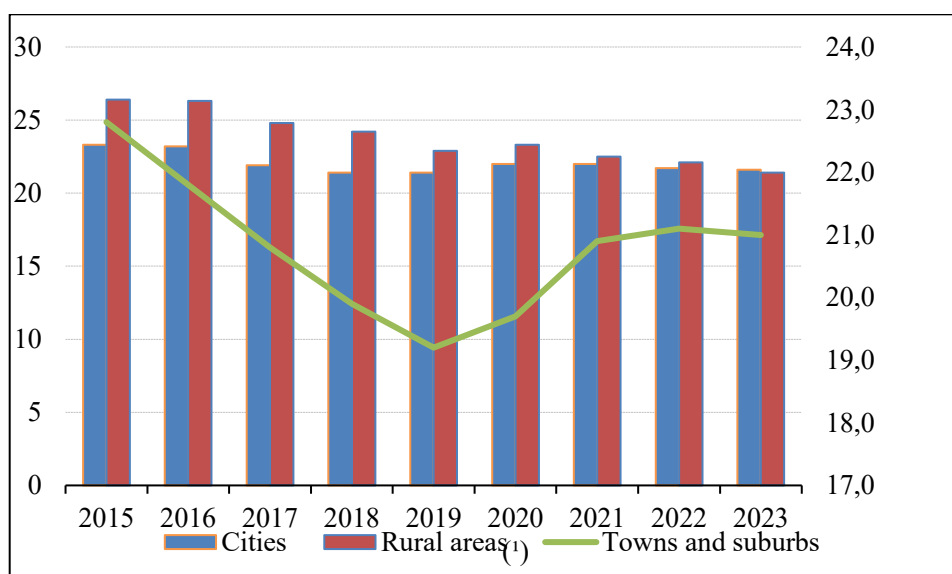


Fig. 1: People at risk of poverty or social exclusion, by degree of urbanization, EU, 2015–2023 (%)
Source: author based on Eurostat (online data code: ilc_peps13n)

Between 2015 and 2019, the data presented indicate a general downward trend in the proportion of the population at risk of poverty or social exclusion across the European Union, correlated with a favorable macroeconomic context characterized by sustained economic growth, falling unemployment, and rising employment. The decline was not uniform across regions; rural areas remained consistently the most affected, despite a moderate decrease in the indicator, highlighting limited convergence between residential areas and the fact that the benefits of economic growth were distributed unevenly, while redistribution mechanisms were insufficient to eliminate structural disparities. Starting in 2020, the downward trend in the AROPE reverses or stabilizes, reflecting the profound impact of the COVID-19 pandemic and the associated economic and social crises. Health restrictions, supply chain disruptions, and rising inflation have disproportionately affected already vulnerable groups. Analysis by degree of urbanization shows that, although all types of areas were affected, rural areas demonstrated a reduced capacity to absorb shocks, while urban areas faced new forms of vulnerability, linked in particular to the cost of living and housing insecurity.

Rural areas continue to record the highest levels of risk of poverty or social exclusion throughout the entire period analyzed, reflecting structural factors such as limited economic diversification, dependence on low-productivity sectors, and reduced access to quality public services. Although the 2015–2019 period brought a slight improvement, recent crises have highlighted the fragility of the progress achieved. Municipalities, situated between rural and large urban areas, exhibit an intermediate social risk profile. The relative stability of the AROPE indicator in these territories suggests the existence of social protection mechanisms and better economic opportunities than in rural areas. The stagnation observed after 2019 indicates the persistence of latent risks, particularly for the population employed in low-wage or unstable sectors, and this territorial segment illustrates the limitations of small- and medium-scale urban development in the absence of coherent social inclusion strategies. Large cities and suburban areas are characterized by the lowest levels of risk of poverty or social exclusion, reflecting the concentration of economic opportunities and services. However, the slight increase in the indicator after 2020 highlights the emergence of new forms of urban exclusion. High housing costs, labor market polarization, and unequal access to services can create vulnerabilities even in developed urban contexts. These trends support arguments in recent literature regarding “new urban poverty,” associated with processes of urbanization and population aging.

The analyzed data underscore the need for territorially differentiated public policies. Uniform approaches risk ignoring the specific characteristics of residential areas and perpetuating existing inequalities. In rural areas, priorities should include investments in infrastructure, education, and economic diversification. In municipalities, policies must aim to strengthen the local labor market and prevent precariousness. In cities and suburbs, interventions should focus on housing affordability and reducing social polarization. From an academic perspective, these conclusions support the need to integrate the territorial dimension into strategies to combat poverty.

Trends regarding people at risk of poverty or social exclusion in the European Union between 2015 and 2023 highlight a combination of limited progress and persistent vulnerabilities. The degree of urbanization remains a key determinant of social risk, and recent crises have demonstrated the fragility of social convergence. The analysis confirms that the sustainable reduction of poverty and social exclusion requires integrated policies, sensitive to territorial specificities, that combine economic growth with social inclusion and territorial cohesion.

3. Territorial disparities and national profiles of poverty risk in the European Union

An analysis of the risk of poverty or social exclusion at the European Union level reveals that, beyond general trends, the territorial distribution of social vulnerability is deeply shaped by national specificities. The structure of the economy, the welfare state model, historical legacy, and public policies account for

significant variations among Member States, both in the overall level of the AROPE indicator and in the relationship between urban and rural areas.

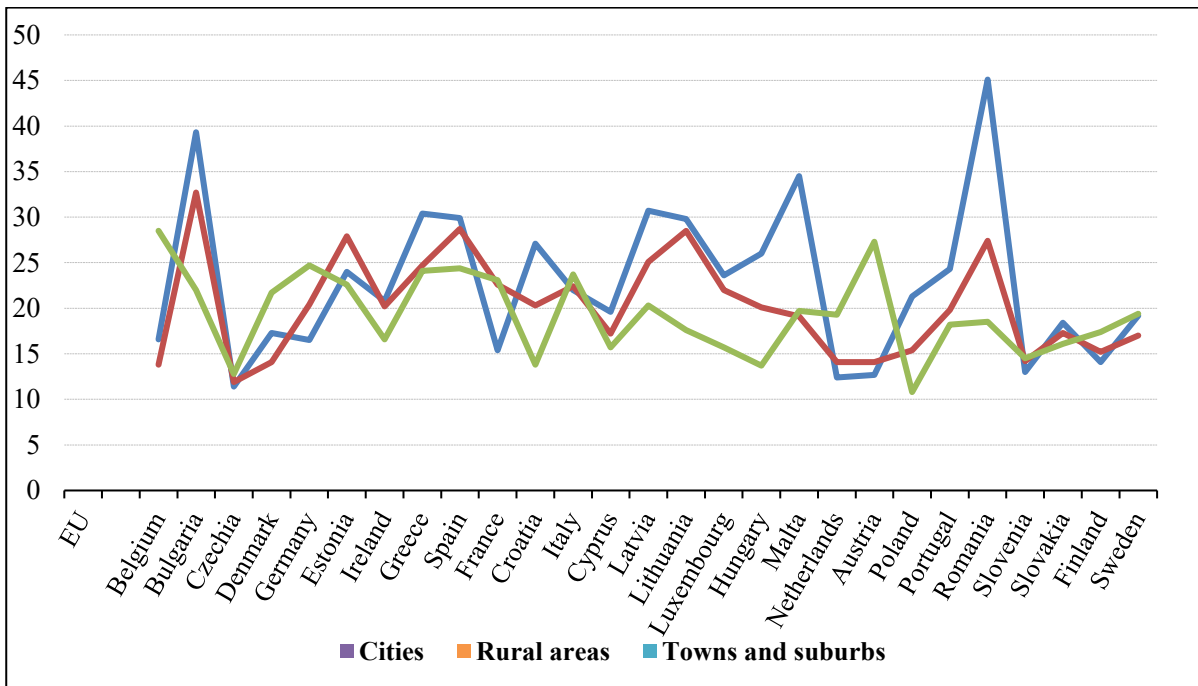


Fig. 2: People at risk of poverty or social exclusion, by degree of urbanization
 Source: author based on Eurostat (online data code: ilc_peps13n)

These disparities reflect historical trajectories of unequal development, the legacy of the post-socialist transition, and insufficient investment in rural infrastructure and the rural economy. In contrast, Western and Northern Europe are characterized by lower values of the indicator and better territorial cohesion, indicating the relatively superior effectiveness of social policies and redistributive mechanisms. In the medium term, the 2015–2023 period is marked more by continuity than by transformation. Although some convergence trends are observed among Member States, they are slow and fragile. Territorial disparities persist, and the degree of urbanization remains a major determinant of the risk of poverty and social exclusion. This structural rigidity suggests the limitations of uniform approaches and the need for differentiated policies tailored to local and regional specificities.

In countries such as Romania, Bulgaria, Latvia, and Lithuania, the risk of poverty or social exclusion reaches very high levels, particularly in rural areas. The differences between urban and rural areas are the most pronounced in the European Union, indicating a marked territorial polarization. Urban areas, particularly large cities, benefit from economic integration and access to services, while rural areas remain marked by structural poverty, depopulation, and underdeveloped infrastructure. Developments from 2015 to 2023 show only marginal improvements, with no real convergence toward the EU average.

The Czech Republic, Slovakia, Poland, and Slovenia are characterized by relatively low levels of the AROPE indicator, even in rural areas. Urban–rural disparities do exist, but they are much smaller than in the eastern EU. These countries have benefited from stronger industrial integration and more spatially balanced labor markets. The prevailing trend is stability, with slight reductions in social risk, indicating relatively effective territorial cohesion.

Germany, France, Belgium, and the Netherlands show moderate AROPE risk values, but with significant particularities. Although rural areas are generally less vulnerable than in the eastern EU, municipalities sometimes record relatively high values, suggesting phenomena of urban social polarization. Large cities concentrate both prosperity and exclusion, and urban–rural differences are less pronounced than intra-urban differences. Italy, Spain, and Greece are characterized by intermediate levels of AROPE risk, with a more balanced territorial distribution. Differences between municipalities, cities, and suburbs and rural areas are moderate, and in some cases the urban environment does not offer a clear advantage over the rural one. Post-crisis developments indicate increased vulnerability in urban labor markets, particularly for young people and precarious workers, which mitigates the traditional advantage of municipalities.

The Nordic countries (Sweden, Denmark, Finland) have the lowest levels of risk of poverty or social exclusion in the European Union. Territorial differences are minimal, and rural areas are not significantly disadvantaged compared to urban areas. The welfare state model, consistent investment in public services and infrastructure, as well as active employment policies explain this territorial uniformity.

An analysis of trends, phenomena, and developments in the risk of poverty or social exclusion in the European Union, based on the degree of urbanization, highlights the profoundly territorial nature of social vulnerability. Cities continue to offer the greatest socio-economic protection, while rural areas remain the most at-risk areas. Sustainable poverty reduction cannot be achieved without a long-term, structural approach that reconciles economic development with territorial cohesion and social equity. The distribution of GDP by urban–rural typology provides an essential perspective on the spatial structure of economic activity and the degree of regional polarization. An analysis of the share of GDP generated in predominantly urban, peri-urban, and predominantly rural regions allows for an assessment of the functional role of different types of areas in the national and European economy, as well as the identification of persistent territorial imbalances.

Table 1: GDP by urban-rural classification, EU, 2021 (% of total GDP)

	Predominantly urban regions	Peri-urban regions	Predominantly rural regions
EU	50.9	33.7	15.4
Belgium	59.3	35.9	4.8
Bulgaria	42.6	48.5	9.0
Czech Republic	39.3	43.4	17.3
Germany	51.3	35.8	13.0
Estonia	67.6	0.0	32.4
Greece	56.7	18.1	25.2
Spain	66.6	30.5	2.9
France	49.2	30.1	20.8
Italy	50.4	40.3	9.3
Latvia	53.0	31.9	15.1
Lithuania	43.1	52.2	4.7
Hungary	36.8	51.4	11.8
Poland	40.2	34.0	25.8
Portugal	54.0	19.8	26.3
Romania	28.0	34.9	37.1
Slovenia	0.0	52.1	47.9
Slovakia	28.0	42.7	29.2

Source: author based on Eurostat (online data code: urt_10r_3gdp), Eurostat (2024). Urban-rural Europe – economy, available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Urban-rural_Europe_-_economy#Gross_domestic_product_.28GDP.29

At the EU level, the structure of GDP is dominated by predominantly urban regions, which account for 50.9% of total GDP, confirming the central role of large urban agglomerations as key economic hubs. Peri-urban regions contribute 33.7%, while predominantly rural regions generate only 15.4% of the European Union's GDP. The data presented in Table 1 reveal the existence of three groups; a first group of countries is characterized by a very high concentration of GDP in urban regions, with shares significantly exceeding the EU average. This group includes Estonia (67.6%), Spain (66.6%), Belgium (59.3%), Greece (56.7%), and Portugal (54.0%). This pattern suggests a hyper-concentration of economic activity in a few major urban centres, accompanied by a relative marginalization of rural areas. In the case of Spain and Belgium, the contribution of rural regions is extremely low (below 5%), indicating a deeply urbanized economic structure and a lack of diversification of productive activities outside major cities.

A second model is represented by countries where peri-urban regions make a major contribution to GDP, exceeding or equalling the contribution of urban regions. Relevant examples include Lithuania (52.2%), Hungary (51.4%), Slovenia (52.1%), Bulgaria (48.5%), and the Czech Republic (43.4%). This pattern indicates a diffusion of economic activities from urban centres to adjacent areas, characteristic of economies where economic suburbanization processes is advanced. At the same time, it reflects a relatively high level of functional integration between urban and peri-urban areas, but also a potential weakness of urban centres as the sole drivers of growth. A distinct case is represented by countries where predominantly rural regions account for a high share of total GDP, such as Romania (37.1%), Slovenia (47.9%), Slovakia (29.2%), Portugal (26.3%), and Poland (25.8%). This pattern can be interpreted either as a sign of a less urban-polarized economy or as an expression of the relative underdevelopment of urban centers from a regional economic perspective. The distribution of GDP by urban–rural typology highlights profoundly differentiated territorial patterns within the European Union. While some countries exhibit marked urban polarization, others are characterized by a significant contribution from peri-urban or rural areas.

The structure of GDP by urban–rural typologies in the European Union reveals a complex and heterogeneous economic geography, in which urban areas dominate but do not monopolize economic growth. Differences between countries reflect distinct historical, institutional, and structural trajectories, confirming the relevance of a spatial approach in the analysis of economic development.

5. Conclusions

This paper has examined the territorial distribution of poverty risk and economic performance in the European Union, highlighting the structural relationship between the at-risk-of-poverty or social exclusion rate (AROPE), GDP distribution, and the degree of urbanization. The analysis evidence that socio-economic disparities are strongly spatially differentiated and persist across Member States, despite common policy frameworks. Rural areas remain systematically more exposed to poverty and social exclusion, reflecting structural constraints such as limited access to infrastructure, lower employment opportunities, and reduced economic diversification. Although a general decline in AROPE was observed during the 2015–2019 period, this trend proved fragile, with the COVID-19 crisis reversing or stabilizing progress, particularly in vulnerable regions. Urban areas continue to exhibit lower levels of poverty risk due to the concentration of economic activity and services, yet recent developments indicate the emergence of new forms of urban vulnerability associated with rising living costs and labor market

polarization. Peri-urban regions display intermediate and relatively stable patterns, but without significant convergence.

At the national level, the analysis highlights substantial heterogeneity. Eastern and Southeastern European countries, including Romania, are characterized by pronounced urban–rural disparities and persistently high poverty risk, while Northern and Western Member States show greater territorial cohesion and lower levels of social vulnerability. The distribution of GDP by urban–rural typology further confirms the uneven spatial organization of economic activity within the European Union. Predominantly urban regions account for the largest share of GDP, whereas rural regions contribute significantly less at the aggregate level. However, in certain countries, a relatively high rural share of GDP reflects structural imbalances rather than balanced development, indicating weaker urban economic centers and limited agglomeration effects. Long-term reductions in poverty risk require integrated interventions that enhance infrastructure, support labor market inclusion, and promote economic diversification, particularly in structurally disadvantaged regions.

References

- Bertolini, P., Pagliacci, F., & Pisciotta, A. (2019). Poverty and Social Exclusion in the European Union: South-Eastern Territorial Patterns. Demb Working Paper Series.
- Byerlee, D., De Janvry, A., Sadoulet, E., Townsend, R., & Klytchnikova, I. (2008). World Development Report 2008: Agriculture for Development.
- Ćwiek, M. T., & Ulman, P. (2019). Income and Poverty in Households in Selected European Countries. *Acta Universitatis Lodzianis. Folia Oeconomica*, 6(345), 9-34.
- Gaman, F., Rauta, E., Luca, O., & Boteanu, C. M. (2020). Sustainable development of rural settlements. Role of EU funds in managing territorial disparities. *Technium Soc. Sci. J.*, 8, 759.
- Huang, X., & Zuo, C. (2023). Economic inequality, distributive unfairness, and regime support in East Asia. *Democratization*, 30(2), 215-237.
- Novotná, Z., & Vydrová, H. V. (2013). Disparities among European Union Member States based on the Europe 2020 agenda indicators.
- Ondoš, S., Sinčáková, Ž., & Hudec, O. (2024). The re-emergence of left-behind regions: The end of spatial equity and the rise of dynamic movements in Slovakia, 1990–2020. *Regional Statistics*, 14(2), 258-282.
- Pop, D., & Stamos, I. (2025). Regional Disparities and the Localisation of the Sustainable Development Goals in the EU. *JCMS: Journal of Common Market Studies*, 63(4), 1052-1079.
- Soliman, P. E. N., & Beram, R. S. (2025). Sustainable development goals and unemployment: worldwide evidence. *Journal of the Knowledge Economy*, 1-51.
- Srinivasu, B., & Rao, P. S. (2013). Infrastructure development and economic growth: Prospects and perspective. *Journal of business management and Social sciences research*, 2(1), 81-91.
- Trevizo, D. (2022). Mexico's armed vigilante movements (2012–2015): the impact of low state capacity and economic inequality. *Latin American Politics and Society*, 64(3), 117-141.



Turkebayeva, K., Bekturganova, M., Sabden, O., Dauliyeva, G., & Kenzhegulova, G. (2022). Assessment of the relationship between inequality, income, and economic growth in the regions of Kazakhstan. *Problems and Perspectives in Management*, 20(2), 511.

Wang, Q., Yang, T., & Li, R. (2023). Does income inequality reshape the environmental Kuznets curve (EKC) hypothesis? A nonlinear panel data analysis. *Environmental Research*, 216, 114575.

Zhang, X., Wu, Y., Skitmore, M., & Jiang, S. (2015). Sustainable infrastructure projects in balancing urban–rural development: Towards the goal of efficiency and equity. *Journal of Cleaner Production*, 107, 445-454.

THE ROLE OF PUBLIC ACCOUNTING IN OPTIMIZING ADMINISTRATIVE EFFICIENCY AND INSTITUTIONAL ACCOUNTABILITY IN THE CONTEXT OF ARTIFICIAL INTELLIGENCE

Associate Professor, PhD Simona MOISE

Spiru Haret University, Faculty of Legal, Economic and Administrative Sciences, Craiova, Romania
simonamoise01@yahoo.com

Abstract

The digital transformation of public administration has brought a profound change to public accounting, redefining it from a predominantly operational activity into a strategic instrument for governance, efficiency, and institutional accountability. Public accounting no longer serves only to record and control budgetary expenditures; it has become essential for monitoring institutional performance, preventing financial irregularities, and supporting administrative decisions with real-time information. This evolution positions accounting as a vector for transparency and public trust, strengthening institutional legitimacy and managerial accountability.

The integration of artificial intelligence (AI) into public accounting represents a decisive step toward the automation and optimization of financial processes. Technologies such as predictive analytics, machine learning, and anomaly detection tools allow public institutions to rapidly identify non-compliant transactions and allocate resources more efficiently. International and national examples, including pilot projects implemented by municipalities and public institutions across Europe and North America, demonstrate how AI can enhance audit efficiency, budgetary control, and strategic planning.

Beyond the technological dimension, public accounting operates within a dynamic legislative context. Recent legislative updates require public institutions to adopt modern accounting standards and implement digital reporting systems, fostering transparency and accountability. The 2023 Public Finance Ministry’s Digitalization Strategy highlights the need for a legislative framework that supports real-time audits, digital reporting, and the protection of sensitive financial data. This underscores the interdependence between regulatory compliance and digital adoption, ensuring secure and reliable financial management.

AI implementation in public accounting offers multiple benefits: reduced human errors, faster data processing, fraud detection, decision-making support, and resource savings. However, significant challenges exist, including insufficient technical expertise, resistance to change, high initial implementation costs, and the need to align legislation with new technological standards. Addressing these challenges requires professional training, digital infrastructure investments, and harmonization of accounting regulations with international standards.

In conclusion, modern public accounting, supported by AI and updated legislation, constitutes a vital tool for optimizing administrative efficiency and institutional accountability. Digitalization and legislative adaptation enable public institutions to operate transparently, efficiently, and responsibly, fostering a smart administration capable of responding promptly to complex economic and social challenges.

Keywords: public accounting; artificial intelligence; administrative efficiency; institutional accountability; digitalization

1. Introduction

Public accounting has evolved significantly over recent decades, transitioning from a purely financial record-keeping function to a strategic instrument for governance and institutional accountability. Digital technologies and AI allow institutions to process large datasets, identify irregularities, and support strategic decision-making with accurate real-time information. This study examines the impact of AI technologies and recent legislative updates on administrative efficiency and institutional accountability, highlighting the importance of a coherent digital and regulatory framework.

2. Literature Review

The literature demonstrates that AI can transform public auditing, increase operational transparency and efficiency, and reduce fraud risks. International studies report AI implementation in public accounting in countries such as Germany, Canada, and the United States, resulting in significant time and resource savings. In Romania, recent research indicates AI’s potential in monitoring local budgets and preventing financial irregularities, although challenges related to infrastructure and expertise remain.

3. Results and Discussion

This study combines qualitative and quantitative methods, including:

Analysis of accounting legislation and official documents (Public Finance Ministry Digitalization Strategy, 2023);

Assessment of AI applications implemented internationally and in national pilot public institutions;

Review of scholarly literature on AI efficiency and risks in public accounting.

Variables include efficiency indicators (time and resources saved), transparency, compliance, and incidence of financial irregularities. Methodology combines document analysis, cross-institutional comparisons, and case studies.

4. Conclusions

Public accounting supported by AI and modern legislation optimizes administrative efficiency, reduces risks, and strengthens institutional accountability. Digitalization facilitates faster, safer decision-making, enhances public trust, and contributes to transparent and efficient governance. Future research should explore AI-based budget forecasting, preventive auditing, and inter-institutional transparency mechanisms.

References

- Accountancy Europe. (2022). *The Future of Public Sector Accounting*. Journal of Public Sector Accounting.
- Drăgoi, M., & Georgescu, A. (2024). The impact of AI technologies on internal public auditing in local institutions in Romania. *Public Economy and Administrative Management*.
- Hopwood, A., Leiner, J. J., & Young, G. R. (2018). *Financial Accounting and Reporting*. Pearson.
- Mardiros, N., et al. (2020). AI-Driven Accounting in Public Administration: Opportunities and Risks. *Public Administration Review*, 80(5).
- Popa, R., & Socol, A. (2021). *Accounting and Auditing in the Digital Era*. Editura Economică.
- Popescu, M., & Radu, L. (2023). Public accounting and digitalization in local administrations in Romania. *Journal of Accounting and Audit*.
- Russell, S., & Norvig, P. (2021). *Artificial Intelligence: A Modern Approach*. Pearson.
- Public Finance Ministry (MFP). (2023). *Digitalization Strategy for Budgetary Accounting*.

THE IMPACT OF INSTITUTIONAL SYNERGIES ON COMMUNITY RESILIENCE IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT GOALS

Lavinia-Adelina MITRACHE

University of Craiova, Craiova, România

mitrachelavinia6@gmail.com | ORCID: 0009-0001-9514-3527

Abstract

In this increasingly complex world stage where numerous interrelated crises and imbalances coexist, SDG 17 is not only a bureaucratic prescription. It turns into a systemic approach to governance and ethics that defines the essence of the 2030 agenda. In this paper, the author attempts to explore the ontological value of multi-actor cooperation and its potential in replacing dispersed assets with synergies across the whole planet.

The paper deconstructs the language of collaboration and highlights the pragmatic tools through which it operates, focusing on the mechanisms of technology exchange, policy convergence, and the motivational impact of tertiary educational organizations in fostering a sense of global citizenship. Using a critical lens, the author examines the bureaucratic barriers and asymmetries of power that prevent the emergence of innovative ideas on the regional and community level. Based on the theory of collaborative advantage and institutional trust, the author proposes a conceptual framework of resilience as a response to these problems.

In summary, the research demonstrates that the revitalization of global partnerships is not an option but a key condition for the survival of humanity in the planetary stage of historical evolution. The results of the study reveal that the viability of sustainable development requires the formation of international networks that could transcend sectoral and local agendas. Thus, SDG 17 ceases to be a supporting instrument but becomes the main vehicle that facilitates regenerative, equitable, and inclusive transformation.

Keywords: Global governance; Collaborative advantage; Systemic resilience; Interdependence; Institutional synergy

JEL codes: Q01; R11

1. Introduction

Considering the wide range of global problems, such as climate change or socio-economic disparities, faced today by humanity, the 2030 Agenda for Sustainable Development appears to be a unified strategy to address such issues. SDG 17 "Partnerships for the Goals" is one of the 17 goals taken on by member states of the UN and plays a unique role within this list of initiatives. SDG 17 is not an isolated goal related to a particular area of human activity, but rather the functional foundation without which the implementation of all other 16 goals would not be possible. The reason why SDG 17 is important for the success of the whole agenda lies in the fact that any entity, no matter how economically developed it might be, cannot make an impact by itself.

In this case, SDG 17 should not be perceived as yet another administrative goal or box ticking practice. Instead, it plays the role of a general catalyst which converts abstract commitments made by national governments into practical steps implemented at the grassroots level, thanks to the effective allocation of funds, the use of innovative technologies and availability of qualified manpower around the world.

Indeed, the logic behind the concept of global partnerships implies a simple truth which must be acknowledged. In order to solve complex systemic crises, it is impossible to rely on stand-alone activities. On the contrary, a hybrid model of governance should be developed that includes participation of various stakeholders such as governmental bodies, private companies, scientific organizations, and non-governmental associations.

Accordingly, revitalization and enhancement of partnerships will not only help improve the situation but become a sine qua non in this context. Simply speaking, the successful implementation of the 2030 Agenda will not depend on achievement of sector-specific goals alone; on the contrary, it will be determined by sustainability of established partnerships between stakeholders.

In the environment of increasing interdependencies, development cannot be considered successful without establishing connections between different subjects of activity and creating joint strategies which take into account needs of multiple parties and transcend boundaries of nation states.

2. Literature Review

The recent academic studies note a transition from the traditional state-centric diplomatic approach to international governance to the multi-stakeholder perspective. The theoretical works argue that SDG17 can be viewed as the integrative factor through which North-South, South-South, and triangular cooperation become important for technology transfer and exchange. According to the experts in sustainability science, the success of the collaborative efforts depends on absorptive capacity at the grassroots level and the coordination of national policies with private business interests. At the same time, the critics emphasize the "collaboration rhetoric," arguing that the lack of control and transparency of money flows undermines the transformative power of these collaborative partnerships.

Furthermore, contemporary academic discourse focuses attention on the term "adaptive governance," suggesting that the ability of partnerships to be adaptive and flexible is equally important to the sum of the financial support provided. Academic researchers point out that unless there is a sufficient degree of technological literacy on the part of the local community, the use of technology referred to in SDG 17 might lead to greater inequality rather than its alleviation. Partnership is no longer understood as a static, linear process, and the measure of success is not the amount of investment, but the capacity for replication and adaptation possessed by local communities. Thus, contemporary academic discourse challenges our assumptions about organizational structure as the primary factor, encouraging us to focus on the quality of relations between institutions instead.

3. Data and Methodology

The methodology of this research is characterized by explorative qualitative analysis that combines a review of foreign strategic papers with comparative evaluation of different types of territorial

cooperation models. In order to determine the efficiency of those mechanisms, which are relevant for the SDG 17, the following KPIs were identified and included into the model:

- (1) strength of partner networks,
- (2) amount of official development aid and

(3) variety of stakeholders engaged in sustainable development processes. Triangulation of data collected through UN reports and case studies of Smart Cities initiatives and innovative networks is the main characteristic of the applied methodology, which provides the researcher with a holistic understanding of resource management within community-specific contexts.

The research approach adopted allows for not only the measurement of resource movements but also the assessment of governance structures that foster or hinder collaboration. By linking macroeconomic statistics with the dynamics of Smart Cities programs, the study goes beyond mere academic analysis and presents practical ways of enhancing collaborations to achieve sustainable development objectives.

4. Results and Discussion

Conclusively, the analysis has shown that the realization of goal number seventeen will be dependent on both the amount of trust between institutions and the extent of digitalization in communication within the partnership. It has been emphasized that successful partnerships are the ones that can effectively translate global ideas into terms understood locally by applying innovations to the needs of the economy and culture. What stands out is the growing role of universities in the ecosystem, acting as centers where theoretical research becomes applicable to the labor market and public service.

However, barriers persist such as bureaucracy in relation to the acquisition of multilateral financing and inflexibility in terms of legal provisions for public-private partnerships. It is indicated that more can be done when it comes to partnerships, meaning that there is need for moving beyond cooperation and engaging in strategic relationships, which should not depend only on election periods or changes in financial markets. SDG17 is one of the few ways toward global recovery, and it should take place by changing the way in which responsibility and risks are shared.

5. Conclusions

In the end, SDG 17 must be understood not only as a goal of management but as the very fabric of resilience on which the whole structure of sustainable development stands. From the current assessment, it can be stated that the success of the 2030 Agenda does not lie primarily in the rigor of goals but rather in their fluid connection and interaction. The move from the spirit of competitive resource acquisition to the spirit of collaboration implies a revision of sovereignty, wherein the success of a community takes priority over that of its sectors. Despite the continued existence of bureaucratic hurdles and economic discrepancies as real issues, the creation of knowledge networks and the engagement in transnational collaboration prove the maturity of global governance. Therefore, it can be said that sustainability will be achieved not through individual measures but through the ability to create credible ecosystems able to transform a diversity of interests into a synergy for social, economic, and environmental recovery.

References

- Bulmer, E., & Yáñez-Araque, B. (2023). Tackling climate change through multi-stakeholder partnerships: Promoting SDG 17 to combat climate change. *Energies*, *16*(9), 3777. <https://doi.org/10.3390/en16093777>
- Cruz, S. A. (2023). SDG 17 and global partnership for sustainable development: Unraveling the rhetoric of collaboration. *Frontiers in Environmental Science*, *11*, 1155828. <https://doi.org/10.3389/fenvs.2023.1155828>
- Martín-Vaquero, J., Hernández-Álvarez, L., González Sánchez, A., Rasteiro, D. M. L. D., Mierlus Mazilu, I., González de la Torre, M. Á., & Queiruga-Dios, A. (Eds.). (2024). *Innovation, Resilience, Leadership and Sustainability in Higher Education*. Springer. <https://doi.org/10.1007/978-3-031-99713-6>
- United Nations. (2023). *Partnerships: Why they matter*. EBSCOhost.

FOOD CONSUMPTION BEHAVIOR UNDER ECONOMIC CONSTRAINTS: ADAPTATION MECHANISMS AND IMPLICATIONS FOR FOOD SECURITY

Antonia-Gabriela Maloș¹; Tudor Andrei Holerga^{2*}

^{1,2} Bucharest University of Economic Studies, Doctoral School Economics II, Bucharest, Romania

* Corresponding author: tudor.holerga@yahoo.com|

Abstract

In the context of increasing economic constraints affecting households, food consumption behavior reflects adaptive mechanisms shaped by budget limitations and market uncertainty. This paper aims to analyze how consumers adjust their food choices, highlighting the main coping strategies and their implications for food security. The research is based on a quantitative approach, using a survey conducted on a sample of Romanian consumers, focusing on variables such as food budget management, price–quantity evaluation, and changes in consumption patterns. The results reveal a clear tendency toward more affordable options, along with a reduction in the consumption of certain products in order to maintain budget balance. Although these adjustments are economically efficient in the short term, they may negatively affect the quality and stability of food consumption, suggesting potential risks for food security. The study contributes to a better understanding of consumer behavior under economic pressure and provides relevant insights for the development of public policies aimed at ensuring sustainable and equitable access to food.

Keywords: food consumption behavior; economic constraints; food security; consumer adaptation; food affordability

JEL codes: D12; I15; Q18; D91

1. Introduction

Economic instability and rising food prices have had a major impact on consumer behavior in the last couple of years (FAO, 2023). The increase in the cost of living and the decreasing purchasing power have made many households focus more on food-related expenses. Thus, the question of how to ensure access to sufficient and affordable food has become a key concern for consumers.

Food consumption patterns are more and more shaped by economic constraints. Consumers adjust their buying behavior according to the income available and to the prices. Therefore, a lot of households turn to lower-cost products, become more attentive to price differences, use fewer quantities, or simply abandon certain categories or brands, in order to be able to balance their budget. Similar consumption behaviors were also found in other studies focusing on consumer adaptation in the face of economic uncertainty (Stanca and others, 2026).

Research has shown that economic pressure can hit food consumption in terms of both quantity and quality. Such measures may help reduce expenses when times are tough, but they might also lead to lower dietary diversity and food quality. Hence, in some cases, these adjustments may even increase the risk of food insecurity (Istudor and others, 2014).

Over the last couple of years, the academic research community has increasingly focused on the interplay

between economic constraints, consumer behavior, and food security. A study on Romanian consumers pointed out that income and affordability are the main factors influencing food choices and purchasing behavior (Ilie and others, 2021). Other research in the same area also brought to the fore the fact that, in the Romanian context, consumers are more and more interested in sustainable but also economically accessible food choices (Lădaru and others, 2020). Similar findings have been reported in research conducted by Zaharia and others, where the influence of economic and sustainability-related factors on consumer decision-making processes was underlined (Zaharia and others, 2019).

More recent studies focusing on resilience stresses the role of households' capacities to absorb and adapt to economic shocks that affect food access and consumption stability (Smerlak and Vaitla, 2017). However, the body of research dealing with the ways in which Romanian consumers adapt to such economic realities is still very much undeveloped.

Therefore, the objective of this research is to analyze food consumption behavior under economic constraints and to identify the main adaptation mechanisms adopted by consumers. The study is based on a quantitative approach using a survey conducted among Romanian consumers. The analysis focuses on food budget management, price sensitivity, and changes in food consumption behavior.

2. Literature Review

Eating habits have drastically changed in the last few years as a result of both increased food prices and the unstable economic situation. A number of studies have found that financial stress can shape consumer behavior with some families shifting attention towards prices, promotions, and cheaper items (FAO, 2023; Ilie et al., 2021). Besides, it has been noted that when people are financially tightened not only can the quality and diversity of food consumption be affected but also the situation of food insecurity can get aggravated (Istudor et al., 2014).

Besides that, other studies have investigated how consumers, for example, manage to compare prices, cook more at home, and cut down on food waste, with the objective of making their budgets last longer especially in times of economic crisis (Stanca et al., 2026). Nevertheless, very little is known about how Romanian consumers adjust their food consumption patterns when faced with economic difficulties. This paper will try to shed some light on these alterations and their possible effects on food security.

3. Data and Methodology

This paper employs a quantitative research methodology to investigate the behavior of food consumption under economic constraints. The study seeks to discover the major coping mechanisms adopted by consumers and to examine their potential impact on food security.

The data was collected from an online survey of Romanian consumers. The survey was conducted on a voluntary and anonymous basis. The questionnaire consisted of multiple-choice questions and Likert-scale items aimed at assessing respondents' views and behavioral tendencies in relation to food consumption under economic pressure.

The survey was structured into seven sections covering socio-demographic characteristics, economic constraints, food budget management, adaptation mechanisms, changes in food consumption, and food security perceptions. The main dimensions analyzed in the questionnaire are presented in table no. 1.

Table no. 1. Main dimensions analyzed in the questionnaire

Research dimension	Main variables analyzed
Economic constraints	Financial pressure, food price increase, consumption adjustments
Food budget management	Budget planning, price comparison, importance of price
Adaptation mechanisms	Lower-cost products, promotional purchases, private-label products, home cooking, food waste reduction
Changes in consumption	Reduction of food consumption, perceived changes in food quality
Food security	Food affordability and consumption stability

Source: Authors' own research

The analysis focused on several aspects related to consumer behavior, including perceived financial pressure, sensitivity to food prices, food affordability, and changes in purchasing decisions. Particular attention was given to behaviors such as choosing lower-cost products, comparing prices before purchasing food products, buying products on promotion, cooking at home more frequently, and reducing food waste.

4. Results and Discussion

4.1. Economic Constraints and Food Consumption Behavior

Most respondents consider that food prices have increased significantly in the last few years. In addition, more than half of the respondents think that rising food prices have influenced the way in which they buy food, and more than half say that increasing food prices have influenced the way in which they manage food at home.

About one-fifth of respondents feel that they have been under financial pressure in relation to food spending in the last three years. About one in four respondents have changed the types of food they eat for reasons of price in the last 3 years. These results show that financial constraints remain an important factor in food purchasing and consumption behavior.

The issue of price has also become a key factor in food-related decisions for many consumers. Many consumers pay more attention to the affordability of food and evaluate products more carefully before making purchases. Similar results were found in previous research on consumer adaptation in times of economic uncertainty (Stanca et al., 2023).

4.2. Food Budget Management and Adaptation Mechanisms

The research results reveal that many consumers actively manage their food budgets through planning and price comparison practices. Respondents frequently reported comparing prices before purchasing food products and paying increased attention to promotional offers.

Another important finding is related to the growing preference for lower-cost alternatives. Many consumers indicated that they choose cheaper products or private-label brands more often than before. In addition, cooking at home and reducing food waste appear to be common strategies adopted in response to economic pressure.

The main behavioral tendencies identified in the research are summarized in table no. 2.

Table no. 2. Main behavioral tendencies identified in the research

Behavioral aspect	Main tendency identified
Food budget management	Increased attention to planning and price comparison
Purchasing behavior	Preference for lower-cost and promotional products
Product selection	Growing interest in private-label products
Consumption practices	More frequent home cooking
Food waste behavior	Greater attention to reducing food waste
Consumption adaptation	Adjustments made to maintain household budget balance

Source: Authors' own research

The findings suggest that consumers increasingly try to optimize household food expenditure while maintaining access to essential food products. These adaptive behaviors reflect attempts to cope with financial pressure and preserve budget stability under uncertain economic conditions.

4.3. Changes in Food Consumption and Food Security

Results show economic limitations may have an effect on the quality and stability of food consumption. Some respondents indicated that they had reduced the consumption of certain products due to a lack of money, while others noticed a decrease in food quality.

Many respondents indicated that the quality of their diet did not change significantly. However, the increasing role of affordability in food purchasing decisions may, in the long run, jeopardize food security and the balance of nutrition.

Indications are given about the link between economic vulnerability and food consumption behavior. In this case food security should not only be considered in relation to food availability but also based on the consumers' capacity to continue having regular access to sufficient and nutritious food without interruption during a time of economic hardship.

5. Conclusions

The study reveals that economic limitations are an important factor affecting food consumption behavior. Increasing food prices and financial stress many times lead consumers to modify their buying decisions and household food-management strategies.

The findings show that consumers watch prices more closely, they perform more thorough product comparisons, and they are more likely to opt for the cheapest alternative or for products on promotion. A lot of the respondents also said that they cooked more often at home and that they tried to reduce food waste to better manage household expenses. However, these adaptation strategies may have an impact on the quality and stability of food consumption, while helping consumers maintain their budget balance. In some cases, cutting food expenses may have an adverse effect on dietary diversity and may lead to an increased risk of food insecurity.

The research offers an insight into-consumer behavior under economic pressure and a reminder of the role of policies aimed at ensuring that food remains affordable and that there is free access to it. A possible direction for further research is the study of the evolution of the Food consumption behavior and household food security of people facing economic constraints in the long term.

References

- Borah, A., Sahu, S., Srivastava, R. P., Singh, M., & Tyagi, D. B. (2024). Exploring the Economic Challenges Threatening Global Agriculture and Food Security. *Ecology, Environment & Conservation* (0971765X), 30.
- FAO, 2023. *The State of Food and Agriculture 2023*. Food and Agriculture Organization of the United Nations, Rome.
- Ilie, D.M., Lădaru, G.-R., Diaconeasa, M.C., Stoian, M., 2021. *Consumer choice for milk and dairy in Romania: Does income really have an influence?* *Sustainability*, 13(21), 12204. <https://doi.org/10.3390/su132112204>
- Istudor, N., Ion, R.A., Sponte, M., Petrescu, I.E., 2014. *Food security in Romania—A modern approach for developing sustainable agriculture.* *Sustainability*, 6(12), pp.8796–8807. <https://doi.org/10.3390/su6128796>
- Lădaru, G.-R., Ilie, D.M., Diaconeasa, M.C., Petre, I.L., Marin, F., Lazar, V., 2020. *Influencing factors of a sustainable vegetable choice: The Romanian consumers' case.* *Sustainability*, 12(23), 9991. <https://doi.org/10.3390/su12239991>
- Smerlak, M., Vaitla, B., 2017. *A non-equilibrium formulation of food security resilience.* *Royal Society Open Science*, 4(1), pp.1-12.
- Stanca, L., Campian, V., Dinu, V., Dabija, D.-C., 2026. Crises precautions: Analysing changes in consumer behaviour – A Romanian food retailer’s perspective. *E&M Economics and Management*, 29(1), pp.225-239. <https://doi.org/10.15240/tul/001/2026-1-014>
- Zaharia, A., Diaconeasa, M.C., Brad, L., Lădaru, G.-R., Ioanăș, C., 2019. *Factors influencing energy consumption in the context of sustainable development.* *Sustainability*, 11(15), 4147. <https://doi.org/10.3390/su11154147>

Acknowledgements

This paper was co-financed by The Bucharest University of Economic Studies during the PhD program.

DYNAMICS OF WATER AND WASTEWATER SERVICE COVERAGE IN ROMANIA OVER THE PERIOD (2014-2023)

Vasilica-Ramona GUȚĂ (COCONEȚU),

Student PhD., Doctoral School of Economic Sciences, „Constantin Brâncuși” University of Targu Jiu, Romania

e-mail: ramona_coconetu@yahoo.com, ramona.coconetu@e-ucb.ro

Abstract

This research analyzes the dynamics of utility infrastructure in Romania between 2014 and 2023, focusing on the comparative evolution of public access to water supply and sewerage networks. Utilizing official data provided by the National Institute of Statistics, the study employs a methodological mix based on Pearson correlation tests and linear regression models to evaluate the interdependence and predictability of these essential services.

Keywords: sustainable development, water infrastructure, wastewater, econometric modeling

JEL codes: Q01, Q25, C22, H54

1. Introduction

Access to public utility services, particularly water supply and sewerage systems, represents one of the most relevant indicators of the quality of life and the level of civilizational development of a society. In the current context, marked by strict European directives and sustainable development goals, the modernization of technical-urban infrastructure has become a strategic priority for Romania.

However, beyond official figures and ongoing construction sites, the reality on the ground indicates an uneven trajectory, shaped by structural legacies and economic challenges that hinder the achievement of social cohesion standards.

The fundamental problem addressed by this article is not merely the lack of access itself, but rather the unbalanced dynamics between the two utility flows. A preference or relative ease is often observed in the expansion of water networks, while wastewater collection and treatment systems appear to remain a secondary priority.

2. Literature Review

The specialized literature dedicated to environmental infrastructure and sustainable development reveals a fascinating theoretical confrontation between the promise of technological progress and the reality of economic constraints. Initially, the academic discourse dominated by the perspectives of international institutions, such as that promoted by Jeffrey Sachs presents access to water and sewerage as a fundamental right and a universal engine of growth. This optimistic model suggests that massive

investments in urban networks will automatically generate a positive spiral in public health and labor productivity.

However, a critical analysis of this trend reveals a "blind spot": the disregard for actual administrative capacity. While "top-down" literature praises the achievement of the 2030 Agenda targets, critics such as William Easterly warn that large-scale centralized planning often fails to understand local specifics, turning performance indicators into mere statistical figures that do not always reflect the quality of life within isolated communities.

Moving to the purely economic dimension, we encounter David Aschauer's renowned theory regarding public capital. It argues with solid reasoning that infrastructure is the foundation upon which private investment rests, lending further validity to the 18-22% growth data observed in Romania. However, this vision is called into question by researchers who focus on the efficiency of expenditures.

3. Data and Methodology

The starting point of the analysis is the official statistical data provided by the National Institute of Statistics (NIS), through the TEMPO Online database. Time series were collected for the period 2014-2023, targeting two fundamental indicators of environmental infrastructure:

- Population served by the public water supply system (indicator code: GOS101A);
- Population connected to sewerage systems (indicator code: GOS103A).

The choice of this decadal interval is justified by the need to capture the impact of two successive European financial cycles on the dynamics of public utilities in Romania.

The raw data were initially systematized in Microsoft Excel to verify integrity and eliminate any reporting errors. Subsequently, the database was exported and processed using IBM SPSS Statistics software.

The statistical processing included:

1. Descriptive Analysis: to establish central tendencies and evolution indices;
2. Pearson Correlation (r): to determine the degree of synchronization between the two subsystems;
3. Linear Regression and Curve Estimation: to model the trend and generate sustainability forecasts.

The central objective of this scientific endeavor is to test the validity of the infrastructure modernization process through the lens of three working hypotheses:

- Hypothesis H1 (Synchronicity);
- Hypothesis H2 (Predictability);

It is important to note that the present analysis focuses on the quantitative dimension of utility coverage (the number of connected beneficiaries), leaving qualitative parameters outside the scope of research. Aspects such as the efficiency of treatment processes, the chemical quality of the supplied water, or network pressure represent distinct variables which, although essential for a holistic evaluation of services, would require a different set of monitoring and analysis tools that exceed the objective of the current econometric research.

4. Results and Conclusions

The results of the analysis conducted over the 2014-2023 decade offer a nuanced perspective on Romania's modernization. The data confirm that the expansion of water and sewerage networks are not isolated processes. However, this interdependence masks a concerning reality: although both systems are growing, they do so along parallel paths that never meet.

The computational model demonstrates a remarkable stability in the pace of development, allowing us to anticipate the figures for 2030 with confidence. Yet, this predictability is equally a red flag. Constant progress, devoid of acceleration, suggests that Romania is modernizing inertially, without the accelerated growth required to quickly close the gaps relative to European standards.

Ultimately, the research suggests that the success of future investments depends on the courage of decision-makers to massively prioritize the sewerage sector. Only through an accelerated recovery strategy, emphasizing the balancing of utility access, can we transform table entries into real and uniform benefits for the entire population.

Every calculated indicator from the way water and sewerage systems display a parallel evolution to the precision with which we can anticipate the needs of 2030—confirms that the figures are solid and that future prospects are based on a real trend, not simple estimates. The table below proposes a simplified reading of this journey: from the close link between utilities to the predictability of their growth and, finally, to the highlighting of that rhythm difference that still separates access to water from access to sewerage.

Table no. 1. Summary of research hypothesis testing

Hypothesis	Key Finding / Indicator	Result	Status
H1 (Synchronicity)	Pearson Coefficient (r)	$r = 0,998, p < 0,01$	Confirmed
H2 (Predictability)	Linear Regression (R^2)	$R^2 > 0,99$	Confirmed

Source: Own processing in IBM SPSS Statistics, based on data provided by the National Institute of Statistics (TEMPO Online).

The full validation of these hypotheses confirms that Romania's utility infrastructure follows a rigid development model. The results indicate that while progress is evident and quantifiable, the mere passage of time will not resolve the disparity between water and sewerage systems without a major shift in the mechanisms for prioritizing public investment.

From a practical standpoint, the study provides policymakers with an objective forecasting tool. The results suggest that current investment strategies are effective for maintaining growth but ineffective for "closing" the gaps. In practice, to achieve European compliance targets sooner than 2030, a decoupling of sewerage investments from the pace of water supply investments is necessary, through financing programs dedicated exclusively to wastewater collection.

Bibliography

World Bank (2020). *Water and Sanitation Services in Romania: Analysis of Sector Performance and Diagnostic of Key Challenges*. Washington, DC: World Bank.

Eurostat (2023). *Population connected to at least secondary waste water treatment*. Database on Sustainable Development Goals.

Field, A. (2018). *Discovering Statistics Using IBM SPSS Statistics* (5th ed.). Sage Publications. (Fundamental source for the application of Pearson Correlation and Linear Regression).

Hauke, J., & Kossowski, T. (2011). *Comparison of Values of Pearson's and Spearman's Correlation Coefficients on the Same Sets of Data*. *Quaestiones Geographicae*. (Specific reference for the validation of correlation coefficients).

IBM Corp. (2019). *IBM SPSS Statistics for Windows*.

National Institute of Statistics (2024). *TEMPO Online Database – Statistics on urban infrastructure indicators (2014-2023 data series)*. Available at: <http://statistici.insse.ro:8077/tempo-online/>.

Acknowledgements

This work was carried out with the support of the "Constantin Brâncuși" University of Târgu Jiu, within the doctoral study program.

To process the text and optimize the clarity of reporting complex data, natural language processing tools (Gemini AI) were used, without altering or modifying the scientific substance of the interpretations.

A COMPARATIVE ANALYSIS OF THE LEGAL FRAMEWORKS AND EXEMPLARY PRACTICES GOVERNING INTERNAL PUBLIC AUDIT IN ROMANIA AND POLAND

Melania Mirela COSMA ^{1*}; Silviu Ionel STOICA²; Omar ALHATO³; Vladimir CRISTEA

^{1 2 3 4} Valahia University, Accounting, Targoviște, Romania

* Corresponding author: saraavram34@gmail.com | ORCID: 0009-0004-1648-0333

Abstract

The public sector is still quite important, especially in countries where it has a lot of power, even if the economy has been growing and information technologies are changing quickly. Good public services and good use of public money are important parts of promoting sustainable development. From this point of view, internal public audit is now a must-have in public entities. This paper examines the prospective advantages of internal public audit in fostering good governance in Romania and Poland. This paper offers a comparative analysis of the efficacy of internal audit processes by examining two EU member states. The primary aim is to investigate the role of internal public audit in the modernization of public administration in both nations. The research examines the correlation among audit quality, value generation, risk mitigation, and institutional efficacy. To reach these goals, a mix of quantitative and qualitative research methodologies is used. This shows how important it is to build and improve practical models for using internal public audit procedures.

Keywords: internal public audit; risk management; public institutions; performance; comparative study

1. Introduction

Internal audit are important to ensure the accuracy and relevance of data when reported. A good accounting system, along with an adequate internal audit, can improve the manager's ability to fulfill their tasks and produce information characterized by transparency and reliability.

The role of internal audit became significant when public sector leaders recognized the importance of decision-making tools for the development and support of stable institutions. In addition to efficient and ethical leadership and management (Hințea and Trofin, 2021; Cetina and Ivan, 2021), a robust audit in the public sector can make organizations in this sector more accountable, thereby improving governance. Thus, internal audit ensures that control mechanisms and risk management function properly, in a well-planned and organized manner, while also verifying the improvements made.

Therefore, the purpose of this article is to provide empirical evidence on general internal audit, with a particular focus on the activity within local authorities in Romania and Poland. The growing importance of this profession in the governmental context. An efficient internal audit, as part of internal control systems, allows the government to function more efficiently and actively. Consequently, this paper presents a comparative study on the relationship between two European countries regarding internal audit.

Thus, the article is structured as follows: Section 2 presents the research methodology. In Section 3, the literature review, we discuss the context of internal audit in Romania and Poland, as well as the regulations and rules applicable to internal audit practices. Section 4 includes conclusions and recommendations. The study aims to make a real contribution to understanding the role of internal audit in the public sector by examining the legislation of two countries.

2. Literature Review

Currently, the internal audit system is linked to the chronological evolution of the Institute of Internal Auditors. The function of internal audit evolved with changes, until its significance became stable. (Stănescu M., 2019) In 1999, the Institute of Internal Auditors proposed the following definition: “Internal audit is an independent and objective activity that provides an organization with assurance regarding the degree of control it has over its operations, guides it towards their improvement, and contributes to value addition. Internal audit helps the organization achieve its objectives through evaluation, using a systematic and methodical approach, and by formulating proposals for increasing effectiveness.” (Institute of Internal Auditors, 2017)

3. Data and Methodology

In this article, we will examine the audit processes in two different European countries. Each of these has its own system when it comes to how internal audit works. In order to better understand the current state in this field, we collected and analyzed data from a variety of sources, including publications, journals, and related materials. We used a qualitative approach, examining documents and work. This helped us to acquire the internal information we needed to develop our own internal audit method (Firmansyah, 2022).

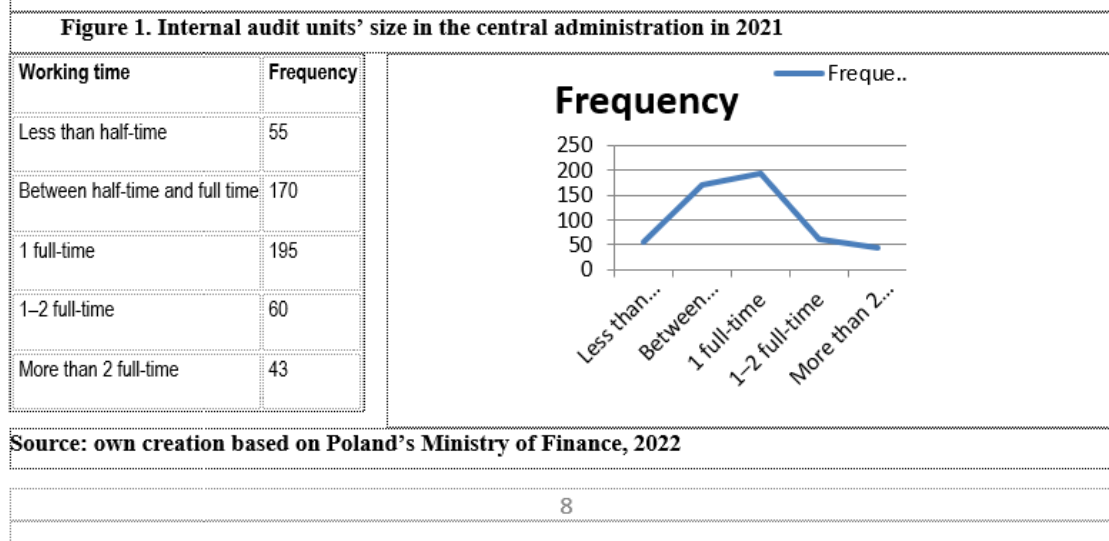
More specifically, our work presents data regarding internal audit in central and local government in Romania and Poland. We collected data from several sources: annual reports and specialized literature on internal audit. Overall, the data in this article will help us to answer the following four research questions:

- What are the factors influencing public internal audit within local authorities in Romania and Poland?
- How does internal audit help local governments to maintain control in both countries, Romania and Poland?
- What are the roles and actors involved in public internal audit for achieving effective managerial control in local administration in both countries?
- What are the organizational regulations and laws regarding audit public internal in Romanian and Polish public systems?

4. Results and Discussion

	Romania	Poland
Regulatory foundation	Act nr.672/2002	Act nr. 63/2006
Structure	Centralized	Decentralized
Internal audit obligation	All public organization (central and local)	All financial and insurance firms and limited to private firms

Poland at audit job is considered work life good and comfortable. (Figure 1).



5. Conclusions

This study explores the system of uniformity employed in the domain of public internal audits for Romania and Poland; after twenty years of membership in the European Union, with ensuring the role of objectivity as an efficient instrument.

Through reviewing the literature, internal audit within the public sector between for those countries have substantial diversity in policy setting from the Local (municipal); and regional governmental levels. For example, in Romania, internal audit is more oriented and centralized at the ministry of finance for the public sector. Whenever, within the Poland case, the internal audit was decentralized and developed within each ministry, and a ministry ought to contemplate creating an internal audit department and system. (Public Finance Act, 274,2009)

We reached similar conclusions, which stated that both countries followed the International Internal Auditing Standard (IIA).

Finally, this study has some limitations, largely due to its emphasis on existing literature and theoretical frameworks. It would be beneficial for academics to conduct empirical studies of internal auditing practices. Despite the growing body of research on internal audit and its relation to corporate governance, we propose that future studies should focus on creating internal audit guidelines for government entities within European nations to improve the subject.

References

- Centrum Rozwoju. (2017). Operational audit. <http://www.centrumrozwoju.pl/index.php?id=54>
- Cetina, M. I., & Ivan, O. R. (2021). The importance of internal audit in public sector research – A bibliometric study. *Ovidius University Annals, Economic Sciences Series*, 21(2), 976–986. <https://ideas.repec.org/a/ovi/oviste/vxxiy2021i2p976-986.html>

- Coetzee, P., Bruyn, R., Fourie, H., & Plant, K. (2018). *Internal auditing: An introduction* (6th ed.). LexisNexis South Africa.
- Daidj, N., & Thierno, T. (2021). *The future of IT audit: Possible developments? State of the art – Survey – Volume 1* (April 2021). *Livre-blanc-audit_N.-Daidj-T.-Toukara.pdf*
- Essekkaki, S., & Bouayad Nabil, A. (2020). Historical overview of the evolution of the concept and function of internal audit (over time and space). *Revue du contrôle, de la comptabilité et de l'audit*, 3(3). <https://www.revuecca.com/index.php/home/article/view/411>
- Firmansyah, D., & Dede. (2022). General sample collection techniques in research methodology: Literature review. *Jurnal Ilmiah Pendidikan Holistik (JIPH)*, 1(2), 85–114. <https://doi.org/10.55927/jiph.v1i2.937>
- Fülöp, M. T., & Szekely, S. V. (2017). The evolution of the internal auditing function in the context of corporate transparency. *Audit Financiar*, 15(3), 440–450.
- Government of Romania. (2014). Government Decision No. 554/2014 for the approval of rules on the establishment of internal public audit committees. <https://mfinante.gov.ro/documents/35673/222265/HG5542014Comiteteaudit.pdf>
- Grzesiak, L. (2021). An internal audit expectation gap in Poland. *Annales Universitatis Mariae Curie-Skłodowska, sectio H – Oeconomia*, 55(3). <https://doi.org/10.17951/h.2021.55.3.37-50>
- Institute of Internal Auditors. (2017). Term and definition in Standards Glossary internal auditing. <https://www.theiia.org/globalassets/site/standards/glossary-comparison-2024-global-internal-audit-standards-to-2017-standards.pdf>
- Ministry of Finance. (2006, June 26). Communiqué No. 11 regarding internal audit standards in public finance sector units (Dz.Urz.MF.2006.7.56). <https://sip.lex.pl/akty-prawne/dzienniki-resortowe/standardy-kontroli-finansowej-w-jednostkach-sektora-finansow-34067601>
- Ministry of Finance. (n.d.). Benchmarking and surveys. Portal Gov.pl. <https://www.gov.pl/web/finance/benchmarking-and-surveys>
- Ministry of Finance. (n.d.). Internal audit assessment. Portal Gov.pl. <https://www.gov.pl/web/finance/internal-audit-assessment>
- Organisation for Economic Co-operation and Development (OECD). (2023). *Diagnostic of the internal audit framework in Poland: Adding value to public sector organizations and promoting the public good*. 22PL22 - Internal Audit Quality Improvement Action Plan.
- Public Finance Act. (2009). Article 274. Act on Public Finance. <https://lexlege.pl/ustawa-o-finansach-publicznych/art-274/>
- Ravdan, G. A. (2020). Internal public audit system in public institutions in Romania. *Review of International Comparative Management*, 21(4), 625–634.
- Romanian Parliament. (2002). Law no. 672/2002 regarding internal public audit, published in Official Gazette no. 953 of 24.12.2002. Portal Legislativ.

- Stanciu, V., & Seria, C. (2019). Insights on the new coordinates in internal audit. *Audit Financiar*, 17(2), 261–273. <https://doi.org/10.20869/AUDITF/2019/154/009>
- Stănescu, M. C. (2019). The role and importance of the internal audit function in the organization. <https://evomind.org/wp-content/uploads/madalina-stanescu-rolul-functiei-de-audit.pdf>
- Szczepankiewicz, E. I. (2019). The development and quality of internal audit in public-interest and private-sector entities in Poland. *Zarządzanie Publiczne*, (49), 5–19. <https://www.ceeol.com/search/article-detail?id=847138>
- Taran, O. L., Lazareva, N. A., & Uzdenova, S. B. (2020, January). The main trends in the development of internal audit and the transformation of the term “internal audit” in Russia. In *First International Volga Region Conference on Economics, Humanities and Sports (FICEHS 2019)* (pp. 197–201). Atlantis Press. <https://www.atlantis-press.com/proceedings/ficehs-19/125932449>
- Țiclău, T., Hințea, C., & Trofin, C. (2021). Resilient leadership. Qualitative study on factors influencing organizational resilience and adaptive response to adversity. *Transylvanian Review of Administrative Sciences*, Special Issue, 127–143. <https://rtsa.ro/tras/index.php/tras/article/download/684/674>
- Wałęsa, N. (2022). The analysis of factors determining auditors' independence in Poland (Doctoral dissertation, Department of Econometrics and Operational Research, Wrocław University of Economics and Business). <https://wir.ue.wroc.pl/info/phd/UEWRb02dc9a37ff041ad96b746f12a9d9e84/>
- Xhani, N., Avram, M., & Iliescu, M. A. (2020). The development of auditing in the public sector in Albania and responsible institutions. *Journal of International Cooperation and Development*, 3(1), 38–50. <https://www.richtmann.org/journal/>

SPIRITUAL AND ETHICAL DETERMINANTS OF ECONOMIC DEVELOPMENT IN POST-COMMUNIST EUROPE: A PANEL ANALYSIS OF ECE COUNTRIES WITH ROMANIA AS COMPARATIVE REFERENCE

Dragoș STANCU

Doctoral School of Economic Sciences, „Constantin Brâncuși” University of Targu Jiu, Romania
dragos.stancu@e-ucb.ro

Abstract: This paper investigates the spiritual and ethical determinants of economic development in eleven post-communist Central and Eastern European (ECE) EU member states over 1990–2022. The study constructs an interdisciplinary framework integrating Weber's cultural sociology, Sen's capability approach, O'Neill's ethics of responsibility, and North's institutional economics, tested through panel data econometrics. Three structurally distinct phases are analysed: communist compression of spiritual and institutional life (1945–1990); the institutional vacuum of transition, during which spiritual and ethical values functioned as informal coordination mechanisms (1990–2004); and post-accession consolidation within the EU framework (2004–present). Romania serves as a comparative reference and interpretive lens — as the sole Latin-heritage country in the Orthodox-Slavic bloc, internally confessionally plural, with a transition trajectory spanning the full range of regional dynamics. Five hypotheses address: phase-dependent salience of spiritual variables; confessional differences in institutional quality; the legacy of communist spiritual compression; the Church as institutional substitute; and confessional tradition and entrepreneurial culture. Results confirm that spiritual and ethical variables are significant economic predictors during transition (effect sizes $\approx 40\%$ larger than in the post-accession phase), while formal EU institutions progressively but not entirely displace their independent explanatory role.

Keywords: spiritual values; post-communist transition; institutional economics; Central and Eastern Europe; panel data

JEL codes: O11; P20; Z12; C33; B55

1. Introduction

The collapse of communist regimes in Central and Eastern Europe after 1989 produced one of the most compressed institutional transformations in modern economic history. Mainstream economic analyses have focused predominantly on macroeconomic stabilisation, privatisation sequencing, and formal institutional reform. Yet a persistent question remains: why did countries sharing broadly similar starting conditions diverge so substantially in post-1990 developmental trajectories? This paper advances the proposition that spiritual and ethical values constitute a non-trivial part of the answer. Drawing on Weber (1905), Sen (1999), O'Neill (2002), and North (1990), the study integrates spiritual and ethical variables into a panel econometric model across eleven ECE EU member states. Romania occupies a structurally privileged analytical position as the sole Latin-heritage country in the Orthodox-Slavic bloc — internally confessionally plural, and exhibiting a transition trajectory that encapsulates the full range of regional dynamics. Beyond academic contribution, the research is designed to be applicable to future societies navigating comparable transformations, from the Western Balkans to post-war Ukraine.

2. Literature Review

Four intellectual traditions inform this study. First, Weber (1905) and Tawney (1926) established that confessional tradition shapes economic behaviour through attitudes toward work and rational conduct; Barro and McCleary (2003) provide cross-national empirical support showing that specific theological beliefs correlate with economic growth independently of aggregate religiosity. Second, North's (1990) institutional economics distinguishes formal rules from informal constraints — values and ethical orientations persisting across formal institutional change — directly relevant to the ECE context. Acemoglu, Johnson, and Robinson (2001) reinforce the multi-century persistence of institutional quality, implying spiritual legacies are not rapidly overwritten by political rupture. Third, Sen's (1999) capability approach reframes development analysis normatively, evaluating quality rather than merely quantity of economic transformation. Fourth, O'Neill's (2002) ethics of responsibility links individual and institutional trustworthiness to the cooperative behaviour on which market economies depend. Despite these contributions, ECE remains analytically underserved: studies applying cultural and spiritual variables to post-communist transition are scarce, and Romania has rarely been positioned as a comparative analytical reference despite its exceptional combination of institutional conditions.

3. Data and Methodology

The empirical analysis covers 363 country-year observations across eleven ECE EU member states over 1990–2022, structured across three phases: Phase I (1945–1990) as pre-sample informing initial conditions through constructed legacy indicators; Phase II (1990–2004), the institutional vacuum of transition; and Phase III (2004–2022), post-accession consolidation. Five research hypotheses guide the empirical strategy:

- H1: Spiritual and ethical values are stronger predictors of economic performance in Phase II than in Phase III, when formal EU-harmonised institutions become dominant.
- H2: Confessional tradition (Orthodox vs. Roman Catholic vs. Protestant-Reformed) explains significant variance in institutional quality and convergence speed, after controlling for standard macroeconomic determinants.
- H3: Countries with lower communist-era spiritual compression exhibit higher post-1990 social capital and superior transition performance.
- H4: The Church, as an institutional substitute, exerts a positive and measurable effect on local economic development where state institutional capacity falls below the sample median.
- H5: Dominant confessional tradition at the regional level correlates with entrepreneurial density and SME dynamics, reflecting transmitted differences in work ethic and risk attitudes.

Dependent variables are GDP per capita growth (World Bank WDI) and HDI (UNDP). Key independent variables from the World Values Survey and Integrated Values Survey include social trust, a composite religiosity index, and a confessional tradition indicator. A communist spiritual compression index is constructed from historical data on church closures, clergy persecution, and religious organisation dismantlement during 1945–1989. The World Governance Indicators supply the institutional ethics dimension. Control variables include initial GDP per capita, gross capital formation, human capital (Barro-Lee), trade openness, and inflation. The baseline is a two-way fixed-effects panel model; endogeneity is addressed via IV estimation using historical religious fractionalisation and Habsburg

legal heritage as instruments, and System GMM (Arellano & Bond, 1991) for dynamic specifications.

4. Results and Discussion

Fixed-effects estimates for Phase II confirm H1: social trust and the composite religiosity index are statistically significant predictors of GDP per capita growth ($\beta_{\text{trust}} = 0.038$, $p < 0.01$; $\beta_{\text{religiosity}} = 0.019$, $p < 0.05$), with effect sizes approximately 40% larger than equivalent estimates for Phase III — consistent with greater economic salience of spiritual variables in conditions of formal institutional vacuum. In Phase III, direct effects diminish while the institutional ethics index becomes the dominant predictor, reflecting the progressive anchoring of economic behaviour in the EU regulatory framework. H2 is confirmed: Protestant ECE countries (Estonia, Latvia) exhibit systematically higher institutional quality and faster convergence than Catholic and Orthodox counterparts, robust to country fixed effects. The Catholic-Orthodox gap is substantially smaller than the Protestant-Catholic gap and is mediated by the Habsburg legal heritage variable, suggesting pre-communist governance structures partially offset confessional differences. H3 finds support: countries with lower communist-era spiritual compression — notably Poland and the Baltic states — exhibit significantly higher post-1990 social trust and superior early transition performance. Romania's high compression score, reflecting systematic subordination of the Orthodox Church and abolition of the Greek Catholic Church after 1948, is consistent with persistently low social trust in Romanian WVS waves and explains relative tardiness of transition recovery compared to Catholic ECE peers. H4 receives partial support: in municipalities where state institutional capacity falls below the sample median — prevalent in rural Romania and Bulgaria in Phase II — Church-affiliated organisations are associated with higher rates of micro-enterprise formation. H5 is supported at the regional level: Protestant-Reformed majority areas in Transylvania display significantly higher SME density than Orthodox-majority regions of equivalent income, controlling for urbanisation and infrastructure, suggesting a persistent confessional imprint on entrepreneurial culture surviving both communist compression and EU accession.

5. Conclusions

This study demonstrates that spiritual and ethical values are structurally significant determinants of economic development in ECE, with their salience varying systematically across the three identified phases. During 1990–2004, when formal institutions were nascent, spiritual and ethical variables served as primary coordination mechanisms explaining substantial cross-country developmental variance. In the post-accession period, formal EU frameworks progressively displace — but do not entirely eliminate — the independent explanatory power of these variables. Romania's post-2007 convergence, among the fastest in ECE, reflects not only formal EU membership benefits but also latent social capital and ethical norms — suppressed but not extinguished by four decades of communist rule — gradually mobilised in a more permissive institutional environment. The principal theoretical contribution is a three-phase conceptual model integrating Weberian, Senian, institutionalist, and O'Neillian frameworks, explicitly designed to be transferable to future societies navigating comparable transformations. The central policy implication is that transition strategies attending exclusively to formal institutional design systematically underestimate the role of spiritual and ethical foundations: building institutional trust, supporting ethical dimensions of governance culture, and recognising community institutions as legitimate economic actors are constitutive elements of sustainable development. Limitations include cross-national measurement challenges for spiritual constructs, the relatively small ECE panel N, and difficulty fully separating

spiritual from geographic and historical legacy effects. Future research should extend the analysis to candidate countries and integrate qualitative methods.

References

- Acemoglu, D., Johnson, S., & Robinson, J. A. (2001). The colonial origins of comparative development. *American Economic Review*, 91(5), 1369–1401.
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data. *Review of Economic Studies*, 58(2), 277–297.
- Barro, R. J., & McCleary, R. M. (2003). Religion and economic growth across countries. *American Sociological Review*, 68(5), 760–781.
- Knack, S., & Keefer, P. (1997). Does social capital have an economic payoff? *Quarterly Journal of Economics*, 112(4), 1251–1288.
- North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.
- O'Neill, O. (2002). *A question of trust: The BBC Reith lectures 2002*. Cambridge University Press.
- Putnam, R. D. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton University Press.
- Roland, G. (2000). *Transition and economics: Politics, markets, and firms*. MIT Press.
- Sen, A. (1999). *Development as freedom*. Oxford University Press.
- Tawney, R. H. (1926). *Religion and the rise of capitalism*. Harcourt Brace.
- Weber, M. (1905/2001). *The Protestant ethic and the spirit of capitalism* (T. Parsons, Trans.). Routledge.

Acknowledgements: *This research is conducted within the doctoral programme of the School of Doctoral Studies. The author gratefully acknowledges the academic guidance of the doctoral supervisory committee.*

THE ROLE OF INTERNAL AUDIT IN STRENGTHENING ORGANIZATIONAL GOVERNANCE IN THE PUBLIC SECTOR UNDER THE NEW GLOBAL INTERNAL AUDIT STANDARDS (2025)

Lidia TONU

Academy of Economic Studies of Moldova, Republic of Moldova
lidia.tonu@ase.md

Galina BĂDICU

Academy of Economic Studies of Moldova, Republic of Moldova
badicu.galina@ase.md

Corresponding author: lidia.tonu@ase.md | ORCID: 0000-0003-0217-6432

Abstract

The Global Internal Audit Standards applicable from 2025 redefine the role of internal audit within organizational governance by explicitly positioning the internal audit function under the authority and oversight of the board. In a global context characterized by increasing institutional pressure for transparency, accountability, and evidence-based public policy, this transformation is also economically relevant, as governance quality directly influences public sector performance and institutional credibility. This paper examines how the new standards strengthen organizational governance in the public sector, with particular focus on Principles 6–8 related to authorization of the mandate, independent positioning of internal audit, and governance-level oversight responsibilities. The research adopts a qualitative and normative-institutional approach based on documentary and comparative analysis of the Global Internal Audit Standards (2025), OECD governance principles, and public sector accountability frameworks. The findings indicate that the new standards strengthen governance through institutionalization of the internal audit charter, reinforcement of functional independence, and establishment of systematic oversight mechanisms regarding resources, quality, and performance of the function. In the public sector, these mechanisms contribute to transparency, accountability, institutional resilience, and public trust.

Keywords: Internal Audit; Organizational Governance; Public Sector Performance; Economic Governance; Global Internal Audit Standards; Evidence-Based Public Policy

JEL codes: M42, H83, D73

1. Introduction

Organizational governance represents the framework through which institutions are directed, controlled, and held accountable in achieving their objectives. In the public sector, growing concerns regarding transparency, integrity, and institutional performance have increased the importance of effective governance and oversight mechanisms. Internal audit is increasingly recognized not only as a control activity, but also as a strategic governance function capable of supporting accountability, risk management, and organizational resilience.

The Global Internal Audit Standards applicable from January 2025 introduce a governance-oriented approach by formally recognizing the role of the board in authorizing, positioning, and overseeing the internal audit function. This represents an important shift from traditional compliance-oriented approaches toward a governance-centered model of internal audit.

Beyond its institutional significance, the governance of the internal audit function is increasingly relevant within the broader context of economic research. In contemporary public administration, governance weaknesses may generate indirect economic consequences through inefficient allocation of public resources, weak policy implementation, and reduced institutional credibility. In a global environment characterized by digital transformation, growing societal expectations, and pressure for evidence-based public action, strengthening internal audit governance becomes an important element of institutional resilience and effective public sector management.

2. Literature Review

Recent literature highlights the growing contribution of internal audit to organizational governance, risk management, and accountability. International institutional frameworks developed by the OECD and the European Court of Auditors emphasize the importance of internal control and assurance mechanisms in strengthening public governance.

At the same time, recent professional developments show an increasing focus on the governance of the internal audit function itself. The Global Internal Audit Standards (2025) establish explicit requirements regarding the role of the board in ensuring the independence, authority, and oversight of internal audit, transforming internal audit from a purely operational activity into an institutional pillar of governance.

From an economic perspective, institutional governance mechanisms such as internal audit play a significant role in ensuring the efficient use of public resources and supporting evidence-based policy implementation. Recent debates in public sector economics increasingly emphasize the importance of institutional quality and governance structures in sustaining administrative efficiency, accountability, and long-term public value creation.

3. Methodology

The research adopts a qualitative and normative-institutional methodology based on documentary analysis and comparative interpretation of the Global Internal Audit Standards (2025). The study examines Principles 6–8 of Domain III in correlation with governance concepts such as accountability, institutional legitimacy, independence, and oversight within the public sector.

4. Results and Discussion

The analysis demonstrates that the new standards strengthen organizational governance through several interdependent institutional mechanisms. First, the standards transform the internal audit charter and mandate into governance instruments formally authorized by the board. Second, they reinforce the independent positioning of the chief audit executive through direct functional relationships with governance bodies.

In addition, the standards establish explicit governance responsibilities regarding oversight of internal audit resources, quality assurance, and performance evaluation. These mechanisms contribute to improving transparency, accountability, institutional credibility, and public sector performance. The findings also indicate that effective governance of the internal audit function is essential for ensuring the objectivity and value-added role of internal audit.

5. Conclusions

The Global Internal Audit Standards (2025) redefine the role of internal audit within organizational governance by strengthening the governance architecture surrounding the internal audit function. The standards emphasize authorization, independence, and oversight as essential institutional conditions for effective internal audit.

In the public sector, implementation of the new standards may contribute to increased accountability, institutional transparency, and public trust. In a broader perspective, strengthening internal audit governance has implications that extend beyond the internal functioning of organizations. It contributes to improving institutional credibility, supporting responsible public resource management, and reinforcing governance structures that underpin effective public sector performance in an increasingly complex global environment.

References

- European Court of Auditors. (2021). Public internal control systems in the EU. Luxembourg: Publications Office of the European Union.
- Institute of Internal Auditors. (2024). Global Internal Audit Standards. Altamonte Springs, FL: The Institute of Internal Auditors.
- OECD. (2020). Public Integrity Handbook. Paris: OECD Publishing.
- OECD. (2021). OECD Principles of Public Governance. Paris: OECD Publishing.

Acknowledgements

The organizers gratefully acknowledge the support and collaboration of the following partners:



“Costin C. Kirilescu” National Institute of Economic Research, Romanian Academy



Academy of Economic Studies of Moldova



Faculty of Economic Sciences, Ovidius University of Constanta, Romania



Doctoral School of Economics II, Bucharest University of Economic Studies, Romania



Faculty of Economics and Business Administration, “Eugeniu Carada”
Doctoral School of Economic Sciences, University of Craiova, Romania



Batman University, Türkiye



Faculty of Economics, Administration and Business, Doctoral School of
Economic Sciences, Stefan cel Mare University of Suceava, Romania



Radom Academy of Economics, Poland



Valahia University of Târgoviște Doctoral School of Economic and Humanistic Sciences



Istanbul Gedik University



Faculty of Economic Sciences, Petroleum-Gas University of Ploiesti, Romania



Research Network on Resources Economics and Bioeconomy Association



Jammu and Kashmir Economic Association, India



CorneliuGroup Research and Innovation Association, Romania



Cyber Security Association for the Cloud, Romania