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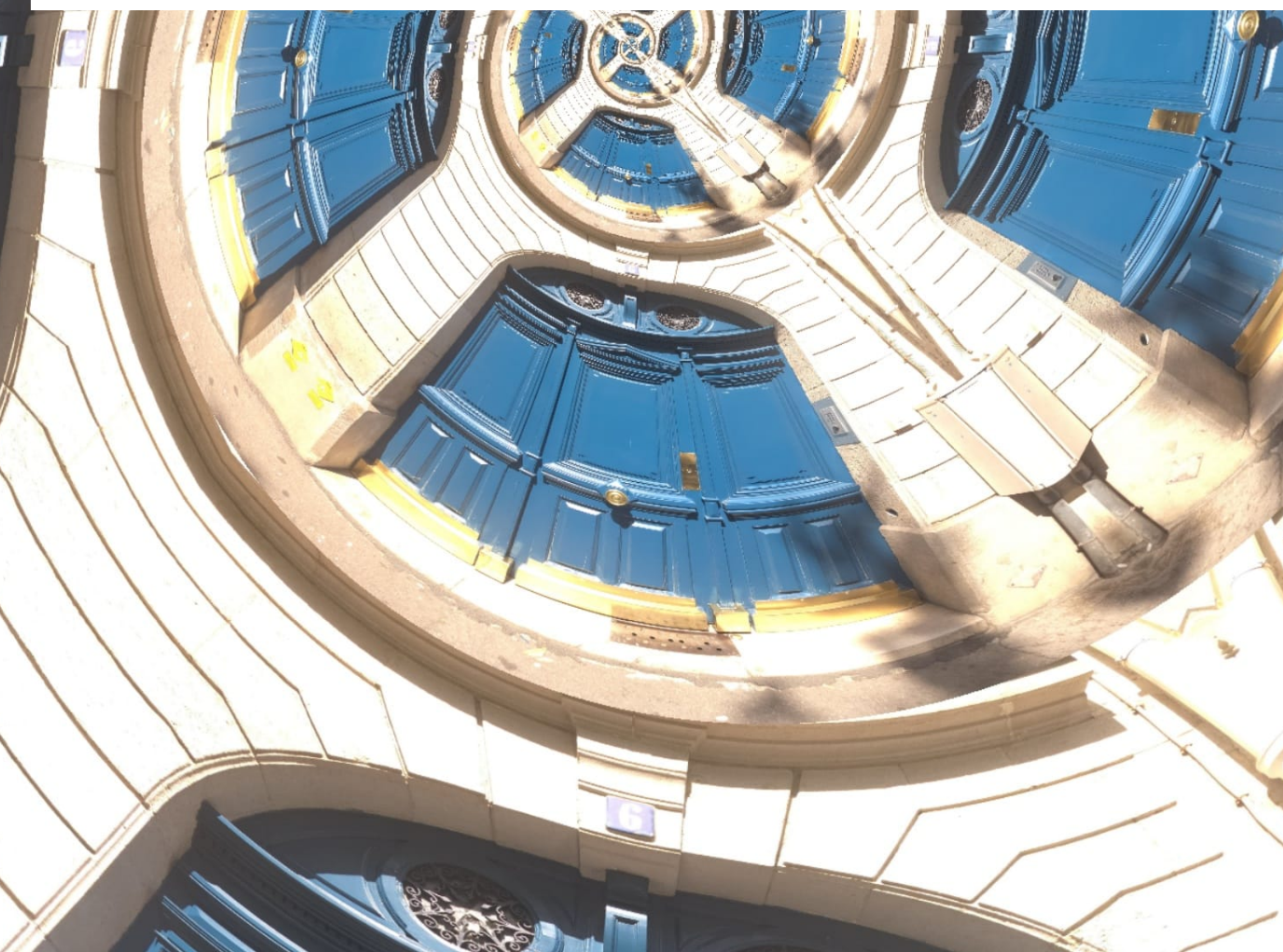

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ORIGINAL PAPER

Cross-Border Equity Market Integration and Price Discovery: Empirical Granger Causality Evidence from Core Eurozone and Central European Stock Indices

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Abstract
This paper investigates empirical market integration, lead-lag dynamics, and price discovery mechanisms across Western and Central European stock markets. Using daily closing prices of the stock indices: BEL 20 (Belgium), CAC 40 (France), and Poland WIG 20 indices spanning 1996 through 2026, raw price series are transformed into stationary daily logarithmic returns. Stationarity is confirmed via Augmented Dickey-Fuller (ADF) tests, and a Vector Autoregression (VAR) system determines an optimal lag length of p=10 based on the Akaike Information Criterion (AIC). Pairwise Granger causality regressions demonstrate statistically significant bidirectional feedback loops across all market pairs at the 5% level. Western European exchanges exhibit the strongest predictive transmission paths, led by the BEL 20 and CAC 40 indices path ($F=5.0634$, $p<0.0001$). Transmission running from core Eurozone markets to Poland's WIG 20 operates at high significance ($p<0.01$), whereas feedback from the emerging Polish index back to Western benchmarks remains statistically significant yet secondary ($p<0.05$). The findings confirm an integrated European financial architecture driven primarily by core Eurozone price discovery, with meaningful systemic feedback from emerging Central European markets.
Keywords: *Granger Causality, Price Discovery, Market Integration, Vector Autoregression, European Equity Markets, Financial Econometrics.*
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Introduction

Global equity market integration has accelerated significantly over the past three decades, driven by capital flow liberalization, financial technology innovation, and monetary union across Europe. Understanding the extent to which asset prices co-move and transmit information across national borders is essential for international portfolio managers, risk officers, and macroeconomic policymakers. In European financial markets, the structural relationship between developed Western European exchanges and emerging Central and Eastern European (CEE) economies provides a compelling framework for analyzing price discovery transmission channels.

While major Eurozone indices such as France's CAC 40 and Belgium's BEL 20 operate within a highly unified monetary and regulatory framework, CEE markets such as Poland's WIG 20 reflect distinct macroeconomic fundamentals, currency dynamics, and growth profiles. The fundamental empirical question is whether price discovery originates exclusively within established core Eurozone markets and spills over unilaterally into emerging regional exchanges, or whether genuine bidirectional feedback mechanisms exist across European financial centers over extended investment horizons.

This study examines the dynamic linear interdependencies among the BEL 20, CAC 40, and Poland WIG 20 using long-term daily historical price time series from 1996 to 2026. By converting raw nominal price levels into daily log returns, verifying integration properties through formal Augmented Dickey-Fuller (ADF) unit root diagnostics, and establishing optimal Vector Autoregressive (VAR) lag selection, this paper executes pairwise Granger causality tests to map out explicit directional predictive transmission channels.

Review of literature

Over the last few decades, the specialized literature has included numerous empirical research studies concerning the behavior of stock markets. Shreevastava et al. (2024) investigated the complex dynamics of Hungary's emerging stock market using GARCH models. Moreover, Raza et al. (2024) conducted an empirical research study on the dynamics of India's emerging stock market, using BSE GREENEX index, by applying a wide range of models from the GARCH family, such as GARCH, EGARCH, APARCH, IGARCH, TARCH, PARCH, but also several statistical and econometric tests.

Dekamini et al. (2025) examined well-founded concepts regarding the impact of financial decisions, particularly under turbulent crisis conditions. Kumar et al. (2023) investigated the complex behavior of the developed stock market in Portugal based on FIGARCH models for a long period of time that encompasses the occurrences of numerous extreme events, such as starting May 2010 until August 2023 daily data.

Mhadhbi and Ghanmi (2025) have provided an empirical study regarding contagion and the propagation of volatility between European stock market indices and the Tunisian stock market index using a GARCH-BEKK econometric framework. Roman et al. (2026) also touched upon topics of interest regarding volatility transmission patterns in the case of stock markets in the South Eastern Europe focusing on the effects caused by certain extreme events and crises in recent decades.

Tilfani et al. (2020) have developed a comparative research study between European Union's stock markets classified according to the main Eurozone and non-Eurozone categories, and other certain stock markets such as UK, US or Germany using complex econometric analysis. Rostamicheri et al. (2026) have conducted a research study on Nordic and European Companies and argued that governance quality can generate a

significant impact on the efficiency of the capital markets. Coker-Farrell et al. (2020) have conducted a research study focused on Eastern European and have examined stock market returns dynamics using asymmetric models. In addition, Spulbar et al. (2023) investigated the volatility spillovers in the case of a cluster of developed stock markets in European Union such as Germany, Austria, France, but also Spain based on GARCH family models.

Lam et al. (2023) have conducted a long term bibliometric analysis on scientific publications considering Granger causality. Arias Gomez and Antošova (2023) investigated the impact of COVID - 19 pandemic of 2020-2021 on the dynamics of European stock markets using a varied econometric approach, including Granger causality. Gherghina et al. (2020) investigated the effect of COVID-19 pandemic on stock markets behaviour based on certain statistical and econometric tools, including Granger causality.

Research Gap

Despite extensive empirical literature on international stock market co-movement, several critical research gaps persist in regional European equity analysis:

Asymmetric Developed-Emerging Dynamic Transmission: Existing studies frequently analyze Eurozone core integration or emerging market volatility in isolation. Limited empirical work rigorously models the simultaneous bidirectional feedback loops between core Eurozone markets (BEL 20 index, CAC 40 index) and major non-Eurozone CEE benchmarks (Poland WIG 20 index) using ultra-long-horizon daily data.

Optimal Lag Structure in Multi-Decadal Analysis: Much of the existing spillover literature arbitrarily imposes short lag lengths (e.g., p=1 or p=2) in daily causality testing. This oversimplification risks failing to capture persistent informational transmission that operates across multi-day trading cycles during periods of market stress.

Empirical Robustness Across Crisis Epochs: Prior studies often evaluate shorter timeframes that fail to span multiple structural market regimes. There remains a gap in establishing whether lead-lag relationships hold across a consolidated 30-year sample encompassing the 2000 dot-com collapse, the 2008 Global Financial Crisis, the 2020-2021 COVID-19 pandemic drawdown, and post-2022 inflationary shifts.

Scope and Limitations

Scope

Asset Coverage: The study evaluates three primary regional market benchmarks: the BEL 20 index (Euronext Brussels), the CAC 40 (Euronext Paris), and the Poland WIG 20 index (Warsaw Stock Exchange).

Temporal Horizon: The empirical dataset covers daily market trading observations spanning from 1996 to 2026 (N=7,609 log return observations per index).

Methodological Framework: Analysis is strictly focused on linear time-series econometrics, incorporating logarithmic return transformations, ADF unit root testing, VAR lag order selection criteria, and pairwise bivariate Granger causality tests.

Limitations

Linearity Constraint: Granger causality evaluates linear lead-lag dependencies. Potential non-linear cross-market dependencies or state-dependent asymmetric spillovers are not captured under standard F-test frameworks.

Unconditional Causality: Bivariate Granger causality tests examine pairwise information transmission without controlling for exogenous global macro factors, such as U.S. monetary policy shifts or global exchange rate movements.

Trading Hours Alignment: Minor microstructural differences in trading market hours, local market holidays, and auction execution timing between Euronext exchanges and the Warsaw Stock Exchange may introduce slight synchronous noise in daily return series.

Research methodology

Data Preprocessing and Transformation To examine empirical lead-lag interactions and cross-market price discovery across European stock indices (BEL 20 index, CAC 40 index, and Poland WIG 20 index), daily nominal price series were transformed into daily log return series. Raw price levels in financial time series typically exhibit non-stationary drift, which can generate spurious regressions and invalidate standard asymptotic distributions. Daily logarithmic returns $R_{i,t}$ are computed as:

$$R_{i,t} = \ln\left(\frac{P_{i,t}}{P_{i,t-1}}\right)$$

where $P_{i,t}$ and $P_{i,t-1}$ denote the closing values of index i on trading day t and $t-1$, respectively.

Unit Root Diagnostics Stationarity is a necessary prerequisite for estimating vector autoregressive models and conducting Granger causality tests. The Augmented Dickey-Fuller (ADF) test evaluates the null hypothesis of a unit root ($H_0: \gamma = 0$) against the alternative hypothesis of stationarity ($H_1: \gamma < 0$) using the following parametric specification:

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum_{j=1}^{k} \delta_j \, \Delta Y_{t-j} + \varepsilon_t$$

where ΔY_t represents the first-differenced log return, α is an intercept term, t is an optional time trend, k specifies the augmentation lag order included to white-noise the error process ε_t, and γ is the coefficient of interest.

Vector Autoregression (VAR) Lag Specification Establishing an optimal lag parameter p is essential prior to Granger testing, as under-specifying lags introduces residual serial correlation while over-specifying leads to a loss of degrees of freedom. An unrestricted VAR model is fitted across the system, and lag selection criteria are evaluated. The Akaike Information Criterion (AIC) is minimized to select lag order p:

$$\text{AIC} = \ln|\hat{\Sigma}_e| + \frac{2k}{T}$$

where $|\hat{\Sigma}_e|$ is the determinant of the residual variance-covariance matrix, k is the total parameter count across equations, and T is the number of usable observations. The model selection criteria identified $p = 10$ as the optimal lag length for capturing systemic autoregressive dependencies.

Granger Causality Test Framework To test whether past values of one stock index contain linear information that assists in forecasting another index beyond its own history, bivariate Granger causality regressions are estimated. For any pair of return series (X_t, Y_t), the unrestricted testing equation takes the form:

$$Y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, Y_{t-i} + \sum_{j=1}^{p} \beta_j \, X_{t-j} + \varepsilon_t$$

The null hypothesis that X does not Granger-cause Y corresponds to the joint linear restriction:

$$H_0: \beta_1 = \beta_2 = \cdots = \beta_p = 0$$

Hypothesis testing is conducted using an empirical F-test comparing the residual sum of squares:

$$F = \frac{(\mathrm{SSR}_r - \mathrm{SSR}_{ur})/p}{\mathrm{SSR}_{ur}/(T - 2p - 1)}$$

where SSR_r and SSR_{ur} denote the sum of squared residuals of the restricted model (excluding lags of X) and the unrestricted model, respectively. A statistically significant F-statistic rejecting H_0 at $\alpha = 0.05$ confirms a directional predictive transmission path.

Results, empirical analysis and discussions



Figure 1 - Original Time Series Plot and Log Returns Plot
Source: Authors' own formulation

The upper panel of Figure 1 depicts the raw historical price trajectories of the BEL 20, CAC 40, and Poland WIG 20 indices from 1996 through 2026. The series display pronounced long-term co-movement, punctuated by synchronous contractions during systemic global shocks—most notably the 2000 dot-com bubble collapse, the 2008 global financial crisis, and the March 2020 pandemic drawdown. While the Western European benchmarks (CAC 40 and BEL 20) demonstrate strong secular upward trends over the multi-decade horizon, the Central European benchmark (Poland WIG 20 index) exhibits persistent structural cyclicality without sustained nominal price breakout.

The lower panel of Figure 1 illustrates the daily logarithmic return series ($R_{i,t}$). Differencing stabilizes the mean around zero across all three markets, eliminating non-stationary trend behavior. However, the return series display distinct volatility clustering: periods of extreme variance are grouped together across markets during crisis epochs (1997–1998, 2008–2009, and 2020), satisfying standard stylized facts of financial return dynamics and verifying suitability for vector autoregressive modeling.

Table 1 presents the Augmented Dickey-Fuller (ADF) test statistics for the daily log return series. Testing was conducted with an intercept to confirm stationary properties required prior to lag selection and causality testing.

Table 1- Augmented Dickey-Fuller Stationarity Test Results

Index Series	ADF Statistic	p-value	1% Critical Value	5% Critical Value	10% Critical Value	Result
BEL 20	-21.7525	< 0.0001	-3.4312	-2.8619	-2.5670	Stationary $I(0)$
CAC 40	-41.7734	< 0.0001	-3.4312	-2.8619	-2.5670	Stationary $I(0)$
Poland WIG 20	-86.8670	< 0.0001	-3.4312	-2.8619	-2.5670	Stationary $I(0)$

Source: Authors' own tabulation

For all three series, the empirical ADF statistics comfortably exceed the critical thresholds at the 1% significance level ($p < 0.0001$). The null hypothesis of a unit root (H_0) is decisively rejected, establishing that the return series are integrated of order zero, $I(0)$.

To determine the optimal lag structure for the Multivariate VAR system and pairwise Granger regressions, information criteria were computed up to 15 lags.

Table 2 - VAR Order Selection Criteria

Lag (p)	AIC	BIC	FPE	HQIC
0	-27.18	-27.18	1.565×10^{-12}	-27.18
1	-27.19	-27.18^{*}	1.547×10^{-12}	-27.19^{*}
5	-27.20	-27.16	1.539×10^{-12}	-27.18
10	-27.20^{*}	-27.12	1.536×10^{-12} *	-27.17
15	-27.20	-27.08	1.537×10^{-12}	-27.16

Source: Authors' own tabulation

** Denotes optimal lag selection per criterion.*

While Schwarz's Bayesian Information Criterion (BIC) and the Hannan-Quinn Criterion (HQIC) favor a parsimonious lag order of $p = 1$, the Akaike Information Criterion (AIC) and Final Prediction Error (FPE) reach their joint global minimum at lag order $p = 10$. Because financial asset returns often exhibit dynamic autocorrelation over a two-week trading horizon (10 business days), $p = 10$ is selected to fully eliminate residual autocorrelation in the bivariate causality specifications.

Pairwise Granger causality tests were executed across all market directions using $p = 10$ lags. The null hypothesis (H_0) specifies that the lagged returns of the predictor market do not contain linear information that improves the forecasting of the target market beyond the target's own lagged history.

Table 3 - Pairwise Granger Causality Test Results

Transmission Path (Predictor → Target)	F-Statistic	p-value	Decision ($\alpha = 0.05$)	Directionality
BEL 20 → CAC 40	5.0634	2.17×10^{-7}	Reject H_0	Bidirectional
CAC 40 → BEL 20	3.8710	2.95×10^{-5}	Reject H_0	Bidirectional
BEL 20 → Poland WIG 20	3.0808	6.42×10^{-4}	Reject H_0	Bidirectional
CAC 40 → Poland WIG 20	2.5002	5.39×10^{-3}	Reject H_0	Bidirectional
Poland WIG 20 → BEL 20	2.1140	2.03×10^{-2}	Reject H_0	Bidirectional
Poland WIG 20 → CAC 40	1.8462	4.78×10^{-2}	Reject H_0	Bidirectional

Source: Authors' own tabulation

The empirical findings reveal significant statistically confirmed feedback mechanisms across Western European and Central European stock indices:

Western European Core Integration: Strong, highly significant bidirectional causality exists between the BEL 20 and CAC 40. The predictive transmission from the BEL 20 to the CAC 40 yields the largest test statistic ($F = 5.0634, p < 0.0001$), while the reverse channel from the CAC 40 index to the BEL 20 index is likewise robust ($F = 3.8710, p < 0.0001$). This reflects tight regional integration and rapid cross-border market efficiency among core Eurozone economies.

Asymmetric Western-to-Eastern Lead-Lag Spillovers: Information flow from Western European markets to Poland's WIG 20 is dominant. Both the BEL 20 ($F = 3.0808, p = 0.0006$) and the CAC 40 ($F = 2.5002, p = 0.0054$) Granger-cause WIG 20 returns at the 1% significance level.

Emerging-to-Developed Feedback Channels: Conversely, the return transmission running from the Poland WIG 20 back to Western European indices is weaker, though still statistically significant at the 5% level (WIG 20 → BEL 20: $F = 2.1140, p = 0.0203$; WIG 20 → CAC 40: $F = 1.8462, p = 0.0478$).

These results demonstrate an integrated European equity market architecture where price discovery originates primarily in core Eurozone exchanges, while emerging

Central European markets absorb price shocks with a slight lag while providing secondary feedback loops.

Conclusions

This study evaluated cross-border price discovery and directional lead-lag relationships among the BEL 20, CAC 40, and Poland WIG 20 equity indices over a 30-year period (1996–2026). Methodological steps confirmed that daily log returns are stationary I(0) series, and an optimal VAR lag length of p=10 was identified based on Akaike Information Criterion (AIC) minimization.

The empirical Granger causality regressions yield three primary conclusions:

Fully Integrated European Architecture: Statistically significant bidirectional Granger causality ($p<0.05$) exists across all examined index pairs, refuting hypotheses of complete market segmentation or purely unilateral informational transmission.

Core Eurozone Dominance: The strongest price discovery vector originates within core Eurozone markets. The predictive channel from the BEL 20 to the CAC 40 generated the highest test statistic ($F=5.0634, p<0.0001$), demonstrating rapid cross-border informational efficiency between adjacent core markets.

Asymmetric Western-to-Eastern Lead-Lag Spillovers: Western European stock indices exercise strong predictive influence over Poland's emerging WIG 20 index ($p<0.001$). While the WIG 20 provides statistically significant feedback to Western markets, its relative test statistics are smaller, confirming that Central European exchanges primarily absorb pricing signals established in Western European financial centers.

Suggestions and Recommendations

Based on the empirical findings, the following strategic recommendations are proposed for portfolio managers, risk analysts, and regulatory authorities:

For International Portfolio Managers & Arbitrageurs:

Incorporate 10-Day Lag Windows in Multi-Asset Models: Portfolio managers utilizing cross-market momentum or tactical asset allocation strategies should incorporate multi-day lag structures (up to p=10) when building predictive return models for CEE equities.

Cross-Market Hedging Strategies: Because Western European market movements Granger-cause CEE index returns with high statistical significance, investors holding exposure in Central European equities (e.g., WIG 20 index) can utilize CAC 40 index or BEL 20 index derivatives as effective early-warning macro hedges.

For Institutional Risk Managers:

Dynamic Volatility & Spillover Tracking: Risk modeling teams must adjust value-at-risk (VaR) and stress-testing frameworks to account for bidirectional feedback mechanisms during periods of heightened international volatility, as cross-border return transmission amplifies systemic risk contagion.

For Financial Regulators & Policymakers:

Cross-Border Regulatory Coordination: Given the structural integration between Eurozone and non-Eurozone financial centers, regulatory bodies (e.g., ESMA, Warsaw Stock Exchange authorities) should maintain joint market surveillance mechanisms to mitigate rapid cross-border panic transmission during systemic crisis events.

Authors' Contributions:

The authors contributed equally to this work.

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ORIGINAL PAPER

Mapping the Digital Assets and their Connectedness Within the Ecosystem: A Bibliometric Analysis

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Abstract

This study provides a bibliometric mapping of research on digital assets and their interconnectedness within the ecosystem, based on 444 documents published between 2017 and 2026 across 147 sources, with contributions from 984 authors. The analysis, conducted using the Bibliometrix R-package, combines performance indicators with scientific mapping techniques. The results highlight a recent concentration in research output, with 76.4% of the documents published since 2022, and the dominant position of the journal *Finance Research Letters* (66 documents). China leads in terms of the number of publications (98), while the United Kingdom accounts for the highest number of citations, while international co-authorship stands at 44.59%. The intellectual structure integrates methodological foundations concerning volatility spillover with applied studies on cryptocurrencies. A thematic map identifies connectivity, spillover effects, and returns as "motor themes," while Bitcoin, volatility, and gold emerge as "basic themes." Recent trends point to a growing interest in stablecoins, tail risk, and non-fungible tokens (NFTs). The study offers a useful synthesis of the field and identifies future research directions, particularly regarding the role of stablecoins and decentralized finance (DeFi) in risk transmission.

Keywords: *Bibliometric Analysis, Digital Assets, Cryptocurrency, Connectedness, Volatility Spillovers, Stablecoins*

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1. Introduction and context of the study

Digital assets represent an expanding area of research within the financial literature, with a central focus on how returns, volatility, and risk are transmitted throughout this ecosystem. This dynamic is also evident in the dataset analyzed, where annual output grows from a single document in the year of 2017 to 99 documents written solely in 2026, a year for which the data is only partial.

The methodological foundations of this field include the propagation and connectivity measures proposed by Diebold and Yilmaz (2012, 2014), which were originally developed for traditional financial markets. When applied to cryptocurrencies, connectivity-based approaches have highlighted the influential role of Bitcoin (Koutmos, 2018; Ji, Bouri, Lau and Roubaud, 2019), as well as the contribution of less prominent coins to volatility transmission (Yi, Xu & Wang, 2018). Subsequent research has examined how connectivity varies over time (Antonakakis, Chatziantoniou & Gabauer, 2019), its behavior within the tails of the distribution (Bouri, Saeed, Vo & Roubaud, D, 2021), and the relationships between cryptocurrencies, NFTs, and DeFi tokens (Dowling, 2022; Karim, Lucey, Naeem & Uddin, 2022).

As this body of literature expands, a quantitative synthesis becomes useful to highlight its intellectual structure and the directions in which it is evolving. This study addresses this objective through a bibliometric analysis of 444 documents published between 2017 and 2026. Unlike the previous work by Stanciu and Stanciu (2025), which focused on the connections between digital assets and traditional finance, the present analysis concentrates on connectivity within the digital asset ecosystem itself.

The research aims to answer four questions:

- What are the primary sources, countries, institutions, and authors contributing to this field?
- Which works and references define its intellectual structure?
- What thematic clusters characterize research on digital asset connectivity?
- How have research themes evolved over time, and what emerging directions can be identified?

The study contributes by providing an integrated overview of the performance and structure of this field, combining bibliometric results with a qualitative interpretation of the identified themes. Consequently, this work can assist in identifying under-researched areas.

The paper is structured as follows. Section 2 presents the literature review, while Section 3 describes the methodology employed. Section 4 details the findings regarding publication performance, geographical distribution and scientific collaboration, intellectual structure, conceptual structure, and thematic trends. Section 5 summarizes the main conclusions, the study's limitations, and future research directions.

2. Literature review

The literature review is based on the ten most-cited documents from the studied corpus, which account for a total of 2,925 global citations. The documents were published between 2018 and 2022 in the *International Review of Financial Analysis*, *Finance Research Letters, Journal of International Financial Markets, Institutions and Money, Journal of Empirical Finance, and Economics Letters.* The studies can be categorized into three research streams: the transmission of shocks among cryptocurrencies, price relationships and tail risk, and the extension of analysis to non-fungible tokens (NFTs) and decentralized finance (DeFi) tokens.

The first stream examines the role of cryptocurrencies in the transmission of returns and volatility. Ji et al. (2019) own the work with the highest number of global citations (498), apply the Diebold-Yilmaz connectivity measures to six cryptocurrencies for the period from August 2015 to February 2018. Litecoin and Bitcoin occupy the center of the returns network. Connectivity is stronger through negative returns, and Bitcoin acts as the primary transmitter of volatility, followed by Litecoin. The authors demonstrate that an asset's importance within the network is not necessarily linked to its market size. Yi, Xu, and Wang (2018) find that the volatility of eight major cryptocurrencies is cyclically connected and that this connectivity has increased since the end of 2016. The LASSO-VAR model, applied to 52 cryptocurrencies, reveals tight interconnectedness: coins with very large market capitalizations transmit volatility shocks more easily. However, some less prominent coinsm, such as Maidsafe Coin, also serve as significant net transmitters. Koutmos (2018) analyzes 18 cryptocurrencies and identifies Bitcoin as the primary contributor to the spillover of returns and volatility. Spillover effects increase over time and peak around major news events, which the author interprets as growing interdependence and a higher risk of contagion. Antonakakis, Chatziantoniou, and Gabauer (2019) employ a TVP-FAVAR approach for the nine largest cryptocurrencies, alongside a market factor constructed from 45 other digital currencies. Total connectivity fluctuates significantly over time and tends to be higher during periods of heightened uncertainty. Bitcoin remains the most influential currency, although Ethereum has recently become the largest net transmitter. Katsiampa, Corbet, and Lucey (2019) apply bivariate BEKK models to pairs consisting of Bitcoin, Ether, and Litecoin, finding bidirectional volatility spillovers and time-varying conditional correlations that are largely positive.

A second line of research focuses on price relationships and extreme risk. Ciaian, Rajcaniova, and Kancs (2018) analyze 17 virtual currencies and two altcoin price indices, using daily data from the 2013–2016 period. Bitcoin and altcoin markets are interdependent, with the link being significantly stronger in the short term than in the long term. In the long term, macro-financial indicators influence altcoin prices more than Bitcoin does, while supply plays a limited role in price formation. Borri (2019) measures conditional tail risk using CoVaR for Bitcoin, Ether, Ripple, and Litecoin. These assets are highly exposed to tail risk originating within cryptocurrency markets, but not to that associated with US stocks or gold. Cryptocurrency portfolios reduce idiosyncratic risk and offer superior risk-adjusted returns. However, once liquidity is taken into account, the weight of these assets in an optimal portfolio remains low. Bouri et al. (2021) apply a quantile VAR model to seven cryptocurrencies for the period from August 2015 to December 2020. Connectivity in the tails of the distribution exceeds levels observed at the mean or median and intensifies with the magnitude of shocks, both positive and negative.

A third line of research focuses on more recent asset types. Dowling (2022) identifies limited volatility transmission between NFTs and cryptocurrencies, alongside co-movement as evidenced by wavelet coherence. The author suggests that cryptocurrency prices may help explain NFT prices, while NFTs themselves may represent a distinct asset class with low correlation. Karim et al. (2022) employ quantile connectivity analysis and find significant risk spillovers across blockchain-based markets. However, NFTs remain largely decoupled from other assets, offering greater potential for diversification.

Overall, these studies document the connectivity among cryptocurrencies, the influential role of Bitcoin, and the time-varying nature of relationships between assets, even under conditions of extreme risk.

3. Methodology

The study analyzes the structure and evolution of research concerning digital assets and their connectivity within the ecosystem, where the data was extracted from the Web of Science Core Collection database. The final dataset comprises 444 documents, published between 2017 and 2026 across 147 sources. The analysis was conducted using the Bibliometrix package in R, via R Studio and the performance analysis examined scientific output, citations, sources, authors, affiliations, and countries. Science mapping included collaboration networks, co-citation and keyword co-occurrence networks, a historiograph, a factorial map, a thematic map, and thematic trends. For the year 2026, the data are partial, as they include only those publications available at the time of export.

4. Results

4.1. Dataset overview & publication performance

Table No. 1. Main information

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2017:2026
Sources (Journals, Books, etc)	147
Documents	444
Annual Growth Rate %	66,62
Document Average Age	2,73
Average citations per doc	27,66
References	10474
DOCUMENT CONTENTS	
Keywords Plus (ID)	417
Author's Keywords (DE)	1232
AUTHORS	
Authors	984
Authors of single-authored docs	54
AUTHORS COLLABORATION	
Single-authored docs	60
Co-Authors per Doc	2,9
International co-authorships %	44,59
DOCUMENT TYPES	
article	417
article; book chapter	1
article; early access	24
review	2

The dataset comprises 444 documents, published between 2017 and 2026 in 147 sources, which corresponds to an average of approximately three documents per source. Articles are the main document type, with 417 papers (93.9% of the total), plus 24 early access articles, one book chapter and two review papers.

The annual growth rate of 66.62% should be interpreted with caution, as it starts from a single document in 2017 and includes the year 2026, for which the data is partial. The average age of 2.73 years indicates a relatively recent corpus, and the average of 27.66 citations per document reflects the accumulated impact of the included works. The analyzed documents total 10,474 references.

At the content level, 1,232 author keywords and 417 Keywords Plus terms were identified. The corpus brings together the contributions of 984 authors, of whom 54 sign individual documents. The 60 documents with a single author represent 13.5% of the total,

the rest being the result of works with several authors. The average number of 2.90 co-authors per document and the 44.59% share of international co-authorships highlight the important role of collaboration in this field.

Figure No. 1. Annual scientific production

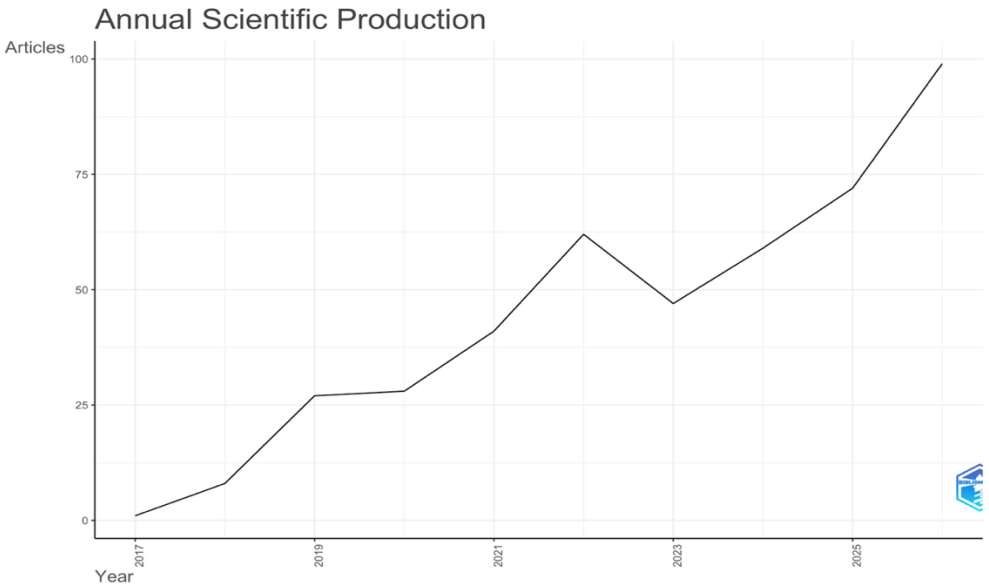


Figure No. 2. Average citations per year

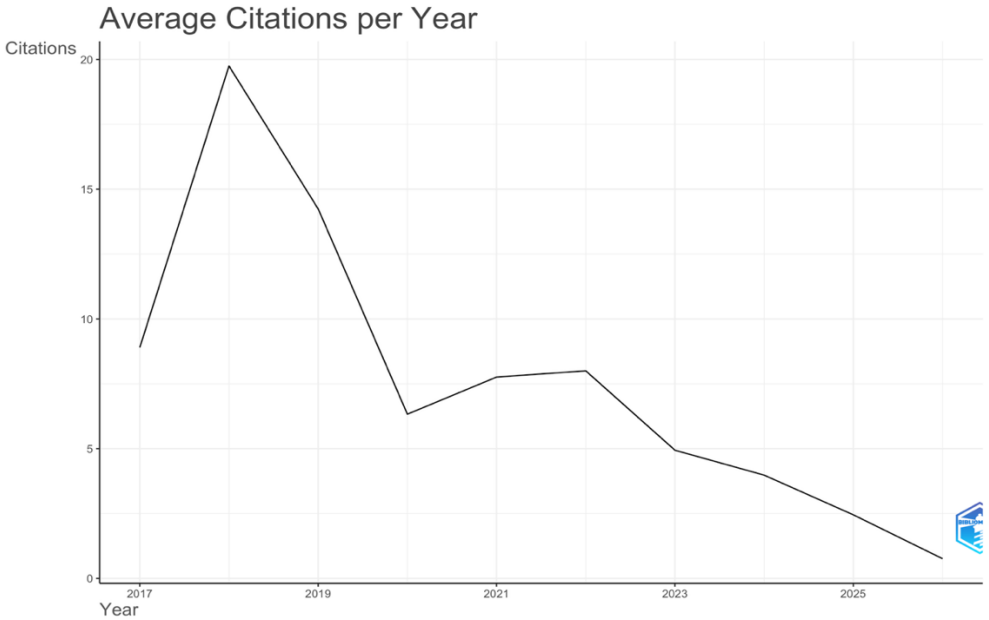


Figure 1 highlights an increase in scientific output, from a single document in 2017 to 99 documents in 2026, the peak for the period analyzed, though the data for the final year are partial. Following an increase from 8 documents in 2018 to 27 in 2019, the output remained nearly constant in 2020 (28 documents), then rose to 41 documents in 2021 and 62 in 2022. The only annual decline occurred in 2023, when the number of documents dropped to 47, followed by a recovery to 59 documents in 2024 and 72 in 2025. The 2022–2026 period accounts for 339 documents—76.4% of the corpus—confirming its recent nature.

Figure 2 presents a different trend. The average number of citations per year reaches its peak in 2018 (approximately 19.7), after which it declines to about 14.2 in 2019 and 6.3 in 2020. There is a slight recovery in 2021 and 2022 (approximately 7.8 and 8.0, respectively), followed by a continuous decline to about 0.8 by 2026. These figures should be interpreted with caution: the years of 2017 and 2018 are based on a small number of documents (1 and 8, respectively), while more recent works have had less time to accumulate citations.

A comparison of the two figures shows that the years with the highest output do not coincide with the years that have the highest average number of citations.

Figure No. 3. Most relevant sources

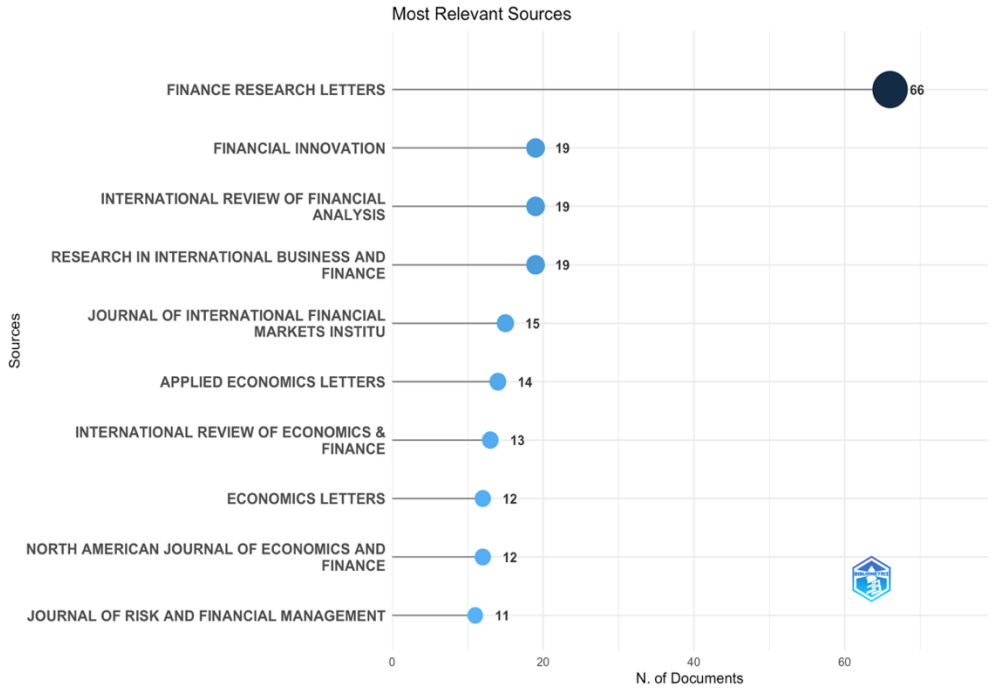
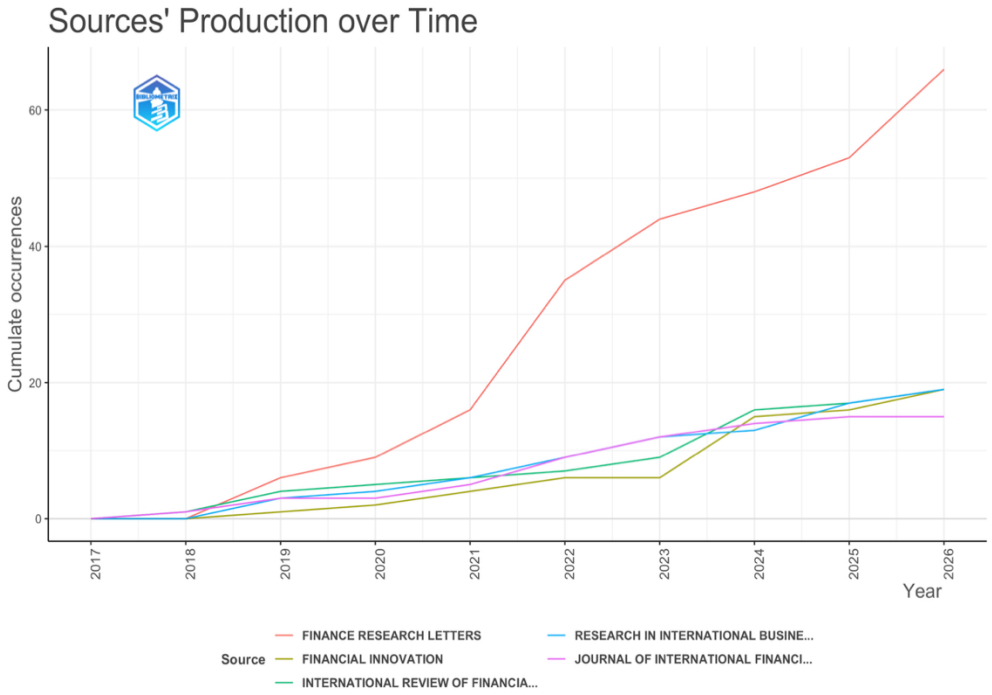


Figure No. 4. Source dynamics



Analysing the most relevant sources, the analysis shows that the top ten sources out of the 147 identified account for 200 documents, representing 45% of the corpus. *Finance Research Letters* ranks first with 66 documents (14.9% of the total)—a figure more than three times higher than that of the next sources. *Financial Innovation, International Review of Financial Analysis,* and *Research in International Business and Finance* each contribute 19 documents, accounting for 4.3% of the corpus apiece. These are followed by *Journal of International Financial Markets, Institutions and Money* (15), *Applied Economics Letters* (14), *International Review of Economics & Finance* (13), *Economics Letters* (12), *North American Journal of Economics and Finance* (12), and *Journal of Risk and Financial Management* (11).

Figure 4 illustrates the cumulative output of the top five sources. *Finance Research Letters* stands out from 2020 onwards, recording its sharpest growth between 2021 and 2022, rising from approximately 16 to 35 documents and reaching a total of 66 documents by 2026. The other four sources show a slower, more closely aligned growth trajectory. *Financial Innovation* and *International Review of Financial Analysis* exhibit a more pronounced increase in 2024, while *Research in International Business and Finance* also reaches a total of 19 documents by 2026. *Journal of International Financial Markets, Institutions and Money* shows no additional documents for 2026, although the data for this year are incomplete. The results indicate that publications are concentrated around a single dominant source, alongside a group of journals with more modest contributions.

4.2. Geographic distribution & scientific collaboration

Figure No. 5. Most relevant countries

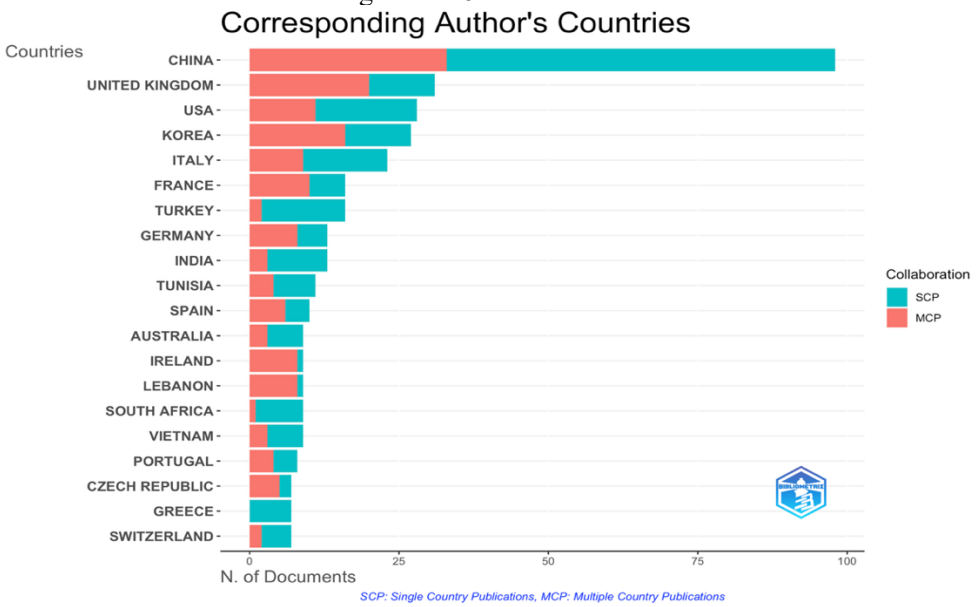
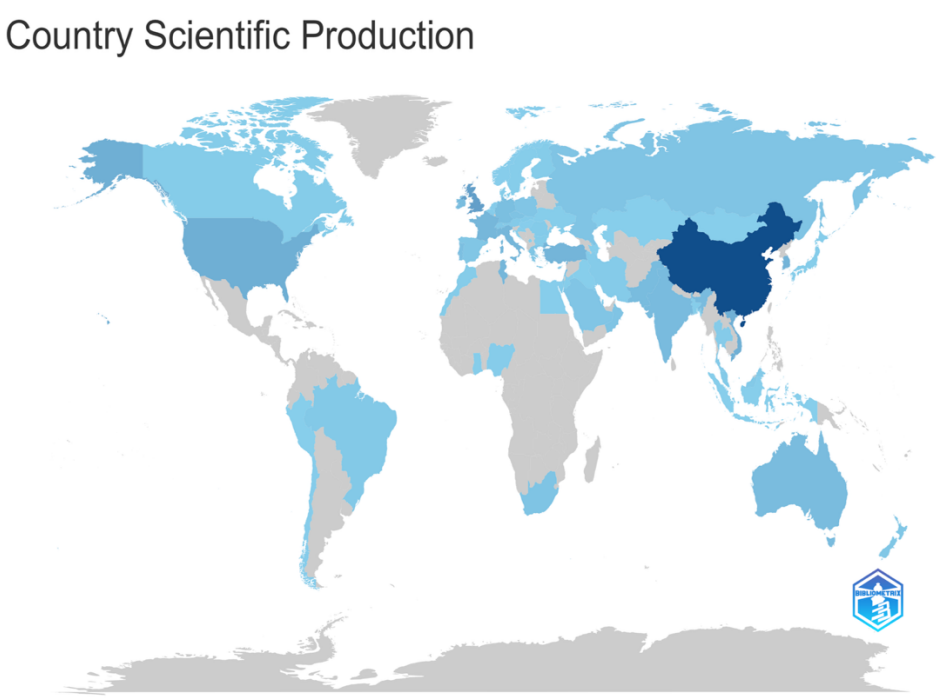


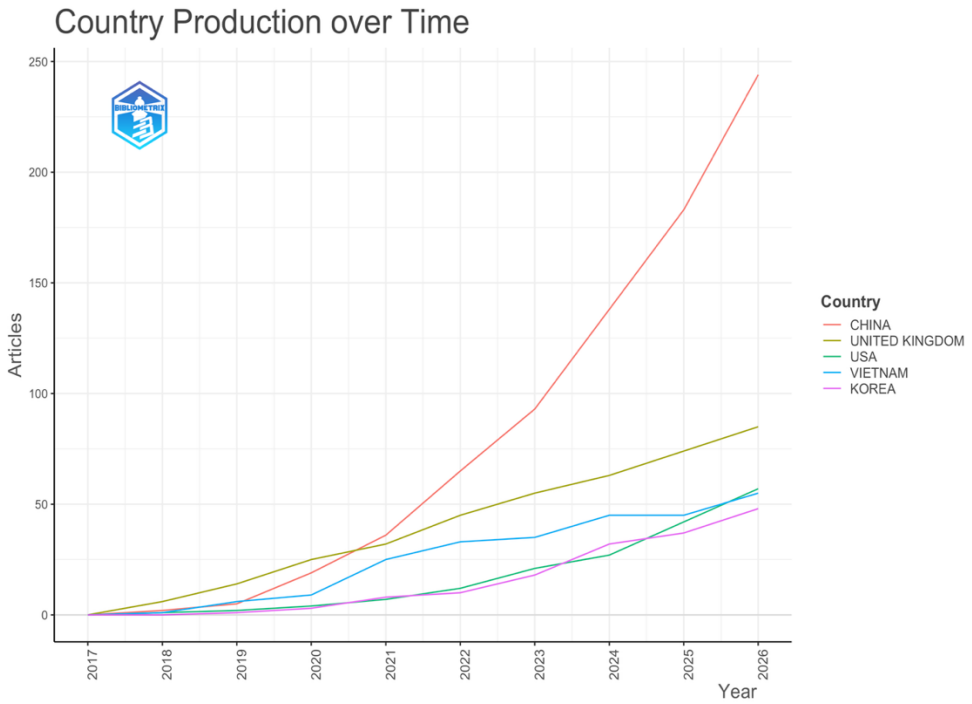
Figure No. 6. Country scientific production



China ranks first in terms of the corresponding author's country, with 98 documents, followed by the United Kingdom (31), the USA (28), Korea (27), and Italy (23). In the case of China, single-country publications predominate, with 33 documents (33.7%) produced through international collaboration. In contrast, the United Kingdom (20 out of 31) and Korea (16 out of 27) have more collaborative publications than purely national ones.

As shown in Figure 5 and 6, China shows the highest intensity, followed by the United Kingdom and the USA. Contributions are present across Europe, Asia, North America, and Oceania, while much of Africa remains unrepresented.

Figure No. 7. Country over time



The temporal analysis reveals an acceleration in scientific output after 2020, with China experiencing the most significant expansion in absolute terms. Its count rises from 19 cumulative occurrences in author affiliations in 2020 to 244 by 2026, surpassing the United Kingdom in 2021. During the same period, the United Kingdom's figures grow from 25 to 85, at a more moderate pace. The USA and South Korea start from low baselines of 4 and 3 occurrences, respectively reaching 57 and 48. Vietnam progresses from 9 to 55 occurrences, though its trajectory is less consistent, with the cumulative total remaining unchanged between 2024 and 2025. These trends point to an expansion of research in Asia - with China standing out in particular, though the figures for 2026 remain partial

Figure No. 8. Most relevant affiliations

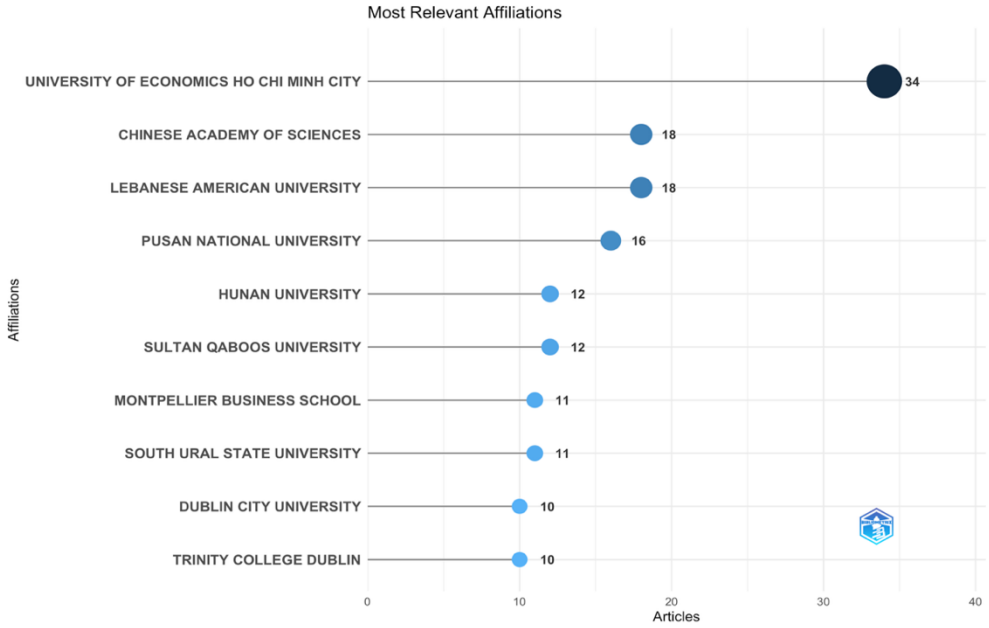
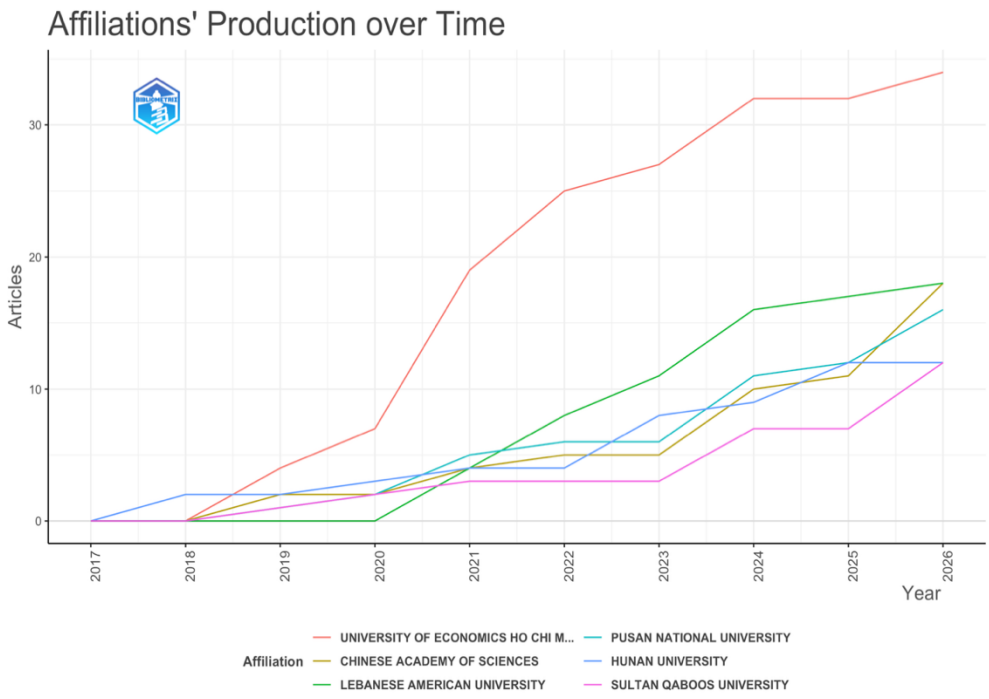


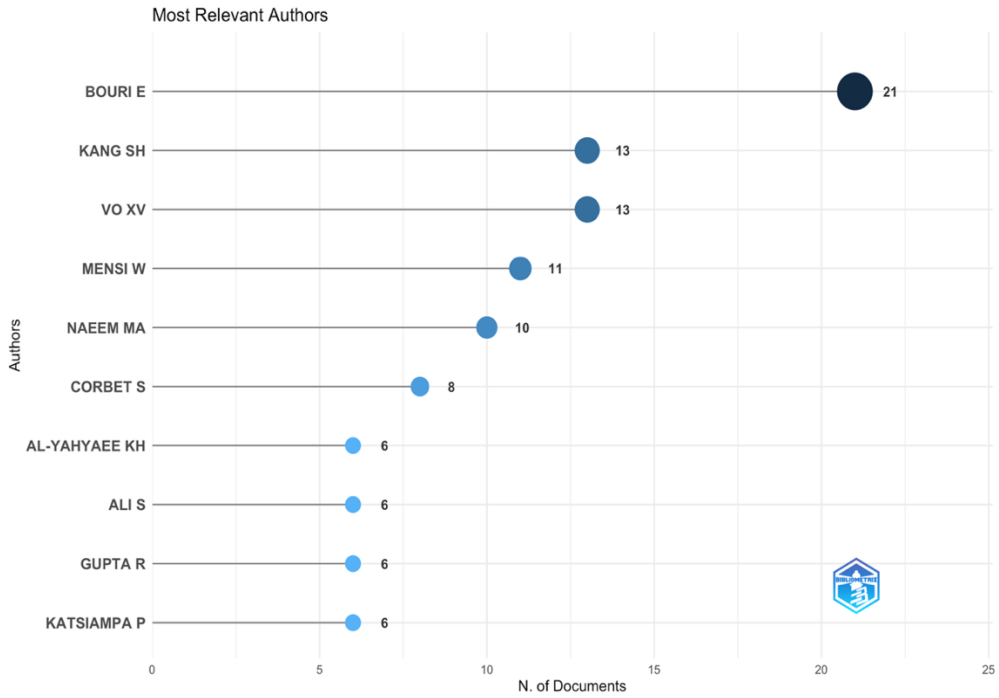
Figure No. 9. Affiliation over time



University of Economics Ho Chi Minh City ranks first among affiliations, with 34 articles and it is followed by the Chinese Academy of Sciences and the Lebanese American University, with 18 articles each. Other mentions include Pusan National University with 16 and Hunan University and Sultan Qaboos University, with 12 articles each.

University of Economics Ho Chi Minh City strengthens its position through a sharp increase between 2020 and 2021, from 7 to 19 articles, reaching a total of 34 by 2026. The Lebanese American University, which had no articles prior to 2020, reaches 18 by 2026, while The Chinese Academy of Sciences climbs from 11 to 18 articles in the final year alone, although the data for 2026 is partial at the date of the study. Hunan University records the earliest contributions among these institutions, starting in 2018, but its total remains at 12 articles from 2025 onwards.

Figure No. 10. Most productive authors



The most productive author in the corpus is Bouri, with 21 documents, followed by Kang and Vo with 13 each, Mensi with 11, and Naeem with 10. Corbet has 8 documents, while Al-Yahyaee, Ali, Gupta, and Katsiampa have 6 each.

Figure No. 11. Country collaboration map

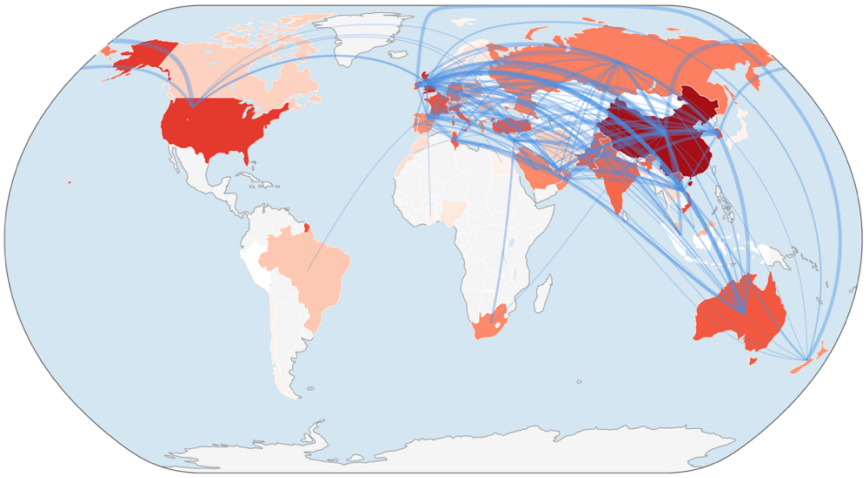
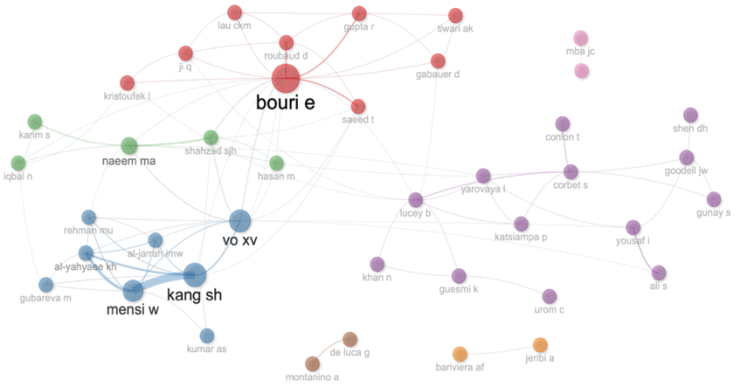


Figure No. 12. Collaboration network



The figures 11 and 12 indicate a dense international network between Europe and Asia, in which the United Kingdom and China emerge as central nodes of collaboration. Visible links also extend to the USA, Australia, and New Zealand, whereas South America and Africa are poorly represented in this network.

Seven clusters of authors are highlighted in the analysis. Bouri occupies a central position in a group that includes Roubaud, Ji, and Gupta, while Vo, Kang, and Mensi form another core, with the Kang-Mensi link being the strongest in the network. Naeem is at the center of a smaller group, alongside Karim and Shahzad, while Corbet, Lucey, Yarovaya, and Katsiampa belong to a more extensive structure. The three isolated pairs indicate that some collaborations remain outside the main network.

4.3. Citation analysis & intellectual structure

Figure No. 13. Most global cited documents

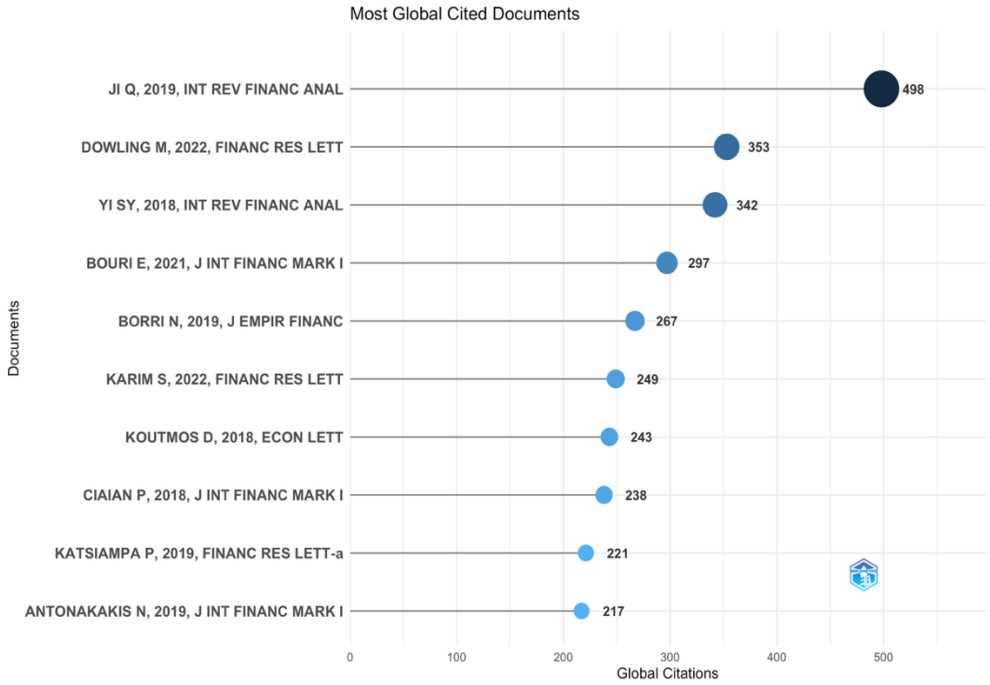
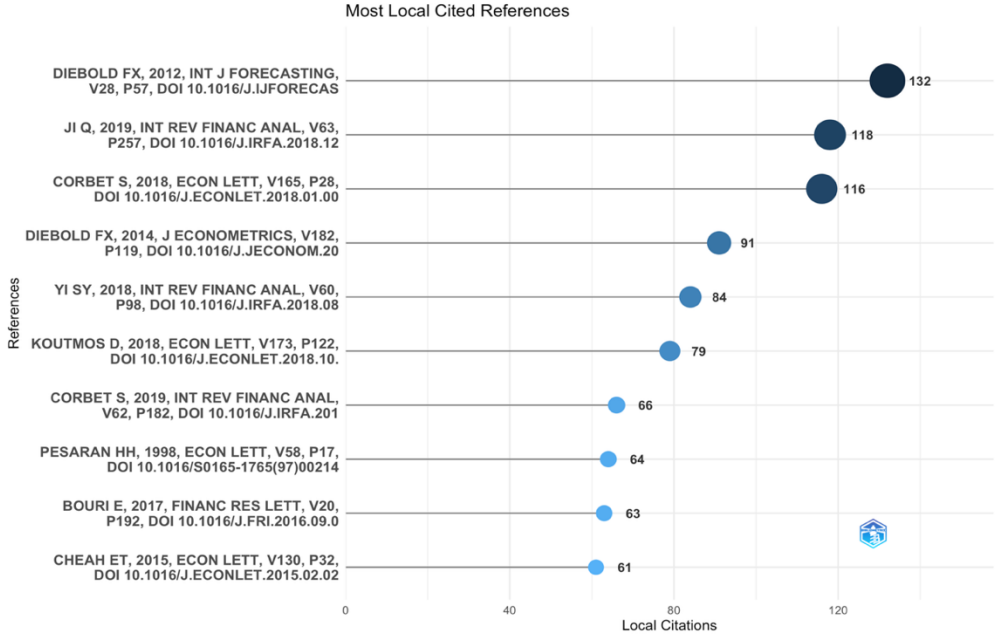


Figure No. 14. Most local cited reference

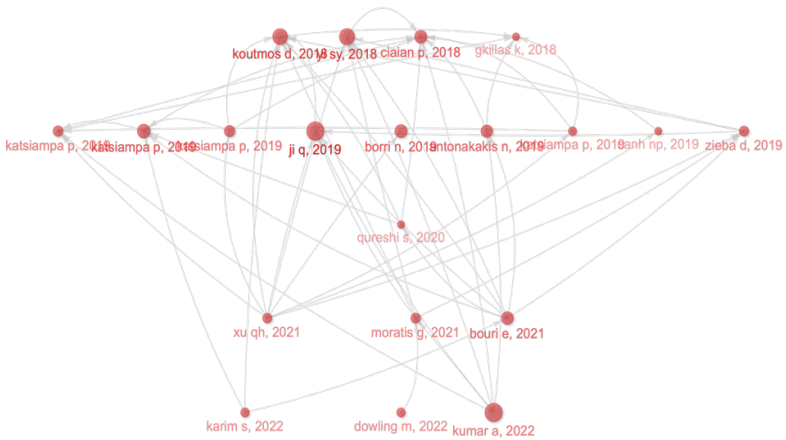


The analysis shows that Ji et al. (2019) is the most-cited document globally, with 498 citations. The study applies the Diebold-Yilmaz measures to six cryptocurrencies and identifies Bitcoin as the primary transmitter of volatility. Next is Dowling (2022), with 353 citations, which finds limited volatility transmission between NFTs and cryptocurrencies, alongside evidence of co-movement. In third place, Yi, Xu, and Wang (2018), with 342 citations, highlight strong volatility connectivity within a network of 52 cryptocurrencies.

The analysis futher indicates that, at the local level, the work of Diebold and Yilmaz (2012) is the most prominent, with 132 citations. This paper proposes measures for total and directional volatility spillover, tested on four U.S. markets. Ji et al. (2019) ranks second with 118 citations, while Corbet, Meegan, Larkin, Lucey & Yarovaya, L. (2018), with 116 citations, find that cryptocurrencies are relatively isolated from traditional assets. Diebold and Yilmaz (2014), with 91 citations, define connectivity measures based on variance decomposition and link them to weighted, directed networks.

Thematically, the top-cited works globally analyze relationships within the digital asset ecosystem. Local references, however, combine studies on cryptocurrencies with methodological foundations developed for traditional financial markets. The common theme remains the transmission of shocks and the connectivity between markets.

Figure No. 15. Historiograph



The historiograph in Figure 15 allows us to trace the development of this research field between 2018 and 2022, through 20 works linked by direct citations. The starting point consists of studies such as Koutmos (2018) and Yi, Xu, and Wang (2018), with the progression continuing through Ji et al. (2019). Subsequently, the network expands to include works on quantile connectivity (Bouri et al., 2021) and NFTs (Dowling, 2022; Karim et al., 2022)

Figure No. 16. Co-citation network

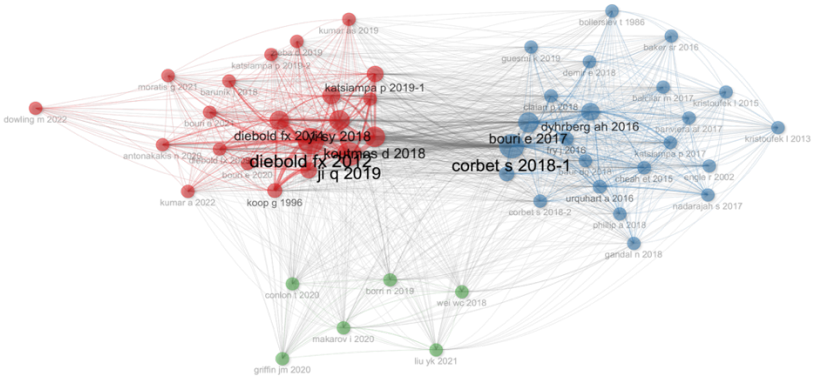
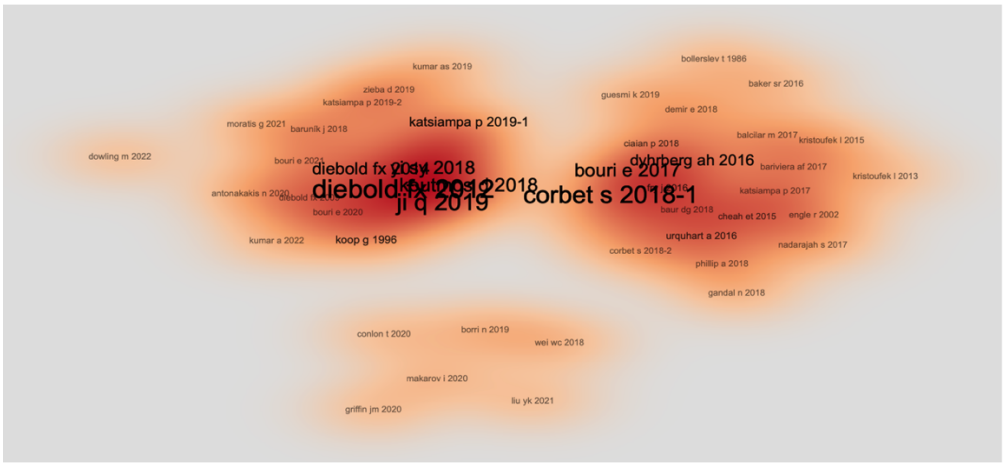


Figure No. 17. Co-citation network density



The co-citation network complements this picture and delineates three clusters of papers. The first focuses on connectivity and volatility spillover (Diebold and Yilmaz, 2012, 2014; Yi, Xu, and Wang, 2018; Ji et al., 2019), while the second centers on the relationship between cryptocurrencies and other assets (Bouri, Molnár, Azzi, Roubaud & Hagfors, 2017; Corbet et al., 2018). The third cluster is smaller and more peripheral, comprising six papers, including Borri (2019). The dense connections between the first two clusters suggest that they are frequently cited together.

4.4. Conceptual structure & content analysis

Figure No. 18. Most relevant words

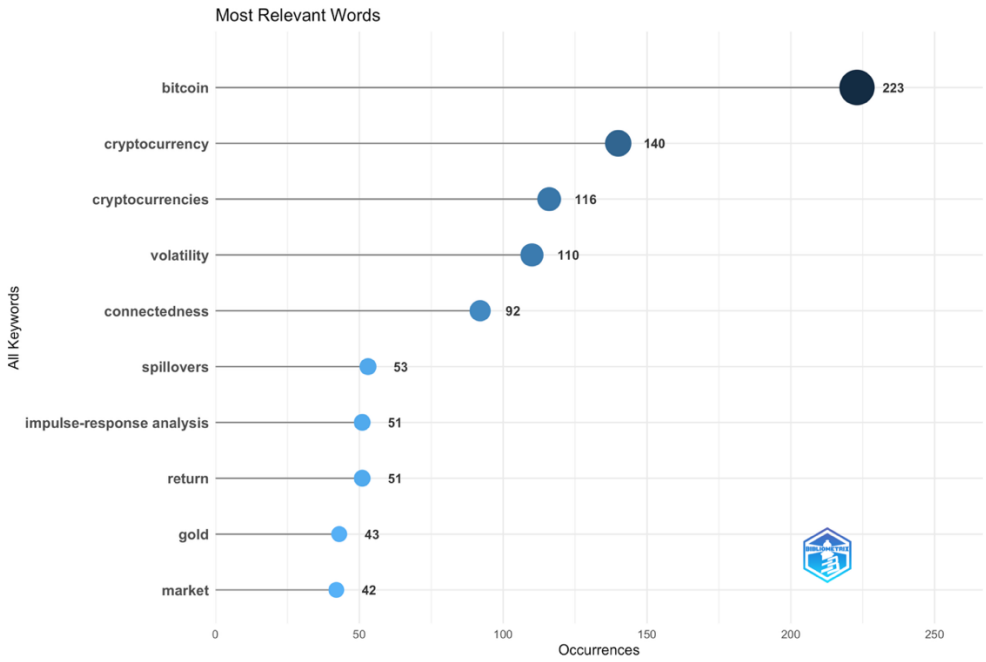


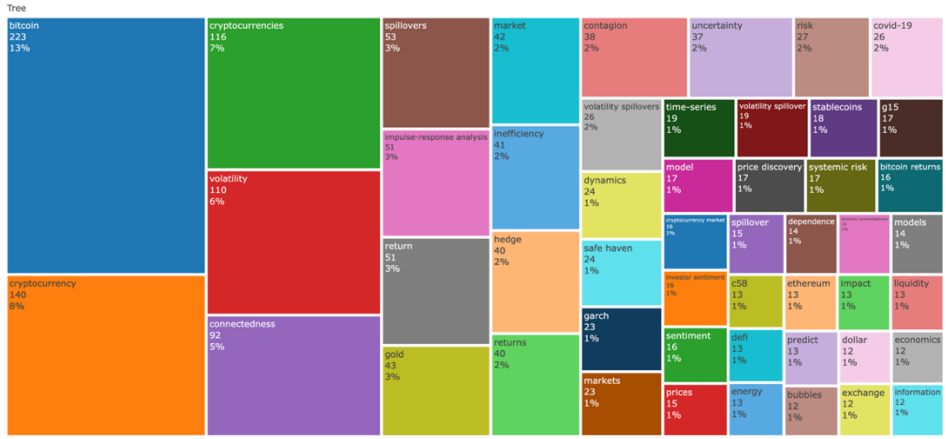
Figure No. 19. Word cloud



Lexical analysis shows that “bitcoin” is the most frequent term, with 223 occurrences, followed by “cryptocurrency” (140), “cryptocurrencies” (116), “volatility” (110), and “connectedness” (92). Taken together, the two forms of the term for

cryptocurrencies would total 256 occurrences, surpassing "bitcoin." The terms "spillovers" (53), "impulse-response analysis" (51), and "return" (51) complete the ranking, alongside "gold" (43) and "market" (42).

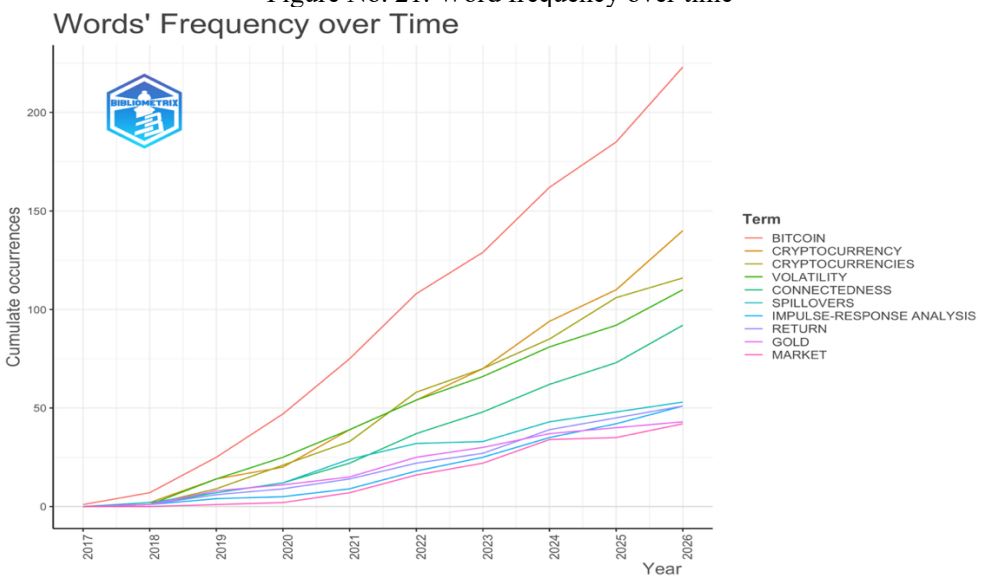
Figure No. 20. Treemap



The treemap provides a broader view of this distribution, with the top five terms account for 13%, 8%, 7%, 6%, and 5% of the total, respectively, while most of the other terms have a weight of no more than 3%. The figure also highlights less frequent terms, such as *contagion* (38), *uncertainty* (37), "COVID-19" (26), "stablecoins" (18), "systemic risk" (17), and "DeFi" (13).

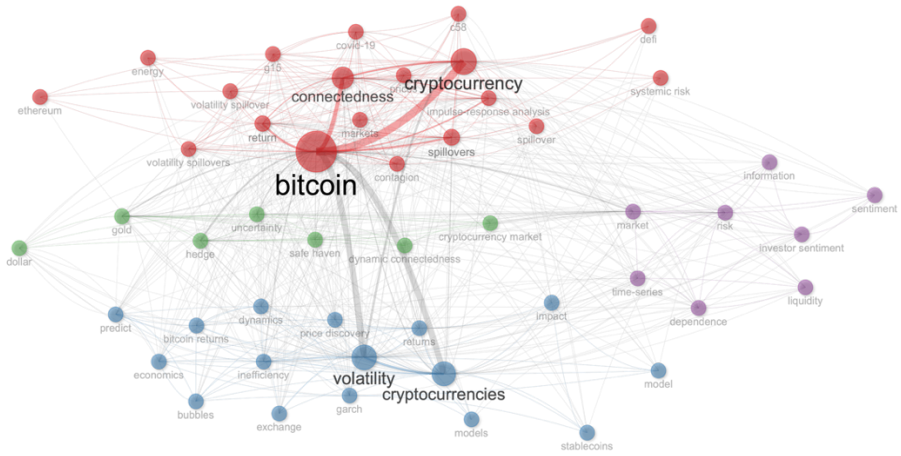
The word cloud in figure no. 19 visually confirms the central position of the terms "bitcoin", "cryptocurrency", "cryptocurrencies", "volatility", and "connectedness" within the vocabulary of this field.

Figure No. 21. Word frequency over time



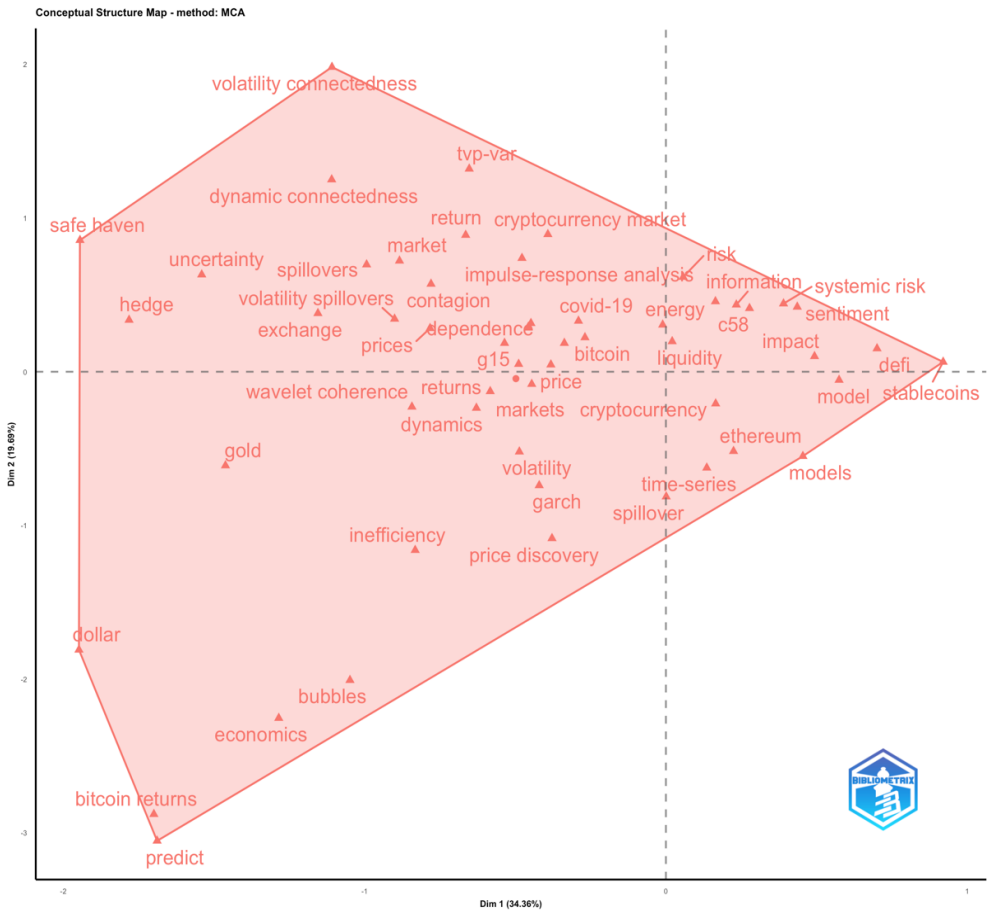
The analysis of lexical dynamics reveals that the term "bitcoin" remained in the top position throughout the studied period, with its cumulative frequency increasing from 47 occurrences in 2020 to 223 in 2026. The term "connectedness" also shows a significant trend, rising from 22 occurrences in 2021 to 92 in 2026. By comparison, between 2022 and 2026, the latter grew from 37 to 92 occurrences, whereas "gold" increased more gradually, from 25 to 43.

Figure No. 22. Co-occurrence network



The conceptual structure of the field is detailed by the co-occurrence network, which outlines four thematic clusters. The largest of these, comprising 19 terms, brings together "bitcoin", "cryptocurrency," "connectedness," "spillovers," "contagion," and "DeFi." The second cluster, consisting of 16 terms, includes "volatility," "cryptocurrencies," "GARCH," "inefficiency," and "stablecoins." The smaller clusters group, on one hand, the terms "gold," "hedge," "safe haven," and "uncertainty," and on the other, "market," "risk," "investor sentiment," and "liquidity." The strongest links in the network originate from "bitcoin" toward "cryptocurrency," "connectedness," "volatility," and "cryptocurrencies," confirming the central position of this term.

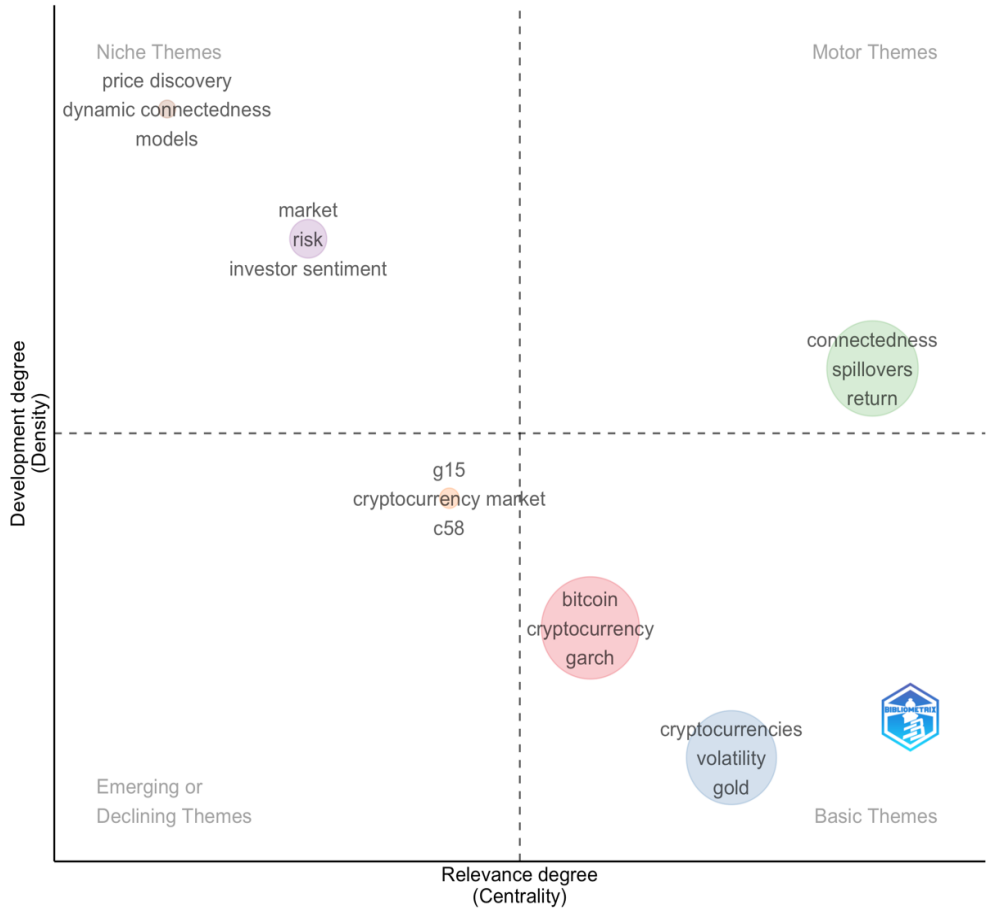
Figure No. 23. Factorial map



The factorial map, derived from multiple correspondence analysis, complements these findings. Together, the two dimensions account for 54.05% of the variance (34.36% and 19.69%, respectively). The terms “stablecoins” and “DeFi” are positioned at the far right of the map, “gold,” “hedge,” and “safe haven” on the left, and “dynamic connectedness” and “TVP-VAR” in the upper area. This arrangement suggests the existence of distinct research directions within the field.

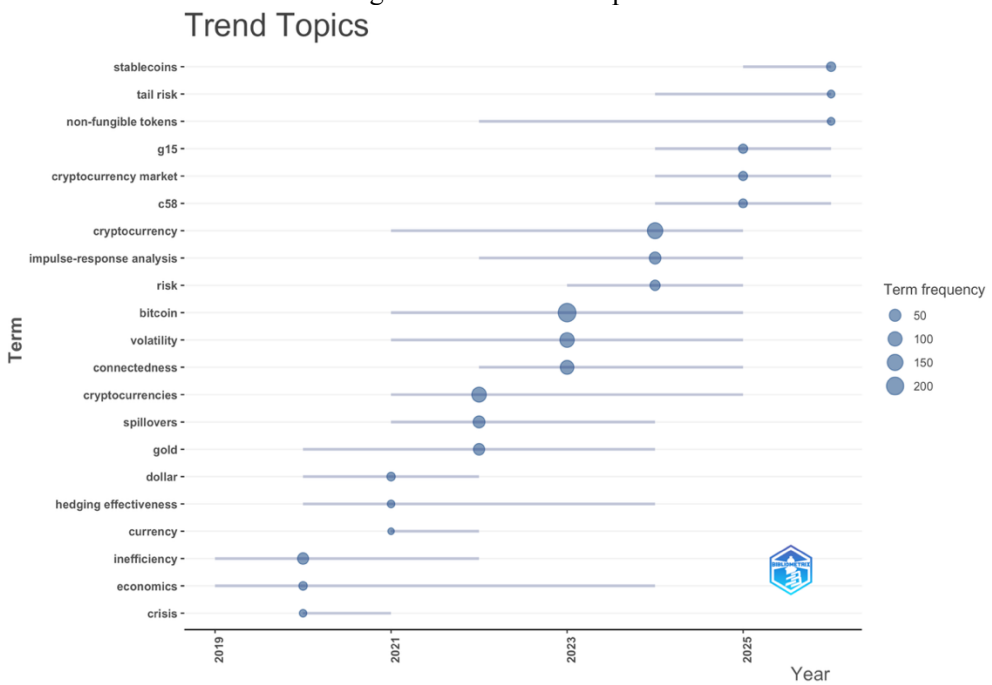
4.5. Thematic analysis & emerging trends

Figure No. 24. Thematic map



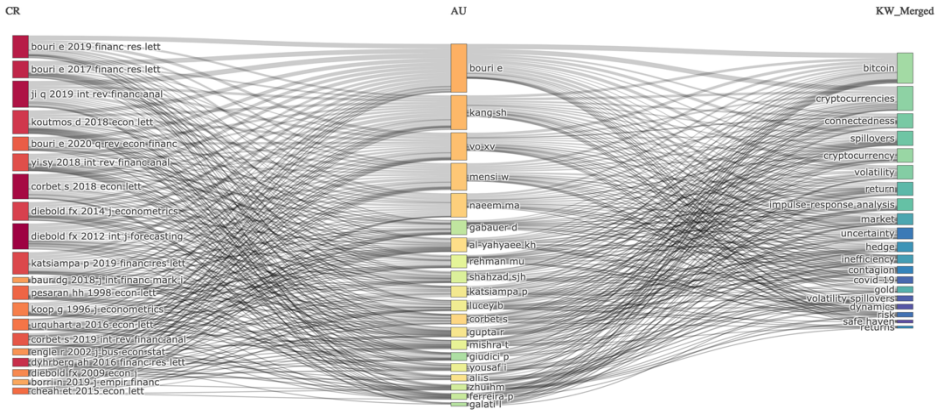
The thematic map classifies research themes based on centrality and density. The terms "connectedness," "spillovers," and "return" occupy the quadrant of driving themes, which are characterized by high relevance and a high degree of development. Basic themes - important to the field but less developed - comprise two clusters: "bitcoin," "cryptocurrency," and "GARCH," as well as "cryptocurrencies," "volatility," and "gold." Conversely, niche themes, well-developed but of lower relevance, include "price discovery," "dynamic connectedness," and "models," along with "market," "risk," and "investor sentiment." The quadrant for emerging or declining themes contains "cryptocurrency market" and the JEL codes G15 and C58.

Figure No. 25. Trend topics



The longitudinal analysis in Figure 25, based on the median year for each term, reveals a gradual reconfiguration of the research agenda. The initial stage is defined by the terms “crisis”, “economics”, and “inefficiency” (2020), followed by “gold”, “spillovers”, and “cryptocurrencies” (2022). The subsequent period highlights the terms “bitcoin”, “volatility”, and “connectedness” (2023), as well as “cryptocurrency”, “impulse-response analysis”, and “risk” (2024). The most recent themes, ”stablecoins”, “tail risk”, and “non-fungible tokens” (2026), suggest an expansion of academic interests toward new categories of digital assets and extreme risks.

Figure No. 26. Three field plot



The three-field plot in Figure 26 correlates cited references, authors, and keywords, providing an integrated view of the intellectual foundations and thematic orientations of the field. In the first field, the works of Diebold and Yilmaz (2012), Corbet et al. (2018), and Ji et al. (2019) stand out. The central field highlights the contributions of Bouri, Kang, Vo, Mensi, and Naeem, while the keyword field is dominated by "bitcoin," "cryptocurrencies," "connectedness," and "spillovers." The dense flows between the fields indicate a strong connection among these references, authors, and themes.

Conclusions

This study mapped research on digital assets and their interconnectedness within the ecosystem, based on 444 documents published between 2017 and 2026 across 147 sources, with contributions from 984 authors. The findings describe an expanding field with a nascent knowledge base, as 76.4% of the documents have been published since 2022. Annual output grew from a single document in 2017 to 99 in 2026; however, this trend should be interpreted with caution, given the low starting point and the fact that the data for the final year is incomplete.

The performance structure reveals significant concentration. The top ten sources account for 45% of the corpus, with *Finance Research Letters* holding a dominant position, contributing 66 documents. Geographically, China leads in terms of the number of documents (98), while the United Kingdom garners the highest number of citations, demonstrating that output volume and academic influence do not necessarily align. The 44.59% share of international co-authorship, along with networks centered around authors such as Bouri, Kang, Mensi, and Vo, underscores the role of collaboration in the field's development.

From a qualitative perspective, the literature can be understood through four interdependent themes. The first, and most prominent, is the transmission of shocks among cryptocurrencies. The methodological framework developed by Diebold and Yilmaz (2012, 2014) for traditional financial markets has been adopted in the study of digital assets, including by Ji et al. (2019). The positioning of the terms "connectedness," "spillovers," and "return" within the quadrant of "driving themes" underscores the centrality of this research direction. While findings partially converge on the influential role of Bitcoin (Koutmos, 2018; Ji et al., 2019), the literature also reveals a more complex structure: market size does not fully account for an asset's importance within the network (Ji et al., 2019), less prominent coins can act as significant net transmitters (Yi, Xu, and Wang, 2018) and, at one point, Ethereum emerged as the largest net transmitter (Antonakakis, Chatziantoniou, and Gabauer, 2019).

The second theme concerns the relationship between digital assets and the broader financial system. Terms such as "gold," "hedge," and "safe haven" form a distinct conceptual cluster. The literature points to a relative isolation of cryptocurrencies from traditional assets (Corbet et al., 2018), as well as limited exposure to the tail risk associated with U.S. equities or gold (Borri, 2019). Nevertheless, the positioning of "bitcoin" and "gold" among the "basic themes", combined with the slower growth of the term "gold", suggests that this area is no longer the primary driver of the field.

The third theme focuses on extreme risk and the instability of relationships between assets. The literature indicates that connectivity varies over time, intensifying during periods of uncertainty (Antonakakis, Chatziantoniou, and Gabauer, 2019) and becoming more pronounced in the tails of the distribution (Bouri et al., 2021). This

perspective indicates that average-based measures can provide only a partial picture of risk transmission.

The fourth theme reflects an expansion into new segments of the ecosystem. Studies on NFTs and DeFi tokens point to limited volatility transmission and a relative decoupling of NFTs (Dowling, 2022; Karim et al., 2022), with terms such as "stablecoins," "tail risk," and "non-fungible tokens" emerging as recent trends. The relatively low frequency of the terms "stablecoins" and "DeFi" suggests that research in these areas is still in its early stages.

This study has certain limitations that should be noted. The analysis is based on documents included in the extracted dataset, while data for 2026 are incomplete, as the year has not ended at the time of the writing, and thematic interpretations are contingent upon the quality of the keywords used. Future research could further explore the role of stablecoins and DeFi in risk transmission, as well as the connections between these segments and traditional markets.

Authors' Contributions:

The authors contributed equally to this work.

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ORIGINAL PAPER

Management challenges in the internationalization of Romanian SMEs

Daniel-Marius Mitrache[1)]

Abstract:

Going out with a business outside Romania's borders is not just a business decision, but is, in essence, an act of courage that tests the very foundation on which an SME was built. In our approach, we move away from the cold figures of statistics to look into the heart of the management of a business that dares to dream on a European or global scale. We rightly ask ourselves: why do so many brilliant Romanian ideas stop at the border? The answer often lies not in the lack of creativity, but in administrative problems and the culture shock of foreign management systems.

We have observed how our entrepreneurs are forced to go through a contradiction: on the one hand, the specifically Romanian agility to solve problems on the fly, and on the other, the rigor and strict procedures required by mature markets. This paper explores the tension between these two worlds. We are talking about the fear of the legislative unknown, about the burden of bureaucracy that doubles at every step across the border and about the loneliness of the SME manager who must be, simultaneously, a strategist, a lawyer and an expert in international logistics.

It is a journey about adaptation. We analyze how digitalization and new models of remote management become the lifeline for small companies that cannot afford entire consulting departments. But, above all, this article is a plea for the professionalization of local management. We argue that internationalization is not just about selling a product in another language, but about rebuilding the entire architecture of the business. In the end, we are left with a conclusion that we hope will inspire, namely that the external success of a Romanian SME depends on the ability to learn from administrative failures and to transform the spirit of survival into a strategy for sustainable and disciplined growth.

Keywords: *Entrepreneurship, Cross-border expansion, Managerial agility, Administrative barriers.*

JEL Classification: M16, F23, L26.

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1. Introduction

Internationalization puts high demands on the management abilities of small and medium-sized enterprises (SMEs). Entering the foreign market involves not only finding potential clients and developing an offer for them but also gaining new knowledge, managing cross-border ties, and allocating managerial efforts towards risky projects. According to OECD (2008), there are some barriers faced by SMEs, such as limited knowledge about the foreign market, insufficient international experience, expenses involved in setting up distribution channels, and problems in managing long-distance relationships. In other words, internationalization becomes for SMEs not only a business choice but also a challenge related to their organizational abilities.

Moreover, the process of internationalization depends on the connections existing outside the particular firm. According to the revised Uppsala model developed by Johanson and Vahlne (2009), firms operate in networks where knowledge, trust, and opportunities for conducting business grow. As a result, uncertainty does not arise only due to an unfamiliar national environment but also because of a firm being positioned outside the relevant networks of business. Thus, this concept explains why even a competitive product and a talented entrepreneur are often not enough for successful internationalization: it involves both developing relationships and learning through them.

This list constitutes a major point of entry for analyzing small and medium sized firms in Romania. In a research aimed at studying companies operating in Romanian manufacturing industry, Dinu and Ionescu (2025) argue that foreign market knowledge, organization related factors and lack of strategic orientation prevent companies from becoming internationalized. The same researchers stress the significance of partnerships, managerial flexibility and resource management. Even though their research is not generalizable to all Romanian SMEs, it serves as a starting point for further examination of internationalization process where external challenges are combined with the capabilities of organizations in dealing with them.

The current paper develops the above managerial approach by considering one crucial trade-off between entrepreneurship flexibility and organizational formalization. Flexibility is understood as the ability of the firm to react promptly to any changes in its environment, while formalization represents the clear definition of roles, procedure descriptions and reliable coordination routines. Instead of treating these approaches as alternative ways to cope with challenges, this analysis considers the possibility of their combination. The main idea behind it is that internationalization requires companies to stay flexible while creating certain organizational structures to ensure greater reliability of decisions and actions.

This reasoning is similarly centered on the changing roles of the SME manager. The research evaluates the connection between strategic choices and administrative compliance, intercultural communication, logistics coordination, and external relationship management. Instead of treating these elements as separate groups of difficulties, the interaction between them is analyzed: novel challenges require more information, limited special resources narrow down decision-making options, and poor coordination turns routine problems into barriers to sustainable development. Such an approach corresponds to the OECD's perspective on the development of SMEs, which involves participation in production, knowledge, and skill networks (OECD, 2023).

Digitalization becomes an additional aspect of consideration, but not a replacement for the development of managers. Mitrache and Spulbar (2025) evaluate the

use of artificial intelligence in resource management, disruption anticipation, and increased economic resilience, although the expenses involved in implementation and the need to consider governance aspects are also recognized. While the paper provides a broader framework for the association between technology and adaptation capabilities, it cannot be seen as proof that artificial intelligence will ensure internationalization success for Romanian SMEs. Hence, technology is discussed along with managerial skills, organizational learning, and accountability.

In this regard, the purpose of the paper is to determine the key managerial obstacles associated with the internationalization process of Romanian SMEs and to discuss the role of professionalization, digitalization, and organizational learning in overcoming these obstacles. The main issue to be investigated in this paper is the following: how can Romanian SMEs reconcile their entrepreneurial flexibility with the need for management, relations, and organization in internationalizing? This paper employs a conceptual approach, using the literature of internationalization, institutional documents, and relevant scientific sources related to the business environment in Romania. This paper does not seek to assess the frequency of particular obstacles nor to create a cause-and-effect relationship between variables.

2. Internationalization of Romanian SMEs: Conceptual and Managerial Perspectives

Internationalization of SMEs may be viewed as the process of turning the entrepreneurial opportunities into organizational obligations through the international dimension. The importance of this phenomenon goes further than the physical presence of sales to include the relations, resources, and managerial organization that enable organizations to participate in international business. This difference is important to make because an international transaction and organizational capability for doing international business are two separate things. In the framework of our conceptual approach to internationalization, we understand it as a capability development for conducting cross-border business.

2.1. Entrepreneurial opportunities and international commitment

The international entrepreneurship perspective challenges the view that firms have to develop a strong domestic presence before engaging in international activities. Oviatt and McDougall (1994) explain the emergence of international new ventures through the application of ideas developed within entrepreneurship, international business, and strategic management. This approach stresses the importance of resource uniqueness and alternative governance mechanisms which allow small firms to gain access to resources without owning them. The perspective shows that while limited organizational size is not a barrier to engaging in international business per se, international new ventures are a special case and not a general template for all SMEs.

From the point of view of Romanian SMEs, the international entrepreneurship perspective provides a meaningful distinction between identifying opportunities and developing the ability to capitalize on them. Being contacted by a foreign firm, approached by a potential distributor, or invited into an international joint venture is an opportunity, but it does not mean that the firm will be able to deal with commitments arising therefrom. The theoretical question is not only about whether the entrepreneur is ready to expand, but also about whether the organization is ready to adapt its management practices and financial resources to the proposed activities. Entrepreneurial initiative is seen as a

beginning of international commitment, but not as a replacement of organizational readiness.

Hence, international commitment has to be understood as both a qualitative concept and financial one. Focusing managerial attention, changing contract practices, setting up reporting systems, and building relations with partners are commitments irrespective of the fact that the firm has no foreign subsidiary. Such understanding preserves the relevance of the analysis for SMEs which may internationalize through exporting and cooperation without foreign investments. Furthermore, internationalization is separated from multinational organization.

2.2. Resources, capabilities, and managerial judgment

A capability-based approach explains why resource accessibility does not guarantee the effectiveness of international operations. As Teece (2014) points out, there is a distinction between the ability of performing routine operations and dynamic capabilities necessary to seize opportunities, to allocate resources and to rejuvenate the organization. It is an approach that ties entrepreneurial management with coordination and transformation of resources within international setting. While being formulated as a multinational enterprise theory, it considers the importance of entrepreneurial capabilities of small organizations and their possibilities to acquire complementary resources abroad.

From a conceptual application of the idea to Romanian SMEs, the distinction is between operational readiness and adaptability. Operational readiness refers to the question of possibility of fulfilling an international order under the current conditions, whereas adaptability refers to the ability of revising the organization's arrangements according to changes in customer's needs, contractual agreements and distribution network. The two are related yet distinct: the ability of executing an order does not mean that the organization is capable of sustaining and further developing itself in the international market environment.

Three interrelated questions could explain the managerial importance of the distinction. Is it possible for the organization to recognize an opportunity suitable for its resources and strategy? Is it possible for the organization to mobilize internal and external resources necessary for pursuing the opportunity? Is it possible for the organization to adapt its practices after realizing that some initial assumptions are wrong? These three questions form an analytical perspective without presupposing that all SMEs have the same resources, face the same conditions and have the same path of internationalization.

Judgment of managers plays a key role within this approach. The issue here is not about whether or not to internationalize; the issue is about which commitments the firm can make and under which circumstances and with which partners. This means that the strategic sense of restraining may be equivalent to rapid entering the international market. In other words, managerial preparedness is about consistency between the opportunity and organization's capability to meet its commitments.

2.3. Entrepreneurial agility and proportionate formalization

Agility and formalization are other concepts that serve as grounds for interpreting the phenomenon of managerial adaptation. Agility represents responsiveness to changes, whereas formalization is the process of clearly outlining roles, processes and decision-making procedures. It is important to note that their connection should not be considered as a choice between entrepreneur freedom and bureaucracy. The question here is about

what activities need some stability and what decisions should remain dependent on the context.

Proportionate governance offers an adequate ground for such differentiation. In her paper, Mitrache (2025) considers how governance practices that are typically used by large companies could be applied to SMEs and microenterprises. She discusses the importance of transparency, accountability, financial and stakeholder management but rejects the concept of unified governance practice, which does not take into account resource constraints of SMEs and microenterprises. It makes the discussed concept of governance practices relevant for the discussion on organizational adaptation.

In the present context, the idea of proportionate formalization is the development of enough organizational structures to make international activities understandable, transferable and reviewable. The example could be the difference between allowing a manager to negotiate with a potential partner and providing evidence of all the obligations that the company has accepted. The first case provides the possibility to be flexible; the second one brings organizational responsibility into play. Those two concepts are complementary since organizational flexibility does not mean lack of clarity when talking about organizational responsibility.

Thus, professionalization is the development of organizational reliability without replacement of entrepreneurs. The main goal of this concept is to make organizations less dependent on undocumented individual knowledge but still maintain their initiative and flexibility. The required transformation is moving from a firm whose coordination is dependent mostly on individuals to the firm in which responsibilities and information could be easily shared. At the same time, it is important not to consider informal management as a specific Romanian concept.

2.4. Digitalization, responsibility, and the boundaries of the conceptual framework

Organizational approaches to internationalization require consideration of the interaction between technological developments and corporate responsibility. Spulbar et al. (2024) consider the connection between digitalization, ESG issues, and regional development via corporate action. The relevance of the research conducted by the authors resides in connecting digital transformation to a broader discussion about business responsibility; the focus on regionality in this study does not constitute a direct illustration of outcomes of internationalization by firms.

Here, digitalization is interpreted as one of the aspects of organizational capacity rather than as an independent reason for international success. The key theoretical issue raised by Spulbar et al. (2024) is related to the ability of technological structures to facilitate the flow of information, coordination, and accountability in line with the activities selected by a company. In addition, sustainable growth is seen as the ability of a firm to maintain international commitment without constantly exceeding its organizational resources. This approach should not be confused with environmental sustainability since the environment and social responsibilities can form part of the operational context in which a business acts.

All this makes it possible to adopt the perspective of internationalization based on alignment: opportunities for entrepreneurship should be consistent with resources, adaptability, and adequate organizational structure. The application of these principles to Romanian SMEs is a conceptual framework rather than an empirical characterization of this business category. The main point of view is that agility acquires additional value

when it is reinforced by organizational processes that ensure learning, responsibility, and performance of commitments.

3. Key Managerial Challenges in Cross-Border Expansion

Managerial problems arising from internationalization occur due to the interaction of external pressures and internal organizational limits. Regulatory pressures, unfamiliarity with customers' needs, or distribution problems do not result in the same outcomes for each company as their relevance depends on company resources, knowledge base, and coordination processes. Through a systematic literature review of 39 obstacles to exporting discovered in 32 studies, Leonidou (2004) makes a clear separation between internal obstacles including informational, functional, and marketing ones, and external obstacles related to procedures, governmental intervention, market situation, and wider business environment. The research proves that the influence of these obstacles is relevant to the specificities of the situation, rather than applicable to smaller firms universally.

Such division provides a good starting point for the analysis of Romanian SMEs while avoiding the generalization of them into one group. The managerial factors making cross-border complexity hard to manage will include the interpretation of administrative requirements, managing relationships, managerial attention allocation, and coordination of business and financial commitment. The importance of such factors is based on their interdependence, so the lack of development in one area raises demands on the others.

3.1. Administrative complexity and the interpretation of legal requirements

In connection with Romanian small and medium-sized enterprises (SMEs), the process of internationalization presupposes an important differentiation of involvement in the European Union (EU) Single Market and doing business with non-EU countries. According to the advice of the European Commission, while most of the products freely circulate within the EU Single Market, the requirements regarding products, obligations connected to particular classes of goods, and prerequisites of statistical reporting can still remain relevant. Trade of the EU and non-EU nations implies the existence of customs formalities. Hence, internationalization cannot be interpreted as a need for applying equally heavy administrative requirements in any case of border crossing; the requirements will depend on the destination, product, and transaction itself (European Commission, n.d.-a).

In this regard, the problem of management consists in recognizing and interpreting these obligations instead of following the same procedure in all cases of foreign transactions. The relevance of the differentiation mentioned above is especially obvious when the business decision is made without taking into account its administrative consequences. In this respect, some proposed delivery system can seem to be quite profitable but at the same time, there is a risk to stay uncertain about who is responsible for paperwork, transportation, and associated expenses. Under this conceptualization, the issue of administrative complexities becomes the organizational problem if there is no clarity concerning responsibility or timely provision of information to the decision-makers.

The example of VAT can illustrate the importance of transaction-specific approach to administrative issues. The differentiation of obligations depending on whether the transaction involves goods or services, whether the client is a business or private individual, and whether the transaction takes place inside or outside the EU is offered by the European Commission (n.d.-b). Hence, in this regard, geographical destination does

not influence the application of the appropriate treatment. In managerial practice, this means that the price, invoices, and other transaction features have to be considered according to the type of the transaction rather than usual domestic practice.

As an addition to this interpretative problem, the issue of digital decision-making systems arises. In this way, Spulbar (2026) examines the conditions under which legal framework influences the process of AI-assisted corporate governance and puts emphasis on accountability and organizational restrictions of the legally informed type. While the research does not focus on SME internationalization, the boundary identified by the author is important in this situation. Namely, any technological assistance does not mean the establishment of responsibility for decisions taken using such systems.

3.2. Cultural differences, communication, and relationship management

Cross-border business relations require interpreting expectations that are not entirely formulated within contractual agreements or official letters. According to the approach used here, cultural differences are discussed in terms of their effects on communication, negotiation and coordination. It is not about labeling each nation with certain behavioral patterns but examining what effects divergent expectations may have on the business relationship.

A sample problem is a misunderstanding that can emerge regarding the nature of what seems to be quite a simple obligation. One side sees the provisionally stated delivery date as provisional, while the other treats the date as the deadline. In addition, an informal promise can be regarded as satisfactory by one of the parties, whereas the other one considers it to be incomplete unless confirmed in writing. This is just a hypothetical example that helps illustrate how misunderstanding can occur even if the participants of the business relationship see themselves as cooperative and proficient enough.

This makes it clear why it is necessary to distinguish language skills from managerial communication. Even if the individuals involved in the business relationship are able to communicate using a foreign language, it does not mean that there is common understanding of specifications, obligations and procedures for escalation of issues. In terms of relationship management, the question is whether the parties are capable of translating communication into mutual commitments.

The dilemma of flexibility and consistency becomes particularly salient in cross-border business communication. Accommodation to the partner's request may help to maintain the good relationship but it may also make it difficult to trace responsibilities if too many exceptions are made informally. On the contrary, sticking to the procedure may make it hard to maintain the relationship when some flexibility is required.

3.3. Resource constraints and the concentration of managerial responsibilities

Resource constraints are not limited only to financial difficulties. According to the OECD (2023), skill availability, management systems, network connections, and the capability to leverage strategic resources become important in terms of SME development and their internationalization efforts.

In this case, managerial attention becomes a resource that is scarce and should be distributed between different tasks. Participation in international operations could imply different decisions related to partner selection, contract terms, production, transport issues, complaints of customers, and many others. In this regard, it becomes more complicated not just due to the overload but also because of the constant return to operational issues instead of strategic considerations.

This allocation strategy could be seen as one of the possible bottlenecks rather than an intrinsic attribute of all Romanian SMEs. It is possible to imagine an SME where the owner-managers approve any change of price, delivery conditions, and customer correspondence. On the first stages of operation, this could ensure some coherence but when transaction numbers increase and the situation becomes more complicated, it becomes more challenging to maintain this practice. Moreover, it can become one of the barriers to consistency even when the product is in high demand.

Access to outside experts cannot help here in many cases. First of all, any advice should be operationalized. The firm can receive the needed assistance from lawyers or accountants but still have no procedures to make sure that the relevant advice will be used by the salesmen, logistic partners, documenters, etc. The main difference here is the one between access to the expertise and ability to use it.

3.4. Operational coordination and financial exposure

The problems of operations and finance are interlinked with respect to international expansion. According to the OECD (2008), the main obstacles mentioned by SMEs are foreign distribution costs, problems connected with international business processes, and difficulties of payments. Thus, the possibility of international expansion cannot be analyzed only with the help of sales potential.

From the point of view of management, the foreign order is a set of interrelated commitments, but not a single commercial success. The production, documentation, transportation, confirmation of delivery, invoicing, and payment must be coherent and consistent with each other. The problems at one stage might influence the timing or costs of the whole process. In other words, the analytical problem goes beyond the completion of individual activities towards understanding and coordinating them.

One of the possible examples explains this connection. The order might seem profitable from the point of view of production and transportation costs of the SME; but the SME does not take into account the period of time when its money will be engaged before receiving payment. In case of delay in the delivery or mistakes in documentation, the cash flow will differ from the expected one at the negotiation stage. Although there are no numbers provided to show how often such situations happen, it is obvious that profitability and financial capacity of the SME should be estimated separately.

It leads to another question related to external partners. Their help with the transport, distribution or administrative problems can provide the SME with the competencies which it does not have itself. But the engagement of the partner does not mean the lack of coordination problem.

3.5. The cumulative nature of managerial challenges

The key problem is due to the fact that each of these problems could exacerbate the other one. Within the approach developed here, lack of information on the market could lead to wrong contractual agreements; unclear definition of responsibility could hinder the administrative response; and administrative delays could impose further pressures on the company's budget. These relations are propositions of analysis and not causality proven empirically using the case of Romanian SMEs.

The importance of this distinction is that it separates an external obstacle from an internal weakness. The company could have little control over an external requirement, but it could be different from others in the extent to which it clearly assigns responsibility for coping with the requirement. Similarly, the company could not make uncertainty

disappear from its international operations, but their organizational implications would depend, among other things, on the ways of information and commitment management.

This means that the internationalization management problem is one of coordination under conditions of scarce resources and imperfect knowledge. Administrative skills, relationship management, financial acumen, and discipline are not alternatives to entrepreneurship. Instead, they are the organizational prerequisites of entrepreneurship.

4. Managerial Adaptation: Digitalization, Professionalization and Organizational Learning

Managerial adaptation involves more than addressing individual problems as they arise. Within the conceptual framework developed here, it concerns the ability to turn experience into organizational arrangements that make international activities more manageable. The objective is not to eliminate uncertainty, which remains inherent in cross-border business, but to prevent recurring difficulties from requiring the same improvised response. Digitalization, professionalization, and organizational learning are considered complementary dimensions of this process: digitalization supports the management of information, professionalization clarifies how decisions are made and implemented, and organizational learning enables practices to change in response to experience.

4.1. Digitalization as an infrastructure for coordination

Digital technologies can support adaptation by improving the availability and use of information across organizational activities. The OECD's 2024 D4SME survey examines how digital tools help SMEs navigate short-term challenges and strengthen resilience, while also identifying continuing difficulties associated with skills and adoption. Its findings provide a basis for considering digitalization as an organizational process rather than a purchasing decision. However, the survey evidence should not be interpreted as a direct assessment of Romanian SMEs or as proof that adopting a particular technology produces successful international expansion (OECD, 2024).

For an internationally active SME, the relevant starting point is the coordination problem to be addressed. A shared record of contractual commitments, customer requirements, delivery milestones, and outstanding payments may be more useful than a sophisticated application that remains disconnected from daily work. The conceptual priority is therefore informational consistency: those responsible for a transaction should be able to work from an agreed and sufficiently current account of its status.

Remote management illustrates this relationship between technology and organization. Digital access to information does not, by itself, establish who must act when a delivery changes or a customer disputes an invoice. An effective arrangement also requires responsibility for updating records, criteria for identifying exceptions, and a clear route for escalating unresolved issues. In this interpretation, remote coordination depends less on continuous electronic supervision than on the combination of accessible information and explicit obligations.

Digitalization should consequently be proportionate to the enterprise's resources and activities. The OECD (2021) emphasizes that digital transformation requires complementary investments in skills, organizational assets, data management, and security. This supports an approach in which technological choices are evaluated alongside the capacity to implement and maintain them, rather than through their advertised functionality alone. For the present analysis, the implication is that a limited but

consistently used system may offer a stronger organizational foundation than multiple tools whose responsibilities and information flows remain unclear.

4.2. Artificial intelligence and managerial judgment

Artificial intelligence introduces additional possibilities for processing information and supporting decisions, but its managerial relevance depends on how it is embedded in organizational practice. Mitrache, Spulbăr, and Mitrache (2024) discuss the relationship between AI-enabled corporate management and intrapreneurship, emphasizing strategic alignment, resource allocation, and employee-driven innovation. Their analysis connects technological support with managerial structures and internal initiative, rather than treating AI as an isolated technical intervention.

Applied conceptually to SME internationalization, this relationship suggests a distinction between generating an output and accepting responsibility for its use. A manager might employ AI to prepare a draft customer response, organize preliminary market information, or summarize documents. These are illustrative applications, not evidence of their effectiveness in the Romanian SME sector. The relevant organizational question is what verification is required before the output informs an external commitment.

A proportionate approach would distinguish tasks according to their consequences. Assistance with an internal draft does not raise the same managerial concerns as reliance on an unverified interpretation of contractual or regulatory obligations. Within the proposed framework, the degree of human review should therefore reflect the potential effects of error, the sensitivity of the information involved, and the enterprise's ability to check the result.

AI-supported adaptation also requires room for employee judgment. If staff members identify recurring inconsistencies in customer documentation or operational records, technological assistance may help organize the information, but management must still decide whether responsibilities or procedures require revision. The purpose of adoption is thus not to remove judgment from the organization, but to improve the conditions under which informed judgment can be exercised.

4.3. Professionalization through delegation and proportionate procedures

Professionalization is understood here as the development of reliable decision-making and implementation practices. It does not necessarily require a large management team or the replication of corporate bureaucracy. For an SME, it may instead involve identifying which decisions require owner-manager approval, which can be delegated, and which circumstances justify escalation.

A practical expression of this principle is the separation of routine decisions from exceptional commitments. For example, a hypothetical enterprise could authorize employees to confirm deliveries within agreed contractual conditions while reserving changes to payment terms or significant price concessions for managerial approval. The analytical value of this distinction lies in preserving operational responsiveness without allowing employees to assume obligations beyond their authority.

Delegation must also be accompanied by access to information. Assigning responsibility without providing the relevant contract, customer history, or operational status would transfer a task without establishing the conditions for its completion. Conversely, providing access to information without clarifying authority may leave staff able to identify a problem but uncertain whether they can resolve it. Professionalization therefore requires alignment among responsibility, information, and decision rights.

External expertise can be incorporated on the same basis. Legal, accounting, or logistics advice becomes organizationally useful when someone within the firm is responsible for translating it into action. The proposed approach is not to seek specialist intervention for every transaction, but to establish when advice is needed, who obtains it, and how the resulting guidance changes operational practice. This allows selective use of expertise while retaining internal accountability.

Procedures should likewise be judged by their contribution to reliability. A concise checklist that prevents repeated omissions can serve a clear purpose; a reporting requirement that does not inform any decision may add administrative work without improving control. The objective is disciplined flexibility: consistency in essential commitments, combined with discretion where adaptation remains necessary.

4.4. Organizational learning from administrative and operational difficulties

Experience becomes a managerial resource only when it changes how the organization understands or performs its activities. Argyris and Schön's (1978) theory-of-action perspective provides a foundational account of organizational learning and the relationship between inquiry, action, and organizational change. It directs attention beyond individual knowledge acquisition to the conditions under which learning becomes part of organizational practice.

For Romanian SMEs pursuing international opportunities, this perspective offers a way to interpret administrative and operational setbacks without romanticizing failure. A delayed delivery, an incomplete document, or a misunderstood specification does not automatically produce useful learning. Its value depends on whether the firm identifies what happened, examines the assumptions behind the decision, and incorporates the lesson into subsequent activity.

A hypothetical documentation error illustrates the distinction. Correcting a missing field may resolve the immediate transaction. Examining why the omission occurred may reveal an unclear handover between sales and administration, an outdated template, or an unrealistic assumption that an external partner would complete the task. The first response repairs the immediate problem; the second creates an opportunity to revise the organizational conditions that produced it.

Within the proposed framework, a proportionate learning routine would involve recording consequential incidents, identifying contributing factors, assigning responsibility for corrective action, and checking whether the revised practice is used. The purpose is not to document every minor inconvenience. It is to prevent knowledge gained through difficult experiences from remaining confined to the memory of the person who handled them.

4.5. An integrated approach to managerial adaptation

Digitalization, professionalization, and learning become mutually reinforcing when they address the same organizational problem. A shared digital record can make a recurring discrepancy visible; clear responsibilities establish who investigates it; and a learning process determines whether the underlying practice should change. Conversely, technology without responsibility may reproduce confusion more quickly, while procedures without review may preserve arrangements that no longer fit the firm's activities.

The following sequence summarizes the conceptual approach proposed here:

- Identify a recurring difficulty or a significant exposure associated with

international activity.

- Clarify the information, responsibilities, and decisions involved.
- Introduce a proportionate procedural or technological response.
- Review its use and revise it in light of experience.

This sequence is an analytical proposal, not an empirically validated model or a universal implementation formula. Its relevance depends on the firm's size, resources, sector, and form of international engagement. Its central principle is alignment: entrepreneurial responsiveness becomes more sustainable when information systems, decision rights, and learning practices support the commitments the enterprise chooses to undertake.

5. Conclusions

In conclusion the findings explores the internationalization of Romanian SMEs not as an expansion of sales outside national borders but as a transition in terms of managerial and organizational capabilities. Specifically, there are two distinct stages of internationalization: the discovery of a market opportunity abroad and the ability to maintain the commitments it makes possible. The former requires an entrepreneurial drive; the latter involves systematic decision making, access to information, clear responsibilities, and the ability to learn based on experience.

The analysis covers several aspects of SME internationalization: administrative, relational, operational, and financial, bringing them together in a managerial framework. These challenges cannot be generalized for all Romanian SMEs or treated as separate obstacles with equal consequences. Their relevance depends on the resource level, sector, targeted markets, and mode of international activity of the firm. Particularly, the administrative requirements should not be presented as automatic increase in bureaucracy in a new country; instead, they should be differentiated based on the type of transaction and regulation. The general managerial question here is how external complexity interacts with internal weaknesses, including unclear responsibilities, fragmented information, and too much dependence on interventions made by the owner-manager.

One of the main implications of this conceptual framework concerns the interaction between agility and organizational discipline of the firm. There is no need to see these qualities as mutually exclusive alternatives. It is possible to keep agility to be responsive to customers and partners, while introducing some formalization to make the firm's commitments more coherent and responsibilities clearer. Thus, professionalization does not have to imply that the firm gives up its entrepreneurial approach and replaces it with a number of complicated procedures; instead, it implies the creation of the necessary organizational structure allowing the firm to act consistently without the involvement of the owner-manager at every stage.

Digitalization is seen in this paper as the means of support for the transition process and not as an independent way to international success. Its managerial value is in its ability to help the firm with the necessary information and coordination. Also, the results of work with artificial intelligence require proper verification and attribution of responsibilities to inform the firm's decisions. Technological implementation becomes relevant only in combination with necessary skills, decision-making rights, and working procedures; otherwise, it may not solve the firm's organizational problems.

Organizational learning is the link between the solution of current problems and the firm's adaptation. Correction of an administrative mistake or solving a delivery conflict solves the current transaction, but does not help the firm to deal with the next one.

Organizational learning implies examination of the underlying assumptions and structures that led to the problem and incorporation of lessons learned in the practice. This way, the transition from the survival-oriented reaction to disciplined growth implies the transfer of experience beyond the person who solved the problem. For managers, the implication for practice is to evaluate international opportunities with regard to the firm's ability to live up to its commitments. It implies clarification of responsibilities, separation of routine tasks from special cases, selective use of specialist advice, and examination of recurring problems. The degree of organizational structure required varies, but its purpose remains unchanged: to preserve the entrepreneurial ability of reaction while reducing unnecessary ambiguity and improvisation.

The contribution of this paper is in the integration of the discussed relationships into the conceptual framework for Romanian SMEs' internationalization. The limitation comes from the same feature. This paper does not provide any information about the prevalence or importance of certain barriers, their causal effect or diversity of the Romanian SME sector with the help of empirical data. Future research can analyze how the described relationships vary depending on the sector, international experience, and destination markets. Comparative case studies, interviews with managers or longitudinal research can examine whether and how delegation, digital coordination, and learning practices change along with the international activity of the firm.

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ORIGINAL PAPER

The presidential advisers in Romania. Recruitment process

Radu Cupcea[1)]

Abstract
The Presidential Administration is a pivotal political institution within the Romanian state mechanism. Despite its importance, the President's entourage remains largely under-researched by social scientists, a gap resulting from both the scarcity of dedicated studies and inherent biases within existing literature. Current analyses prioritize the presence of high-ranking civil servants while rarely offering a qualitative perspective. Utilizing a mixed-methods approach, this article draws on semi-structured interviews conducted with advisers at the Cotroceni Palace who served between 1990 and 2025. It examines professional trajectories, recruitment processes, the adviser-president relationship, and the impact of politicization. Ultimately, this study highlights the dynamics of presidential entourage formation and seeks to establish a framework for future large-scale qualitative research.
Keywords: *presidential advisers, policy advice, professional profile, recruitment processes*.

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The existence of political advisers is as old as politics itself. In an already-published scientific article (Cupcea, 2024), we presented numerous sources from antiquity that give us clues about the existence of wise and faithful people who were positioned next to the leaders in order to provide them with advice, and analysed information from the fields in which they had expertise. We also need to recognise that the relationship between leaders and advisers is a familiar theme in the academic societies of Western Europe, and that it has been a focus of classical political thinking. In early modernity, the theme was taken up by the genre of writing called "speculum principis" or "the mirror of princes", which aimed to advise princes on how to rule.

However, in their contemporary embodiment, the presence and manifestation of advisers in the activity of political leaders is vastly different from classical understanding. We identify political consultants, presidential advisers, ministerial advisers, and parliamentary advisers. We divided the presidential advisers into "American-type" presidential advisers, who we meet in the staff of the President of the United States of America, "French-type" presidential advisers, present in the process of exercising power at the Élysée Palace, and the presidential advisers from continental Europe, where this phenomenon is of recent date.

The typology of advisers, as you may have realized, derives from the type of governance. France, where the type of political regime now called "presidential" initially originated, has a directly elected president who enjoys significant power, and is a country described as a "presidential monarchy" (Duverger, 1974), with a president whose influence is unparalleled in other democracies. (Martigny V, Peters, BG.)

In the United States, where the office of president was invented and subsequently disseminated, the person elected by the voters exercises centralised political power in the absence of a prime minister.

Against the backdrop of such power, unparalleled in other democracies of the world, the leaders of the French and American presidential administrations were determined to hire reliable, loyal and responsive advisers, to whom they would entrust a part of their power. An unparalleled fact because "most of the other Western democracies are parliamentary regimes. In some, although nominally headed by a president, the president plays only a protocol role and consequently the same role belongs to any advisers he might have." (Alexe, Barbăroșie, 2012). However, some states have been inspired by these two major governance models - and implemented them and adapted them. Federal Brazil is a good example of a regime that drew inspiration from North American presidentialism. In Europe, the French model inspired Portugal and former Communist regimes such as Romania, Poland, Ukraine, the Republic of Moldova, the Republic of Belarus or other ex-Soviet authoritarian regimes in Central Asia.

Returning to the way we define the people in the President's entourage, a definition that I have chosen to assign to the "presidential adviser" and which was inspired by the method Richard Shaw used in the case of the "ministerial adviser" (Shaw, 2023:3), is that of a public servant temporarily appointed by the president to provide party-political advice, and who is free from the requirements of political impartiality that apply to permanent bureaucracy. The notion of presidential adviser is not the same as what we call a political consultant, because "the term political consultant refers to political agents specializing in winning elections, who appeared and developed over the last half century, and were employed due to their experience in the specific field of political campaigning." (Dulio, 2004: 5) and (Védrines, 2025). I also chose not to identify them solely as political advisers to the president - because the work of a person in this position involves much

more than offering political advice. Sometimes, depending on their specialization, advisers provide the president with technical or specialised advice. Some conclusions drawn from the study of the historical occurrence of presidential advisers claim that these would be the people in charge of "putting power into action" (Martigny V, Peters, BG. *Ibid*.).

Depending on the country, system and regime, the objective situation of the presidential advisers is therefore certainly not identical. However, one observation is universal: advisers of state leaders are found at the highest levels of political power in all contemporary states, and in a much larger number today than a century ago.

In Romania, the presidential institution was established on March 28, 1974, when Dictator Nicolae Ceaușescu wanted to go abroad and present himself as a real head of state, not as a mere party leader (Despa, 2025). After the fall of the Communist regime, the provisional leadership took over the presidential duties (through Ion Iliescu). 1992 was the first year in which presidential elections were held in Romania. Since then, according to the constitutional provisions in force, the President of Romania operates in a rather semi-presidential political regime.

As in most of the newly-democratised Central-Eastern European states, it became the established norm that the president, prime minister and ministers should surround themselves with teams of "personal advisers", whose number varied between three and over ten - people with solid or highly politicized professional profiles (this does not exclude, however, their subsequent and sometimes very speedy appointment to high administrative positions in countries where political patronage or even shameless kinship systems reign) (Dulong, D., France, P., Le Mazier, J., 2019).

Regarding these advisers, after thirty-five years there are some simple research questions to which the public and academia expect an answer – or at least a nuancing of the answer they have in mind. The first one is - how are presidential advisers recruited in Romania? Another question regards the key criteria that leaders who won the presidential elections took into account when building their teams at the Cotroceni Palace. From what professional backgrounds do advisers and counsellors in the presidential administration come? Were these people known beforehand by the person who became president, or was it simply a political lottery? The answers are important and necessary in order for the public to understand the typology elected leaders in Romania are looking for when selecting staff able to carry out their mandate. At the same time, any persons who aim for the position of presidential adviser will by the end of this work be edified, I hope, by the methods of presidential selection, because we all realize very well that there are no fixed, predetermined criteria in this field.

How do you become a presidential adviser in Romania? Recruiting

In the case of the first presidential team, things were the exact opposite of what happened later. It was the first and last time the advisers came to the President, and it was not the President who sought the advisers. At that time, there were not many options available on the Romanian socio-professional market. President Emil Constantinescu was the first leader who had the opportunity to choose graduates of higher education in the West. President Ion Iliescu, in his first "transition" mandate and taking into account his

previous political career, could only choose a team made up of "*apparatciki*",[2] as one of his advisers defined himself. (Interview No. 2)

The group of experts within ADIRI,[3] whose members worked in Cotroceni, consisted of two sociologists, two lawyers, an engineer, a military historian and an economist specialising in foreign trade. This group, in addition to concerns about "Romania's accession to the Western world" and questions it asked itself during the events that preceded the transition of power, was mainly concerned about access to the forefront of Romanian politics. Desire for political affirmation prompted some of the members of the association to send a letter to the president of CFSN,[4] Ion Iliescu, with a series of observations and suggestions on the direction of the post-Communist Romanian state. The President found the contents of the letter attractive and invited them to become his advisers. "*We were a group and we stayed that way. At one point he [the President] wanted to get to know us after reading something we had written, and we stayed together. Most of the members of this group were his advisers."* (Interview No. 2).

Collaboration in this format did not last very long. The presidential term was limited, the challenges were great, and the struggle for power and for influencing the economic and external path of the country proved even greater. Differing views on the process of governing had also affected the President's relationship with his team of advisers. After about two years, the first team of presidential advisers gradually left the presidential administration, considering, through the voice of its leader, that "the experience of the first team of the Presidency, immediately after the Revolution, more precisely after the first free elections, has no equivalent and no consequences in the following period." (Interview No. 1). Of the seven, only two stayed with President Iliescu at Cotroceni after the 1992 elections - sociologist Iosif Boda and engineering professor Marius Guran. The second presidential team was built around Boda, whom Ion Iliescu appointed Head of the Presidency's Internal Policy Department. This time, President Iliescu hired former General Vasile Ionel as an adviser to the Department of Defence and National Security; having studied at the Military Academy of the USSR, the latter had already been compromised by accusations of being a GRU collaborator (Idem). Career diplomat Traian Chebeleu was appointed Foreign Policy adviser; he also held the position of presidential spokesperson, without possessing any qualities for such a position. The Department of Economic Affairs and Reform saw the appointment of Mișu Negrițoiu, an economist with experience both in the country and abroad, who was active in the party established by the President and took part in government policies during the transition to the market economy. Professor Marius Guran continued to advise the president on matters of science, education and culture; and an electronics technician who became known during the demonstrations of 21 December 1989 in the University Square in Bucharest, Iosif Dan, was invited by Ion Iliescu to advise him on domestic policy matters, after Iosif Boda left for an ambassadorial position.

The second presidential team was built by the President of Romania taking into account, even more than the first time, his ties with the past - and with a clear emphasis

[2] A familiar Russian term, which referred to a functionary or paid activist of the Soviet party or government "apparatus", who held an important, but not first rank, leadership position.

[3] Abbreviation for the Association of International Law and International Relations, established in 1966, bringing together university and diplomatic elites from the Socialist Republic of Romania.

[4] Council of the National Salvation Front.

on domestic politics. He managed to keep Boda and Guran, while relying on the organizational experience and notoriety of some of his new advisers, even though this was quite controversial in those tumultuous times. He assembled a mixed team of people who had never worked together before. Except for the presidential adviser for Education, who he would retain during his next term, Ion Iliescu did not have a brilliant mandate, mainly due to the fact that he failed to co-opt the most well-informed and experienced "*apparatciki*"; he lost the elections of 1996.

The Rector of the University of Bucharest, Professor Emil Constantinescu, managed to win the 1996 presidential election. He had been advised since 1992 by actor Mircea Diaconu, who pursued "the strategy of turning the little-known teacher with a common name into a friend of the voters" (Voinea, Delcea, 2014). Supported during the election campaign by numerous people from civil society - from the fragile private business environment timidly being built to the Romanian Democratic Convention (CDR) - the new president remained focused on building his team using people from these groups. A fragment from the contemporary press reiterates this: "... the new head of state appointed his close friends, who were part of the campaign staff, to lead the main departments within the Presidency. Among them, Zoe Petre, Dorin Marian, Petru Berteanu, Mugurel Ciuvică, Cătălin Harnagea, Gheorghe Huiu." (Câmpean, 2000). The personality around which President Constantinescu started building the team was his colleague and friend, historian Zoe Petre. He carried out almost all his political actions in tandem with this lady. He appointed her to the position of presidential adviser on Domestic and Foreign Policy Issues to the President of Romania and coordinator of the Public Policy Department of the Romanian Presidency as soon as the election results were announced. In the presence of his history-specialised adviser, President Constantinescu continued the appointments. They took place in a noncommittal way, in the office of one of the non-governmental organizations that the two professors of the University of Bucharest had established.

*"*The evening before the official enthronement of the new President, there was great agitation at the headquarters of the Romanian Foundation for Democracy on Splaiul Unirii. A short while ago, at his request, I had opted for the position of presidential adviser, over that of Minister of Public Works." (Căpăţînă, 2002:61).

Negotiations on the division of functions had already started after the 1996 parliamentary elections, which the Convention had won. For this reason, despite the high demand - as many were all too willing to participate in the governance of the country - leader Constantinescu had enough positions available and ready to be distributed to those who had backed him in the process of obtaining political power. The president's main problem was that citizens' expectations were very high; and people trained in democratic governance and experienced in the political field were non-existent.

Inventorying President Constantinescu's team, we find the following data: a history teacher highly involved in civics, a geological engineer who had studied Political Science in the United States of America, an ex-engineer re-furbished into journalism, two lawyers, a medical graduate turned businessman and a civil engineer who advised him without any remuneration. All of them had been selected by Romania's second president, to form his team of presidential advisers. Other persons, either from CDR or from university backgrounds, were subordinated to them. President Constantinescu was looking for people who had not been part of the political apparatus of the former Communist state, preferably with studies outside Romania or active in an academic environment and the

field of private business. These were the criteria which the third President of Romania employed to engage those who would assist him.

"Emil Constantinescu had previously been a university Rector and had supported the emergence of our Faculty of Political Sciences, and in his mind the faculty had to educate not only specialists in the interpretation of the political phenomenon, not only academics, but also senior public officials. In fact, he brought to Cotroceni, right from the beginning, people who had been my students. They were hired even before me." (Interview No. 3).

With Ion Iliescu, the selection constraints were not very high. He looked for trained and experienced people from either the party apparatus or from higher education institutions which had prepared political cadres for roles within the former regime, many of them with training periods abroad. With Emil Constantinescu, however, things were more complicated due to constraints related to public perception. He adopted a distancing from the old, politically experienced staff, preferring to keep those Cotroceni officials already employed during the time of Ion Iliescu, and to hire some more additionally. More and more new state counsellors coming from university departments, national and Western academic media, and NGOs were invited to be part of the Constantinescu Administration.

The consequences of such recruitment were numerous. Two of them are worth noting. The first consisted in the fact that the shift in power in post-communist Romania was put into practice at the Cotroceni Palace too. The second consisted in the fact that during the presidential mandate of 1996 – 2000, the type of work done and the actions taken were almost all chaotic.

"It was something new for us. Because you realize that at that time we really came from civil society and had no connection with the administration, especially since there was still this kind of enclosed administration from Ceaușescu's time, and with mentalities left over from that time. We really went there, each of us minding his own business, and did not get included into the rhythm of those already in office. We made our own organizational charts and job descriptions somehow. So - seeing and doing." (Interview No. 4).

The recruitment process remained and has not altered up to the current president, President Dan. Some of these people were appointed on political grounds because they provided support to candidate Constantinescu, and their lack of expertise in public administration and political life did not matter at all. Most of the staff had never been involved in politics before. Zoe Petre described the phenomenon in detail:

"The team was set up in part with those who had remained active in supporting Emil Constantinescu between 1992 and 1996" (Vancu, Ungureanu, Șerban, 2016).

A female adviser was also involved in the process of recruiting President Traian Băsescu's first team of presidential advisers. Her name is Ana Adriana Săftoiu, and at that time she was a deputy in the Democratic Party (PD). Before being called by the President, Ms Săftoiu had graduated from the Faculty of Letters, worked as a journalist for the press agencies ROMPRES and MEDIAFAX, served as Secretary of State and spokesperson for the Government, then worked as Cabinet Director for the Minister of Transport, Traian Băsescu (2000-2001). Her career in the field of political communication was growing, and being active in the electoral campaign for the local elections greatly helped her from a political point of view. The phone call from the president, which is what many of the interviewees said happened, did not come out of the blue.

The possibility of being called and invited to be part of the presidential team

increases if: 1) you are a member of the president's party, 2) you have worked with the president before or in his campaign, 3) you have a consistently expanding career and have made sure the public knows about it, 4) you share the same political ideology or are part of the same professional group as the president, 5) you have been recommended by someone in the president's entourage - or the president has simply noticed you by chance. It can be either all or just one of these possibilities, as far as I could see from the interviews I conducted. In the case of the Băsescu Administration, the recruitment was carried out in a direct manner and from an authoritarian position:

"He asked me if I wanted to go to Cotroceni. I was an elected deputy on the lists for Bucharest. I made no special effort towards this nomination. I was included on the lists when I was on vacation – the first holiday in three years, in the summer of 2004, after the City Hall campaign and supporting the PD in a complicated opposition. I answered "yes". "Then, after you take the oath, you resign. Who takes your place?" he asks. I have no idea "You make another man happy too." "Someone else", he continued. "Let's go the other way," I say. And we start to work on the function flowchart. For the post of national security adviser, he proposes Vasile Blaga. For me, very good news. At last, a man I know in the unknown world that opens before me." (Săftoiu, 2015: 27-28)

In his two terms as president, Traian Băsescu appointed and replaced approximately 29 presidential advisers. During the 10 years of his mandate he was the one who increased the organisational flowchart at the Cotroceni Palace from 6 to 10 departments, appointing a presidential adviser and several subordinate state councillors to each of them. In addition to the already existing departments, new departments for Public Communication, Education and Research, Public Health, Planning and Policy Analysis were created; the Planning and Policy Analysis department was different from the former Internal Policy Department, which was renamed as the Department for Relations with Public Authorities and Civil Society.

As with President Constantinescu before him, President Băsescu recruited as presidential advisers people from his narrow political circle with whom he had won political battles, as well as professionals from academia or civil society who had not been involved in politics until then. He started with two journalists, an engineer from the Democratic Party, an economist-politician who had withdrawn from the electoral race in his favour, a human rights lawyer and a philosopher known to the general public. The rotation of the staff around Mr. Băsescu took place permanently, and most of the people he recruited at the Cotroceni Palace were subsequently appointed to strategic positions in the state, heads of diplomatic missions or political positions in the parties he influenced - the Democratic Liberal Party (PD-L) and the People's Movement Party (PMP).

In an attempt to outline a profile of the people who President Băsescu sought out and invited to be part of his team during his two terms in office, I will say from the start that he was interested in intellectuals with high visibility in the public arena, who criticized the Social Democratic Party, usually without them having been active in politics or having shown any ambition to become party leaders. He was also interested in experienced diplomats or career military personnel. Here, for example, is the recruitment process of the civil society adviser on constitutional and legal matters, a woman coming from civil society:

"One day I simply received a phone call from Traian Băsescu, whom I did not know. He was already the President of Romania, but his voice was unmistakable. I remember it was in the afternoon, towards evening, and he told me that he would very much like me to be a presidential adviser. I said yes, but we still need to meet and talk. It

was kind of a yes, we need to talk, but he was going to take the oath quickly. I admit that the next day I went to the Bucharest City Hall where I met him and that was it. (Interview No. 5)

Very few of Traian Băsescu's councillors had been politicians before their appointment. With the exception of Vasile Blaga, Theodor Stolojan and Mihai Stănişoară, all the presidential advisers became politicians only after they left Cotroceni Palace. Data from interviews reveal that President Băsescu usually noticed someone during meetings he was attending, or following reports he was reading; then he was in the habit of contacting that person and make him an offer to join his team at Cotroceni.

"The President didn't know me before becoming president. I got a phone call at some point where I was told he wanted to meet me. I went to a meeting with several intellectuals. There was a wider discussion, after which I received another call and was asked if I wanted to join the presidential administration. It's not something to turn down, so I accepted". (Interview No. 6)

Described during the interviews as a leader who read most of the documents put in front of him very carefully, President Băsescu had moments when he met and debated with people outside Cotroceni who had drawn up analyses on foreign policy issues or international security issues. Subsequently, in some cases, he asked the people concerned to become his presidential advisers or permanent state advisers.

"I was working with the Presidential Administration at the level of the National Security Adviser and the Foreign Policy Adviser, with Anca Ilinoiu and Iulian Fota. The President called me regularly, let's say even once a week, to discuss different issues. … He invited me to Cotroceni. He said that he needed this alternative opinion, because that's what he was always looking for, and that he needed to have this kind of expertise every day." (Interview No. 7)

Despite displaying openness towards varied expertise opinions and an appetite for oppositional debates with his own advisers, we found that the frequent changes within this administration, either through resignation or through transfer to other positions within the state, were due to the difficulty of working with Băsescu as leader. At the same time, Mr Băsescu preferred to reward loyal advisers with elevated positions.

President Klaus Werner Iohannis came the closest to matching the Băsescu administration in terms of the number of presidential advisers recruited to Cotroceni Palace. According to the data we were able to gather, a total of 21 people were appointed to these positions during his administration. It started with two politicians with political experience from the National Liberal Party (PNL), where he also hailed from; with an economist who had advised him during the election campaign; with a female writer working for the press; and with a historian who was close to the Liberals. A total of six presidential adviser positions that he constantly tried to keep in the organizational structure, only replacing the office holder, as needed. Unlike Traian Băsescu, Klaus Iohannis preferred to get to know his advisers better before hiring them. Klaus Iohannis usually sent the invitation after several work meetings, numerous discussions and a period of so-called probation - and only if he was attracted to the ideas and behaviour of the person he was targeting.

"I met him in my position as a 'Political Specialist' at the US Embassy in Bucharest. We interacted several times in preparation for the visits of some American diplomats to Sibiu. In 2014 we discussed the possibility of me joining his team of counsellors. I responded positively to his invitation." (Interview No. 8)

During this administration, a large part of the team served as state counsellors at

Cotroceni, and only after working closely and satisfactorily with the President were they offered positions as presidential counsellors.

"I did not know the President beforehand. The recommendation came from my colleagues in the health field. He wanted to meet me, I had an interview and after the interview he invited me to be part of the team of advisers. At that time I was, at least during my first term, a state counsellor; later, during the second term, I was appointed presidential counsellor. (Interview No. 9)

Counsellors Simona-Livia Maftei, George Vladimir Duhan, Anișoara Ancu, Ioan Oprișor, Diana-Loreta Păun or Delia Dinu all went through this process. This president cared a lot about the professionalism of those he recruited, but also about the professional experience of future advisers. Experiments were not part of President Iohannis' style of selecting and leading. For this reason he relied, like his predecessor, on career diplomats grounded in central and European administration who also held political positions, selecting them without taking into account whether they had previously been part of the team of a prime minister of a different political colour. For President Iohannis, what mattered about being an adviser was the ability to keep things under control immediately, without any adaptation period. The adaptation was intended only for those who performed the function of state counsellor.

"In the case of President Iohannis, before the vote, before the start of the electoral campaign, he asked me if I wanted to be his adviser on European Affairs. I said yes. Obviously, this depended on the outcome of the elections, but later I said yes and the deal materialized." (Interview No. 10).

If you had previously been a presidential adviser, if you were a minister, deputy, senator or secretary of state - even from the Social Democratic Party - but you had achieved political results and significant experience in politics at that time, you qualified for the role of adviser to President Iohannis. This selection grid resulted from the fact that President Iohannis did not have a rich experience in national politics; and also, most likely, because he needed to be surrounded by safety and tranquillity. Experienced people could provide him with the stability he needed. Consequently, the fields where the advisers of the Iohannis Administration came from were mainly legal and diplomatic, comprising people from state institutions, with just three exceptions of persons coming from outside state institutions.

A slightly different case of organization, though not of recruitment, is represented by the Dan Administration. The VII-th President of Romania has surprisingly increased the number of presidential advisers within the administration - from six advisers to eleven. The organizational chart of any presidential administration in Romania had never had more than seven presidential advisers at the same time. If we also take into account the state and honorary counsellors, President Dan has a total of 29 official counsellors, the largest number of people employed at the same time to assist the Head of State in the exercise of the five-year mandate.

In terms of recruitment and the areas from which he selected his advisers, President Dan relied on a person with diplomatic experience that he had known for a long time, and invited two university professors and three old-guard politicians to join him. Among the political advisers, it is worth pointing out that Dacian Cioloș has close relations with people within the political circles of the French Republic; Ludovic Orban massively supported Mr. Dan when he ran for the City Hall of the Capital, as well as during the presidential campaign; and the third, Eugen Tomac, also collaborated with President Dan and worked effetively with former President Traian Băsescu, being perceived as one of

his disciples. At the same time, President Dan invited a specialist from the Romanian business environment as well as several lawyers to join his team - all, former collaborators, in various fields, from the General City Hall of Bucharest. Most of them were called and offered positions on the team only after he was elected to office. He knew them all very well beforehand, and had negotiated with them previously.

"I had spoken to the President a few times before, when he was the Mayor of Bucharest and I think we had spoken to each other on the phone a few times following some public statements of mine. I remember that at one point the President had called me and asked me to explain to him about the VAT gap and what should be done. We had two phone conversations like this. He is the kind of man who, when he wants to understand somehting, he calls." (Interview No. 11)

Analysing each appointment made by President Dan, we can highlight the fact that he relies on a team of former collaborators from the time when he was Mayor, people with positions in the administration, and several experienced political figures; counting on continuity, loyalty and expertise in the management of the state apparatus. He did not manage to work with Ludovic Orban for more than a month because of some political statements that Orban made - proof that there is, however, a big difference between being a politician and being an adviser on domestic policy issues. The roles are similar, but the qualities required for the two political positions differ greatly. President Dan has recruited more people who have built a career outside state institutions than his predecessors did. He has four honorary counsellors, two of whom are MEPs.

Conclusions on the profile of recruited presidential advisers

Summing up the data I have collected from interviews and from the database of all the people who have been appointed as presidential counsellors since 1990, I have tried to outline a social profile of the people in the presidential entourage.

I took into account their social origin and used the classic indicators of studies, profession and workplace from which they come, and this observation highlighted a very small number of counsellors from the private sector (business owners, professionals and senior managers from the private sector). We found an under-representation of the private sector of about 1 in 10, which can be explained by the fact that Romania was part of the Communist area, where the private sector of the economy accounted for only 12.8% of gross domestic product in 1989.

Centralized data reveal that almost 9 in 10 presidential advisers in these 36 years came from a state position before their appointment, while just over 1 in 10 came from either the private sector or from civil society, as broadly defined by Alam, Martinache and Nollet.

Regardless of the period or political orientation, the Romanian presidential administrations recruited mainly from the state bureaucratic and academic elite: zero counsellors from the private sector in Ion Iliescu's first period, with the first notable appearance of counsellors from the private sector under Emil Constantinescu (almost 29%) and the Dan administration (currently); Iliescu's 2000–2004 mandate recorded the highest combined share of private plus mixed (~35%), signalling a relative diversification compared to the 1990s. The two longer administrations, Băsescu and Iohannis (10-11 years each), had similar patterns: around 77-86% state, 14% private.

Regarding the educational trajectory of the respondents, a relative balance between occupational categories is observed. Presidential advisers in Romania

overwhelmingly have higher education. There is only one case of a presidential counsellor with just secondary education (Dan Iosif). Counsellors with a legal background predominate — almost a quarter of those who have held or still hold this position have studied law, which reflects the central role of counsellors on legislative/constitutional issues in the Romanian Presidential Administration. Engineers, economists and diplomats form the second important group, each around 13-15%, representing a significant proportion of the technical/economic profile alongside that of foreign policy. The military and historians have a constant presence (~7% each), especially in posts related to national security, defence and domestic politics. The combination of lawyer and diplomat appears several times (Traian Chebeleu, Cristian Diaconescu, Bogdan Aurescu), suggesting that legal training is often a bridge to a high-level diplomatic career. Here it is worth mentioning that the Faculty of Commerce, within the Bucharest Academy of Economic Studies, was the place where most foreign policy advisers were trained (Luminița Odobescu, Anca Ileana Ilinoiu, Lazăr Comănescu, Ioan-Mircea Pașcu), having a high share in recruiting and training staff for state institutions both during the Communist regime and after its change. The School of the Academy of Social and Political Sciences was also a place where the first teams of presidential and government advisers came from. Another thing that caught my attention is that a large number of presidential advisers graduated from the National College of Defence, in addition to their basic studies (Iulian Fota, Dorin Marius Marian, Vasile Blaga, Mihai Stănişoară, George Scutaru, Bogdan Aurescu), and some of the respondents were professors in this institution of political-military education (Sergiu Tudor Medar, Cristian Diaconescu).

Unlike the previous division by state - private - mixed categories, in terms of educational background we chose to place the same counsellor in several categories of studies, because many counsellors have completed studies/training in several fields (for example Ioan Talpeș is both historian and has a military background; Cristian Diaconescu is both a lawyer and a diplomat).

In one sentence, the blueprint of the presidential adviser in Romania looks like this: he has higher education, he has built his professional career inside the state, he has completed his studies in various state educational establishments, he has political ideas similar to those of the president, he is loyal and aims to be appointed to a position of constitutional judge, ambassador or minister before his mandate is finished.

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ORIGINAL PAPER

Governing ESG Claims about Artificial Intelligence: Evidence and Institutional Accountability

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Abstract:
Organisations may document the use of artificial intelligence (AI) without substantiating the environmental, social or governance (ESG) benefits attributed to it. This article examines how public claims about AI can be assessed and connected to institutions able to demand explanations and corrections. A purposive conceptual synthesis draws on sustainability reporting, ethical assurance and algorithmic accountability. The analysis distinguishes implementation, technical capability, attributed ESG outcomes and broader sustainability contributions. It specifies four evidential judgements: substantiated as stated, supportable only after qualification, undetermined and contradicted. The original assertion is assessed before any revised wording is considered, so that a defensible narrower statement cannot erase a contradiction in the initial claim. Three hypothetical cases examine environmental efficiency under changing deployment conditions, average social improvement alongside subgroup harm, and governance assurance based on confidential evidence. They illustrate why support depends on the outcome, population and period asserted, and why restricted public access can coexist with independent verification. The contribution is a claim-level adaptation of assurance approaches that connects evidential judgements to disclosure responses while assessing institutional answerability separately. Its practical usability remains untested. The framework provides a basis for examining both the justification of an ESG assertion and the distribution of authority to challenge its public use.
Keywords: *artificial intelligence; ESG disclosure; substantiation; institutional accountability; ethical assurance; greenwashing.*

JEL Classification: G34; M14; M42; O33; Q56.

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1. Introduction

An organisation can accurately report that it uses artificial intelligence to monitor energy consumption while leaving its environmental contribution unestablished. Monitoring, reliable prediction and reduced consumption are different achievements. A disclosure can move between them without explaining the additional inference. The same difficulty arises when a technical result is presented as evidence of fairer access, safer work or more effective oversight. Readers must assess what the evidence supports and whether anyone can require the organisation to reconsider its interpretation.

Sustainability reporting research distinguishes organisational activities from their measurement and communication (Christensen et al., 2021). Studies of AI-assisted reporting examine opportunities for analysis alongside the risk of persuasive but misleading disclosures (de Villiers et al., 2024; Moodaley & Telukdarie, 2023). Our concern is AI as the subject of an ESG claim, regardless of whether people or software prepared the disclosure. The problem is what an organisation is justified in saying about AI's contribution and who can demand an explanation when that justification is challenged.

Existing research provides substantial foundations for this inquiry. Sætra's (2023) AI ESG protocol connects impact assessment, information and responsibilities. Burr and Leslie (2023) develop ethical assurance through structured argumentation. Pittz's (2026) editorial places AI governance and ESG assurance within a shared research agenda. Building on these approaches, we examine how the scope of a particular public assertion affects the evidence it requires and the response warranted when that evidence is incomplete, qualified or contradictory.

The research question is: *How should AI-related ESG claims be assessed against the available evidence, and what institutional arrangements allow those assessments to be challenged and the claims to be corrected?*

The framework separates evidential status from institutional answerability. It distinguishes partial support, missing information and contradiction, including situations in which AI deployment changes after evaluation. Its contribution is to connect those distinctions to decisions about retaining, narrowing, suspending or correcting individual ESG assertions. This is an application and adaptation of assurance ideas, with the limits of the contribution established through comparison with neighbouring approaches.

The political significance concerns control over evaluation. Organisations, vendors, auditors and affected groups may have unequal access to evidence and unequal authority to demand revision. Sections 2 and 3 establish the conceptual basis and research procedure. Section 4 develops assessment criteria and examines three hypothetical cases. Section 5 considers the distribution of evidential and corrective authority, before Section 6 sets out limitations and conclusions.

2. Conceptual foundations and relevant literature

2.1. Defining AI-related ESG claims and their scope

An AI-related ESG claim is a public organisational assertion about the use, capabilities or effects of AI that is presented as relevant to an environmental, social or governance objective. Statements about implementation and technical capability fall within this definition when they form part of an ESG justification, although neither establishes a benefit on its own. A claim's meaning depends on the application, period, population, comparison and assessment boundary. Anticipated contributions also require a clear distinction between a forecast and an outcome already observed.

AI can produce information used to describe its own effects. This creates two distinct questions: whether the reporting process is reliable and whether the reported contribution is substantiated. De Villiers et al. (2024) examine generative AI across sustainability accounting, reporting, assurance and report use. Moodaley and Telukdarie (2023) review the relationship between artificial intelligence, sustainability reporting and greenwashing. These studies inform the assessment of reporting practices; they do not settle every claim about AI's effects. Even a well-controlled reporting process can communicate an inference requiring further justification.

The assessment must also consider relevant consequences of AI itself. Van Wynsberghe's (2021) distinction between AI for sustainability and the sustainability of AI prevents a beneficial application from defining the entire evaluation. Environmental life cycle analysis develops this point by considering the system's own burdens alongside those of its application (Ligozat et al., 2022). A statement about a net contribution consequently requires a wider evidential basis than a bounded claim about one operational benefit.

ESG indicators leave room for evaluative choices. Berg et al. (2022) identify scope, measurement and weighting as sources of divergence between ESG ratings. Their findings concern ratings rather than AI outcomes, but they clarify why an automated indicator still needs a defensible interpretation of improvement. We use evidential adequacy to describe the fit between that interpretation, the assertion's scope and the evidence offered. Relevant coverage, reliable information and a warranted inference matter whether the supporting material is quantitative or qualitative.

2.2. Existing approaches to substantiation and accountability

The relationship between claims and evidence is already central to several relevant frameworks. Sætra's (2023) protocol for assessing and disclosing the ESG implications of AI capabilities, assets and activities includes impact statements, information sources, knowledge gaps and responsible persons. Burr and Leslie (2023) connect ethical claims with evidence and argument while incorporating deliberation throughout a project's lifecycle. These approaches provide the basis for asking how far a particular public statement is justified and how its interpretation can be examined.

Auditing research locates this examination within organisational practice. Raji et al. (2020) organise internal algorithmic auditing across development stages, with documentation connecting decisions and review. Mökander (2023) treats technical evaluation and scrutiny of organisational processes as complementary. Batool et al. (2025) organise AI governance research around who governs, what is governed, when and how. This literature helps explain why assessing a disclosure requires attention to the decisions and responsibilities behind its wording.

Lam et al. (2024) provide a particularly close comparator. Their criterion audit framework concerns external compliance and assurance and examines the need for interpretable audit outcomes, including the limitations of a simple pass/fail result. We draw on this concern with differentiated judgements while assessing the support for individual public assertions rather than issuing an opinion on a professional audit engagement.

Recent ESG-specific research addresses related issues from different positions. Al-Zoubi et al. (2026) examine AI-driven reporting, greenwashing and legal accountability. Krasteva-Hristova and Georgieva (2026) consider AI-assisted sustainability assurance and the continuing role of professional judgement. Pittz (2026)

proposes an institutional research agenda linking AI governance and ESG assurance. Table 1 identifies the basis retained from neighbouring approaches and the more specific application developed here.

Table 1. *Relationship to neighbouring conceptual approaches*

Approach	Basis retained	Application developed here
AI ESG protocol Sætra (2023)	Impact statements, information sources and responsibilities.	Examine the inference supporting a particular public assertion.
Ethical assurance Burr and Leslie (2023)	Structured justification and participatory examination.	Differentiate evidential judgements and disclosure responses.
Assurance audits Lam et al. (2024)	Criteria-based examination and interpretable audit outcomes.	Distinguish judgements about a public assertion from professional audit opinions.
Algorithmic auditing Raji et al. (2020, 2022)	Lifecycle documentation and institutional conditions for review.	Locate evidence access and corrective authority for the claim.
AI in ESG assurance Krasteva-Hristova and Georgieva (2026)	Professional judgement when AI assists assurance.	Assess claims about AI's contribution, regardless of the reporting tool.

Note: *The final column specifies this article's application; it does not imply that earlier frameworks exclude these questions.*
Source: *Authors' comparison of the cited approaches.*

Within the literature reviewed, the task remaining for this article is one of analytical specification: how should support for an individual ESG assertion be classified when its wording extends beyond the evaluated task, population or period, and how does that judgement relate to the obligation to answer a challenge? Existing frameworks can accommodate these questions. We develop their application explicitly, including circumstances in which evidential support and institutional answerability diverge. The focused review does not establish the absence of comparable formulations elsewhere.

2.3. Evidence and accountability challenges in AI deployment

Evidence about AI is obtained under conditions that disclosure can obscure. Evaluation concerns a particular task, data distribution and deployment configuration. A model update or a change in users may affect the relevance of earlier findings. The NIST AI Risk Management Framework connects context, evaluation and continuing monitoring (Tabassi, 2023). Applied to ESG claims, this means that an earlier result may remain available without remaining applicable. Reassessment is warranted when a change affects the premises of the claim; it does not depend on assuming that every AI system learns during operation.

Different actors may hold different parts of the justification. A vendor may know the model's evaluation conditions, an employer may control deployment, and a reporting team may endorse the public statement. Raghavan et al. (2020) show why claims about

algorithmic hiring assessments require scrutiny of validation practices, data choices and prediction targets. Their study offers a sector-specific precedent for examining the relationship between a promised social benefit and the technical procedures said to deliver it, without establishing the quality of all current hiring systems.

These difficulties intensify familiar accountability problems. Bovens (2007) understands accountability as a relationship in which an actor explains and justifies conduct to a forum able to question, judge and attach possible consequences. Raji et al. (2022) show why external auditing also depends on institutional design, including access and independence. A statement may therefore be well supported while offering weak opportunities for challenge, just as an accessible forum may examine an unsupported assertion. The framework keeps these positions distinct instead of concealing them within an overall credibility score.

3. Research approach

The study used conceptual synthesis and adaptation to examine how the evidence supporting AI-related ESG claims relates to the institutional arrangements through which those claims can be challenged and corrected. Following Jaakkola (2020), the research design assigned a distinct role to each theoretical component: sustainability reporting specified the object of assessment; ethical assurance informed the examination of the relationship between claims and evidence; and accountability theory located this assessment within an actor–forum relationship. The unit of analysis was an individual public assertion, including separable propositions within a compound disclosure.

The bibliographic basis comprised the 23 sources cited in the article and listed in its final bibliography. Sources were selected purposively for their contribution to the research question through targeted searches and examination of reference lists, completed on 1 October 2026. Searches combined “AI” or “artificial intelligence” with “ESG”, “sustainability reporting”, “assurance”, “claims”, “accountability” and “auditing”. Additional searches on environmental assessment and algorithmic hiring helped clarify assessment boundaries and the substantiation of social benefits. Priority was given to publications from 2020 onwards. Earlier foundational work was retained where necessary, particularly Bovens (2007), whose account of institutional accountability informed the analysis of who must provide explanations and who can demand them.

Inclusion required an identifiable contribution to the argument, verifiable publication details and access to the relevant content. Verification distinguished bibliographic accuracy from substantive support. Publication details were checked against publisher or institutional records and DOI information, where available. The relevant content, including author-deposited versions where appropriate, was consulted to assess whether the source supported the claim or interpretation attributed to it. Citations used the journal issue year when it differed from the year of initial online publication.

The selected literature combined conceptual frameworks, empirical studies informing specific analytical distinctions, and institutional guidance. Pittz’s (2026) editorial was used to locate the discussion within a contemporary research agenda. Its arguments were treated as a scholarly position rather than empirical findings. The selection supported a focused critical synthesis, with no claim to exhaustive coverage or systematic-review completeness. Promotional accounts lacking a traceable evidential basis were excluded.

The analysis proceeded in three steps. First, it differentiated assertions about AI implementation, technical capability, attributed ESG outcomes and broader sustainability

contributions, identifying the additional justification required to move between them. Second, it examined how partial support, missing information and contradictory evidence affected the assessment of a defined assertion. Third, it connected these evidential judgements to the actors holding the evidence, endorsing the public claim and reviewing challenges. This sequence kept the question of whether a statement was supported separate from the question of who could require an explanation or correction.

Three hypothetical cases were then constructed to examine the resulting criteria: environmental efficiency under changing assessment boundaries and deployment conditions; an aggregate social improvement alongside harm to a subgroup; and governance assurance based on confidential evidence. The premises were stated explicitly, and changes to a premise or to the wording of the claim were examined to determine whether they warranted a different judgement. These cases tested conceptual distinctions that a binary assessment of credibility could obscure. They were not observations of sampled organisations, and no original performance data were collected. Their role was limited to examining the framework's reasoning; they did not establish its practical usability, agreement between independent reviewers or effects on reporting behaviour. Section 4 presents the resulting conceptual criteria and their application, while Section 5 considers their governance implications.

4. A framework for assessing and governing claims

4.1. From using AI to demonstrating ESG benefits

Consider an organisation that introduces an AI system to identify workplace hazards. Records can confirm that the system is operating, and tests may show that it detects certain risks reliably. A claim that employees are safer requires further evidence: what happened after the risks were identified, how the organisation responded, and whether exposure to danger or injuries declined. Detecting a problem is one part of the explanation for an improvement; action on the warning must also be examined.

This example illustrates why the wording of an ESG claim matters. An organisation may report that it uses AI, that the technology performs a particular task, or that its use has produced a benefit. It may also make a broader statement about its contribution to sustainability. These claims can appear together, but each requires different support. Table 2 distinguishes them and identifies the conclusions that evidence at each level leaves open.

Table 2. *Types of AI-related ESG claims and the evidence needed to support them*

Type of claim	Evidence needed	What remains to be established
Implementation	Records identifying the system, its task, the setting and the period of use.	Use alone does not demonstrate effectiveness or an ESG benefit.
Technical capability	Evaluation relevant to the task, users and system version, with errors and limitations reported.	Performance on a technical task does not establish an improvement in an ESG outcome.
ESG outcome attributed to AI	Evidence of the outcome, an appropriate comparison and an explanation of AI's contribution.	An observed change alone does not establish that AI produced it.

Broader or net contribution	Relevant benefits and burdens across the stated activities, period and affected groups.	An improvement in one area does not settle the wider consequences or the acceptability of trade-offs.

Note: *The four claim categories and their associated limits of inference are the authors' analytical formulation.*

Source: *Authors' conceptual synthesis. Christensen et al. (2021) inform the distinction between sustainability activities and their reporting; Mökander (2023) and Tabassi (2023) inform the treatment of technical assessment; van Wynsberghe (2021) and Ligozat et al. (2022) inform the consideration of the sustainability burdens associated with AI itself.*

Returning to the workplace example, a decline in injuries after the system's introduction would be relevant evidence. The organisation would still need to examine whether changes in training, staffing or equipment contributed to that decline. Records of employees' and managers' responses to warnings could help explain AI's role. The assessment can draw on qualitative evidence about decisions and working practices, provided the public claim reflects how convincingly that evidence supports the proposed explanation.

Extending a result beyond the setting in which it was obtained requires similar care. Evidence from one workplace may be relevant to another, but differences in tasks, users and working conditions need consideration. A later change to the AI system may also affect whether an earlier evaluation remains applicable. The result need not be discarded. The organisation should explain why it continues to support the claim now being made.

The period covered by a statement matters as well. Expected savings depend on assumptions about future use, whereas savings already achieved require evidence of what occurred. Keeping that distinction visible allows anticipated benefits to be communicated without presenting them as established results. Once the assertion is clear, reviewers can examine whether its evidence is sufficient, supports a narrower formulation, leaves the issue unresolved or conflicts with the statement.

4.2. Evidential judgements and their limits

The framework uses four evidential judgements, set out in Table 3. Each concerns a defined assertion and an identified body of available evidence. These are categories for assessing public claims, not professional audit opinions or organisational ratings. Their use requires an explanation of how the evidence bears on the wording under review.

Table 3. *Evidential judgements and corresponding disclosure responses*

Judgement	Decision criterion	Response indicated
Substantiated as stated	Sufficiently reliable evidence covers the assertion and its material assumptions, with relevant counterevidence addressed.	Retain with scope, uncertainty and review conditions visible.
Supportable only after qualification	Evidence supports a material restriction of the same assertion; its extension is unsupported, not contradicted.	Replace the wording; specify the unsupported extension.
Undetermined	Necessary evidence is missing, inaccessible or inconclusive; neither substantiation, a supported restriction nor contradiction is established.	Seek specified evidence; suspend categorical endorsement meanwhile.
Contradicted	The assessed evidence warrants rejecting the original assertion, even if different wording would be supportable.	Correct or withdraw the affected assertion and explain why.

Note: *Assess the original wording before considering a replacement. Contradiction takes priority over possible qualification. Responses concern disclosure, not legal liability; uncertainty does not establish falsehood.*
Source: *Authors' proposed criteria.*

Assessment begins by separating compound assertions and weighing favourable evidence alongside relevant counterevidence. Where that assessment warrants rejecting the original wording, the assertion remains contradicted even if a narrower statement would be defensible. Qualification applies where evidence supports a material, bounded part of the same assertion, while its extension remains unsupported rather than contradicted. If no such part can be established and rejection is unwarranted, the judgement is undetermined. Unresolved disagreement between credible sources may also warrant that judgement; an isolated adverse observation does not automatically refute an average or probabilistic claim.

Qualification must preserve the kind of assertion being assessed. Restricting a claim to the sites for which the stated outcome is supported may be justified when other sites remain unevaluated. Replacing a claim about total environmental impact with one about energy efficiency changes the proposition. That replacement may improve the disclosure, but it does not substantiate even a bounded part of the original net-impact assertion.

Adequacy depends on the outcome asserted and the methods appropriate to it. Material uncertainty should be disclosed, and reviewers should distinguish evidence they inspected from an assurance report they relied on or information they could not examine. Public availability alone establishes neither reliability nor completeness. Conversely, restricted public access does not show that verification is absent. The governance case below examines how a claim can be supported through independent scrutiny while its underlying records remain confidential.

4.3. Applying the framework to three hypothetical ESG cases

Environmental assessment provides the first case. Luccioni et al. (2024) examine energy use during AI inference across tasks and model configurations, making deployment choices relevant to assessment without establishing the net impact of any particular application. Dauvergne's (2022) political economy analysis questions the assumption that local efficiency gains necessarily yield wider sustainability gains. These perspectives support a distinction between an operational comparison and the broader consequences attributed to it.

Suppose a facility has a credible comparative evaluation supporting lower energy use per unit through AI-assisted scheduling under specified operating conditions. Production subsequently expands, while computing and equipment burdens remain unmeasured. The evaluated efficiency improvement can be substantiated. A claim that the organisation's total environmental burden fell remains undetermined on these premises: a different metric and a wider boundary are involved. Reporting the local result separately preserves useful information without treating it as a qualified version of the net-impact claim. If the model is replaced, the historical result may remain valid, but continuing savings require justification that the earlier evaluation still applies. Better technical performance in the replacement model does not supply that justification on its own.

The social case concerns a service whose average waiting time falls after an AI-supported allocation system is introduced. Assume that credible evaluation supports AI's contribution, but disaggregated evidence shows longer waits for a group requiring assisted access. A claim of lower average waiting time can be substantiated; a claim that waiting times fell for every eligible group is contradicted. The supported average does not change the status of the universal assertion. Nor does it establish more inclusive access, which concerns who can use the service and under what conditions, beyond the time spent waiting.

This case separates correction of a statement from resolution of a distributional conflict. The organisation may communicate the average improvement accurately while still needing to explain and address the adverse subgroup outcome. Affected users should be able to question the definition of improvement as well as data accuracy. In workplace settings, the International Labour Organization (2025) similarly brings privacy, monitoring-related stress and worker participation into its assessment of digital safety tools. A benefit on one measure does not decide the acceptability of a deployment across these dimensions. The framework identifies the unresolved judgement without assigning weights that would offset one group's losses against another's gains.

The governance case concerns a disclosure that transactions flagged by AI were reviewed consistently against stated criteria during a specified period. Assume that a competent independent reviewer examines evaluation records, samples operational files and checks follow-up, finding sufficient evidence to support that bounded claim. Transaction data remain confidential, but a public assurance statement identifies the criteria, period and limitations. Restricted public access can then coexist with substantiation through independent examination. Readers rely partly on the reviewer's competence, independence and reported findings. The conclusion concerns the operation of the review process; it does not establish that AI improved governance overall.

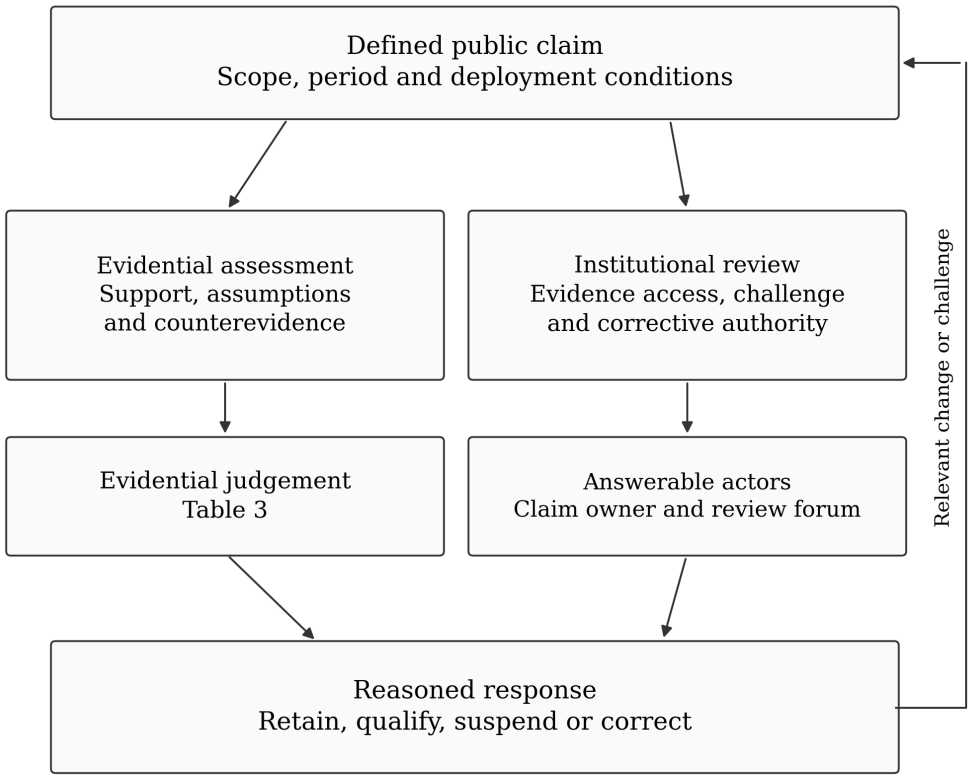
Now suppose that evidence necessary to assess the claim is unavailable to both the reviewer and the deploying organisation, no adequate alternative exists, and the disclosure relies only on an unexplained vendor assurance. The claim becomes

undetermined for that review, rather than disproved. A policy requiring human oversight cannot establish how oversight operated. This differs from a situation where inaccessible vendor records can be replaced by sufficient operational evidence. Even a substantiated operational claim may remain institutionally weak if no identified body must answer challenges or can secure a correction.

4.4. Institutional responsibility and corrective authority

Figure 1 connects evidential assessment and institutional review while preserving their separate conclusions. The first asks whether the assertion is supported. The second asks who can inspect its basis, contest the assessment and require an answer. Weak review arrangements do not make a factual statement false, but they restrict the opportunities to challenge its interpretation and continued public use.

Figure 1. *Separate assessments linked to a reasoned organisational response*



Note: *Arrows represent proposed review relationships, not measured effects. Evidential status and institutional answerability are assessed separately.*
Source: *Authors' framework.*

Responsibility must be located for holding the evidence, endorsing the claim and deciding on a response. Different actors may perform these roles, provided their relationship is explicit. A reporting team without access to technical records needs a route to a qualified assessment. An auditor who identifies an overstatement needs access to

someone authorised to amend it. Naming responsible actors is insufficient when the information or power necessary to act does not accompany the role.

The response follows from the evidential judgement and the forum's remit. Supported wording may be retained, a partly supported assertion narrowed, an undetermined benefit claim suspended pending examination, or a contradicted statement corrected or withdrawn. Where the forum lacks corrective authority, referral needs an identified destination. Changes in model version, use or population, and relevant counterevidence, warrant renewed assessment when they affect its premises. Retaining the earlier wording and reasons for revision prevents a correction from erasing the record of what the organisation previously communicated.

5. Discussion and governance implications

5.1. The contribution and its boundaries

The analytical gain lies in keeping the object of each judgement stable. The environmental case distinguishes a historical efficiency result from a present claim about total burden. The social case shows why a true average cannot rescue a false universal assertion. The governance case separates restricted public access from the absence of adequate verification. Each example changes a premise or the proposition under review, allowing the consequences for its assessment to be explained without assigning the organisation a single credibility label.

This application complements the attention to audit outcomes in Lam et al. (2024). Here, the judgement concerns the wording of an individual disclosure and does not certify an algorithmic system's compliance with a normative framework. The institutional distinction adds a separate question: who must answer for that wording and who can obtain a response? Adequate evidence can substantiate a statement without ensuring accountable governance. Equally, the existence of a complaints process cannot establish that the statement is true. The normative requirement for answerability follows from the actor–forum relationship developed in Section 2.3.

This separation also clarifies the treatment of competing ESG concerns. A narrowly defined environmental claim may be supported while the deployment raises unresolved social questions. Those questions remain relevant to oversight even if they fall outside the assertion being assessed. The framework therefore limits what a disclosure can establish while leaving room to challenge the organisation's choice of what to disclose. Judgements about the acceptability of trade-offs require a substantive evaluation of the affected interests, beyond the evidential status of one statement.

5.2. Evidential access and the distribution of authority

Deciding what counts as improvement distributes influence. An organisation's choice of comparison, population and time horizon shapes which effects are visible. Dauvergne (2022) connects accounts of AI's environmental benefits to corporate power and displaced costs. The question for governance is whether another actor can challenge the assessment boundary or merely check calculations within it. A review may accurately verify the selected indicator while leaving the central disagreement about excluded consequences untouched.

Meaningful access requires institutional arrangements as well as information. Raji et al. (2022) examine how selection, remuneration, access and subsequent action affect external auditing. A reviewer's independence should therefore not be inferred solely from the label "external". Commissioning terms should allow scrutiny of material

assumptions and communication of consequential limitations. Confidentiality can justify controlled access, but it should not automatically give the evidence holder final authority over what may be questioned. Public explanations should identify the basis and limits of the reviewer's conclusion.

The burden of substantiation raises a related asymmetry. In our view, organisations making benefit claims should remain responsible for supporting them. Affected groups should not have to reconstruct a proprietary system before a relevant challenge receives an answer. Their accounts may reveal excluded outcomes, inaccessible services or changes missed by reporting categories. Participation does not make every objection decisive. It should, however, entail a reasoned response and an opportunity for escalation; otherwise, an invitation to comment may leave the distribution of authority unchanged.

5.3. Proposals for implementation and empirical evaluation

One possible organisational measure is a dated claim record linking exact wording to evidence, assumptions, responsible actors and review conditions. It would distinguish publicly available material from evidence examined confidentially by a named reviewer, identify unresolved limitations and record changes requiring reconsideration. Its purpose is to make the justification traceable; keeping the record would not itself demonstrate improved sustainability. The extent of review should reflect the claim's scope and the consequences of the deployment, with its practical demands examined before wider adoption.

Standard setters and public oversight bodies could support comparable descriptions of assurance scope, access restrictions and corrective responsibilities. Such descriptions may help readers identify omissions without imposing one performance measure across ESG pillars. Their effects would depend on incentives, competence and enforcement, concerns already established in sustainability reporting research (Christensen et al., 2021). The proposal offers questions for oversight and does not state current legal obligations or replace applicable assurance standards.

Empirical examination could begin with a bounded sample of public claims and their supporting methodological documents. Independent reviewers could record the proposition assessed, the evidence accessible to them, their judgement and reasons for disagreement. Interviews could then examine whether named forums actually obtain answers and secure revisions. This would assess the criteria's interpretability separately from the operation of accountability arrangements. An unsupported claim would warrant scrutiny, but a finding of intentional greenwashing would require further evidence about knowledge, conduct and context.

6. Limitations and conclusions

The framework's limitations follow from its conceptual design and purposive literature selection. Its consistency across reviewers, organisational feasibility and effects on disclosure have not been tested. The hypothetical cases establish distinctions under stated premises, without showing their prevalence. A review of public documents would also face limits where relevant evidence remains private. Applying the framework would require sector-specific criteria and attention to the powers of the reviewing institution. It cannot resolve substantive disagreements about acceptable trade-offs merely by classifying the evidence.

The research question requires two connected answers. Evidence must be assessed against the scope, period and level of inference of the assertion actually made. Where it falls short, the reviewer should distinguish a supported restriction of that assertion from uncertainty or contradiction. Institutional arrangements must then identify an actor responsible for explaining the disclosure and a forum able to question it and secure an appropriate response. Neither answer can substitute for the other.

A correction is accountable only if its reasons and consequences remain open to examination. Replacing an overstatement with defensible wording should preserve the record of the earlier claim, particularly where credible evidence contradicted it. Organisations also need to reconsider continuing claims when deployment changes undermine their original justification. These requirements connect the assessment of evidence to the distribution of authority over public ESG information. Whether applying them produces more reliable disclosure is a question for subsequent empirical research.

Authors' Contributions:

The authors contributed equally to this work.

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ORIGINAL PAPER

Using Artificial Intelligence in Teaching Romanian as a Foreign Language

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Abstract:
The use of Artificial Intelligence (AI) in teaching Romanian as a foreign language (RLS) to foreign students is a modern trend that transforms the learning process, offering personalization, instant feedback and interactive resources. This technology is used especially in the preparatory year to support the development of oral and written communication skills of foreign students. In Romanian universities, where AI technologies are used, the emphasis is on a learning model, where AI does not replace the teacher, but helps him. Active learning and teaching with the help of AI of the Romanian language as a foreign language is one of the best ways to learn, and artificial intelligence systems can help foreign students take control of the lessons taught and progress at their own pace. Teaching Romanian to foreign students with the help of digital tools requires more than linguistic knowledge; it requires a mix of psychology, technology and cultural anthropology. The development of language technologies and artificial intelligence at the university level adapted for Romanian as a foreign language is a priority to ensure institutional digital sovereignty and the inclusion of foreign students.

Keywords: *Artificial Intelligence, learning process, Romanian language, resources, foreign students*

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Introduction

The integration of Artificial Intelligence (AI)-based systems into the teaching of Romanian as a foreign language (RFL) to international students represents a modern paradigm shift that fundamentally restructures the architecture of learning. It necessitates a transition from standardized instruction to a fluid model defined by adaptive personalization, instantaneous feedback, and interactive resources. Far from being a mere fleeting technological trend, the infusion of generative algorithms and natural language processing (NLP) tools optimizes the acquisition of the complex grammatical and lexical structures inherent to the Romanian language. In a globalized academic environment—where Romanian universities attract diverse, multicultural cohorts of students—the dynamics of interaction between native and non-native speakers are enhanced by digital environments capable of simulating real-world communication contexts, thereby mitigating negative affective filters such as language anxiety.

The practical, high-impact utility of these technological ecosystems is most evident during the university preparatory year. This transitional phase—encompassing both linguistic and socio-cultural adaptation—is pivotal for international students, as it is specifically designed to foster the rapid development of two-way communication skills, in both oral and written forms. Within this context, TELL (Technology-Enhanced Language Learning) tools serve as a powerful catalyst.

According to relevant research, the proper implementation of these systems in universities does not aim to exclude or diminish the human role; rather, it is founded on the principle of complementary support and educational symbiosis: "Artificial intelligence is not intended to replace the teacher, but instead functions as a system geared toward optimizing teaching work (a teacher-facing system) by handling the automation of administrative processes, iterative grading, and the generation of differentiated materials" (Schmidt, Strasse, 2022: 45).

This approach frees up valuable pedagogical time, shifting the focus from the mere transmission of information toward mentorship and individualized cultural guidance. Through the use of intelligent Computer-Assisted Language Learning (CALL) platforms, the traditional teaching model is replaced by active learning. Adaptive algorithms allow international students to take full control of their educational journey, enabling them to navigate morphosyntactic structures and progress at their own pace, independent of the average level of their peer group.

This cognitive autonomy is vital for consolidating competencies, providing a safe space where mistakes are not publicly penalized but rather corrected contextually, in real time. As recent specialized literature highlights: "Intelligent tutoring systems provide automated differentiation, capable of recalibrating the difficulty level of texts and exercises for A1–C1 proficiency levels; they directly stimulate long-term memory through spaced-repetition techniques based strictly on the individual performance of the non-native student" (Chira, Câmpean, Daisa, 2026: 89).

Modern, digitally-mediated pedagogy for teaching Romanian as a second language goes beyond the mere transmission of grammatical data or strictly lexical skills; it demands an organic blend of applied psychology, technological expertise, and cultural anthropology. International students do not merely learn words; they assimilate a new way of structuring reality. Psychology plays a role in monitoring the motivational dynamics and cognitive barriers specific to foreign learners acquiring a language with a complex inflectional structure, such as Romanian.

At the same time, while technology provides the tools for decoding, digital platforms lacking the integration of cultural anthropology fail to convey the spirit of the language. The idiomatic context, pragmatic subtleties, humor, and socio-cultural nuances specific to the Carpathian-Danubian-Pontic region cannot be translated word-for-word by generic algorithms trained primarily in English. This phenomenon is addressed in current research: "Global commercial AI models often exhibit significant accuracy gaps when generating colloquial Romanian or metaphorical structures a result of the acute scarcity of high-quality, large-scale Romanian datasets. This necessitates deep human intervention to calibrate the cultural and anthropological filters applied to the content" (Museanu, 2024: 115).

However, in Romanian universities that have already adopted such innovations, the fundamental approach does not aim to exclude the human element; rather, it seeks to implement a model of complementary support in which AI does not replace the instructor, but instead assists them.

Learning and teaching Romanian as a foreign language with the aid of AI offers one of the most effective paths to language acquisition, as artificial intelligence systems can empower international students to take charge of their lessons and progress at their own pace. Yet, teaching Romanian to international students using digital tools requires more than just linguistic knowledge; it demands a sophisticated blend of psychology, technology, and cultural anthropology. Furthermore, the development of language technologies and artificial intelligence tailored for Romanian as a foreign language within a university setting is a strategic priority for ensuring institutional digital sovereignty and the full inclusion of international students.

Reconfiguring the Didactics of Romanian as a Foreign Language (RFL) in the Digital Age

The transition of the didactics of Romanian as a foreign language (RFL) into the digital age represents more than just a shift of course materials from paper to computer screens; it entails a structural redefinition of pedagogical interaction, content delivery methods, and the ways in which international students develop their linguistic autonomy. The progression from emergency remote teaching (characteristic of the pandemic period) to sustainable hybrid systems and subsequently to platforms optimized by Artificial Intelligence (AI) has highlighted the need to adapt teaching techniques to the new cognitive profile of digital natives. In this new ecosystem, the instructor is no longer the sole transmitter of knowledge, but rather a facilitator of technologically mediated learning experiences. The digitalization of RFL has demonstrated that traditional teaching strategies centered on long lectures lose their effectiveness in the absence of direct physical contact. A far more dynamic and interactive approach is required, underscoring the importance of diversifying platforms and maintaining pedagogical flexibility: “Teaching Romanian as a foreign language in an online environment requires a careful selection of digital tools (such as Zoom, Google Meet, or Moodle) that can sustain students' attention and replace the physical classroom interaction with collaborative tasks and real-time interactive exercises” (Burtea-Cioroianu, 2022: 136).

Consequently, the reconfiguration of didactics stemmed from the need to break away from the rigid patterns of frontal teaching, paving the way for an e-learning model centered on flexibility one in which multimedia materials and synchronous or asynchronous tools lay the groundwork for the introduction of intelligent technologies.

Digital didactics in higher education is shifting from a phase where all students view the same screen to one where the screen adapts interactively to the individual viewer. In this regard, Adăscăliței (2025) provides a highly rigorous theoretical and applied perspective on how AI is redefining instructional design and the assessment of competencies within universities. The author highlights the immense potential for personalization offered by these systems: "Artificial intelligence is reshaping the act of teaching through its capacity to analyze the performance data of each pupil or student in real time, generating individualized learning paths and providing a precise diagnosis of cognitive gaps transcending the time constraints of a conventional class session" (Adăscăliței, 2025: 54).

In the specific context of the preparatory year for the Romanian language where students come from highly diverse linguistic backgrounds this capacity for automated diagnosis is essential. AI can detect, for instance, whether a native Arabic speaker faces specific difficulties in correctly writing the unique Romanian vowels (*ă*, *î*, *â*), while a French-speaking student might struggle with neuter gender agreement; the system can then provide each with entirely different sets of exercises, tailored to their immediate needs.

However, Adăscăliței (2025) draws attention to a fundamental ethical and methodological issue, warning against using technology as an end in itself, devoid of a solid pedagogical foundation: "The introduction of artificial intelligence into the academic sphere must not fall into the trap of a sterile technological determinism. Its pedagogical value emerges only when algorithms are subordinated to clear learning objectives, and the instructor remains the primary architect of the didactic scenario ensuring the content is both ethically sound and scientifically valid" (Adăscăliței, 2025: 112).

Understanding how AI can support the teaching of the Romanian language requires a clear conceptual distinction between general language and the specialized language used in academic or professional settings. International students in their preparatory year require more than just basic conversational skills; they must, in a remarkably short time, master the scientific jargon specific to their future fields of study (such as medicine, engineering, law, or economics). During this transition, distinguishing between a word in common use and a strictly specialized term becomes crucial for the design of AI systems and linguistic databases.

This issue of conceptual distinction is examined in depth within the Romanian specialized literature by Chirițescu and Păunescu (2021), who explore the semantic complexity of terminologies. The authors emphasize: "Although terms and words share the same lexical stock, terms are highly specialized linguistic units that operate within a well-defined conceptual structure. In Language for Specific Purposes (LSP), the semantic stability of a term is vital for cross-cultural academic integration" (Chirițescu, Păunescu, 2021: 97).

For designers of AI platforms dedicated to Languages for Specific Purposes (LSP), this implies that computer systems must go beyond merely translating or generating grammatically correct sentences; they must be trained on specific terminological ontologies. AI algorithms must recognize that, within the context of LSP, a word's semantic network and syntactic valencies undergo a radical shift.

Furthermore, Chirițescu and Păunescu draw attention to the lexical dynamics of modern society and the way in which terms migrate into general language a phenomenon accelerated by technology: "The line between a common word and a specialized term is becoming thinner in the digital era, as technological advancements force professional

terminologies into everyday discourse, challenging foreign learners to master both simultaneously" (Chirițescu, Păunescu, 2021: 102).

Consequently, an effective AI platform for teaching Romanian as a second/foreign language (RLS) must incorporate dynamic vocabulary modules capable of demonstrating to international students how the meanings of Romanian lexemes shift according to context. This form of adaptive e-learning allows for the immediate contextualization of scientific terms, fostering a deep conceptual understanding that traditional, print-based dictionary methods cannot provide in a dynamic way. Educational theory must always be validated by the reality of the classroom. The transition toward AI-mediated instruction cannot occur in an institutional vacuum; it depends directly on the digital competencies, perceptions, and openness of university faculty. Recent empirical studies provide highly valuable data on how Romanian educators experience and conceptualize this transformation.

In a recent landmark study, Pop and Marc (2025) investigated the perceptions of teachers in Romania regarding the integration of AI into foreign language instruction. Their research reveals a sense of moderate optimism, coupled with a keen awareness of the need for continuous professional development: "Romanian in-service teachers recognize the immense potential of AI in personalizing learning pathways, yet they express significant concerns regarding the lack of institutional guidelines and the urgent need for professional development in digital pedagogy" (Pop, Marc, 2025: 311).

The data collected by Pop and Marc indicate that educators do not exhibit a technophobic resistance toward AI; rather, they express a structural concern regarding the lack of clear methodologies for validating machine-generated materials. In the context of teaching Romanian as a Second Language (RSL) during the preparatory year where time is extremely limited the use of materials containing subtle errors could compromise the entire pedagogical process.

Furthermore, the research conducted by Pop and Marc (2025) highlights that teachers perceive AI as a tool for time optimization, confirming the "digital assistant" model detailed in the abstract of this article: "AI should not be seen as a replacement for human empathy and cultural mediation, but as a cognitive tool that automates repetitive grading tasks, allowing teachers to focus on genuine interactive and communicative activities" (Pop, Marc, 2025: 314).

This feedback from practitioners demonstrates that the successful implementation of AI in Romanian universities depends on the creation of strategic training programs for teaching staff, enabling them to become architects of technologically augmented learning experiences and capable of orchestrating the interaction between the student and the digital tutor. To fully understand the viability and sustainability of intelligent systems in the teaching of Romanian as a Second/Foreign Language (RLS), a rigorous analytical assessment of the competencies that students and instructors must develop is required. An overview of strengths, weaknesses, opportunities, and threats (a SWOT analysis) provides an essential diagnostic framework.

In this regard, Lăpădat and Lăpădat (2025) have conducted a detailed SWOT analysis of specific competencies in foreign language teaching, offering theoretical conclusions that are directly applicable to the context of RLS. The authors highlight the structural value of communicative competencies adapted to the contemporary environment: „The SWOT analysis reveals that while digital competencies significantly enhance learner autonomy and provide unprecedented access to authentic linguistic resources, they can also lead to cognitive overload and a fragmented understanding of

grammatical systems if not properly scaffolded by the instructor" (Lăpădat, Lăpădat, 2025: 271).

Applying this perspective to the teaching of Romanian in the preparatory year, we can identify the elements of a SWOT matrix:

• Strengths: AI offers personalization at a granular level, providing immediate corrective feedback on pronunciation and writing; it eliminates the stress of being evaluated in front of peers and allows for an individualized pace of learning.

• Weaknesses: A high risk of fragmented learning, the loss of the language's macro-structural cohesion, and the possibility that students might memorize automated templates generated by a chatbot rather than developing authentic linguistic reasoning.

• Opportunities: The democratization of access to personalized language-learning resources; the ability to instantly generate exercises tailored to a student's specific interests (e.g., medical or technical case studies in Romanian); and the promotion of social and academic inclusion.

• Threats: Excessive technological dependence, the erosion of direct human interaction skills, and a decline in linguistic quality resulting from the use of AI models that are not culturally calibrated to the nuances of the Romanian language.

Lăpădat, L. and Lăpădat, M-M (2025) also draw attention to the crucial aspect of assessing competencies in a hybrid environment: „Traditional assessment methods are insufficient to measure the complex, non-linear competence acquisition driven by modern technologies. European educational frameworks demand an integrated approach where communication, digital literacy, and cultural adaptability are evaluated simultaneously" (Lăpădat, Lăpădat, 2025: 275).

This conclusion compels the Romanian academic community to revise not only its teaching tools but also its examination methodologies within the preparatory year. AI-assisted assessment should not be limited to automated multiple-choice tests; rather, it must evaluate the international student's ability to perform spontaneously and coherently within complex social and academic interactions.

As noted in the abstract that underpins this research, teaching Romanian as a foreign language via digital platforms is not merely a matter of software engineering or applied linguistics. It lies at the inextricable intersection of three major fields: psychology, technology, and cultural anthropology. Consequently, learning a foreign language as an international student under the pressure of rapid integration into the university environment is a process characterized by a significant emotional burden. The "affective filter" hypothesis, a concept within foreign language pedagogy, explains how negative emotions such as the fear of failure, shyness, or anxiety can hinder language acquisition, regardless of the quality of the instructional materials.

AI systems act here as a factor for psychological stabilization. An AI-based conversational agent (a dedicated chatbot) serves as a non-judgmental interlocutor. A foreign student can repeat a difficult grammatical structure such as phonetic alternations or the correct use of the dative and genitive cases in Romanian dozens of times, without the fear of being mocked or negatively evaluated. This safe interface lowers cortisol levels and encourages active linguistic experimentation. Thus, AI becomes a form of psycho-pedagogical support that fosters the learner's cognitive resilience.

As for the technological challenge, in the context of learning Romanian as a second language (RLS), it stems from the highly inflectional nature of the Romanian language characterized by extensive morphological richness, a complex system of

declensions and conjugations, and contextual nuances arising from a relatively flexible sentence word order.

Unlike English, which features rigid word order and limited inflection, the Romanian language requires far more sophisticated NLP algorithms to detect and correct subtle errors in grammatical agreement—regarding gender, number, and case—as well as the proper use of clitic forms of personal pronouns. Consequently, the technology employed in universities must go beyond the capabilities of a generic translation tool; it should instead utilize large language models (LLMs) that have been fine-tuned specifically on corpora of Romanian academic texts and samples of speech characteristic of foreign learners.

As is well understood, language serves as the vehicle for a culture; it cannot be divorced from the historical, mythological, and social context of the people who speak it. A foreign student in a preparatory year must do more than simply translate words; they must grasp why certain structures function the way they do within Romanian society. For instance, polite forms of address, idiomatic expressions, colloquial metaphors, and the pragmatics of discourse are all deeply rooted in the anthropology of the Romanian cultural sphere.

Global commercial AI models, having been trained predominantly on Western data that has undergone automated translation, frequently fail to capture these specific nuances. While they may generate text that is grammatically correct, it often proves entirely sterile or socioculturally inappropriate. Without an infusion of cultural anthropology - achieved through the manual selection and labeling of data by human experts - the technology risks producing an artificial, hybrid, and deculturalized version of the Romanian language, thereby depriving international students of the tools necessary for organic integration into society.

It must be noted, however, that the digitalization of education through AI inevitably brings into play a geopolitical and macro-institutional dimension: digital sovereignty. In the current landscape, knowledge of and control over data constitute a fundamental form of power. When Romanian universities fully outsource their teaching, assessment, and content-creation processes to commercial platforms owned by large transnational corporations, they relinquish a portion of their academic autonomy.

Institutional digital sovereignty entails that universities in Romania ideally organized into national academic consortia develop and own the technological infrastructure used in the teaching process. In the context of teaching Romanian as a Foreign Language (RFL), this means creating a National Corpus of the Romanian Language as a Foreign Language, hosted on secure, domestic servers and governed by rigorous ethical and scientific standards, in full alignment with the directives of the Romanian Academy.

This technological independence has a direct impact on the quality of inclusion for international students. Having proprietary infrastructure allows for the customization of platforms to suit the specific needs of each university for instance, by integrating medical terminology for universities of medicine and pharmacy, or technical terminology for polytechnic universities. Inclusion goes beyond merely providing access to a screen featuring a chatbot; it entails ensuring an equitable digital environment that recognizes each student's starting linguistic profile whether they are a native speaker of Arabic, French, English, or Chinese and offers them cognitively bridging tools that are culturally optimized. Thus, digital sovereignty serves as a shield, safeguarding the quality, authenticity, and high standards of Romanian higher education on the international stage.

Conclusion

The use of Artificial Intelligence in teaching Romanian as a foreign language (RFL) serves as an essential driver of modernization for contemporary Romanian higher education. Technology can no longer be viewed merely as an auxiliary element; rather, it functions as a structural component of the didactics within the preparatory year one capable of driving significant transformation by personalizing the educational journey and fostering learner autonomy among international students.

Nevertheless, it must be noted that AI should not and cannot replace the human instructor. The added value of technology emerges specifically when it operates as a "teacher-facing system," handling administrative tasks and repetitive grading, thereby freeing up the instructor's time for mentoring, direct communicative interaction, and cultural mediation.

An interdisciplinary approach is required. Consequently, the development of educational software must bring together diverse teams comprising linguists, programmers, educational psychologists, and cultural anthropologists. Only through this convergence can it be ensured that digital tools are capable of addressing learners' affective filters while accurately conveying the pragmatic and sociocultural nuances of the Romanian language.

Teaching staff require substantial institutional support for training in AI practices applied to the teaching of Romanian as a foreign language. It is therefore imperative to introduce continuous professional development courses focused on digital didactics and the ethical use of AI in education. Teachers must be trained to become critical evaluators of content generated by algorithms.

Consequently, universities in Romania must collaborate to develop indigenous language models, trained on reliable, scientifically verified academic corpora. Relying exclusively on global commercial platforms poses a long-term risk to linguistic identity and the security of institutional data. Artificial intelligence serves as an invaluable driver of modernization for the teaching of Romanian as a foreign language, with the potential to transform passive learning into a dynamic, student-centered journey. Nevertheless, its pedagogical value depends on maintaining a stable hybrid model, in which the teacher remains the central orchestrator of the educational process—validating linguistic accuracy and fostering cultural-anthropological competence.

At a macro-educational level, the development of language technologies and artificial intelligence systems natively adapted to the specificities of the Romanian language and implemented within universities is an absolute priority. This endeavor is essential not only for safeguarding the institutional digital sovereignty of Romanian universities but also for ensuring the genuine, equitable, and successful inclusion of international students into the local academic and social landscape.

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ORIGINAL PAPER

Imagining the Savage: Alterity and the Human Condition in Lahontan

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Abstract
Freedom and happiness occupy a central place in Lahontan's representations of Indigenous life, offering an alternative perspective on the institutions and values of European civilization. This study examines how personal autonomy, communal solidarity, social equality, and independence from material wealth contribute to the construction of the free and happy "savage". In Lahontan's writings, these qualities challenge the assumption that political authority, private property, economic prosperity, and social prestige are necessary conditions of a fulfilling human existence. The confrontation between Adario and his French interlocutor, however, reveals a deeper difficulty: different ways of life are evaluated through culturally specific expectations concerning comfort, ambition, dependence, and well-being. Neither perspective fully escapes the tendency to judge the Other according to its own values. Furthermore, the coexistence of egalitarian claims with practices of slavery exposes the limits of the freedom attributed to Indigenous communities. The analysis argues that Lahontan's representations open alternative possibilities for understanding the human condition, while their selective and sometimes contradictory character prevents the idealization of Indigenous life from becoming an unquestionable model of human happiness.

Keywords: *Lahontan; savage, alterity, freedom; happiness; social equality; human condition*.

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Introduction

The encounter with Native American populations posed a challenge to European thought, which was now confronted with ways of life that were different and difficult to understand. The criteria familiar to European civilization no longer served to explain the behavior of certain populations, who—due to cultural differences—appeared to be savages. Observing differences in social organization, beliefs, and behavior, Europeans constructed representations in which the "savage" appears either as an expression of an inferior humanity or as the embodiment of traits that Europeans themselves seemed to have lost. Thus, an imaginary world emerges in which the "savage" plays an ambivalent role—that of an inferior being or a model of humanity to which Europeans relate nostalgically. In any of the representations constructed around him, the "savage" becomes a figure of alterity. The imaginary can be understood here as an attempt to comprehend a different existence. The "savage" thus becomes a figure through which the European can examine his own values, institutions, and perceptions of himself. Furthermore, we could say that through this relationship with the other, the European has the opportunity to reconsider the way he understands humanity and the human condition. The encounter with the "savage" thus also becomes an anthropological challenge. However, the question arises: to what extent does valuing the other contribute to understanding him, or does it rather transform him into a model that expresses the expectations of the one who represents him?

I will approach these issues starting with the writings of Baron de Lahontan, in which we find various representations of Native American populations. In works such as *Nouveaux voyages*, *Mémoires de l'Amérique septentrionale*, and *Dialogues*, he describes everyday practices, recounts conversations, and reports on encounters with "savage" interlocutors (Lahontan, 1990, vols. 1–2). I will treat these writings as hermeneutic material from which we can trace some characteristics of the "savage," treated as a figure of the imaginary and an expression of alterity. Lahontan's writings do not present a homogeneous portrait. At times, the author admires the intelligence, freedom, and communal solidarity of those he describes; at other times, he distances himself from them by judging their beliefs and behaviors. In *Dialogues*, we encounter the figure of Adario, the savage who critically questions European institutions and is capable of challenging the arguments of the representative of a civilization considered superior (Lahontan, 1990, vol. 2). However, since this is a literary character rather than a real person, we recognize here the author's voice rather than the result of an encounter between representatives of the two cultures.

Lahontan depicts the savage as rational, free, and happy (Lahontan, 1990, vol. 2). Based on these images, identifying humanity with the model of European civilization becomes problematic. I will examine these representations, also taking into account an anthropological question: how can we reconsider our own human condition through an encounter with a different way of life? What happens to the definition of humanity when rationality and moral judgment are acknowledged in those considered uncivilized? To what extent can freedom and happiness be understood independently of the institutions, values, and aspirations of European society? At the same time, the question arises regarding the limits of the representation: does recognizing admirable qualities in the other also imply the understanding of their particular way of life?

The starting point is that the images of the "savage" constructed by Lahontan reveal to us other possibilities of thinking, of organizing communal life, and of appreciating existence, thereby challenging the universal nature of European criteria of humanity. The

"savage" is no longer solely the object of judgments formulated from the perspective of civilization; rather, he becomes an interlocutor capable of judging the European world in his turn. This perspective does not automatically eliminate stereotypes associated with the "other." The traits attributed to the "other" are selected and valued through a framework that remains dependent on our own cultural standards. European superiority becomes questionable when viewed through these representations of the "savage." But at the same time, there is a risk of reducing the "other's" distinctive characteristics to the image of an exemplary existence.

In this article, I will analyze the construction of the image of the savage in Lahontan's work in relation to the organization of social relations and the criteria for a fulfilling life. The savage is portrayed as free and happy, in contrast to the civilized European. I will identify how these images function in Lahontan's writings and some of the anthropological implications they reveal (Lahontan, 1990, vols. 1–2). From this perspective, the figure of the savage allows us to examine the relationship between the representation of alterity and the understanding of our own human condition, without one necessarily guaranteeing the realization of the other.

1. Freedom as independence and self-control

Freedom is one of the characteristics through which Lahontan portrays the savage and distinguishes him from the civilized European. In savages, he observes a lack of subordination to a sovereign, communal solidarity, and independence from the accumulation of possessions. All of these elements construct the image of an existence that relates differently to the individual and society. Lahontan admires the savage for his ability to freely dispose of himself and for the fact that he can participate in community life without the constraints typical to European institutions. Social life is no longer identified with hierarchy, coercive authority, and individual property. In this sense, the portrayal of the savage gains an anthropological dimension. What emerges here is the image of the happy savage, whose existence is fulfilled and who seeks peace of mind, which he attains through his autonomy from desires fueled by wealth and prestige. Freedom and happiness are mutually supportive; the former concerns the way in which relationships between people are organized, while the latter shows us how a life can be considered fulfilled.

In *Nouveaux voyages*, the freedom of the savage is expressed through the speech of La Grangula, the Iroquois leader who responds to Governor de La Barre's demands. Faced with an authority that claims the right to control the alliances and trade relations of Native American communities, La Grangula asserts: "We were born free; we depend on neither Onnontio nor Corlar" (Lahontan, 1990, vol. 1: 308)[2]. He then claims the freedom of movement, the freedom to maintain relations with other populations, and the freedom to buy or sell according to their own interests. The Iroquois leader thus rejects his community's dependence on French authorities, asserting their own decision-making capacity.

Here we encounter a concrete manifestation of freedom, not an abstract attribute of natural man. Freedom manifests itself through the rejection of foreign authority and through the assertion of the community's right to determine its own relationships with others. La Grangula observes a contrast in the Europeans' attitude: on the one hand, they

[2] „Nous sommes nez libres, nous ne dépendons d'Onnontio non plus que de Corlar" (Lahontan, 1990, vol. 1: 308).

claim to value freedom of action and decision-making; on the other, they attempt to impose restrictions on the Native American populations. The leader invokes the possibility of maintaining trade relations with the English under the same conditions under which other communities maintain relations with the French. Furthermore, he reproaches the French and the English for occupying territories to which they had no rights (Lahontan, 1990, vol. 1: 309). We observe here that European authority is subject to critical scrutiny: what the colonizer presents as the legitimate exercise of power is interpreted by the other as an unjustified attempt at subjugation.

This claim for freedom takes place within a well-defined context. At Grangula, he speaks on behalf of communities engaged in military conflicts and alliances, each with their own political and commercial interests. Through his speech, the Iroquois leader challenges the claim of an authority to control other communities without their consent. Thus, the "savage" possesses a political will of his own, being capable of rejecting the position of dependence within which the European seeks to place him.

In *Dialogues*, freedom is represented by the contrast between the Huron's autonomy and the European's subordination. Discussing laws and authority, Adario states: "We were born free and are united as brothers, each as much a master as the others" (Lahontan, 1990, vol. 2: 831)[3]. Freedom is associated here with equality among the members of the community, without ruling out the existence of a leader. Adario particularly challenges the possibility that one person might arbitrarily dispose of another's existence. The contrast with the European model is taken further. While the Frenchman is dependent on the king, governors, and those who hold public office, he, the Huron, defines himself by personal autonomy: "I am master of my own body, I have control over myself, and I do as I please" (Lahontan, 1990, vol. 2: 831)[4].

What we see here is a more general conception of freedom than that concerning the relationship between states. To be the master of yourself means not living under the constant threat of an authority that can interfere with your very existence. For Adario, freedom entails the ability to act without fear and without depending on the will of those in a position of authority. In contrast, the Frenchman accepts relationships of subordination that he considers necessary for social order. We are witnessing a reversal of the relationship: the savage, who lacks the institutions of civilization, claims an autonomy that is denied to those who are supposedly protected by these institutions. Moreover, the institutions of civilization seem incapable of granting equal autonomy to those living under their authority.

The autonomy of the savage is also represented through its relationship to laws and social order. In "Des Loix," Lahontan defends the necessity of laws based on their function of protecting society against violence, theft, and injustice. He believes that punishments are necessary precisely because people do not always abide by the rules of just coexistence (Lahontan, 1990, vol. 2: 830–832). Adario challenges the effectiveness of these institutions and points to the injustices committed in the very name of the law. We are dealing with two different ways of understanding the relation between individual freedom and the conditions of collective life. For the French philosopher, the law protects us against the arbitrary conduct of others; for Adario, it is precisely the need for coercion that

[3] „Nous sommes nez libres & frères unis, aussi grands Maîtres les uns que les autres" (Lahontan, 1990, vol. 2: 831).
[4] „Je suis maître de mon corps, je dispose de moy-même, je fais ce que je veux" (Lahontan, 1990, vol. 2: 831).

demonstrates the difficulty people have in living together without causing each other harm (Lahontan, 1990, vol. 2: 832).

The image of the free savage challenges the idea that coercive authority is a necessary condition for any form of social organization. Adario does not argue that such authority is impossible or entirely useless. He does, however, argue for the existence of a community in which relationships between people can be organized according to rules other than those of French society. The institutions through which the latter organizes its existence can no longer be considered, without justification, universal forms of human life.

2. Property, solidarity, and dependence

In *Mémoires de l'Amérique septentrionale*, a community is imagined in terms of solidarity that limits the importance of individual possession. Lahontan states: "The Savages know neither 'yours' nor 'mine,' for one may say that what belongs to one belongs to another." (Lahontan, 1990, vol. 1: 637)[5]. More specifically, this refers to the support given to someone who has failed to return from a hunt or who has lost a tool necessary for survival. Goods circulate among community members according to need, without those providing support having any contractual obligation. Solidarity thus emerges as a common practice of communal life (Ghenea, 2014a).

The expression *ni tien, ni mien* does not necessarily describe property relations in Native American societies. That certain organization of communal relations contrasts with European patrimonial individualism (Răduică, 2023). The examples he provides refer primarily to mutual aid, the use of goods, and the willingness to meet the needs of others. This image is significant in that it associates freedom with solidarity. Autonomy, therefore, does not imply separation from the community (Ghenea, 2014b). The "savage" is portrayed as a person whose independence can coexist with relationships of mutual support. In this portrayal, individual freedom does not imply constant competition for goods nor the strict demarcation of personal interests.

The question that arises is from what perspective these reports are appreciated at the community level. Georges E. Sioui argues that the representations of liberty, equality, and solidarity in Lahontan's writings express values characteristic of Native American thought, which the European author was able to understand thanks to his direct contact with indigenous communities (Sioui, 1992: 71–73). From this perspective, the critique of property and personal subordination cannot be reduced to a literary device intended to denounce the injustices of French society. Sioui's perspective allows us to reconsider the relation between the critical function of the image and the social experience that it represents. Robert Twiss accepts the possibility that the arguments attributed to Adario may have originated, at least in part, from Lahontan's encounters with Native American interlocutors (Twiss, 2024: 10–12). However, the recognition of certain communal values does not justify their unconditional extension to all Native American populations or to all social relationships within a community. This distinction becomes particularly necessary when the image of equality is confronted with the existence of forms of personal dependence.

This image of solidarity is accompanied by an emphasis on equality. Lahontan attributes to Native Americans the belief that members of the community are equally masters of their own existence, since people share the same origin and there is no natural

[5] „Les Sauvages ne connoissent ni tien, ni mien, car on peut dire que ce qui est à l'un est à l'autre" (Lahontan, 1990, vol. 1: 637).

basis for the subordination of some to others (Lahontan, 1990, vol. 1: 639). French society appears to be characterized by differences in rank and wealth, and an individual's prestige depends largely on his or her social position. The "savage" is portrayed as a person who does not judge his peers solely by the goods they possess or the positions they hold.

This absence of personal subordination does not imply the absence of any form of collective organization. Lahontan describes how deliberations take place in the councils of elders, how decisions regarding the community's interests are made, and the role played by the orators who communicate the outcome of these deliberations (Lahontan, 1990, vol. 1: 640–641). We are thus speaking of the existence of rules, responsibilities, and forms of authority that are recognized by the participants. The difference from European organization lies primarily in the way authority is exercised and justified, and in its relationship to the autonomy of the community's members. Consequently, the image of the free savage cannot be reduced to that of a person living without any constraints. He is part of a social organization that relates differently to authority and freedom than French society does.

The representation of freedom can also be understood through the way in which the savage relates to material interests. In *Mémoires*, Lahontan notes that the savages call money "le Serpent des François" and associate it with theft, rivalry, and betrayal. Money corrupts relationships between people (Lahontan, 1990, vol. 1: 638). The image of the serpent suggests a power that penetrates social life and alters its rules, such that the acquisition of goods becomes a dominant need. In "Du bonheur," Adario takes up this critique, calling money "le démon des démons, le Tiran des Français" (Lahontan, 1990, vol. 2: 850). Through its association with the term "Tyrant," money takes on the connotation of coercion attributed to political authority. Europeans can become dependent on their own material aspirations even when they are not under any immediate external coercion.

The critique of money goes beyond the simple organization of the economy. In his speech, Adario argues that material interest influences the assessment of people's worth, the distribution of prestige, and the relationships among members of society. The rich acquire a privileged position, while the poor end up dependent and humiliated (Lahontan, 1990, vol. 2: 850). Human relationships are affected by the accumulation of wealth, as people draw closer to or distance themselves from one another depending on the benefits they can obtain. The image of the free savage also implies the absence of such dependencies. Freedom presupposes the possibility of living without one's personal worth or relationships with others being determined by wealth and an interest in material goods. This criticism does not lead to a rejection of economic exchange. As we have seen, La Grangula asserts the right to buy and sell as an expression of his community's freedom. What is contested is not economic exchange as such, but the role that material interest and the desire for enrichment play in altering social relations and creating unnatural hierarchies that lead to personal subordination. We cannot, therefore, attribute to the "savage" the image of absolute self-sufficiency.

3. Freedom in family relationships: choice and authority

Freedom is also reflected in family relationships. In the dialogue "Sur le mariage," Adario discusses his daughter's desire to marry a young man whom he does not consider suitable. Nevertheless, he admits that the decision is hers: "She wants it; that is enough

among us" (Lahontan, 1990, vol. 2: 876)[6]. The character then discusses the possible objections his daughter might raise if he were to try to impose another husband on her. Parental authority is challenged by the individual's right to decide on their own existence, and marriage cannot be justified solely by the interests or preferences of the family.

The meaning of freedom extends beyond political relationships. Autonomy also emerges within family relationships, in contrast to an authority based on age or family status. We cannot, however, affirm the existence of full equality between women and men. The representations of family relationships in the *Dialogues* also contain generalizing or derogatory assessments (Lahontan, 1990, vol. 2). What is relevant here is that freedom is also associated with the possibility of personal choice, which does not imply the absence of any constraints in the family life of the Huron community.

4. The limits of equality: freedom and slavery

The limits of freedom and equality are highlighted by the existence of slavery. Even when describing the community's solidarity in *Mémoires*, Lahontan notes that people who have lost family members may receive slaves (Lahontan, 1990, vol. 1: 637–638). In *Dialogues*, after defending equality and criticizing the relationships of subordination in French society, Adario makes the following remark: "Here comes my slave to tell me that they are waiting for me in the village" (Lahontan, 1990, vol. 2: 848)[7]. The character accepts the labor of slaves and the benefits of their capture. This contradiction limits the image of freedom attributed to the savage. Equality is affirmed among members of the community, but it is not recognized for all individuals in relation to it. The image of collective and individual freedom coexists with practices of domination that are not subject to the same criticism. Réal Ouellet interprets the contradiction between the demand for equality and the acceptance of slavery as an indication of Lahontan's ironic distancing from Adario (Ouellet, 1995: 333). We observe that at times the author tends to problematize even the discourse of the character through which he criticizes European society. It remains to be seen whether or not this contradiction represents an ironic intention. However, what remains clear is that we cannot transform the free savage into a symbol of universal human equality. The character accepts slave labor and the benefits of enslaving others. This contradiction limits the image of freedom attributed to the savage. Equality is affirmed among members of the community, but it is not recognized for all individuals who have a relationship with it. The image of collective and individual freedom coexists with practices of domination that are not subject to the same criticism. Réal Ouellet interprets the contradiction between the demand for equality and the acceptance of slavery as an indication of Lahontan's ironic distancing from Adario (Ouellet, 1995: 333). We observe that at times the author tends to problematize even the discourse of the character through which he criticizes European society. It remains to be seen whether or not this contradiction represents an ironic intention. However, what we take away from this is that we cannot transform the free savage into a figure of universal human equality. His portrayal challenges the necessary nature of European-specific subordination, but it does not offer a social model in which relationships of dependence are absent.

[6] „Elle le veut, cela suffit parmi nous" (Lahontan, 1990, vol. 2: 876).
[7] „Voilà mon Esclave qui vient m'avertir qu'on m'attend au Village" (Lahontan, 1990, vol. 2: 848).

5. Happiness and the multiple ways of life

Freedom is the foundation of the savage's happiness, according to Lahontan. In his *Mémoires*, he asserts that Native Americans value peace of mind more than material wealth and consider the ability to live without turmoil to be worth more than the vast knowledge of civilization (Lahontan, 1990, vol. 1: 639). Furthermore, in "Du bonheur," Adario challenges the notion that a fulfilling life is synonymous with wealth, comfort, and prestige. In his portrayal of the happy savage, the latter is not interested in accumulating material goods and is not dependent on the recognition of those above him in the social hierarchy (Lahontan, 1990, vol. 2).

However, the happiness of the savage cannot be understood solely in terms of his autonomy from authority or economic interests. The question arises: by what criteria can we consider someone's life to be happy? And to what extent can these criteria be applied to the lives of those whose needs and aspirations differ from our own?

When Lahontan presents the privileges of the wealthy as evidence of the superiority of European life, he describes the luxurious homes, carriages, gardens, entertainments, and comforts of the French aristocracy, asking whether there can be a more pleasant life than that of people who lack for nothing (Lahontan, 1990, vol. 2: 855). Adario rejects this notion of superiority, arguing that material advantages do not guarantee happiness. Behind wealth and rank, in his view, lie rivalry, fear of losing royal favor, envy, and constant turmoil (Lahontan, 1990, vol. 2: 855).

In contrast to the European way of life, the savage prefers a simple existence and inner autonomy. Adario prefers "to be a Huron, with my body bare and my soul at peace" (Lahontan, 1990, vol. 2: 856)[8]. Nudity is presented as the opposite of luxury and wealth and symbolizes a simple lifestyle free from obligations. At the same time, peace of mind cannot be secured by material possessions. Where the European sees deprivation and poverty, the savage sees freedom. Free from the obsession with getting rich, the savage is liberated from the need to impress others in order to maintain his social status.

This is not merely a matter of the contrast between poverty and wealth. Adario challenges the notion that material possessions can determine the value of a life (Lahontan, 1990, vol. 2: 856). A man may enjoy comfort and prestige without being satisfied with his life, just as the absence of luxury does not necessarily imply suffering. Happiness is linked to the way we live our lives without being dominated by aspirations that constantly cause us turmoil. In this view, freedom from social constraints goes hand in hand with the ability to appreciate what we already have in our own lives.

The dialogue is not limited to the contrast between the happy savage and the European who is incapable of acknowledging his own unhappiness. Lahontan asserts that people raised in an environment of ambition and competition come to find satisfaction precisely in these pursuits and argues that "happiness exists only in the imagination" (Lahontan, 1990, vol. 2: 857)[9]. Furthermore, he argues that the constant desire to acquire something new gives value to existence, since the absence of aspirations would turn life into a monotonous succession of already familiar pleasures. This argument introduces a new criterion for assessing happiness. If happiness depends on imagination, habit, and what a person desires, material conditions cannot be evaluated independently of the meaning they acquire for the person experiencing them. Ambition, which Adario considers a source of suffering, may be interpreted by his interlocutor as a prerequisite for

[8] „estre Huron, avoir le Corps nû, & l'ame tranquille" (Lahontan, 1990, vol. 2: 856).
[9] „le bonheur ne consiste que dans l'imagination" (Lahontan, 1990, vol. 2: 857).

an interesting life. Conversely, the Huron's tranquility, which Adario sees as spiritual fulfillment, appears to the Frenchman as a lack of aspiration. Each judges the other's existence based on his own criteria, and the difference cannot be explained solely by the possession of material goods or their absence.

In his discussion of the concrete conditions of life in the wild, Lahontan lists the lack of comfort, the difficulties of hunting, and the dangers of travel and war, considering them incompatible with happiness (Lahontan, 1990, vol. 2: 852). Adario responds that these activities are familiar to the Hurons and that some of them are even sources of satisfaction. He asks what essential difference there is between sleeping in a hut and sleeping in a palace, if both provide the necessary conditions for rest. Similarly, food that a European might consider meager may adequately satisfy the needs of the Huron (Lahontan, 1990, vol. 2: 853–854).

The difference between the two perspectives lies in the relationship between experience and the assessment of existence. For the Frenchman, the hardships of life in the wilderness constitute deprivations because they are judged in comparison with his own habits. For Adario, European comfort can become a burden, and activities considered exhausting can be experienced as forms of freedom and satisfaction. This does not mean that the same material conditions are necessarily pleasant or unpleasant, but rather that their meaning also depends on the habits, expectations, and values of the person experiencing them. The way people value their lives is inseparable from the way they have learned to live them.

From this perspective, the dialogue on happiness allows us to identify an anthropological implication. What is considered necessary, bearable, or desirable may vary depending on the concrete forms of existence. People do not evaluate their lives solely based on the material conditions in which they live, but also on the meaning they attribute to those conditions. The difference between their lives concerns both the organization of daily activities and the criteria by which they are evaluated.

In the end, the two interlocutors fail to reach an agreement regarding the criteria for happiness (Lahontan, 1990, vol. 2). Adario continues to interpret European ambition as a form of suffering, while Lahontan considers the Huron's tranquility incompatible with the aspirations of a man raised in French society. We observe that, although each can describe the other's life, they continue to evaluate it from within their own way of life. Moreover, neither of them would accept changing their own way of life. Lahontan rejects the invitation to become a Huron, considering it impossible for a Frenchman to get used to the diet, clothing, activities, and customs of a Native American community (Lahontan, 1990, vol. 2: 858). Adario replies that the difficulties cited result largely from habit (Lahontan, 1990, vol. 2: 859–860). In contrast, when assessing the possibility of becoming French himself, Adario invokes obstacles that he considers incompatible with his values: submission to authority, social conventions, tolerance of injustice, and dependence on rank or wealth (Lahontan, 1990, vol. 2: 860–861).

Susan Pinette interprets this confrontation as a rejection of the model of cultural conversion, noting that each interlocutor ultimately refuses the possibility of adopting the other's way of life. This interpretation prevents us from treating the Huron community as an ideal that Europeans could reclaim simply by renouncing civilization (Pinette, 2006: 47). However, it does not follow from the dialogue between the two that cultural change is impossible. Adario argues that the Frenchman's habits can be altered, and his refusal to become French reflects his rejection of certain practices he considers unjust. Resistance

to change thus consists of both habits and values, which each of them believes they cannot abandon without fundamentally altering their existence.

We could say that, since certain habits can be changed, the criteria for a good life are not entirely independent of experience. But even the willingness to adopt new behaviors does not imply acceptance of the values that accompany them. The European and the Huron are not merely discussing the possibility of sleeping in a cabin, giving up certain foods, or changing their clothing. They raise deeper questions about how they understand authority, dependence, prestige, and freedom. Precisely for this reason, the refusal to engage in cultural transformation cannot be explained solely by the difficulty of material adaptation.

6. Between the experience of alterity and idealization

The question still remains: how does Lahontan's image of the "savage" help us understand alterity? David Allen Harvey observes that Lahontan's admiration for the freedom of Native Americans can be linked to his own dissatisfaction with social hierarchies, absolutism, and institutional constraints (Harvey, 2010: 181). In other words, Lahontan's account is not a neutral description of Native American life. We can therefore highlight the selective nature of the representation of the "other": certain characteristics of the "savage" become particularly valuable because they address the difficulties that Europeans identify in their own existence.

Jean-Marie Apostolidès interprets the image of Native American freedom in relation to a nostalgia for an aristocratic independence lost in the process of consolidating monarchical authority. Solidarity, equality among community members, and the absence of dependence on a sovereign would, in this reading, express a social ideal linked to Lahontan's position in French society (Apostolidès, 1986: 76–79). This interpretation explains why certain characteristics of the savage take on such powerful meaning in the critique of European civilization. However, it does not demonstrate that these values were merely projections of the author, with no counterpart in the lives of Native American communities. The difficulty of representing the "other" becomes clearer: the recognized traits of the "savage" may indeed belong to his experience, but they may also correspond, at the same time, to the author's own beliefs.

The image of Huron happiness can thus serve as an alternative through which European life is reexamined. But it is precisely this reevaluation that risks emphasizing the traits that reinforce the opposition between the two ways of life. Adario presents his community as being almost entirely free of rivalries, conflicts, and divergent interests, while French society is characterized by ambition, envy, and dependence. The contrast between an exemplary community and one dominated by corruption is highlighted, but individual experiences that do not fit these general characterizations are ignored. For his part, Lahontan evaluates the Huron's way of life based on the criteria of comfort, wealth, and the variety of pleasures. He may concede that the savage finds satisfaction in his own life, but he continues to regard this satisfaction as inferior to that offered by European civilization. Thus, both interlocutors encounter difficulties when attempting to understand a different way of life without reducing it to their own criteria. The dialogue highlights the plurality of ways to appreciate life, but does not lead to a reconciliation of perspectives.

The images of the free and happy savage raise questions about the validity of the forms of organization and valuation of existence that Europeans take for granted. Through these images, the relationships of authority, property, and dependence, as well as the criteria of wealth and prestige, cease to serve as sufficient criteria for assessing the human

condition. The savage represents the possibility of an existence organized according to different rules and valued by different standards. This possibility, however, does not amount to asserting the universal superiority of Huron life, nor does it imply the equal recognition of all ways of life. Each perspective remains tied to the customs and values through which we interpret our own existence.

Conclusions

The way Lahontan imagines the "savage" brings into question the possibility of identifying humanity with the characteristics and values of European civilization. The ability to reason, to make moral judgments, to organize communal life, and to aspire to happiness appears in the representations of ways of life that do not follow the European model. Cultural difference thus becomes an opportunity to question the human condition: to what extent does what a society considers natural, necessary, or valuable express universal human qualities?

The image of the free and happy savage offers us a different perspective on European existence. The savage can judge the institutions and mores of a civilization that claims to define and evaluate him. Freedom and happiness can no longer be assessed solely in relation to political authority, property, wealth, or comfort. The criteria by which Europeans understand their own condition are confronted with the possibility of different ways of organizing and valuing human life. A reconsideration of humanity begins when these criteria lose their seemingly universal character and become themselves the objects of reflection.

We cannot conclude from this that the savage's perspective represents a higher truth, free from prejudice. Lahontan's characters challenge European generalizations, but they, in turn, make sweeping judgments about their own communities and about French society. Freedom and happiness are attributed to selectively presented ways of life, and one's appreciation of another's life often remains dependent on the habits and values of the person judging it. Difference can be acknowledged without being fully understood. Even when the other becomes an admirable model, the portrayal of that person may continue to reflect the expectations and concerns of the one describing him.

The constructed character of these images does not undermine their anthropological relevance. They should not be treated either as transparent depictions of Native American societies or as mere European projections devoid of any connection to the experience of alterity. Their critical power derives precisely from the confrontation between the representation of a different way of life and the certainties through which Europeans justify their own way of life. In this confrontation, the "other" becomes a potential interlocutor, even if the discourse attributed to him remains mediated by the author's perspective.

Thus, imagining the savage can open up a possibility for reconsidering the human condition itself, without guaranteeing that the limits of representation will be transcended. Recognizing the freedom and happiness of the other challenges the assumption of European superiority, but does not necessarily equate to accepting that otherness. It is precisely this gap between appreciation and understanding that constitutes the philosophical problem made visible by the way Lahontan imagines the savage. His images allow us to ask both what we can discover about our own humanity through an encounter with a different existence, and to what extent we are capable of understanding it without transforming it into an expression of our own ideals.

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ORIGINAL PAPER

The value of morality in the system of legal science and in the enhancement of social relations

Roberta Ploscă[1)]

Abstract
The system of legal science is undoubtedly built on a system of values. It can therefore be considered that in the permanent evolution of society and the legal system, the idea of following the degree of interconnection of law with moral values is always welcome. Being subject to the rules of morality, human beings can prevent a conflict with the legal norms and this can have certain consequences in their social life. At the same time, one should approach the issue of whether, in the construction of the rules of conduct, law can receive the influence of morality and, consequently, whether we can attribute to morality the quality of a vague source of inspiration for law. Whether even at the present moment the relationship between law and morality is worthy of being valued or we can see morality as totally incompatible with law in today's society, whether there is a clear predilection of the human being towards morality or the concept of morality is easily neglected or we intentionally lose sight of the actual meaning of the term in assessing the balance of the relationships between us, all these are still as many perspectives that involve profound and conclusive discussions from which we can capture the status of this value in its relationship with the science of law.
In any case, it can be said that morality can help the understanding of the legal dimension in a superior way.

Keywords: *legal system, rule of conduct, moral value*

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Introduction

We always live in times that are likely to become bright and in which we feel that we are forging our own path which helps us build or at least strive to draw a new world. However, creating a new, better world requires enormous, creative work, for the benefit of all, for the benefit of our families and, first of all, for our own benefit, in the sense that by improving one's own life, one can open up prospects for the future and create "peace" in the relationships one is in.

There is no doubt that our individual plans are diverse, that there may be chasms of thought between one's own views, values and, simultaneously, between common creative activities. Thus, as results from the legal literature "determining the role and place of values in relation to social development and the improvement of the human condition implies a concrete, real, historical approach". (Craiovan, 2009: 253)

In this unfolding of life, while taking into account individual differences, we discover the mastery of moral values, a strong foundation which can be the essence of changes for the better and which can contribute to the beauty and greatness of our individual achievements articulated at the social level.

Moreover, it is deemed that "the social, illuminated by morality, is thereby raised in its entirety to the level of universality and freedom of the moral being" (Dănișor, 2014: 120) and morality is "encountered in all areas of community and personal life; actions, feelings, attitudes, relationships are moral". (Mihai, 2002:109)

Content

"Contemporary attempts to capture different value configurations and possible hierarchies reveal the meanings of philosophical, moral, scientific, political, legal, religious, economic, artistic values." (Craiovan, 2009: 252-253)

In the context of values, it is fair and opportune to note the essential common features of morality and law because both relate to people and guide them in the reality of life.

The strong expressions of morality for human beings are complemented by the superiority of the legal regime, determining several common characteristics, but also different aspects, since it is considered that "morality is not law, despite interferences with it." (Mihai, 2002: 110)

However, legal rules and moral norms, together, give a complex, special expression to life in common, the moral ones through their elasticity and the legal ones through their rigidity. Human beings thus become interested both in the features of law and in what is essential in life from a moral perspective, fitting into the reality of social relations from both angles.

It may result that "it is true that both moral and legal norms are externalized and materialized in facts, thus producing social consequences and, implicitly, socializing the human individual". (Mihai, 2003: 211)

Since from the point of view of legal doctrine, "the 'territory' of morality is broader and deeper than the sphere of legal regulations" (Craiovan, 2001: 141), it follows that the problem of knowing moral rules broadens the perspective of knowing law, legal reality and leads to a deeper knowledge of the law-morality relationship.

It is about the entire social structure which can experience inadequacies, inadequacies which law can also face by constantly relating to the needs resulting from society, to the needs deriving from more or less defective social relations. Within the framework of relations, by approaching the moral substance of one's own spirit, the

human being solves or avoids certain concrete social problems that would otherwise fall under the jurisdiction of law.

"True morality consists in the *awareness of our community* with the being", states professor Gheorghe Dănișor (Dănișor, 2014: 120). "The being flows into Morality, the latter giving it meaning, the harmonization due to the possession of meaning is communication and thus aspiration towards the calm unity of universality" (Dănișor, 2014: 120).

The lack of morality can be a great obstacle on the way to the development of social relations because morality largely contributes to the balance of our reactions in relationships. The lack of morality or a weak morality does not help one's own needs and the needs of society at all.

In the absence of morality, we cannot show impartiality, sufficient and serious responsibility, a constructive spirit of community and mutual aid, an experience of life and human harmony. In the literature, it is emphasized that "the idea of justice is linked to the idea of morality, which is what truly establishes relationships between people" (Dănișor, Dogaru, Dănișor, 2008: 67).

If the image of law and morality is not clear, our life cannot be open enough to embrace the good, to remove the obstacles that stand in the way of cordial relations.

Yet, between law and morality "the contrasts are not always clear, the law–morality 'value confrontation' not being free from ambiguities" (Craiovan, 2001: 141).

Morality is of great importance and sheds light on the legal process, including ideas that we need to know in order to be able to perceive what is actually essential for common behaviour. Moreover, legal doctrine emphasizes that "legal consciousness is enhanced by morality" (Mihai, 2002: 109).

Another valuable aspect of morality lies in the discovery and highlighting of the human character that can generically evoke a social atmosphere of certain generations, because moral precepts can also represent a legacy which, in order to carry it forward, we must have the great responsibility to preserve in our conscience and to respect at its true value. At the same time, we can capture how new generations understand the human spirit and to what extent they penetrate the reality of life which, even if faced with a much greater variety of situations and new problems of a certain gravity, must avoid disorder at all costs, a factor that destabilizes social relations. It is said that "the disordered relational expression of needs and interests endangers collaborative co-existence and therefore people themselves have created legal norms to impose models of conduct in their relationships with each other and to repress their violation" (Mihai, 2003: 211).

We obviously accept that we are witnessing completely new situations in society that illustrate the emergence of other conceptions of life, when we can ask ourselves whether these somehow come into opposition to morality or are more closely intertwined with it.

The unprecedented situations that we know should not determine a sudden change in human attitudes, but should increase the area of analysis of new realities and the needs they require without giving up the fundamental principles of the existence of morality in the social system.

By clearly understanding the image of moral principles, we realize that they continue to serve the conceptions that come in waves, perfectly naturally, as the human being and, consequently, society itself, evolve.

It follows that we must focus on the way in which we perceive the depth of morality which continuously demonstrates the necessity of its existence regardless of the

fact that the world is changing. We consider that the manners deriving mainly from education and having a moral character, must not be wasted, that they must remain valid at all times in the enhancement of social relations. We believe that the determination of attitudinal perspectives of great value necessarily involves education, a complex process that highlights in a broad framework our interest in socialization. In this context, it is assumed that "man cannot be a moral and legal subject outside a minimum of culture". (Mihai, 2003: 217) Culture, according to Professor Gheorghe Mihai, is "a product of the collaboration of generations, a social good that can be valued individually, it is the storage and transfer of values, ideals, moral and legal norms" (Mihai, 2003: 217).

Morality depends on people's mentality and its principles are largely derived from the spirit of society, reflecting people's desire to have a life with an elite content, having the role of showing how people "grow" under the auspices of an ideal social life, devoid of vices and how they learn to love pure, fair and sincere manifestations in their relationships. This is the direction that morality follows, a direction in which, not by coincidence, it encounters the dynamics and force of law. "It is useless to legislate if the legislative system does not find its establishment on a well-determined package of moral values: justice, sincerity, honesty" is argued in the General Theory of Law (Dănișor, Dogaru, Dănișor, 2008:12).

We thus allow ourselves to realistically illustrate how both categories of norms can actually be capitalized and their organized action can lead to the realization of life within the best parameters.

Although the similarity between the two terms - law and moral - is sensitive, we should not deeply divide the two phenomena because both contain aspects regarding social relations in the sense of improving them, in the sense of creating people with a positive and correct attitude.

However, the substantial difference occurs from the language used in the construction of these categories of norms and not only. Also, the source of morality "results from the individual and collective conscience, while that of positive law from the will of a legislative authority" (Mihai, 2002: 110). Therefore, the individual character of moral norms, unlike the generality of legal norms developed by authorized state bodies, is obvious in their disjunction.

According to Professor Gheorghe Mihai, "the content of morality is duty, and its objective is the enhancement of the spirit, while the content of law is the imperative and permission, whereas the objective is the societal order" (Mihai, 2002: 110).

The scope of moral concerns involves issues of conscience, the scope of legal concerns also involves rigorous elements of compliance with a certain conduct imposed precisely by law on people, without any form of emotional involvement.

Also, "unlike law, moral norms in a society are not necessarily unitary. Law, on the other hand, by its nature is and must be unitary, ensuring a unique legal order in society, in a given country" (Craiovan, 2001: 141).

The disjunction can also be determined by the fact that moral norms emphasize human character, while legal norms emphasize human conduct, but both elements are relevant and conducive to good social relations, and converge towards the idea of knowing the truth and respecting the just.

Although it is clear that these positive traits belong to both morality and law and persist vigorously in the lives of individuals and in their conscience, when you move from one dimension to another, the individual character enters into the global, and while "moral sanction is the blame that the individual gives himself, realizing that the violation of a

moral obligation resulted in the infringement of a moral value" (Mihai, 2002: 110) in law, conflicts are settled if necessary even through the coercive power of the state, therefore, situations are resolved through active intervention from the outside, in the name and under the power of the law. "This external attitude of law in relation to conscience separates the legal norm from the moral norm" (Dănișor, Dogaru, Dănișor, 2008: 32).

Nevertheless, we try to present and continue to recognize the subtle power of morality in the system of human relations which, at the same time, are the subject of legal concerns, and to succeed, once again, in forming an overview of morality and law, and consequently to emphasize, in the most concrete way possible, the connection between the two entities.

Depending on our individual views and our particular actions, it is easier or more difficult for us to see and establish this connection, to demonstrate attachment to moral values or to receive them in a nuanced way, often in the face of the rigours of the legal rules which, in a general and officially permitted way, bring into our lives certain and mandatory elements which must be observed and which imply responsibility and accountability, thus expressing a complex and profound representation of society. The multiple aspects provided for by legal norms reveal the rhythm of the unfolding of facts, the rapid and eternal succession of events falling under the incidence of state-sanctioned norms, waiting to be resolved.

At the same time, morality also presents its topicality within our lives, shaping our conscience and managing to preserve important links that remain at our discretion to animate them through our inner, individual strength and to evoke them in essential moments of our existence. Nevertheless, the opinions expressed in the legal literature are that "not all legal norms are likely to have a moral significance" (Craiovan, 2001: 141), that "law is not amoral, its norms contain a minimum of morality, but this should not lead to confusing law with morality" (Cristea, 2014: 4).

The existence of the law-moral relationship is appreciated from many points of view, which confirms a real concern for the two broad spheres of human conduct.

Morality expresses the most humane sides of human conduct, a picture of one or another era and of the present that shows, enriches and emphasizes different characters.

Both dimensions, morality and law, are built on facts taken from life, seeking to prove what is just, each of them having a main merit, that of shaping conduct in the spirit of a gracious coexistence.

We remain optimistic about preserving moral convictions, but also deeply realistic, that although the fruition of moral precepts supports the law, we cannot limit to them in the improvement of social relations. This is the moment from which we can look at morality from a secondary perspective.

We can conclude, however, that moral rules do not hinder the creation of law but can be absorbed into this process, and through a general, but complex approach, morality can also be recognized for its practical contribution to the development of social relations.

Professor Gheorghe Mihai rightly says that "we can reveal the entry of moral values into the horizon of law: honesty is a moral value, but it is given a legal dimension" (Mihai, 2003:216) since law, in his opinion, "consecrates it indirectly" (Mihai, 2003: 216).

The thorough presentation of some moral precepts and their assimilation open an optimistic perspective of respecting legal norms, both categories of norms, as we have already emphasized, having a fair character and being generated for their own benefit and, indirectly, for the purpose of improving social relations. Therefore, the value of morality

in its relationship with other categories of norms, including legal ones, should not be underestimated.

In the absence of morality, whose main characteristic does not relate to obligation, we may not be sufficiently vigilant in observing the usefulness of legal norms and in appreciating the significance of these rules in society.

Moral norms are also a creation of human consciousness promoted by the will of man for man to build and maintain relationships in a community in the most positive way and to perpetuate the spirit of coexistence under balanced auspices.

The features of law and morality are presented and affirmed by relating to people and in the light of an objective conception of the entire society.

The question should not be raised whether moral norms are in some respects superior or inferior to legal norms given that both have a content which reflects an ongoing human life. "The hierarchy of values, therefore their placement on a certain scale depending on the importance given by society and the individual, should not be understood as a mechanical subordination of one value to another, which would cancel the specificity of each value, its original and irreducible function", according to Professor Ion Craiovan (Craiovan, 2009: 253).

The relationship of law to morality reflects the fact that both dimensions within the process of creating rules concern social reality and offer us, according to this reality, certain models of behaviour capable of improving life in common which, we certainly observe, does not come by itself, but through efforts to comply with the rules.

It depends on us whether we fit, through our actions, into the lines of these value dimensions containing the elements that guide us towards the ideal of social life. The establishment of rules is derived from concrete life circumstances and our attitudes and manifestations highlight the role and importance of law and morality which, in different proportions, form an overall picture worthy of consideration in the formation of optimal relationships.

Good knowledge of moral precepts and their correct understanding actively and consistently help the individual in the process of becoming aware of the need to respect legal rules in society. Moreover, the point of view according to which "morality can only be social, because only in society does it appear as moral' is stated in the literature (Dănișor, Dogaru, Dănișor, 2008: 8).

We are not talking about a mechanization of social relations, but about their framing in a broad, complex and significant official dimension of law in order to ensure relational harmony by establishing representative landmarks, with sufficient social substratum to be able to supervise the conformity of attitudes with the rules.

The typicality of legal norms largely imposes the typicality of certain behaviours in the formation of social relations in the sense of their perfectibility, but morality, through the justice of its precepts, appears as a complement in the understanding and explanation of law. It is considered that moral precepts "can coexist with a legal order, in many situations the two orders being complementary" (Dănișor, Dogaru, Dănișor, 2008: 8).

Morality, however, is a reflection of a characteristic state of each person, in the first instance, later related or not to legal science. Only the implementation of moral precepts demonstrates and shows us, through the experience acquired over time, the purpose of their existence.

Therefore, although different, law and morality have an essential coordinate - a stability of the ties in society - an object that unites them. Morality establishes principles, being in close connection with the individual and thus creating the perspective of

improving social relations - law establishes principles, being in close connection with the very social relations that constitute the object of its concerns. "The presence of morality in law is evident in its very principles: the principle of equity, justice, freedom, and that of responsibility" (Mihai, 2002: 110).

Morality opens horizons and maintains its vigour through the power of example. We thus think about the important role it plays in the unfolding of events in general, in this wide expanse of human relations. It is also appreciated that "the social problem is a problem that concerns the interiority of the individual and only in its essentialization can it find its solution" (Dănișor, 2014: 119). In the opinion of Professor Gheorghe Dănișor "this solution is philosophical, moral, not economic or of another nature" (Dănișor, 2014: 119).

Proceeding to the comparative analysis of the two dimensions, we see human psychology in both. "As a moral subject, each person is more or less moral, has degrees, ways of being moral, depending on how faithful they are to moral values and norms, at what level the consciousness of the assumed obligation is located" (Mihai, 2002: 109).

Under the rule of knowledge of norms generated by morality and law, which insist on the fairness of human actions and in the sense of observing these norms, human relationships can reflect a state of well-being.

There are subjective points in examining the two entities, but it is always necessary for the interpretation of rules, even if different, to be correct, and, in expressing individually filtered realities, it is ideal to take into account the objective conditions because, in the light of the interpretations that we naturally limit to ours, we risk deviating from their substance. This can be achieved through education developed in the correct sense because through a rational behaviour based on education we can create optimal relationships. The entire attitude of man must take into account education, a worthy source, a general basis of pertinent criteria that is implicitly and fundamentally included in the externalization of man in the universe of society.

I conclude with the expressions of the renowned professor Gheorghe Dănișor: "Today, the social appears to individuals as something else of their own" (Dănișor, 2014: 119). In his opinion, "it must be understood that the social, being something other than the individual, is identical to the latter, which means that as many essential characters as individuality has, society also has them, and as many essential characters as society has, individuality also has them" (Dănișor, 2014: 119).

Conclusions

The cooperation of the two dimensions can lead to an overall harmony of the connections between people that aims to achieve a balance between them. Reflections of morality in social life are useful in enhancing social relations since social relations are the object of the concerns of law. On the one hand, law demonstrates objectivity - morality demonstrates subjectivity, but both are the result of practical experiences.

Under the rule of knowledge of norms generated by morality and law, which insist on the fairness of human actions, in the sense of complying with these norms, human relationships reflect a state of well-being.

For law, the fundamental rule is the creation and preservation of harmony in society by establishing instructive attitudinal models that the better we observe, the better we will realize the need to assimilate them. "These models are transindividual and appear to individuals as coming from social exteriority" (Mihai, 2003: 211).

For morality, if there are rules, it is proof that their promotion is not useless, but that they constitute means contributing to the framing of human actions in a mechanism worthy of consideration for individual and social balance. But these rules can be interpreted from different perspectives, and consequently, their usefulness can be perceived differently and the variety of social relations obviously determines multiple differences and similarities that cannot all be followed.

In both dimensions, the will of man is essential and education positively influences the perception of many individuals, through their simple and natural quality as human beings. Morality "reunites in its components the reason, the will and the affectivity of man, which he externalizes in moral acts" (Mihai, 2002: 109).

Some of our actions coordinate themselves and unite, but in most cases a model is needed to create a type of relationship intended to be ideal. We address these models most often in the course of our actions and fix them in relationships between peers precisely in order to assimilate them into our own lives, and these models can gain consistency within the entire society.

Taking into account the relationship between law and morality, we take into account, in the case of morality, the rational behaviour of man by finding out the general features of his true character, morality reckoning with the human interiority from a more subtle, even philosophical perspective, while law guides us in finding out the truth from the point of view of a true system, in all its details, trying not to neglect any detail.

Law and morality "think" deeply about the human relationship, look at it closely and direct it towards the idea of perfection. In relation to law and morality, points of view can be expressed subjectively, but also with a great power of objectivity, because otherwise we would make confused, even erroneous assessments.

Their substrate appears to be the creation of ideal relationships. In this process, while morality is subtle, law in its rigour is abrupt. We can follow the effects that morality can have in society and see whether they are directly or indirectly related to the complexity of law. Whether morality is a strictly distinct form of law or often interferes with the legal entity remains subject to debate.

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ORIGINAL PAPER

Immersive experience in teaching

Daniela Scorțan[1]

Abstract
Immersive learning is a learning strategy that, based on high-value technologies, provides artificial content and environments that replicate real-life scenarios. Simulating reality therefore increases student engagement and proactivity in learning. Immersive learning is more profound because the virtual environment allows us to simulate behaviors, decisions, and errors before applying them to real work. The ability to simulate reality with remarkable realism (visual, acoustic, dynamic) allows virtual reality to trick the brain into believing artificial information. We can induce perceptions, environments, and experiences by also modulating the various sensory channels. This is especially important in training and learning processes related to high-risk contexts (for example, medical and healthcare environments or construction sites). Immersive learning represents an effective solution in training and learning processes because, starting from a greater level of engagement, students develop and refine skills and techniques (know-how) in a highly stimulating environment. The effectiveness of virtual environments stems precisely from the spatial design achieved with methodologies borrowed from filmmaking, user interface design, and user experience. Spatial development enhances student immersion by acting on three levels: spatial presence (students enter another dimension); self-presence (students interact and their actions produce effects); and social presence (the virtual environment is capable of fostering interaction between participants). Combining virtual reality and training means exposing the world of education to a paradigm shift. First, in environmental terms, training shifts from a physical to a fully immersive experience. Second, in temporal and qualitative terms, users have the opportunity to learn more independently, according to their own time and space constraints. Finally, the roles of student and teacher are transformed, with the former becoming an active participant and the latter becoming a facilitator.
Keywords*: immersive learning, virtual environments, interaction, strategy, experience*

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Introduction

Today, information and communication technologies enable learners to process information more quickly and effectively. However, it remains the educator's responsibility to identify methodologies, strategies, and techniques to apply in the given context.

In their study on modern digital communication, Chirițescu and Păunescu (2026:80) examine how technology affects public discourse in two different ways: "the digital environment promotes both the expansion of access to information and the emergence of new challenges related to content validation, information overload, and the influence of algorithms on the communication process."

If the teaching method synthesizes the concepts and principles underlying the learning process, teaching methodologies provide the tools to apply it. For example, if blended learning and interactive lessons represent innovative teaching methods, they will be matched by innovative teaching methodologies such as e-learning, role-playing, learning by doing, and so on.

In her study on adapting teaching methods for modern students, Bărbuceanu (2025: 192) explains that children who grow up with technology think and act differently, requiring big changes in how teachers run their classrooms: "Digital natives grew up surrounded by technology, so it's second nature to them because they don't just use technology, they actually prefer it when they are learning. Their brains are wired and comfortable with screens and digital tools change how they process information and how they interact in class with their colleagues."

Discussing the evolving needs of modern learners, Stoian (2025: 223) emphasizes the importance of integrating technology-based learning tools into English language teaching: "alternative teaching methods are suited for digital natives, especially the methods that employ technology: to project the course, to create PowerPoint slides, to use visual aids including tables and diagrams for the presentation of IF-clauses types, to have digitalised multiple - choice exercises, to send via internet useful English materials, etc."

The revolution we are witnessing is impacting both schools and training institutions, which are increasingly oriented toward active learning. The student-teacher relationship is becoming more direct, and the exchange allows for enrichment of the learning process and better retention of knowledge. Students are the protagonists of their own learning and navigate the learning environment more consciously. Laboratory activities, known as learning by doing, represent one of the earliest forms of active learning strategies. While in the past, this time was used to practice skills, limited to available materials, today more can be done.

Thanks to immersive teaching, active learning is stimulated in virtual reality contexts. Students are immersed in realistic spaces that reproduce the reality they will encounter outside the learning environment and invited to interact. Immersive learning uses tools such as 3D projections, virtual reality headsets, and tablets to allow students to interact with the simulated space. This is how the immersive classroom was born, a place where mind and body are active and curiosity and interest are intensely stimulated.

Instead of teaching a language as an academic subject (focusing heavily on grammar rules, translation, and memorization), immersion places the learner directly inside a context where the target language is the primary medium of communication and daily operation.

Addressing the cognitive demands of language learning, Lăpădat and Lăpădat (2025: 260) detail how strategic reading practices and collaborative dialogue build deeper

critical thinking and inferential skills in foreign language students: "Instruction must protect processing capacity for integration, make inferential moves visible, and cultivate dispositions of curiosity and fair-minded scepticism. This requires a synthesis of extensive reading to build fluency, intensive reading to model and practice strategic reasoning, and dialogic routines that distribute the work of interpretation across a community of learners."

How Immersion Works in Language Teaching

Language immersion works by copying the natural way children learn their mother tongue: through daily experience and constant exposure rather than memorizing rules. In practice, schools approach this in three main ways. With total immersion, students spend their entire day listening, speaking, and learning strictly in the new language, completely avoiding translation. Partial immersion splits the day in half, using the new language to teach regular subjects like science, math, or history for about 50% of the time. Finally, two-way immersion brings together native speakers of two different languages in the same classroom, allowing students to learn each other's languages together as peers.

Language immersion takes several practical forms depending on the classroom setting, available technology, and the learner's specific goals. In public school systems worldwide, educational immersion programs, which were first pioneered at scale in Canada during the 1960s, teach standard subjects like math, geography, and history directly in the foreign language. By focusing on normal schoolwork, students build functional comprehension and pick up new vocabulary rapidly without spending hours on formal grammar drills.

Taking this idea a step further, task-based learning turns a new language into a practical tool for solving everyday problems, completing hands-on projects, and mastering specialized technical skills for workplace jobs. To make this experience even better, modern digital tools and virtual reality headsets place students inside realistic computer-made scenes. Learners can practice ordering food in a busy street market, discussing a business deal, or finding their way around a new city. This gives students a safe, relaxed space to build strong speaking confidence without ever needing to travel.

Finally, motivated adult learners frequently create their own micro-immersion routines by transforming their daily environments: switching their phone software to the target language, listening to foreign podcasts during commutes, reading literature without translating, and setting strict "no native language" rules for themselves during conversation practice.

Compared to traditional grammar-heavy classes, language immersion offers several distinct advantages that help learners speak more naturally. Because every lesson connects new words directly to real-world objects, physical actions, and immediate needs, students understand context far more easily than they would by memorizing dry vocabulary lists. This constant, active exposure breaks the habit of mental translation, training the brain to connect words directly to concepts without constantly translating back and forth to their native tongue. Ultimately, this steady flow of real-life listening and speaking builds natural speech rhythms and conversational fluency much faster than traditional rules-first instruction ever could.

The Foundations of Language Immersion: Proven Results from Real Classrooms

The idea of learning a second language by using it every day in real situations comes from a famous Canadian study done by researchers Wallace Lambert and Richard Tucker. The study started in the late 1960s, and the final results were published in 1972. Before this project, many teachers and parents worried about young children learning school lessons in a foreign tongue. They believed that children would struggle with their normal subjects, get confused, or lose their ability to speak and write correctly in their native language. To see what would actually happen, the researchers tracked a group of small English-speaking kindergarten children in Quebec who took all their regular school classes, such as math, science, and history, completely in French. Instead of memorizing long lists of grammar rules or doing boring language drills, these children used French as a practical tool every single day. They used it to read their textbooks, talk to their classmates, and solve everyday classroom problems. After following the children for several years, the researchers discovered three major results: the children learned to speak and understand French smoothly and naturally, reaching a level very close to native speakers. They learned math, science, and history just as well as other kids who were taught only in English. Their native English skills did not suffer at all. They read, wrote, and spoke English just as well as their peers. This important experiment proved that learning school subjects directly in a new language is completely safe and works very well. It changed language teaching forever and helped spread this natural learning method to classrooms all across the world.

After early studies proved that learning a second language through direct practice actually works, a researcher named Fred Genesee wanted to understand the details even better. During the 1980s, he looked at twenty years of information gathered from real classrooms. He compared several different teaching methods to see how and when students learn best. He studied programs where very young children started learning fully in a new language right from kindergarten. He also looked at programs that split class time equally between two languages, as well as programs that waited until middle or high school to start. His research showed two main things. Children who start learning a new language at an earlier age develop much better listening skills and talk far more naturally. Students of any age can easily understand hard subjects like math and science, even when those lessons are taught in a completely new language. By turning years of messy classroom data into simple, clear advice, Fred Genesee built a useful guide. School boards and decision-makers around the world still use his guide today to build great language programs for students.

How Language Immersion Works: From Science and Brain Research to Practice

Stephen Krashen created the main theory that explains why learning a new language by using it directly is so effective. In 1982, he showed that people do not master a language by memorizing grammar rules or long lists of words. Instead, we learn when we hear and read meaningful messages in relaxed, stress-free settings. He called his main idea “comprehensible input.” This means we naturally learn a language when we get information that is just one small step above what we already understand. To help students understand without using their native language, teachers use simple tools: visual pictures and drawing on the board, physical hand movements and gestures, real objects you can see and touch, hands-on classroom activities. By focusing entirely on interesting, real-life

topics instead of boring grammar exercises, immersion classrooms create the perfect environment for natural speech to grow.

Merrill Swain brought an important change to language learning by showing that just listening and reading are not enough to speak a new language perfectly. While studying long-term students in Canada, she noticed something interesting: the children understood spoken words and reading materials very well, but their spoken and written grammar still contained regular mistakes. In 1985, Swain published her research to introduce the Comprehensible Output Hypothesis, which explains why active practice is necessary. This idea shows that to really master a language, students must use it actively by speaking and writing it themselves. When students are encouraged to talk and write in real situations, they immediately notice the gaps between what they want to say and what they actually know. This active effort forces the brain to shift from just listening and reading to actively building sentences: speaking in real time encourages fast thinking, writing makes sentence design visible, and correcting errors builds true accuracy. Because of this discovery, interactive speaking and writing tasks are now a required part of any successful language learning program.

Roy Lyster focused on a common problem in full language immersion programs: students often learn to speak very smoothly, but they continue to make simple grammar mistakes. In his 2007 book, Lyster introduced a method called the counterbalanced approach. He proved that to truly master a new language, students need a steady balance between focusing on the subject they are studying and learning the correct structure of the language itself. Instead of forcing students back into boring grammar drills, his approach mixes helpful language tips directly into normal classroom activities: teachers guide students to notice their language choices while working on regular lessons, students practice grammar rules while solving real problems in class, learners move smoothly between understanding new facts and expressing those facts correctly. By guiding students to pay attention to both the lesson content and correct grammar, teachers help them speak easily and accurately in real life.

A famous study in 2009 by researchers Jared Linck, Judith Kroll, and Gretchen Sunderman showed what actually happens inside the human brain during language immersion. Before their work, most people believed that immersion worked simply because students spent more total hours practicing. However, Linck and his team proved that extra practice is only part of the explanation. The real secret is that the brain actively turns down the volume on a person's native language. In traditional classrooms, students usually translate every new word back to their native language before they can understand it. Immersion breaks this slow habit by placing learners in an environment where they hear and see the new language everywhere, from street signs to daily conversations with others. This environment forces the brain to quiet down the native language and connect new words directly to real-world objects and meanings. This important mental shift removes the delay caused by constant mental translation: students stop translating every sentence word for word in their heads, the brain learns to process new words instantly and naturally, conversational speech becomes faster, smoother, and much easier to use. By training the mind to think directly in the new language, immersion helps people reach natural fluency much faster than traditional classroom lessons.

The Evolution of Language Immersion: From Classrooms to Virtual Environments

Recent research in language learning focuses on Virtual Reality (VR), Extended Reality (XR), and how the brain processes information.

Antonina Dhimolea and Regina Kaplan-Rakowski (2022) revealed that immersive digital tools now allow learners to experience authentic language environments without leaving their home country. By studying research on 3D VR headsets, they proved that virtual environments create a strong sense of physical presence. This tricks the brain into feeling like it is actually standing in a foreign setting. Feeling as if you are really there activates the same natural brain processes as living abroad, helping learners connect new words directly to objects and interactive characters. The study highlighted three major discoveries about Virtual Reality. It creates a safe, low-stress environment where students feel much more comfortable speaking with virtual characters instead of facing a real classroom. It helps people learn and remember new vocabulary far better than flat computer or television screens. It delivers the best results when used regularly over time, rather than as a single, short-lived tech demonstration. By turning digital spaces into realistic practice spots, VR makes learning a language natural, engaging, and easy to access anywhere.

A 2024 study by Yueqi Weng, Matthew Schmidt, Wanju Huang, and Yuanyue Hao examined how modern digital tools like Virtual Reality (VR) and Augmented Reality (AR) affect younger students in primary and high schools. By looking closely at 33 different studies, the researchers proved that immersive digital environments consistently improve language learning for school-aged children in several important ways. First, interacting with 3D virtual worlds speeds up vocabulary learning by giving children clear pictures and hands-on clues for new words. Second, these interactive setups boost excitement and interest, making young students much more eager to practice every day. Finally, talking with virtual characters reduces the fear of making mistakes in front of classmates. This safe environment encourages kids to try out real conversations and build strong speaking confidence. However, the researchers also shared an important lesson for teachers: digital tools work best when combined with solid, proven teaching methods, rather than being used just as flashy digital gadgets.

In 2021, researchers Guido Makransky and Gustav Petersen created an important guide called the Cognitive Affective Model of Immersive Learning (CAMIL). This model explains how virtual reality changes the way students learn new information. Their research showed that realistic 3D environments give students a strong feeling of personal presence. This means learners feel as if they are genuinely standing inside the virtual world, which builds real curiosity and boosts their motivation to practice. However, the researchers issued an important warning for teachers and lesson planners. If a virtual world contains too many moving visuals or extra details, it can easily overwhelm the brain's memory limit. When the brain gets overloaded, students find it much harder to learn new vocabulary and understand complex grammar rules. To make sure virtual reality leads to real learning, teachers must design simple, step-by-step lessons. They should focus on helping students learn the language, rather than adding extra digital features.

A 2026 study by researcher Burcu Şimşek looked at information from 21 different projects involving more than 2500 students to see how virtual reality helps people practice active speaking and writing. The study proved that virtual reality tools give a clear, positive boost to these communication skills. The benefits are much stronger when students are learning a completely new language rather than practicing tasks in their native

tongue. The main reason for this progress is that virtual environments help students feel much less nervous about speaking out loud. By surrounding learners with helpful, interactive pictures and scenes, virtual reality creates a relaxed setting. Students feel far more comfortable taking risks, trying out new words, and expressing their thoughts without worrying about making mistakes in front of a real audience.

Recent research points to three main lessons about how virtual and augmented reality are changing the way people learn new languages. First, digital tools create a relaxed, low-pressure space that greatly reduces the fear of speaking out loud. By practicing inside a private, computer-made world, students can try out real conversations without worrying about making embarrassing mistakes in front of a live audience. Second, interacting with objects inside a three-dimensional space creates stronger mental triggers. This physical experience helps learners remember new words for a much longer time compared to using traditional paper flashcards or memorizing word lists. Finally, experts emphasize that technology by itself is not a magic fix. For virtual tools to work well, they must be combined with clear teaching plans that help students focus on correct grammar and vocabulary. This step-by-step guidance keeps learners from feeling overwhelmed by busy, complex virtual settings.

Creating an Immersion Environment for Technical English Instruction

Teaching specialized technical English works best when language learning is tied directly to real workshop actions. Mechanical students learn technical terms much faster when they connect words directly to physical machine parts and real hands-on tasks, rather than memorizing vocabulary lists. When using English becomes the only way to get a required tool or complete a job step, students speak out of real practical necessity instead of just trying to pass a classroom test. By maintaining a strict English environment in the workshop, teachers help students stop translating every word back to Romanian, training their brains to connect English technical terms directly to physical objects and machinery.

Classroom Management and Methodology in the International Garage

Teaching a technical subject entirely in English works best when teachers treat the classroom like a real international garage from day one. Start by setting clear rules: inside the workshop, English is the only language used, and the teacher acts as the shop manager who only responds to English requests. Instead of writing Romanian translations on the board, teachers help students understand by using physical tools, clear diagrams, hand gestures, and color-coded boards. Keeping lessons focused on one simple task at a time ensures students do not feel overwhelmed by too many new words and mechanical parts at once. When a student makes a language mistake, the teacher corrects it naturally by repeating the sentence with the right technical word rather than stopping the lesson to explain grammar. Finally, teachers can use practical moments, like asking for a tool at the equipment desk, as fun, everyday opportunities for students to practice simple English sentences.

Sample Lesson Plan: Machine Maintenance and Safety Advice

Lesson Title: Machine Maintenance and Safety Advice
Time Needed: 50 minutes
Goal: Learn how to give quick safety advice using **should**, **shouldn't**, and **ought to**.
Step 1: Warm-Up (5 minutes)

- **Where it happens:** in the regular classroom.

- **What happens:** start with a real workshop problem to grab attention.
- **Activity:** play a brief sound clip of a grinding machine or show a picture of an overheating engine.
- **Question:** ask the class: "*What is wrong with this machine?"* and "*What should the technician do right now?"*
- **Purpose:** get students focused immediately on real shop-floor problems.

Step 2: Learn the Language (12 minutes)

- **Where it happens:** in the regular classroom (at the board).
- **What happens:** learn the main advice phrases using mechanical examples.
- **Activity:** write three clear examples on the board:
  *You **should** check the oil level.* (Good practice)
  *You **shouldn't** touch hot pipes.* (Safety warning)
  *You **ought to** wear safety goggles.* (Strong recommendation)
- **Sentence Pattern to remember:** subject + modal word (should/ought to) + action verb
- **Practice together:** say the sentences out loud as a group to master the technical terms and pronunciation.

Step 3: Easy Worksheet Practice (13 minutes)

- **Where it happens:** at student desks in the classroom.
- **What happens:** complete a short written exercise to check grammar accuracy.
- **Task 1 (Matching):** connect the machine problem to the correct advice:
  Problem: "The gear is vibrating." → *Advice:* "You should tighten the bolts."
- **Task 2 (Fill in the blanks):** Choose *should*, *shouldn't*, or *ought to*:
  1. You _____ run the machine without the safety guard. (*shouldn't*)
  2. You _____ oil the chain before starting the motor. (*should*)

Step 4: Immersive Practice Activity (15 minutes)

- **Where it happens: Immersive Workshop Area** (At a mock workbench, test rig, or using a Virtual Reality headset).
- **What happens:** Students step into a hands-on workshop environment to practice a real breakdown scenario in pairs while wearing safety gear (goggles and gloves).
- **Role-Play Activity:**
  Student A (Machine Operator): reads a fault card (e.g., "*The hydraulic pressure is dropping rapidly"* or "*The belt is slipping"*).
  Student B (Technician): listens to the problem and gives 2 or 3 quick advice solutions using the target words ("*You should turn off the power"* or "*You ought to check the valve"*).
  Switch: students swap roles and try a new fault card.

Step 5: Wrap-Up and Review (5 minutes)

- **Where it happens:** back in the regular classroom.
- **What happens:** Review key safety points and fix common grammar mistakes.

- **Activity:** write 2 common grammar mistakes on the board (e.g., "*You should to check the valve"*). Ask the class to find and fix the mistake together ("*You should check the valve"*).

Pedagogical Analysis: Why the Immersive Lesson Plan Works

The immersive experience in this lesson plan functions by taking standard grammar practice and embedding it entirely within a simulated mechanical workshop environment. The hands-on activity in this lesson plan works by taking ordinary grammar exercises and placing them completely inside a realistic workshop setting. Right from the beginning, realistic machine sounds and clear pictures bypass old-fashioned textbook exercises. These tools immediately help students draw on their real-world technical experience. Every target phrase (*should*, *shouldn't*, *ought to*) connects directly to everyday job tasks, such as checking oil levels or inspecting loose gears. This direct connection helps students link grammar rules to standard work procedures without needing to translate every single word in their heads. During the role-play, students put on actual safety gear, like goggles and gloves, and stand around a real test rig or workbench. By doing this, they step into the roles of real machine operators and technicians fixing a breakdown. This physical movement and hands-on tool use shift their attention away from the fear of making speech mistakes. Instead, they focus entirely on solving the practical problem in front of them. This relaxed setup allows natural spoken English to come out easily under real workplace conditions.

Conclusions

Decades of classroom research and real-world teaching prove that learning a new language through immersion is safe and works very well. From early famous studies in Canadian schools to modern brain research, evidence consistently shows that learning school or technical subjects directly in a second language does not slow down a student's progress. Children still master their school subjects easily, and their ability to read and write in their native language stays just as strong. Instead of forcing students to memorize dry grammar rules, immersing learners in meaningful, real-life settings teaches the brain to connect new words directly to real objects. This trains the mind to process ideas instantly, removing the slow delay of word-for-word mental translation.

Traditional language immersion relies on physical surroundings, but modern digital tools like Virtual Reality and Augmented Reality open up brand-new possibilities for students. Immersive technology creates safe, low-stress settings where learners can practice real-time conversations, interact with 3D virtual objects, and build speaking confidence without worrying about making embarrassing mistakes in front of a live audience. However, technology by itself is simply a tool that needs proper guidance. To keep students from feeling overwhelmed by too many visual details and to help them remember what they learn over time, digital tools must be paired with clear, proven teaching methods. These step-by-step strategies ensure a healthy balance between open speaking practice and helpful grammar guidance.

In the end, whether students learn through hands-on workshop tasks, practical job exercises, or interactive virtual worlds, immersion changes language learning completely. It turns a boring school subject into a practical tool for solving real-life problems. By combining traditional teaching methods with modern technology, teachers create friendly,

stress-free spaces where students build natural speaking skills, correct grammar, and real job confidence.

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ORIGINAL PAPER

The Always-On Culture: Expectations for Work Communication Beyond Working Hours

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Abstract
The use of digital communication technologies has changed the way employees interact with their organization. Employees are able to stay connected with work at all times due to the use of smartphones and other digital communication technologies. This is reflected in the creation of an 'always-on' work culture. Employees feel a need to stay connected and available for work communication beyond working hours. This is a new way of interacting with work and is likely to impact employee outcomes. The aim of this article is to examine the existing research on the impact of work communication beyond working hours on employee outcomes. Studies on work communication beyond working hours and work-related smartphone use have found that employees feel compelled to respond quickly to work communication beyond working hours. This reduces the opportunity for employees to psychologically detach from work and is likely to increase stress and emotional exhaustion. Moreover, the literature suggests that more frequent communication during non-working hours with work-related content can lead to higher levels of work-life conflict, sleep problems, and burnout. At the same time, the idea of being constantly connected to technology can create a sense of responsibility to be connected to supervisors and colleagues as well. In this respect, the "always connected" culture can actually contribute to an organizational culture that expects employees to be connected at all times. Overall, the article suggests that the "always connected" culture is becoming an increasing problem in modern organizations. Perhaps by developing clear communication norms and work-life boundaries, organizations can begin to mitigate some of the negative effects that can come with communication during non-working hours.

Keywords: *Always-on culture, After-hours communication, Work-life boundaries, Digital connectivity, Employee wellbeing*

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1. Introduction

Over the past two decades, digital communication technologies have profoundly transformed the way employees relate to their work and to the organizations that employ them. E-mail, smartphones, instant messaging applications and collaborative platforms have made it possible for work to be carried out, coordinated and monitored independently of a fixed place or a fixed schedule (Wajcman & Rose, 2011). What was initially welcomed as a source of flexibility and efficiency has gradually produced a less visible consequence: the boundary between working time and non-working time has become increasingly permeable. Employees can now be reached by supervisors, colleagues and clients in the evening, during weekends and even while on holiday, and many of them feel that they are expected to answer.

This development is commonly described as the emergence of an "always-on" work culture. In such a culture, constant availability is no longer an exception reserved for specific occupations or emergency situations, but an implicit norm that shapes everyday working life. Mazmanian, Orlikowski and Yates (2013) showed that, among knowledge professionals, the individual choice to use mobile e-mail devices in order to gain autonomy over when and where to work gradually led to a collective expectation of continuous responsiveness, which in turn reduced the very autonomy the devices were supposed to provide. This "autonomy paradox" illustrates that being permanently connected is not merely a matter of personal habit, but a phenomenon that is embedded in organizational norms and social expectations.

The scale of the phenomenon has been documented at the European level. A joint report by Eurofound and the International Labour Office (2017) on telework and ICT-mobile work found that working anytime and anywhere is associated with longer working hours, an overlap between paid work and personal life, and higher levels of stress among employees who frequently use these technologies. The shift towards remote and hybrid work arrangements in recent years has further reinforced the importance of the topic, as the physical separation between the workplace and the home has diminished for a large part of the workforce. At the same time, the issue has entered the public and legislative agenda, with debates on the so-called "right to disconnect" being held in several European countries and at the level of the European Union.

Research on work-related communication outside working hours has grown considerably in the fields of organizational psychology, management and occupational health. Studies have examined after-hours e-mail use, work-related smartphone use during leisure time, extended work availability and the pressure to respond quickly to work messages (Boswell & Olson-Buchanan, 2007; Barber & Santuzzi, 2015; Schlachter, McDowall, Cropley & Inceoglu, 2018). Their findings are not entirely uniform: while some employees experience after-hours connectivity as a useful resource that increases their control over work, a growing body of evidence suggests that it can interfere with recovery, family life and health. Nevertheless, these studies remain dispersed across disciplines and often focus on isolated outcomes, which makes it difficult to obtain an integrated picture of how the always-on culture develops and why it matters for employees.

Against this background, the aim of this article is to examine the impact of work communication beyond working hours on employee outcomes, with a particular focus on the role of organizational expectations. More specifically, the article seeks to answer three questions: (1) what factors lead employees to remain connected to work outside their formal working hours; (2) what are the consequences of this permanent connectivity for

psychological detachment, stress, work-life conflict, sleep and burnout; and (3) how can organizations limit the negative effects of the always-on culture. To address these questions, the article draws on empirical studies and established theoretical frameworks, including boundary theory, the effort-recovery model and the conservation of resources theory.

2. Conceptual and theoretical background

2.1. Key concepts

Research on work communication beyond working hours uses several related concepts that capture different aspects of the same phenomenon. In one of the first studies on the topic, Boswell and Olson-Buchanan (2007) examined the use of communication technologies after hours, defined as the use of devices such as mobile phones, pagers, laptops and e-mail to perform work or to communicate with work contacts outside regular working time. Fenner and Renn (2010) described a similar behaviour as technology-assisted supplemental work: the performance of job-related tasks at home, after normal working hours, with the help of information and communication technologies. Both concepts focus on what employees actually do once the formal working day has ended.

Other concepts emphasise the expectations and psychological states that accompany this behaviour. Extended work availability refers to a situation in which employees are expected to be reachable and to respond to work demands outside their regular working hours, even if they are not actually contacted (Dettmers, Vahle-Hinz, Bamberg, Friedrich & Keller, 2016). Workplace telepressure, introduced by Barber and Santuzzi (2015), describes a preoccupation with and an urge to respond quickly to work-related messages, regardless of when they arrive. Unlike after-hours technology use, telepressure is a subjective experience. It may be present even when no message is actually answered, and it captures the feeling of being "on call" that characterises the always-on culture.

A third group of studies concentrates on the device itself, analysing work-related smartphone use during leisure time (Derks & Bakker, 2014; Ohly & Latour, 2014). Smartphones are particularly relevant because they are carried everywhere, combine work and private functions in a single device and send notifications that interrupt non-work activities. In this article, the term "work communication beyond working hours" is used as an umbrella concept that includes receiving, reading and answering work-related messages, calls and e-mails outside formal working time. "Always-on culture" refers to the organizational and social context in which such communication becomes a normal and expected part of working life.

2.2. Boundary theory and the work-nonwork interface

The most common theoretical lens for analysing after-hours communication is boundary theory. Individuals create and maintain boundaries around their different life domains, such as work and family, in order to simplify and organise their environment (Nippert-Eng, 1996; Ashforth, Kreiner & Fugate, 2000). These boundaries can be placed on a continuum ranging from segmentation, where work and private life are kept strictly separate, to integration, where the two domains overlap and the transitions between them are frequent and easy (Ashforth et al., 2000). Work-family border theory adds that borders differ in their permeability, meaning the extent to which elements of one domain can enter

the other, and in their flexibility, meaning the extent to which they can be moved in time and space (Clark, 2000).

Communication technologies make the boundary between work and home considerably more permeable. A work e-mail read during dinner or a message answered late at night is an intrusion of the work domain into the private one, which requires a micro role transition from the role of partner or parent to the role of employee. Individuals differ in their preferences for segmentation or integration, and the fit between these preferences and what the work environment allows influences their well-being (Kreiner, 2006). Kossek, Ruderman, Braddy and Hannum (2012) also show that employees differ in boundary control, the perceived ability to decide when, where and how often they cross the boundary between work and non-work. The concept of boundary control is particularly important for the always-on culture, because it suggests that the effects of after-hours communication depend not only on how often it occurs, but also on whether employees feel they can choose to disconnect.

2.3. Recovery, resources and job demands

A second set of theories explains why after-hours communication may affect employee health and well-being. According to the effort-recovery model (Meijman & Mulder, 1998), effort spent at work produces short-term strain reactions, such as fatigue, which are normally reversed when the demands are removed and the individual has the opportunity to recover. If recovery is incomplete because work demands continue to be present during non-working time, strain accumulates and can lead in the long term to health problems. Sonnentag and Fritz (2007) identified four recovery experiences: psychological detachment from work, relaxation, mastery experiences and control over leisure time. Psychological detachment, the state of mentally switching off from work, has received the most attention, as it is consistently associated with better well-being (Sonnentag, 2012). The stressor-detachment model further argues that job stressors reduce detachment, which in turn explains part of their negative effect on employees (Sonnentag & Fritz, 2015).

The conservation of resources theory (Hobfoll, 1989) offers a complementary explanation. It states that people strive to obtain, retain and protect the resources they value, such as time, energy and attention, and that stress occurs when these resources are threatened or lost. Constant availability for work consumes resources that would otherwise be used for rest and family life, and it prevents their replenishment. Finally, the job demands-resources model (Demerouti, Bakker, Nachreiner & Schaufeli, 2001; Bakker & Demerouti, 2007) distinguishes between job demands, which require sustained effort and are linked to exhaustion, and job resources, which support motivation and engagement. From this perspective, after-hours communication can operate both ways. When it is experienced as an obligation, it acts as an additional demand. When it increases flexibility and control, it may function as a resource. This dual nature runs through the rest of the article and explains why the consequences of the always-on culture are not the same for all employees.

3. Why employees stay connected: drivers of the always-on culture

Understanding the consequences of after-hours communication first requires understanding why employees remain connected to work once their formal working day has ended. Research suggests that this behaviour cannot be explained solely by individual choice or by the technical possibility of being reachable. It results instead from a

combination of organizational expectations, psychological pressures, social norms and personal motivations, which reinforce each other over time.

3.1. Organizational expectations

One of the most consistent findings concerns the role of organizational expectations. Fenner and Renn (2010) showed that employees' perceptions that their organization expects them to use technology to work after hours were associated with more technology-assisted supplemental work, which in turn was related to higher work-to-family conflict. These expectations are rarely formalised in contracts or internal regulations. More often, they are communicated implicitly, through the behaviour of managers who send messages late in the evening, through the speed with which colleagues reply, or through the informal rewards given to those who are always available.

Piszczek (2017) argued that organizational expectations for technology use at the work-family interface limit the boundary control of employees, reducing their ability to decide when they engage with work outside working hours. Similarly, Mellner (2016) found that perceived availability expectations were associated with more work-related smartphone use during leisure time and with lower psychological detachment from work, and that this relationship depended on the boundary control employees perceived. Belkin, Becker and Conroy (2020) went further and showed that the expectation to monitor e-mail after hours can be harmful even when employees spend little actual time on it. In other words, it is not only the work done after hours that matters, but also the feeling of being expected to be available, which they described as an "invisible leash".

3.2. Workplace telepressure

Organizational expectations are often internalised by employees as a psychological pressure to respond quickly. Barber and Santuzzi (2015) defined this experience as workplace telepressure and showed that it is associated with perceived workplace norms regarding responsiveness. Employees experiencing high telepressure reported poorer sleep quality, higher levels of burnout and more absences due to health reasons. Telepressure helps explain why many employees check their messages even when nobody has explicitly asked them to. The urge to respond becomes a habit, and the delay between receiving a message and answering it is perceived as a potential sign of low commitment or lack of professionalism.

3.3. The autonomy paradox and the cycle of responsiveness

Mobile technologies are often presented as tools that increase employee autonomy, as they allow people to choose when and where they work. However, research shows that this autonomy can become a source of constraint. In their study of knowledge professionals, Mazmanian, Orlikowski and Yates (2013) found that individuals used mobile e-mail devices to gain flexibility and control over their work, yet the collective use of these devices raised expectations of availability across the whole group. As each person became more responsive, the others felt compelled to do the same, and the freedom to disconnect gradually diminished. The authors called this the autonomy paradox.

Perlow (2012) described a similar mechanism as a "cycle of responsiveness". Pressure to be available leads employees to respond more quickly and more often. Their responsiveness raises the expectations of clients and colleagues, which in turn increases the pressure to be available. Over time, constant connectivity becomes the norm and is no longer perceived as a choice. Both studies show that the always-on culture is produced

collectively, through everyday interactions, and cannot be reduced to the habits of a few individuals.

3.4. Social norms and individual motivations

The norms that exist within teams and work groups also shape after-hours behaviour. Derks, van Duin, Tims and Bakker (2015) found that daily work-related smartphone use was associated with higher work-home interference, especially among employees who perceived a strong norm of being available. Gadeyne, Verbruggen, Delanoeije and De Cooman (2018) similarly highlighted the importance of integration norms, work demands and individual preferences for integrating work and home in explaining the relationship between after-hours ICT use and work-to-home conflict. When high workloads and norms of constant availability come together, employees have few alternatives to answering messages outside working hours.

Individual factors also play a role. Boswell and Olson-Buchanan (2007) found that employees with higher ambition and greater psychological involvement in their job were more likely to use communication technologies after hours. Ohly and Latour (2014) showed that the effects of work-related smartphone use in the evening depend on the motivation behind it: use that is autonomously motivated, out of interest or personal importance, is experienced differently from use that is driven by external pressure or a sense of obligation. In a broader synthesis of empirical studies, Schlachter et al. (2018) likewise underlined the distinction between voluntary and expected technology use during non-work time. Nevertheless, as the studies above suggest, the boundary between voluntary and imposed connectivity is often blurred, since "voluntary" choices are made within an organizational context that rewards availability.

4. Consequences of work communication beyond working hours for employee outcomes

Most of the research on after-hours communication has examined its consequences for employees. Although the studies differ in their methods, samples and the specific behaviour they analyse, their findings point in a similar direction: when work communication extends into non-working time, employees lose opportunities to recover, and the effects can accumulate in the form of stress, work-life conflict, sleep problems and burnout. This section discusses these consequences in turn.

4.1. Psychological detachment and recovery

The most immediate consequence of after-hours communication concerns psychological detachment from work. As shown in the previous section, recovery requires not only physical distance from the workplace, but also the ability to stop thinking about work (Sonnentag, 2012). Messages that arrive in the evening or at the weekend interrupt this process, as they reactivate work-related thoughts, problems and tasks. Park, Fritz and Jex (2011) found that the use of communication technology at home was associated with lower psychological detachment from work. They also found that technology use helped explain why employees with stronger segmentation preferences, as well as those working in organizations that supported segmentation, detached better from work.

Diary studies, which follow employees from day to day, confirm these findings. Derks, ten Brummelhuis, Zecic and Bakker (2014) showed that, among employees who use their smartphones intensively, work-related smartphone use during the evening hinders recovery activities such as psychological detachment and relaxation. Mellner

(2016) similarly reported that perceived availability expectations were associated with lower detachment, especially among employees with low boundary control. The literature therefore suggests that the always-on culture affects employees not only through the time spent working after hours, but also by keeping work mentally present during the time that should be dedicated to rest.

4.2. Stress and emotional exhaustion

When recovery is repeatedly incomplete, the strain produced by work accumulates, in line with the effort-recovery model (Meijman & Mulder, 1998). Several studies show that even the mere expectation of being available can produce stress. Dettmers et al. (2016) compared days on which employees were required to be available for work with days on which they were not. On availability days, employees reported a lower mood at the start of the day and showed a higher cortisol awakening response, a physiological indicator of stress, even if they were not actually contacted. Dettmers (2017) further found that extended work availability was associated with lower well-being, an effect explained by reduced psychological detachment and increased work-family conflict.

The role of expectations is also highlighted by Belkin et al. (2020), who found that organizational expectations to monitor e-mail after hours were associated with emotional exhaustion, whereas the actual time spent on e-mail was not the decisive factor. From the perspective of the conservation of resources theory (Hobfoll, 1989), constant availability can be seen as a continuous drain on resources. Employees remain in a state of anticipation, ready to react to a message that may or may not arrive. This state consumes energy and attention, which become unavailable for rest and personal activities.

4.3. Work-life conflict

Work-life conflict is one of the most frequently studied outcomes of after-hours communication. Greenhaus and Beutell (1985) defined work-family conflict as a form of inter-role conflict in which the demands of the work and family roles are incompatible, so that participation in one role makes participation in the other more difficult. After-hours communication generates exactly this type of conflict, as it requires employees to attend to work demands while being physically present in the family domain. Boswell and Olson-Buchanan (2007) found that the use of communication technologies after hours was associated with higher work-life conflict, and Fenner and Renn (2010) reported similar findings for technology-assisted supplemental work.

The emotional content of after-hours messages also matters. Butts, Becker and Boswell (2015) showed that electronic communications received during non-work time affect employees' emotions according to their tone: messages perceived as negative generate anger, while those perceived as positive generate happiness. They also found that the time spent responding to such communications was associated with work-nonwork conflict. A recent scoping review by Blake, Hassard, Singh and Teoh (2024) concluded that most of the studies examining work-related smartphone use during off-job hours report a positive association with work-life conflict. It also highlighted the moderating role of factors such as boundary preferences and organizational norms.

4.4. Sleep problems and burnout

After-hours communication can also affect sleep, which is one of the most important mechanisms of recovery. Lanaj, Johnson and Barnes (2014) found that work-related smartphone use late in the evening was associated with shorter sleep, which in turn

led to greater depletion the following morning and lower work engagement during the day. Barber and Santuzzi (2015) linked workplace telepressure to poorer sleep quality. Conversely, Barber and Jenkins (2014) showed that employees who create technological boundaries before bedtime, for example by avoiding work-related technology use in the evening, report better sleep outcomes.

When stress, lack of recovery and poor sleep persist, they can contribute to burnout. Burnout is a prolonged response to chronic job stressors, characterised by exhaustion, cynicism and a reduced sense of professional efficacy (Maslach, Schaufeli & Leiter, 2001). Derks and Bakker (2014) found that work-related smartphone use was associated with work-home interference, which was in turn related to burnout. Their findings also show that recovery experiences play an important role in this relationship. Barber and Santuzzi (2015) reported that employees experiencing high telepressure also showed higher levels of burnout. From the perspective of the job demands-resources model (Bakker & Demerouti, 2007), these findings suggest that permanent availability works as an additional job demand that, in the absence of adequate resources and recovery, leads to exhaustion.

4.5. Effects beyond the individual employee

Finally, the consequences of the always-on culture are not limited to the employee. Becker, Belkin, Conroy and Tuskey (2021) examined both employees and their significant others and found that organizational expectations to monitor e-mail after hours were associated with higher employee anxiety. This was in turn linked to poorer health and lower relationship satisfaction for employees as well as for their partners. Their findings show that availability expectations cross the boundary of the organization and affect the family as a whole. Seen from this angle, the always-on culture becomes a broader social issue, which reinforces the relevance of public debates on the right to disconnect.

5. Discussion: the always-on culture as an organizational phenomenon

Taken together, the studies discussed above show that work communication beyond working hours cannot be understood only as an individual behaviour or as a simple consequence of technological progress. Smartphones and e-mail make permanent connectivity possible, but they do not by themselves make it necessary. What turns the possibility into an obligation is the set of shared assumptions, expectations and practices that develop within organizations. In this sense, the always-on culture can be understood as a form of organizational culture: a pattern of basic assumptions learned by a group, which are taken for granted and transmitted to new members as the correct way to think and behave (Schein, 2010).

The process through which this culture emerges is largely informal. Managers rarely require employees to answer messages at night. However, a late e-mail from a supervisor, a colleague who replies within minutes or the appreciation shown towards those who are always reachable send clear signals about what is valued. Over time, these signals are interpreted as expectations, internalised as telepressure and reproduced through each employee's own responsiveness (Barber & Santuzzi, 2015; Mazmanian et al., 2013; Perlow, 2012). This explains why the always-on culture is difficult to change through individual effort alone. An employee who chooses to disconnect may fear being perceived as less committed than colleagues, so the individual decision is constrained by the collective norm.

At the same time, the literature does not suggest that all forms of after-hours connectivity are harmful. For some employees, the possibility of checking messages in the evening reduces uncertainty, allows them to organise their work more flexibly and offers a sense of control (Ohly & Latour, 2014; Schlachter et al., 2018). The consequences depend largely on two factors. The first is the fit between the employee's preferences and the requirements of the work environment. Employees who prefer to integrate work and private life tend to experience connectivity differently from those who prefer to keep the two domains separate (Kreiner, 2006; Gadeyne et al., 2018). The second, and probably the more important, is boundary control: the extent to which employees feel that they can decide for themselves when to engage with work and when to disconnect (Kossek et al., 2012; Mellner, 2016).

This distinction helps to clarify the central argument of this article. The problem is not connectivity itself, but connectivity that is expected, implicit and difficult to refuse. When availability becomes a norm rather than a choice, the flexibility promised by digital technologies turns into a constraint. Employees lose control over their boundaries and the negative consequences discussed in the previous section are more likely to appear. This is consistent with the findings of Belkin et al. (2020) and Becker et al. (2021), who showed that organizational expectations of availability can affect well-being regardless of the actual time spent on after-hours communication. Kossek (2016) also argues that managing work-life boundaries in the digital age is not only an individual responsibility, but also an organizational one, as organizations shape the conditions under which employees can or cannot separate work from the rest of their lives.

Consequently, the always-on culture should be treated as a feature of the organizational environment that can be shaped through management practices and public policies, rather than as a personal problem of employees who fail to manage their time.

6. Implications for organizations and public policy

The analysis presented above has several implications for organizations. Since the always-on culture is largely sustained by implicit expectations, the first step is to make these expectations explicit. Organizations can develop clear communication norms that specify when employees are expected to be available, which channels should be used for urgent matters and what response times are reasonable outside working hours. Such norms reduce the uncertainty that fuels telepressure (Barber & Santuzzi, 2015) and give employees greater boundary control, which the literature identifies as a key protective factor (Kossek et al., 2012; Mellner, 2016).

Managers play a central role in this process. Because expectations are often inferred from the behaviour of supervisors, managers who avoid sending messages late at night, or who clearly state that such messages do not require an immediate answer, can help change the norms of their teams. Experiments with predictable time off have shown that collective agreements on periods of disconnection can improve both employee satisfaction and the quality of work (Perlow, 2012). Organizational support is also important. Day, Paquet, Scott and Hambley (2012) found that organizational support for information and communication technology can reduce the negative effects of ICT demands on employee stress and strain. At the individual level, practices such as keeping work devices away during the evening may protect sleep and recovery (Barber & Jenkins, 2014), but these practices are effective only if the organizational culture allows them.

At the level of public policy, the always-on culture has increasingly been addressed through the right to disconnect. France was among the first countries to introduce this

right in its Labour Code, through Law no. 2016-1088 of 8 August 2016, which requires companies to negotiate the conditions under which employees may disconnect from digital tools. Portugal followed in 2021 with Law no. 83/2021, which obliges employers to refrain from contacting employees during their rest period, except in cases of force majeure. At the European level, the European Parliament adopted on 21 January 2021 a resolution calling on the European Commission to propose a directive on the right to disconnect (European Parliament, 2021). After negotiations between the European social partners failed to produce an agreement, the Commission launched its own consultation on fair telework and the right to disconnect. However, no directive has been adopted to date. In Romania, the right to disconnect is not yet regulated by a dedicated law. The protection of employees relies on the general provisions of the Labour Code regarding working time and rest periods, as well as on Law no. 81/2018 on telework. The findings discussed in this article suggest that legal regulation can provide an important minimum standard. However, its effectiveness depends on whether organizations also change the informal norms that sustain constant availability.

7. Conclusions

This article examined the impact of work communication beyond working hours on employee outcomes, with a focus on the organizational expectations that sustain the always-on culture. The analysis shows that employees remain connected to work after hours not simply by personal choice, but as a result of explicit and implicit organizational expectations, workplace telepressure and team norms that reward constant availability. The consequences of this connectivity are predominantly negative. It reduces psychological detachment and recovery, increases stress and emotional exhaustion, intensifies work-life conflict, disrupts sleep and can contribute to burnout. Its effects can also extend to employees' families. At the same time, connectivity is not harmful in itself. Its effects depend largely on whether employees retain control over their boundaries.

The main conclusion is that the always-on culture is an organizational and social phenomenon, which requires organizational and policy responses rather than individual solutions alone. Clear communication norms, managerial role modelling and legal frameworks such as the right to disconnect can help restore the boundary between work and private life.

The analysis has certain limitations. It relies mainly on studies conducted in Western contexts and on research designs that do not always allow causal conclusions. Future research could examine the always-on culture in Central and Eastern European organizations, including Romania. It could also explore how different sectors and generations experience after-hours communication and how effective right-to-disconnect regulations are in practice.

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ORIGINAL PAPER

FinTech and Financial Stability: Risk Channels, Resilience, and Regulatory Trade-offs

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Abstract

This study examines the impact of FinTech on financial stability, with the aim of clarifying through which channels digital financial innovation strengthens or weakens resilience, and under which institutional conditions. Its objectives are to (i) synthesise four risk channels into a testable framework, (ii) measure digital-finance adoption consistently across the European Union and (iii) estimate its association with bank solvency, asset quality and systemic stress. Methodologically, a Digital Finance Adoption Index (DFAI) is constructed from Eurostat data on internet banking and online purchasing (the first principal component explains 93.3% of their joint variance) for the 27 member states over 2008–2025. The index is related to bank Z-scores, non-performing loan (NPL) ratios and the European Central Bank's country-level Composite Indicator of Systemic Stress (CISS) in two-way fixed-effects panels with Driscoll–Kraay standard errors, lagged regressors, an interaction with regulatory quality and eight robustness checks. The results show that adoption has converged strongly (the cross-country coefficient of variation of internet banking fell from 0.69 to 0.23), although Romania and Bulgaria remain the least digitalised. Higher adoption is associated with lower NPL ratios (a one within-country standard deviation increase corresponds to roughly 37% lower NPLs) and with lower systemic stress in the euro area. Its association with bank solvency is conditional: it is significantly negative where regulatory quality is weak (WGI estimate below about 0.7, including Romania, Bulgaria, Croatia, Greece and Italy) and turns positive above about 1.3. These relationships are absent in first differences and partly sensitive to country-specific trends, which indicates slow-moving structural rather than short-run effects. The paper concludes that FinTech's net effect on stability is conditional on governance, and that the European regulatory response, from DORA to MiCA and the AI Act, should be complemented by investment in supervisory capacity where institutional quality lags behind digital adoption.

Keywords: *FinTech; financial stability; systemic risk; regulatory quality; non-performing loans; European Union*

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1. Introduction

Financial technology has moved from the periphery to the core of the European financial system. In 2025, a median of 78% of individuals in the European Union used internet banking, compared with 25% in 2008, and the share of individuals purchasing online grew from 13% to 63% over the same period. Payments, credit scoring, compliance and an increasing part of risk management are now delivered through digital infrastructures, often provided by a small number of technology firms. This transformation raises a classic question in a new form: does financial innovation make the system safer by reducing frictions and broadening diversification, or does it introduce new sources of fragility that supervisors are not yet equipped to monitor?

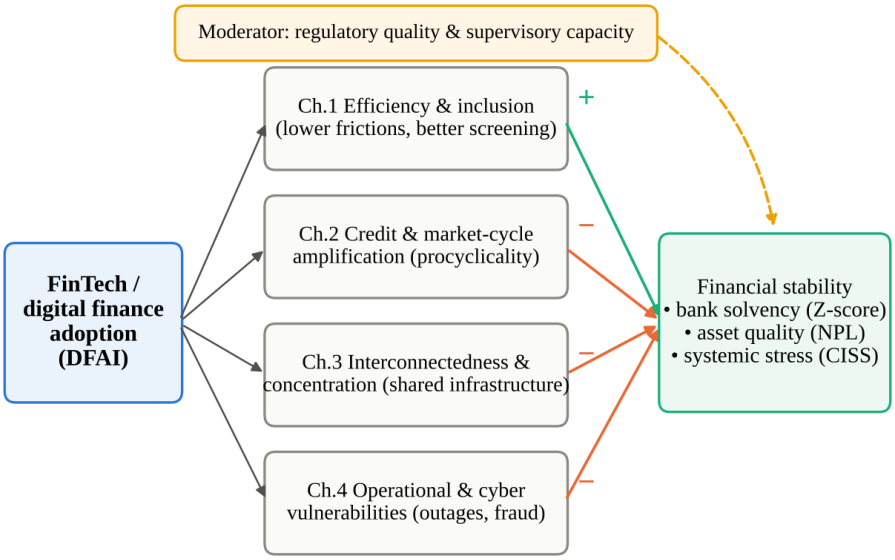
The literature has not converged on an answer. Cross-country evidence ranges from no net effect of FinTech on the fragility of financial institutions, with stabilising effects in emerging markets and destabilising effects in developed ones (Fung, Lee, Yeh & Yuen, 2020), to a stabilising association complemented by bank concentration in a panel of 63 countries (Daud, Ahmad, Khalid & Azman-Saini, 2022), and to an overall negative but statistically insignificant effect in 198 countries, driven by digital lending (Cevik, 2024). Bank-level evidence suggests that a greater FinTech presence is associated with more risk taking by financial intermediaries, but possibly with less risk taking where domestic institutions are stronger (Elekdag, Emrullahu & Ben Naceur, 2024). Policy bodies emphasise new vulnerabilities, including dependence on third-party providers, market correlations, cyber risk and model risk associated with artificial intelligence (Financial Stability Board [FSB], 2024).

This paper contributes to the debate in three ways. First, it organises the mechanisms discussed in the literature into four risk channels, which yield testable predictions for different dimensions of stability. Second, it constructs a transparent and comparable Digital Finance Adoption Index (DFAI) for all 27 member states of the European Union over 2008–2025, a sample that is under-represented in a literature dominated by Chinese and global panels. Third, it tests whether the relationship between adoption and stability is conditional on regulatory quality, and it reports a systematic set of robustness checks, including specifications that challenge the main results. The analysis is particularly relevant for the post-communist member states, where digital adoption is catching up rapidly while institutional quality remains heterogeneous.

2. Risk channels and hypotheses

The framework distinguishes four channels (Figure 1).

Figure 1. Risk channels linking FinTech adoption to financial stability



Source: Author's conceptualisation.

The first is an *efficiency and inclusion channel*. Digital distribution lowers intermediation costs, while alternative data and automated underwriting improve screening and monitoring (Fuster, Plosser, Schnabl & Vickery, 2019; Philippon, 2016). Broader participation diversifies funding and lending bases. This channel predicts better asset quality and, other things equal, stronger bank solvency.

The second is a *credit and market-cycle amplification channel*. Platform lending can grow rapidly outside the prudential perimeter, as illustrated by the shift of mortgage origination towards non-bank FinTech lenders after the global financial crisis (Buchak, Matvos, Piskorski & Seru, 2018). Competitive pressure on incumbents can compress margins and encourage risk taking (Vives, 2019; Thakor, 2020), while FinTech credit may respond differently from bank credit to monetary policy, with lower sensitivity to policy-rate shocks (Cornelli, De Fiore, Gambacorta & Manea, 2024).

The third is an *interconnectedness and concentration channel*. Banks and non-banks increasingly rely on the same cloud providers, application programming interfaces and payment gateways. Such shared infrastructure creates common exposures and single points of failure, and stock-market evidence shows significant risk spillovers between FinTech firms and incumbent institutions (Li, Li, Zhu, Yao & Casu, 2020).

The fourth is an *operational and cyber channel*. Outages, data breaches, fraud and model failures become more material as activity migrates online, and the widespread use of similar artificial intelligence models may increase herding and procyclicality (Daníelsson, Macrae & Uthemann, 2022; FSB, 2024).

The net effect of these channels is theoretically ambiguous, and it is likely to depend on the quality of governance. Strong regulatory and supervisory institutions can capture the efficiency gains of the first channel while containing the externalities of the other three. Three hypotheses follow. *H1*: higher digital-finance adoption is associated with better asset quality (lower NPL ratios). *H2*: the association between adoption and bank solvency is conditional on regulatory quality, being more favourable where

regulatory quality is higher. *H3*: higher adoption is associated with lower systemic stress, through better diversification and faster price discovery, unless the concentration and cyber channels dominate.

A further difficulty in the literature concerns measurement. Supply-side measures, such as FinTech start-up funding (Haddad & Hornuf, 2019) or the volume of FinTech and big tech credit (Cornelli, Frost, Gambacorta, Rau, Wardrop & Ziegler, 2023), capture the size of new providers but are concentrated in a few financial centres and are sensitive to where platforms are domiciled. Studies that use alternative-finance volumes find that the effect on stability depends on the instrument, with digital lending and digital capital raising pointing in different directions (Cevik, 2024). Demand-side measures, based on the share of the population using digital financial services, are less granular but more comparable across countries and closer to the diffusion process through which FinTech reshapes incumbent banks. Because most FinTech activity in the European Union is channelled through, or in partnership with, licensed banks, a demand-side measure is particularly appropriate for a European panel.

3. Data and methodology

3.1. Sample and variables

The panel covers the 27 member states of the European Union from 2008 to 2025. Table 1 defines the variables and reports descriptive statistics. All series were retrieved from the original providers' application programming interfaces on 31 October 2026 and were verified by checksums after processing.

Table 1. Variables, sources and descriptive statistics (EU-27, 2008–2025)

Variable	Source (code)	Obs.	Mean	S.D.	Min – Max
Bank Z-score	World Bank GFDD (GFDD.SI.01)	376	14.30	9.78	−0.33 – 57.44
NPL ratio (%)	World Bank (FB.AST.NPER.ZS)	447	6.12	7.31	0.15 – 47.75
CISS (annual mean, 10 EA countries)	ECB, CISS (SS_CIN)	180	0.14	0.14	0.01 – 0.60
Internet banking (% individuals)	Eurostat (isoc_ci_ac_i, I_IUBK)	485	51.99	24.81	1.52 – 97.76
Online purchases, last 3 months (%)	Eurostat (isoc_ec_ibuy; isoc_ec_ib20)	485	40.70	21.26	1.67 – 87.47
DFAI (standardised units)	Authors, from Eurostat	485	0.00	0.97	−1.94 – 1.97
Regulatory quality	World Bank WGI	486	1.10	0.49	0.11 – 2.07
Real GDP growth (%)	World Bank WDI	486	1.70	3.95	−16.04 – 24.62
Inflation (%)	World Bank WDI	486	2.67	3.16	−4.45 – 19.70
GDP per capita, PPP (const. 2021 $)	World Bank WDI	486	49,745	22,000	21,251 – 136,772
Private credit (% GDP)	World Bank WDI	451	83.11	42.56	22.07 – 254.67
Bank capital/assets (%)	World Bank (FB.BNK.CAPA.ZS)	448	7.55	2.32	−1.26 – 15.05
Bank concentration (%)	World Bank GFDD (GFDD.OI.01)	378	70.75	15.95	28.56 – 98.73

Note: The Z-score and bank concentration are available until 2021. Sources: Eurostat (2026); World Bank (2026a, 2026b); European Central Bank (2026); author's calculations.

Digital-finance adoption is measured with two Eurostat indicators that are available for all member states on a harmonised basis: the share of individuals using internet banking and the share of individuals who made online purchases in the previous three months. Internet banking captures the migration of retail banking relationships to digital channels; online purchasing captures the diffusion of digital payments. The two indicators are highly correlated (r = 0.87). A principal component analysis on their standardised values shows that the first component explains 93.3% of the joint variance, with identical loadings (0.71), so the DFAI is defined as the average of the two standardised indicators. Compared with indices based on FinTech start-up funding or alternative-finance volumes, this measure reflects the demand side of adoption, is available annually for all countries and is not distorted by the domicile of large platforms.

Financial stability is measured along three dimensions. Bank solvency is captured by the bank Z-score, which compares the buffer of capital and returns with the volatility of returns, so that a higher value indicates a lower probability of insolvency (Laeven & Levine, 2009; Lepetit & Strobel, 2013); it is available from the World Bank's Global Financial Development Database until 2021. Asset quality is measured by the ratio of non-performing loans to gross loans (World Bank, available until 2025), used in logarithms. Systemic stress is measured by the country-level CISS of the European Central Bank (Holló, Kremer & Lo Duca, 2012), averaged over each year from daily data for the ten euro-area countries for which it is published. Regulatory quality is taken from the Worldwide Governance Indicators (Kaufmann, Kraay & Mastruzzi, 2011). Control variables include real GDP growth, inflation, the logarithm of GDP per capita, domestic credit to the private sector, bank concentration (in the Z-score models) and the bank capital-to-assets ratio (in the NPL models).

3.2. Empirical strategy

The baseline specification is a two-way fixed-effects panel model:

$$S_{it} = \beta \cdot DFAI_{i,t-1} + \theta \cdot (DFAI \times RQ^{c})_{i,t-1} + \gamma \cdot RQ_{i,t-1} + \delta' X_{i,t-1} + \mu_i + \lambda_t + \varepsilon_{it} \qquad (1)$$

where S is one of the stability measures for country i in year t, X is the vector of controls, μ are country fixed effects and λ are year fixed effects. Country effects absorb time-invariant differences in financial structure, while year effects absorb common shocks, such as the sovereign debt crisis, the pandemic and the monetary tightening of 2022–2023. All regressors are lagged by one year to reduce simultaneity. In the interaction term, the superscript c denotes regulatory quality centred on its sample mean (1.10), so that β measures the association at average regulatory quality and θ measures how it changes with regulatory quality. The marginal effect of adoption, $\beta + \theta(RQ - 1.10)$, is evaluated across the observed range of regulatory quality (Brambor, Clark & Golder, 2006). Standard errors follow Driscoll and Kraay (1998), which are robust to heteroskedasticity, serial correlation and cross-sectional dependence, an important property in a monetary union exposed to common shocks.

Two further design choices deserve mention. First, the lag structure does not remove all endogeneity concerns, since unobserved country-specific trends could drive both digital adoption and bank stability. For this reason, the robustness analysis adds country-specific linear trends and estimates the model in first differences and in non-overlapping three-year averages, which separate short-run from structural associations.

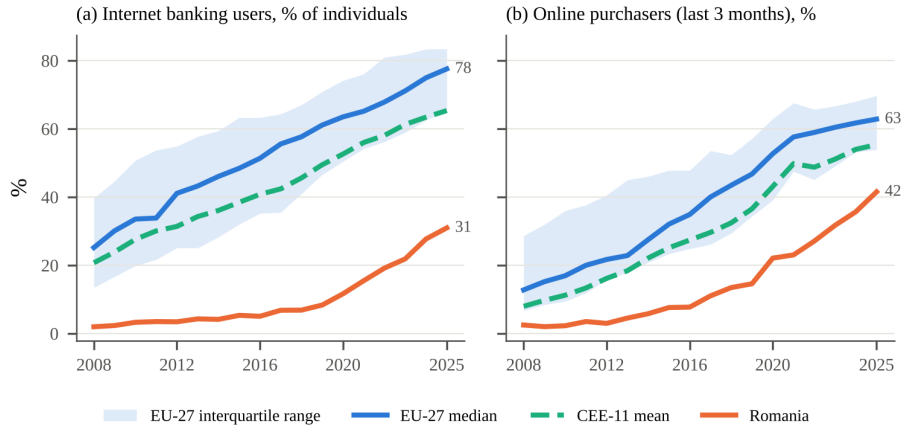
Second, because the post-communist member states share a common history of rapid financial deepening through foreign bank ownership, an interaction between the DFAI and an indicator for the eleven Central and Eastern European members is used to test whether the adoption–stability relationship differs in this group beyond what regulatory quality explains.

4. Results

4.1. Stylised facts

Figure 2 documents the diffusion of digital finance. Adoption has increased in every member state, and dispersion has declined sharply: the coefficient of variation of internet banking fell from 0.69 in 2008 to 0.23 in 2025. The eleven Central and Eastern European member states have narrowed the gap with the EU median, with average internet-banking use rising from 21% to 65%. Romania, however, remains at the bottom of the distribution: only 31% of individuals used internet banking in 2025, the lowest value in the Union (Bulgaria 31.1%, Denmark 97.6%), although online purchasing has accelerated to 42%. Over the same period, asset quality improved markedly, with the median NPL ratio falling from 8.0% in 2013 to 2.1% in 2024. This co-movement in trends is precisely why the econometric strategy relies on year effects and on robustness checks with country-specific trends.

Figure 2. Diffusion of digital finance in the European Union, 2008–2025



Note: CEE-11 = Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. Source: Author's representation based on Eurostat (2026).

4.2. Baseline estimates

Table 2 reports the main estimates. For bank solvency, the unconditional association between lagged adoption and the Z-score is negative but statistically insignificant (columns 1–2). Once the interaction with regulatory quality is introduced (column 3), the interaction term is positive and highly significant ($\theta = 3.71$, $p < 0.01$): the association between adoption and solvency becomes more favourable as regulatory quality improves, in line with H2.

Table 2. Digital finance adoption and financial stability: baseline estimates

	(1) Z	(2) Z	(3) Z	(4) ln NPL	(5) ln NPL	(6) CISS	(7) CISS
DFAI (t−1)	−1.137	−0.656	−0.775	−0.746***	−0.614***	−0.051***	−0.031
	(2.280)	(1.659)	(1.340)	(0.118)	(0.106)	(0.019)	(0.027)
Regulatory quality (t−1)			4.685***		−0.584***		−0.092**
			(1.733)		(0.163)		(0.045)
DFAI × RQ (t−1, centred)			3.712***		0.340***		0.065**
			(0.970)		(0.087)		(0.028)
GDP growth (t−1)		0.202*	0.157**	−0.016	−0.008	−0.001	0.001
		(0.104)	(0.065)	(0.012)	(0.011)	(0.001)	(0.002)
Inflation (t−1)		0.241***	0.174*	0.012	0.014	0.000	−0.001
		(0.093)	(0.103)	(0.010)	(0.011)	(0.007)	(0.006)
ln GDP per capita (t−1)		−13.561***	−13.008***	−2.748***	−2.836***	0.185**	0.083
		(2.035)	(2.528)	(0.376)	(0.334)	(0.089)	(0.087)
Private credit/GDP (t−1)		−0.004	−0.010	0.003**	0.004***	0.001***	0.001***
		(0.010)	(0.010)	(0.001)	(0.001)	(0.000)	(0.000)
Bank concentration (t−1)		−0.023	−0.001				
		(0.023)	(0.018)				
Capital/assets (t−1)				0.100***	0.087***		
				(0.013)	(0.013)		
Observations	348	340	340	409	409	168	168
Countries	27	27	27	27	27	10	10
Period (dependent var.)	2009–2021	2009–2021	2009–2021	2009–2025	2009–2025	2009–2025	2009–2025
R^2 (within, two-way)	0.004	0.113	0.194	0.504	0.540	0.255	0.323
Country and year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Two-way fixed-effects estimates; Driscoll–Kraay standard errors in parentheses; **, , denote significance at 1%, 5% and 10%. Regulatory quality is centred on its sample mean (1.10). Source: Author's estimations.

For asset quality, higher adoption is associated with significantly lower NPL ratios (column 4). The coefficient of −0.75 implies that a one within-country standard deviation increase in the DFAI (0.63) corresponds to an NPL ratio that is about 37% lower in the following year, which supports H1. The positive interaction in column 5 indicates that this association is strongest in countries with weaker regulatory quality, where the initial stock of bad loans and the potential gains from better screening were largest.

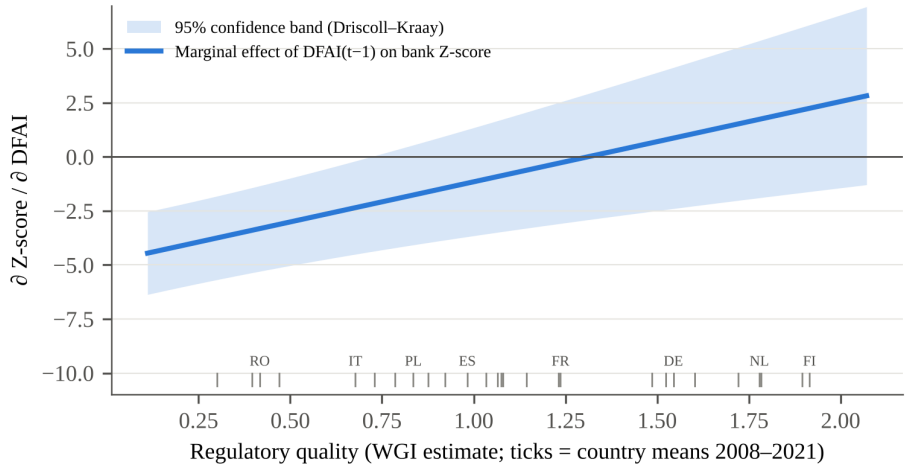
For systemic stress, adoption is associated with a lower CISS in the euro-area subsample (column 6). A one within-country standard deviation increase corresponds to a reduction of about 0.03 points, roughly a fifth of the sample mean, which supports H3. When the interaction is included (column 7), the main effect loses significance and the interaction becomes positive, suggesting that the stress-reducing association is concentrated in euro-area countries with lower regulatory quality, mainly in the southern periphery.

The control variables behave plausibly. Real GDP growth is positively associated with the Z-score (0.16, $p < 0.05$), and domestic credit to the private sector is positively associated with both NPL ratios and systemic stress, consistent with the view that rapid credit expansion is a leading indicator of vulnerability. The capital-to-assets ratio is positively associated with subsequent NPL ratios, which is likely to reflect the fact that banks with weaker loan books were required to hold, or chose to hold, larger buffers. The strong negative coefficient on GDP per capita in the Z-score and NPL models captures within-country convergence in income and should not be interpreted causally.

4.3. Conditional effects: the role of regulatory quality

Figure 3 plots the marginal effect of adoption on the Z-score across the range of regulatory quality. The effect is negative and statistically significant at the 5% level for regulatory-quality values below about 0.71, a range that includes Croatia, Greece, Romania, Bulgaria and Italy over 2008–2021. It crosses zero at about 1.31 and becomes positive, though imprecisely estimated, in the Nordic countries, the Netherlands, Germany and Ireland. For Romania (average regulatory quality 0.42), the estimated marginal effect is about −3.3 Z-score units per unit of the DFAI. Expressed in terms of a one within-country standard deviation of adoption, this corresponds to a decline of about 2.1 units, roughly 15% of the sample mean Z-score. An additional specification shows that the solvency association is also more negative in the Central and Eastern European member states beyond what regulatory quality explains (interaction with a CEE indicator: −2.87, $p = 0.02$), while no such difference exists for NPL ratios (−0.02, $p = 0.84$).

Figure 3. Marginal effect of digital finance adoption on bank solvency, conditional on regulatory quality



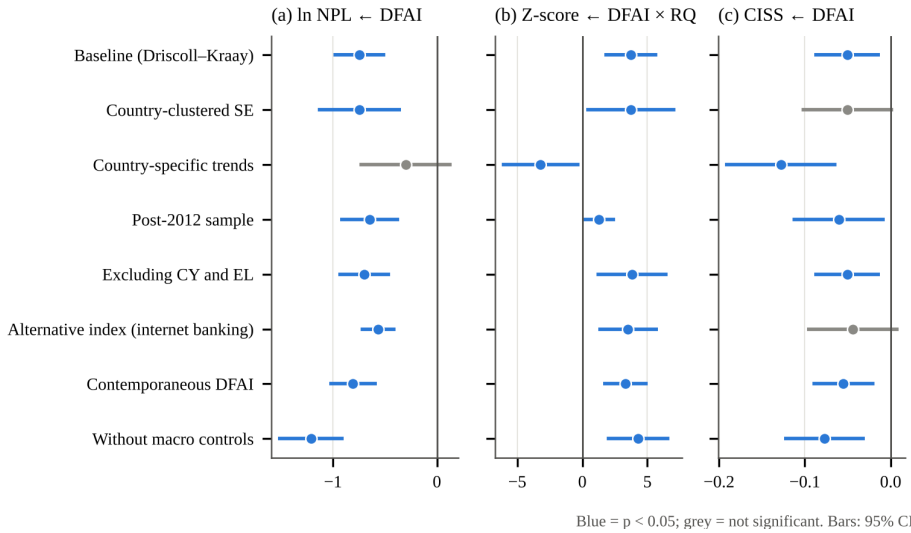
Note: Based on column (3) of Table 2. Source: Author's estimations.

4.4. Robustness

Figure 4 summarises eight robustness checks for the three key estimates: country-clustered instead of Driscoll–Kraay errors, country-specific linear trends, a post-2012 sample excluding the global financial and sovereign debt crises, the exclusion of Cyprus and Greece (the countries with the most extreme NPL ratios), an alternative index based

on internet banking only, contemporaneous instead of lagged adoption and the omission of macroeconomic controls.

Figure 4. Robustness of the key estimates



Note: Point estimates and 95% confidence intervals; panel (a) DFAI coefficient in the ln NPL model, panel (b) DFAI × RQ interaction in the Z-score model, panel (c) DFAI coefficient in the CISS model. Source: Author's estimations.

Three findings stand out. First, the NPL association is robust in sign and significance to every check except country-specific trends, under which it falls to −0.30 (p = 0.17); it also survives in non-overlapping three-year averages (−0.72, p = 0.05). Second, the stress-reducing association is robust, and it even strengthens with country-specific trends (−0.13, $p < 0.01$), although it becomes marginal with clustered errors (p = 0.06) or with the narrower index (p = 0.09). Third, the regulatory-quality interaction for bank solvency is robust to all checks except country-specific trends, under which it reverses sign (−3.21, p = 0.03). In first differences, none of the three associations is significant.

These results have a clear interpretation. The relationships identified are not short-run, year-to-year effects, but structural associations embedded in the medium-term trajectories of countries. Member states with strong institutions have combined rapid digitalisation with improving solvency, whereas member states with weaker institutions have digitalised without a comparable strengthening of bank buffers. Once each country's own linear trend is removed, the remaining deviations do not reproduce this pattern. The evidence is therefore consistent with a conditional, governance-dependent relationship between FinTech and stability, but it does not support a causal interpretation at short horizons.

5. Discussion: resilience and regulatory trade-offs

The results help to reconcile the mixed findings in the literature. The positive association with asset quality is consistent with the efficiency and inclusion channel, while the conditional association with solvency echoes the bank-level evidence that FinTech presence is associated with less risk taking where institutions are stronger (Elekdag, Emrullahu & Ben Naceur, 2024). The heterogeneity between emerging and developed

markets reported by Fung et al. (2020) may partly reflect differences in institutional quality rather than in the level of development as such.

For European policy, the findings point to three trade-offs. The first concerns *innovation versus prudential perimeter*. The Markets in Crypto-Assets Regulation (Regulation (EU) 2023/1114) and the planned revision of the payment services framework extend regulation to new activities, but supervisory resources determine whether the new rules are enforced proportionately. Where regulatory quality is low, the gains in asset quality from digital adoption appear to coexist with weaker solvency, which suggests that the efficiency channel is not matched by a corresponding strengthening of capital buffers.

The second trade-off concerns *efficiency versus concentration*. The Digital Operational Resilience Act (Regulation (EU) 2022/2554), applicable since January 2025, introduces an oversight framework for critical information and communication technology third-party providers. This addresses the interconnectedness and operational channels directly, but its effectiveness depends on the analytical capacity of national authorities, which our results suggest is most needed precisely where it is weakest. The Instant Payments Regulation (Regulation (EU) 2024/886) will further increase the speed of fund transfers, which supports efficiency but also accelerates potential deposit outflows in stress episodes.

The third trade-off concerns *automation versus model risk*. The Artificial Intelligence Act (Regulation (EU) 2024/1689) classifies creditworthiness assessment as a high-risk use and imposes governance obligations. The FSB (2024) highlights third-party concentration, market correlations, cyber risk and model risk as the main AI-related vulnerabilities. These risks are not yet visible in aggregate indicators such as Z-scores and NPL ratios, which reinforces the need for granular supervisory data.

The specific vulnerability of the Central and Eastern European member states also deserves attention. In these countries, digital banking has largely been introduced by subsidiaries of Western European banking groups, which often operate group-wide platforms and outsource technology services to the parent bank or to the same global providers. Digitalisation therefore tends to deepen operational dependencies on entities located outside the host jurisdiction, at the same time as it improves retail efficiency. This structure may explain why the solvency association is more negative in the region even after controlling for regulatory quality, and it gives host supervisors a strong interest in the cross-border cooperation mechanisms foreseen by DORA.

For Romania and other member states in the low-regulatory-quality range, the implication is not to slow digital adoption, which brings inclusion and asset-quality benefits, but to sequence it with investment in supervisory technology, cyber-resilience testing and data-sharing between financial and digital authorities. Proportionality should be understood as matching supervisory capacity to the speed of digital change, rather than as lighter rules for smaller markets.

Four practical recommendations follow from the analysis. First, national authorities should monitor digital adoption together with stability indicators, since the relationship between them depends on institutional conditions that differ across member states. Second, supervisory capacity, including data analytics and cyber-resilience expertise, should be treated as a macroprudential resource and expanded where digital adoption is growing fastest. Third, the European Supervisory Authorities could publish harmonised indicators of bank dependence on critical third-party providers, which would allow the concentration channel to be measured directly. Fourth, financial-inclusion strategies in the least digitalised member states, including Romania, should be

accompanied by consumer-protection and fraud-prevention measures, so that broader access does not translate into higher operational risk.

6. Conclusions

This paper examined the relationship between FinTech and financial stability in the European Union over 2008–2025. It proposed a framework of four risk channels and measured digital-finance adoption with a transparent index based on harmonised Eurostat data. Three conclusions emerge. First, digital-finance adoption has converged strongly across the Union, but Romania and Bulgaria remain clear laggards. Second, higher adoption is associated with lower NPL ratios and with lower systemic stress in the euro area, consistent with an efficiency and resilience channel. Third, the association with bank solvency is conditional on regulatory quality: it is negative where governance is weak and positive where it is strong. FinTech's net effect on stability is therefore neither positive nor negative in itself; it depends on whether institutions evolve as quickly as technology.

The analysis has limitations. The adoption index captures retail usage rather than FinTech firms' balance sheets, crypto-asset exposures or cloud concentration, for which harmonised data are not yet available. The Z-score series ends in 2021, the CISS is available only for ten euro-area countries and the associations are not robust to all specifications, notably country-specific trends and first differences. Future research should combine supervisory micro-data on bank–FinTech exposures with quasi-experimental designs around the implementation of DORA, MiCA and the Instant Payments Regulation, in order to move from conditional associations towards causal evidence.

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ORIGINAL PAPER

Quality education as a determinant of progress towards the Sustainable Development Goals

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Abstract:
The quality of education is recognized at the international level as an important part of the structural factors that support sustainable development, both as a specific goal of the Agenda 2030 and as a cross-cutting element that affects a majority of the global goals set at that level. It is recognized that education as a key factor in social and economic transformation and one of the most important investments with a high return. The study aims to highlight the role that achieving a high level of education plays in strengthening a more aware and resilient global society, by assessing its role through a comparative analysis between Romania and the European average. The recent data confirm that there is a gap between Romania and the European Union average. The interpreted results showed us that the average score of a Romanian student is 428 points, lower than both the European Union average and the OECD average, with over 40% of students below the minimum level of proficiency in all domains. These gaps reveal the constraints that affect human capital and highlight the necessity of systemic measures that aim to support an improvement in educational performance and reduce inequalities between social classes. The role that education plays in sustainable development is a complex process that aims to support individuals' capacities to make informed decisions and responsible actions, both for the present and for future generations. The comparative studies carried out at the European level highlight that a third of the member states, including Romania, are still below the optimal level of performance regarding this domain. Therefore, under these circumstances, closing the educational gap between Romania and the European Union average is a key element that can support an acceleration of progress regarding sustainable development goals.

Keywords: *Quality education, sustainable development, SDG 4, human capital, educational performance.*

JEL Classification: I21, I25, Q01

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1. Introduction

Educational performance continues to be crucial in the process of sustainable development. Not only access to learning opportunities but also the competencies gained and used throughout the whole lifetime are covered within the term. It is more than just academic success since such skills as comprehension of the complex processes and issues and the ability to participate economically and socially and take informed decisions matter as well. Under the 2030 Agenda, the fourth sustainable development goal (SDG 4) is to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

The connection between education and sustainable development implies consideration of both learning results and the equal opportunities provided by the country. Participation in the process of formal education cannot serve as the decisive factor for assessing whether a learner gains required competencies. Moreover, national averages give partial information when there are large inequalities in achieving particular results. Thus, the evaluation of the educational performance includes not only performance but also the ability to achieve a minimum standard of competencies and educational inequalities.

Comparing the performance in Romania to the average EU level, the latter becomes the suitable framework for addressing those issues. Gaps in the results presented in the data used for this study indicate problems concerning the capability of the education system to develop competencies in learners. Such gaps need to be considered not only as differences in test scores but also as obstacles to the development of human capital and achievement of sustainable development goals. Knowing their nature and characteristics becomes crucial for understanding in what areas improvements in education should be done.

Thus, the main problem addressed by the current research is the difference between the educational performance of Romania and the European reference level discussed in the context of the goals of quality education and sustainable development. While educational attainment and learning outcomes cannot be considered interchangeable terms, the latter become the key focus in the analysis, thus being the core of the research design. Expanding educational participation and improving the quality of learning are the two sides of educational advancement.

The research aims to evaluate the educational performance of Romania in comparison with the average level in Europe and discuss implications of the identified gaps for human capital and for the achievement of SDG 4. The focus of the analysis is made on the levels of achievements in math, reading and science and the percentage of students scoring below minimum competency levels. In addition to these parameters, the analysis is supported by the indicators of educational participation and attainment chosen selectively.

To investigate the research issue, two research questions have been formulated. They are the following: how the educational performance of Romania compares to the European Union average and what are the implications of these differences for the progress towards quality education and sustainable development of the country? Descriptive and comparative methodological approach is used to identify the magnitude and characteristics of these differences. Interpretation makes the difference between educational results and their larger implications. No causal connection is drawn between education and sustainable development.

The contribution of the research into the literature comes from the integration of performance gaps and selectively chosen educational indicators into a single analytical framework based on SDG 4. The approach allows connecting the analysis of learning outcomes to the goal of developing human capital and discuss possible policy priorities concerning both of these aspects.

2. Theoretical Background and Literature Review

In this regard, the link between education and sustainable development consists not only of the acquisition of basic skills but also the ability to engage with complex social, economic, and environmental issues. For this reason, education for sustainable development (ESD) entails much more than providing information related to sustainability. UNESCO (2017) presents this idea when linking the three learning dimensions: cognitive, socio-emotional, and behavioural, since knowledge, values, and action are different aspects of learning.

Such an approach requires the separation of quality education as a development goal from education for sustainable development as an educational concept. While quality education is focused on inclusiveness, equity, and effectiveness of learning, ESD deals with the competences necessary to cope with sustainability challenges. Despite some similarities, these ideas cannot be confused. UNESCO's framework considers the relationship between education and Sustainable Development Goals, while identifying the specific learning objectives and educational activities which make it possible to integrate sustainability into teaching and learning (UNESCO, 2017).

It is important to note that the issue of foundational competencies is relevant in such a framework. Reading, mathematics, and science provide the tools needed for information processing, analysis, and problem solving. However, success in these areas does not mean that a person has all the necessary knowledge and engages in responsible behaviour. The inclusion of socio-emotional and behavioral dimensions by UNESCO implies that ESD involves learning outcomes other than cognitive achievement. Therefore, educational assessment results could be used to analyze the basics of learning but not to conclude whether or not learners have all the competencies (UNESCO, 2017).

The significance of education in economic terms extends beyond participation in schools but also through knowledge and skills acquired by individuals. This distinction forms the crux of the theory of Hanushek & Woessmann (2008), who examine the role of cognitive skills in economic development. The critical review by Hanushek and Woessmann (2008) raises the problem of using years of education as a sufficient measure of human capital due to different levels of achievement despite identical periods of educational participation. In turn, educational quantity and educational quality denote two distinct sides of human capital accumulation.

Hanushek and Woessmann (2008) point out that there exists abundant evidence for the effect of cognitive skills on individual earnings, income distribution, and economic growth. Such an approach makes it possible to place learning outcomes in the core of the relationship between education and economic performance rather than consider increased school participation to be automatically beneficial in terms of economics. Therefore, one can consider the case for using achievements as a measure of contribution of education to economic development.

The differentiation between achievement and attainment has significant implications for methodology. Educational attainment indicators are the measurements of qualifications or attained level of education, while achievement measurements reveal

performance in particular fields. None of these measurements can substitute each other completely. The results reviewed by Hanushek and Woessmann (2008) make it possible to propose an analysis, which uses both attainment and achievement measures to assess human capital.

The economic meaning of cognitive performance needs to be compatible with the research design used. The existence of evidence in the body of literature on the relationship between skills and economic development, however, cannot itself confirm causality by means of a simple comparison of achievement scores. For the current study, human capital approach provides an appropriate perspective: educational achievement denotes competence differences, which can be economically analyzed in the context of existing literature.

Average performance is insufficiently informative about the dynamics of education because it does not show how educational achievements are distributed within the student population. In the study of equity in PISA 2022, the OECD found the persistence of the link between students' socioeconomic status and their performance. In OECD countries, disadvantaged students were significantly more likely than advantaged students to fall short of the minimal proficiency standard in mathematics (OECD, 2023a).

Specifically, the issue of socioeconomic inequalities is particularly important for the case of Romania. According to the OECD country note, students who belonged to the most advantaged socioeconomic quartile performed 132 points higher than those who belonged to the least advantaged quartile in mathematics in PISA 2022. At the same time, the share of performance variance attributable to students' socioeconomic status was 26% in Romania against the OECD average of 15% (OECD, 2023b). These results suggest a comparatively strong relation between the two factors under analysis although they cannot be considered as the measure of the causal influence of families.

Another aspect of the discussed issue is the inequality in the distribution of low-performance levels. The OECD found that the difference in the proportion of low-performing mathematics students between advantaged and disadvantaged groups exceeded 50 percentage points in Romania (OECD, 2023a). This information indicates that the problem of national education concerns not only the average performance of students but the unequal distribution of educational challenges among different groups of children.

These considerations provide a justification for the joint analysis of the aspects mentioned above. The national average cannot mask significant disparities in the opportunities and performance of specific groups of children. At the same time, assessing educational disadvantage requires taking into account the actual competencies acquired by students and not their educational engagement.

The extant literature suggests using an analytical framework based on three complementary dimensions: competencies achieved, distribution of educational results and their connection to sustainable development. In particular, Hanushek and Woessmann (2008) explain the economic logic of considering educational results as part of human capital. Equity analysis by the OECD stresses the necessity of considering differences between different socioeconomic strata in terms of the results attained. Furthermore, UNESCO (2017) considers education as one of several components which include knowledge, values and ability to act responsibly.

Combining these findings, it becomes clear that the use of one educational indicator is not enough to assess the quality of education provided. Achievement measures provide information about students' success in some specific areas; proficiency measures

help to identify the number of insufficiently skilled people; participation and attainment indicators present additional aspects of educational progress. Joint interpretation of these indicators will serve as more objective basis for evaluating the place occupied by Romania in relation to the EU average, maintaining the separate meanings of the indicators.

In addition, this framework identifies one essential interpretative boundary. Cognitive assessment is relevant to the formation of human capital but does not measure sustainable behavior, societal resilience or progress in other dimensions of SDG 4. Differences between countries' achievements do not necessarily identify the reasons for these differences. Therefore, the contribution of the comparison is in documenting the gaps in education and interpreting them from the point of view of human capital, equity and sustainable development, rather than measuring sustainability itself or identifying the reasons behind it.

3. Data and Research Methodology

This research is based on a descriptive and comparative methodology for an assessment of Romania's educational performance compared to the EU average. In the analysis, both indicators of demonstrated competencies and some educational participation and educational attainment indicators are used. Such approach allows distinguishing between learning outcomes, the sustainability of participation in education, and the achievement of higher educational levels, and not considering the last three components as equivalents of educational development.

The empirical methodology includes two components. The first one considers achievement in mathematics, reading, and science and the proportion of low-performing students. It uses the PISA 2022 assessment as an empirical base for the performance data analysis presented in the study. The second component concerns the issue of early leaving from education and training and tertiary educational attainment and uses Eurostat indicators included in the framework of monitoring of SDG 4 at the European level (OECD, 2023; Eurostat, n.d.-a, n.d.-b).

The use of PISA 2022 is determined by a clear choice of reference cycle, but does not mean that these data are the latest educational information available. In order to provide a consistent reference year for the main comparison, Eurostat indicators are analyzed for 2022 as well. The temporal consistency contributes to understanding, without meaning that the indicators relate to the same individuals or educational generations.

This paper uses publicly available statistics that are aggregate data obtained through official sources. Statistics for PISA are derived from OECD reports and the National Report of Romania, while additional educational statistics are taken from the Eurostat database. This paper does not use microdata to make an estimate of achievement scores but uses publicly available statistics while retaining the definitions, population, and units of measurement of each source (OECD, 2023b; Ministerul Educației, 2023).

Table 1. Indicators and analytical dimensions

ANALYTICAL DIMENSION	INDICATOR	POPULATION	UNIT
Demonstrated competencies	Mean achievement in mathematics, reading and science	Students covered by PISA 2022	PISA score points
Insufficient proficiency	Students performing below Level 2, separately for each domain	Students covered by PISA 2022	%
Socioeconomic inequality	Mathematics performance gap between the nationally most advantaged and least advantaged socioeconomic quarters	Students covered by PISA 2022	PISA score points
Educational discontinuity	Early leavers from education and training	Population aged 18–24	%
Educational attainment	Population with tertiary educational attainment	Population aged 25–34	%

Sources: OECD (2023b), Ministerul Educației (2023)

The PISA indicators evaluate performance in three different domains. Individual mean scores are considered separately, without trying to produce an overall performance indicator in education. Likewise, the percentage of students scoring below Level 2 is analyzed separately for mathematics, reading, and science. These percentages do not indicate the percentage of students scoring below the threshold in all three domains (OECD, 2023).

The socio-economic performance gap is a contextual indicator of inequality. It evaluates the performance in mathematics of students situated in the top quarter and bottom quarter of the PISA socio-economic distribution. As these two socio-economic categories are constructed on the level of each country, they capture the relative rather than absolute differences in the level of resources available to students. Romania's result is presented together with the OECD benchmark stated in the source. In addition, the latter is not shown as an EU average (OECD, 2023b).

According to Eurostat, early school leavers are people aged 18–24 years old that completed at most lower secondary education and did not participate in any education or training programs in the four weeks preceding the survey. It is important to emphasize that this measure, taken from the EU Labour Force Survey, is not an administrative number of students leaving schools (Eurostat, n.d.-a).

Indicators of tertiary educational attainment represent the proportion of individuals aged 25-34 years who completed tertiary education, meaning levels 5-8 of the International Standard Classification of Education 2011. This indicator is taken from the EU Labour Force Survey. It represents completed educational attainment and not participation or assessment results (Eurostat, n.d.-b).

The unit of analysis is Romania, while the European Union acts as the main comparative reference group. In the case of Eurostat indicators, the benchmark is the published EU aggregate consisting of 27 member states, EU27_2020. The observations related to the entire population are used, not those broken down by sex. The published EU aggregate is kept as it is and is not replaced with the unweighted arithmetic mean of national percentages (Eurostat, n.d.-a, n.d.-b).

As for PISA achievement, the European reference values are determined from the Romanian national report and are clearly marked as the averages of EU reported in the document. The OECD average is kept as an additional benchmark. Such explicit distinction prevents the two reference groups from being confused and keeps the original source of comparison (Ministerul Educației, 2023).

The primary dataset includes observations for 2022. The source, labels, units, and any qualifications related to the observation are kept during the data preparation. No interpolation or imputation of missing observations is done. Calculations are done using the precision of the published values, while the display is rounded only after the calculation of the difference. If the source supplies only rounded values, the gap should be interpreted at the same precision level.

The approach does not involve the construction of a composite index out of the indicators. The PISA scores and population percentages are measures of different constructs and their combination by summation or averaging is impossible without additional normalization and weighting procedure.

The main comparative measure is the difference between Romania's value and the corresponding European reference value. For PISA achievement, the score gap is calculated as:

$$G_d = S_{RO,d} - S_{EU,d}$$

where $S_{RO,d}$ denotes Romania's mean score in domain d and $S_{EU,d}$ denotes the EU reference score for the same domain. A negative value indicates that Romania performs below the European reference. The magnitude is expressed in PISA score points, not as a percentage shortfall, because the comparison concerns positions on an assessment scale rather than a ratio-scale measure.

For indicators expressed as percentages, the gap is calculated as:

$$G_k = P_{RO,k} - P_{EU,k}$$

where $P_{RO,k}$ and $P_{EU,k}$ represent the respective percentages for indicator k. The resulting difference is reported in percentage points.

Interpretation depends on the direction of the indicator. A positive gap in early leaving or low proficiency indicates a less favourable outcome for Romania, whereas a negative gap in tertiary educational attainment indicates a lower attainment rate. These directional differences are made explicit in the presentation of results to avoid treating every positive numerical difference as an improvement.

The socioeconomic achievement gap is calculated as:

$$I_{RO} = S_{RO,Q4} - S_{RO,Q1}$$

where $S_{RO,Q4}$ is the mean mathematics score of students in the most advantaged national socioeconomic quarter and $S_{RO,Q1}$ is the corresponding score for the least advantaged quarter. A larger value indicates a wider difference in achievement between these groups. The measure describes an association between socioeconomic position and performance; it does not estimate the causal effect of family background.

The analysis pays particular attention to the size, direction and educational meaning of the identified differences. Comparative tables and graphs are used to distinguish between achievement gaps and disparities in participation and attainment. No new statistical significance tests are performed based on rounded aggregate figures. Statistical significance claims are made based on the findings of the source publications only; otherwise, differences are referred to as gaps.

There are several restrictions on the scope of interpretation. Firstly, PISA evaluates skills in particular domains of the target students, while Eurostat indicators cover

a wider age spectrum and various education cycles. Secondly, the average figures and aggregate percentages can hide the differences by social groups, schools, regions. The socioeconomic indicator is one of the measures of this diversity, but it does not give the whole picture of educational inequality.

Thirdly, a cross-sectional analysis cannot reveal whether the educational gaps narrowed or widened. It requires another analysis that will compare different years. Fourthly, the chosen indicators do not evaluate sustainable behavior, economic resilience, or other aspects of SDG 4 goals. The contribution of those indicators is the evaluation of certain educational gaps related to the research topic.

The general principle of methodology in the analysis is comparability: each indicator is compared according to its own definition, target population, and reference benchmarks. In this way, the research identifies Romania's educational gaps without going beyond what evidence suggests.

4. Results and Discussion

The findings from the PISA 2022 test show that Romania has continued to lag behind European benchmarks on mathematics, reading, and science. Romania performed at around 428 points in each of the subjects tested, whereas the average scores for the European Union, according to the Romanian report, stood at 469 points in reading and 481 points in science (Ministerul Educației, 2023). The gaps suggest that below-average performance by Romania is not specific to a particular subject area.

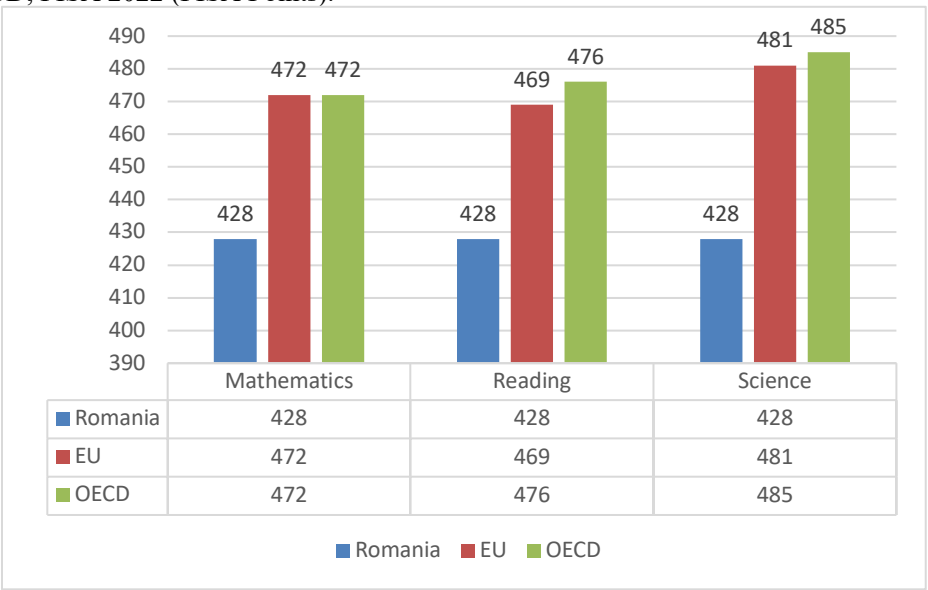
Table 2. Mean PISA achievement and Romania's performance gaps, 2022

Domain	$\bar{X}$Ro	$\bar{X}$EU	$\bar{X}$OECD	Ro–EU gap	Ro–OECD gap
Mathematics	428	472	472	−44	−44
Reading	428	469	476	−41	−48
Science	428	481	485	−53	−57

Sources: Developed by the author based on the research methodology

The largest observed gap relative to the EU average concerns science, at 53 points, followed by mathematics at 44 points and reading at 41 points. These differences should be interpreted within each assessment domain rather than as directly interchangeable quantities. Nevertheless, their common direction indicates that Romania's educational challenge extends across the three types of competencies considered. The identical rounded national scores do not imply that students demonstrate equivalent abilities across subjects, since each domain has its own assessment framework and proficiency scale.

Figure 1. Mean achievement in mathematics, reading and science: Romania, EU and OECD, PISA 2022 (PISA Points).



Sources: Developed by the author based on the research methodology

According to the human capital approach, the results are consistent with differentiating between schooling and the skill acquisition process. According to Burks et al. (2009), cognitive skills allow one to receive information about the economic value of education beyond mere schooling years. This way, one can interpret Romanian gaps as signals about disparities in measured skills rather than discrepancies in educational participation only. In terms of economic importance, Romanian achievement gaps can be viewed in light of the existing research on skills and development, but this paper's comparison cannot serve as an estimate of this effect.

Furthermore, the interpretation needs to take into account the issue of population representation. As indicated by the OECD, the sample of PISA 2022 in Romania included around 76% of the total 15-year-old population. In that regard, it is important to stress that the outcomes pertain to the competence levels achieved by the population sample used in the assessment process and not by all Romanian adolescents. This clarification is important in view of the relation to inclusive education goals.

Mean scores identify the overall position of an education system but do not show how widely insufficient competencies are distributed. The proportion of students below Level 2 provides a complementary perspective by identifying those who do not reach the baseline proficiency threshold in each domain. In Romania, the rounded proportions were 49% in mathematics, 42% in reading and 44% in science.

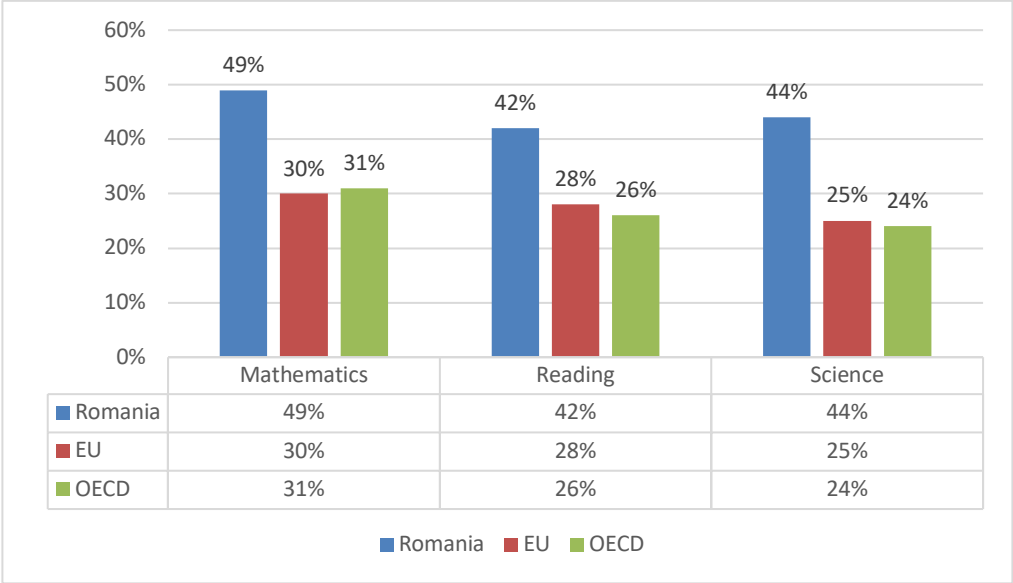
Table 3. Students below Level 2 proficiency and Romania's comparative gaps, 2022

Domain	Ro%	EU%	OECD%	Ro–EU gap %	Ro–OECD gap%
Mathematics	49	30	31	+19	+18
Reading	42	28	26	+14	+16
Science	44	25	24	+19	+20

Sources: Developed by the author based on the research methodology

In mathematics, the proportion of underperforming students is the largest among all other subjects; about half of the students evaluated did not reach the second level. As compared to the European standard, the difference in the proportion of underperformance was 19 percentage points in mathematics and science, while that in reading was 14 percentage points. In conclusion, the national problem involves low average results and a significant number of underperforming students.

Figure 2. Students performing below Level 2 in mathematics, reading and science: Romania, EU and OECD, PISA 2022.



Sources: Developed by the author based on the research methodology

The educational implications of this research become clear if one considers the proficiency thresholds. In mathematics, the Level 2 includes the recognition of the way in which a simple situation may be described in terms of mathematics without specific directions on this point. In reading, it consists in the identification of the key idea in a long enough piece of text and finding the required information based on some predetermined criteria. In science, it involves the recognition of the explanations of well-known phenomena and evaluation of whether a simple conclusion is made based on the provided data (OECD, 2023).

Lack of skills at this level cannot be considered as a sign of having no knowledge and being unable to do anything in this field. It shows only that the level of proficiency

has not been reached yet. It helps to avoid the simplification of a graduated assessment of skills into an absolute category of ability.

Moreover, the obtained results help to find the connection between educational attainment and sustainable development. According to UNESCO (2017), the latter implies several aspects including cognitive, socio-emotional, and behavioral aspects of education. While PISA does not provide the measures of all three components, it evaluates the competencies related to its cognitive dimension. The problems of interpretation of texts, numbers, and evidence can limit the availability of means necessary for addressing complicated development issues.

There are performance gaps for Romania which correlate to social inequality in the country. According to the OECD, there is a performance difference of 132 points between the students who are most privileged in terms of SES, and those who are less privileged in the nation, which is greater than the average 93 point gap for other OECD countries. Romania's performance gap exceeds the OECD standard by 39 points.

Table 4. Socioeconomic inequality and academic resilience in mathematics, PISA 2022

Indicator	Romania	OECD average	Romania–OECD difference
Achievement gap between the most and least advantaged socioeconomic quarters	132 points	93 points	+39 points
Variation in mathematics performance accounted for by socioeconomic status	26%	15%	+11 percentage points
Disadvantaged students reaching the top national quarter of mathematics performance	7%	10%	−3 percentage points

Sources: Developed by the author based on the research methodology

The share of the influence of socioeconomic factors on the level of mathematics performance in Romania amounted to 26%, in contrast to 15% across the OECD countries. This figure shows the strength of the relationship in question within the framework of the assessment. Neither does it say that socioeconomic factors play a role of causal determinants of 26% of each student's achievements; it does not separate the independent roles of schools, families, or neighborhoods (OECD, 2023).

Academic resilience provides another view of the issue. Seven percent of disadvantaged children managed to reach the highest national quartile of mathematics

performance in Romania against 10% in the OECD reference. It means that the disadvantage cannot preclude high relative achievement. However, the smaller proportion of Romanian students means that overcoming the disadvantage via educational success occurs less often than in the OECD reference.

This evidence makes one think about understanding the educational quality and equity from the perspective of two dimensions together. One cannot conclude that the growth of the mean would show inclusiveness of learning opportunities in itself. Likewise, increased participation could not mean sufficient competencies of disadvantaged children. Within the human capital it is necessary to pay attention to both the mean level and the distribution of cognitive skills, which turns the persistent achievement inequality into the issue relevant to the economic opportunity and its distribution in terms of education.

This evidence means that it is necessary to prioritize those interventions that combine learning support programs with efforts to decrease the barriers of participation. They may comprise early detection of learning disabilities, provision of continued remediation, and assistance for teachers working in diverse environments. These policy recommendations address problems that exist in reality but not those proven to be effective by the evidence presented. Teacher preparation and professional development and assistance to disadvantaged schools are the priorities in terms of the European Commission's analysis of Romania (European Commission, 2023).

The results from PISA can be placed within an educational framework by making reference to the early school leaving and higher education indicators. The aforementioned indicators relate to different age groups and do not follow the tested pupils throughout their development. However, they provide additional insight into educational enrollment and completion.

Table 5. Complementary educational indicators: Romania and the European Union, 2022

Indicator	Age group	Romania (%)	Eu average (%)	Romania–EU gap (percentage points)
Early leavers from education and training	18–24	15.6	9.6	+6.0
Tertiary educational attainment	25–34	24.7	42.0	−17.3

Sources: Developed by the author based on the research methodology

The early-leaving indicator in Romania exceeded the one of the European Union countries on average by 6 percentage points. This result means that there is a higher percentage of people who have limited education and do not participate in further education or training. It should not be viewed as the number of drop-outs per year since it describes the characteristics of the population instead of flows in schools.

At the other end of the education indicator scale, 24.7% of the Romanians had tertiary qualifications compared to 42.0% in the European Union. The 17.3-percentage-point difference shows that there is a shortage in higher education. However, this does not prove the quality of these qualifications or clarify the reason for the difference in rates (entry, completion, migration, etc.).

Combining these indicators, it is possible to conclude that the country faces three problems: lack of competencies in many assessed persons, relatively high early leaving and a smaller number of young adults with tertiary qualifications. At the same time, it does not mean that there is a causal relationship between these measures. But it confirms the fact that educational achievements cannot be measured using a single indicator of schooling or qualification.

From these results, it follows that Romania's move towards quality education requires consideration of achievements not only as regards its level but also its distribution. Coexistence of subreference achievements, wide-spread under-proficiency, and substantial socioeconomic disparities reveals educational problem combining skills' and inclusiveness aspects. In the context of the UNESCO approach, the importance of overcoming such foundations lies within the framework of enabling the learners to engage with sustainable development; nevertheless, foundation improvements do not cover all educational aspects of sustainability (UNESCO, 2017).

In regard to linking to resilience, it is possible to develop a conservative relationship based on the regional development literature. Mitrache et al. (2024), studying regional resilience using a bibliometric approach, stress the importance of the concept for policies aimed at ensuring economic balance, social inclusion, and environmental protection. This contribution provides the wider developmental perspective for understanding educational gaps. It does not measure the influence of education nor proves that better assessment scores lead to greater regional resilience.

From this position, educational disadvantage can be viewed as a potential barrier to inclusive adaptive capacity instead of being an indicator of resilience. Such interpretation combines the human capital theory by Spulbar and Mitrache (2025) and the policy concerns of Mitrache et al. (2024). It retains the difference between the empirical findings of the current comparison and conclusions made by other studies.

Three priorities follow from the suggested interpretation:

- ✓ Improvement of foundations of learning with explicit focus on the learners lagging behind the proficiency baseline.
- ✓ Reduction of the concentration of educational disadvantage through targeted support of learning and participation.
- ✓ Promotion of educational continuity and success in completing studies as well as complementary objectives of qualification levels.

These priorities represent the evidence-based agenda rather than a ranking of different policies in terms of their efficiency. Existing comparisons reveal the areas of educational gaps but do not prove which intervention will bring more progress. For policy evaluation, additional information about implementation, cost, participation, and outcome is needed.

The major conclusion drawn is that overcoming educational gaps in Romania cannot be reduced to the raising of the national average. It requires the improvements in the acquired competencies, greater opportunities to reach them, and continuity in participation in education. Such dimensions can provide a plausible link between the educational achievements revealed and goals of human capital development, not considering sustainable development or resilience as the measured outcomes.

5. Conclusions

Comparative analysis demonstrates a consistent gap between the performance of Romanian education and the reference values set by European Union standards. The mean

achievements of Romanian students in mathematics, reading, and science, based on the PISA 2022 study, appear significantly lower than the reference value of European Union. The gap is especially noticeable in the area of science skills. The presence of low proficiency is another proof of it as 40% or more of the tested students demonstrated the skills below the second proficiency level when considered individually. It means that the problem goes beyond the national average as many students lack basic skills in different areas of knowledge.

Equity is another important aspect that should be taken into account while assessing the quality of education. The large mathematics achievement gap between advantaged and disadvantaged students proves that the national performance conceals some disparities within the population. The high correlation between socioeconomic status and learning achievements together with the low share of disadvantaged resilient learners suggests that increasing the national average will not solve all problems of Romanian educational system.

The additional indicators complement this assessment without establishing a causal link between the different educational stages. A higher rate of early leaving from education and training and lower rate of tertiary education are two other gaps relative to the EU average. As those indicators refer to different populations, they do not show how individual students progress from lacking proficiency to early departure or to lower qualification level. Still, when analyzed together, they highlight that the problem of education is connected with learning outcomes, continuity, and successful conclusion.

In general, the contribution of this research is the integration of those aspects into one framework related to quality education and sustainable development. Qualifications, participation, and competencies cannot be used interchangeably as it is needed to keep them separate in the context of the research but to analyze their complementary importance for human capital.

The policy implications of this research concern three interrelated priorities. It is necessary to develop foundational competencies, reduce the socioeconomic inequality in learning, and ensure continuity in education. Additional help for the learners with difficulties, enough support for disadvantaged schools, and solutions for overcoming barriers to participation can be considered possible directions for actions. The effectiveness of these solutions and the optimal use of resources require further consideration, though.

The connection with sustainable development should be analyzed under the conditions described above. More competencies and learning inclusivity provide a strong basis for participation in economy and society. The indicators selected for analysis do not reflect the behavior and the adaptation abilities related to sustainable development, neither do they measure economic resilience. Consequently, the research supports a discussion about the educational conditions relevant for sustainable development but does not imply that increasing scores in assessments leads to sustainability.

Several limitations limit the scope of conclusions. This research is based on aggregate data and mostly consists of cross-sectional observations and therefore is not able to establish causal relationships or analyze changes over time. Different populations, age groups, and measurements frameworks further limit the extent to which the indicators can be integrated. Finally, the comparison on national level does not reflect all differences at regional, school-level and individual level.

Future research may include the comparison of the data across different assessment cycles, regional breakdown of the results, and student-level analysis of the

factors that affect achievement. The evaluation of educational interventions may help to understand what measures contribute to competencies and learning equality.

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ORIGINAL PAPER

Legal perspectives on the regulation of artificial intelligence systems and the protection of the stability of employment relationships

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Abstract:

The evolution of artificial intelligence systems requires a profound reassessment of the foundations of labor law, moving from the classic vision of subordination to the employer, whether a natural or legal person, to a reality in which the algorithm acquires control and coordination powers. The establishment of a regulatory framework capable of legally integrating these autonomous agents requires the definition of a form of hybrid responsibility, which prevents the dilution of the employer's obligations through the use of technology. The protection of employees' interests in this context cannot be limited to simple temporary measures, but must be shaped around the recognition of a fundamental right to job stability in the face of uncontrolled automation. From a legal perspective, this protection involves the imposition of strict limits on the replacement of human labor, based on the principle of social utility and the need to maintain a balance between technological efficiency and social security.

A rigorous analysis of algorithmic control mechanisms reveals the need to introduce ”human safeguard clauses”, which would guarantee that decisions affecting the essence of the individual employment contract remain under the jurisdiction and discernment of the human factor. The law must intervene through imperative norms that condition the implementation of artificial intelligence systems on the demonstration of the fact that they do not cancel the employee's right to exercise their profession, transforming technological progress from a threat to economic existence into a support tool. Thus, the outline of a liability regime for the acts of intelligent agents and the consolidation of mechanisms to combat dismissals based exclusively on algorithmic performance become the basis of a new labor law, capable of protecting the dignity and viability of the employee status in a labor market dominated by automation.

Keywords: *Digital legal personality, employment security, guarantee of human intervention, algorithmic law, artificial intelligence (AI).*

JEL Classification: K31, O33, J63

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1. Introduction

Introducing artificial intelligence (AI) in the workplace leads to considerations that go beyond simple substitution of human activities by technologies. Besides tools designed for the purpose of automating production or administration processes, employers make use of data analysis for allocation of work tasks, behavior monitoring, and performance assessment. Both processes are covered by the broader concept of algorithmic management that includes not only artificial intelligence but also rule-based methods of organizing and evaluating work (International Labour Organization [ILO], 2024a). This differentiation is important as not all automated management tools represent artificial intelligence, however, both can have an impact on employees' working and staying conditions.

There are two ways how introduction of technologies in the organization affects the employment stability of its members. While AI can help in making organizational changes in a way that will lead to reduced necessity of particular work or position performance, the algorithmic management can impact the decisions about particular workers. None of these approaches implies necessary dismissal of employees. While task automation can go together with human work, provided how technologies are introduced and what kind of tasks are delegated to humans and machines (ILO, 2024b), still, ability to generate performance evaluations, recommendations, or predictions requires consideration of how this output of technologies obtains its authority and can be contested.

From the standpoint of labour law, what is problematic about technology is not the fact that it is an element of managerial decision-making but the fact that technology can blur the exercise of employer's power. Algorithmic management scholarship raises the issue of accountability and the complexity of mapping the rationale behind the tools used by managers (ILO, 2025). It is especially pertinent when such a tool is used to justify an employment action. A technological recommendation cannot be considered as a justification per se because it needs to be assessed in light of the criteria behind the decision taken. The normative assumption made here is that delegating management tasks to technology cannot enable the employer to diminish his obligations towards employees.

In order to understand how to consider the issue of organizational changes and employment protection, international labour standards serve as an important source of information. Article 4 of the ILO Termination of Employment Convention, 1982 (No. 158) states that termination shall be justified by a valid reason connected to the worker's capability or behaviour or to the needs of the business. This provision serves as an international standard that takes into account legitimate interests of the organization but does not equate dismissal with an unlimited managerial discretion. It will also help differentiate termination resulting from an assessment of a particular worker from the one resulting from reorganization of the economic process (ILO, 1982).

As far as the EU is concerned, the legal regime combines data protection rules with regulations regarding the risks associated with AI. Article 22 of the Regulation (EU) 2016/679 covers decisions based exclusively on automated processing which produce legal effects or similar impacts on individuals, unless there are some exceptions and safeguards. The scope of this Article should not be neglected or transformed into a general ban on any AI-enabled decisions. The Regulation (EU) 2024/1689 introduces a risk-based approach, listing particular types of employment applications in Annex III and setting certain requirements related to human oversight. It is important to state that the AI Act complements but does not replace current labour-law and data-protection rights (European

Parliament and Council, 2016, 2024). Technical compliance and legality of the employment decision are related but separate matters.

The Romanian labour law gives one a basis to examine these issues. According to Article 10 of the Law No. 53/2003, employment is considered to be the work done under the subordination of an employer, who can be either a natural or legal person. Article 6 covers the protection against unfair dismissal. Article 17 mentions the provision of information regarding criteria used for professional evaluation as one of the obligations of the employer. Regarding dismissals which are not connected with an employee's personal features, Article 65 states that the abolition of an employee's position must have a serious cause. Thus, these provisions give a good ground for the analysis of application of the safeguards in case of assessment or restructuring based on the use of technology. Technological introduction does not imply an automatic right of dismissal nor a right to keep the same position.

In consequence, the research problem looks at whether current safeguards are adequate in case the exercise of management powers is achieved through technological mediation. Through a doctrinal method, the analysis will use international standards, European regulation, and the labor law of Romania in an interaction with relevant judicial interpretations. The purpose of the analysis is to establish the circumstances in which the use of artificial intelligence by employers does not prejudice the legitimacy, accountability, and challengeability of decision-making related to employment. Employment security is interpreted as protection from termination of employment being unjustified or illegal, and not as immunity from organizational change. It is on the grounds of the above that the tests of meaningful human oversight, intelligibility of decision-making, and availability of redress become important.

2. Artificial intelligence and employer authority

The technological transformation impacts not only the legal characterisation of the employment relation but also the exercise of managerial authority. Recommendations or decisions in respect of instruction, supervision, and evaluation of the worker's performance can be generated by means of the technological device. Directive (EU) 2024/2831 acknowledges the changed way of exercising managerial functions by referring to automation of such tasks as work distribution, scheduling, evaluation, and imposing measures adverse for the worker. These conclusions were drawn from the regulation of platform work, but there is also a more general legal point at stake: technological mediation of the exercise of authority might make the source and grounds of the employment-related decision less transparent to its addressee (European Parliament and Council, 2024b, recitals 8 and 30).

Thus, the legal analysis should distinguish between technological autonomy and legal responsibility. Regulation (EU) 2024/1689 defines the AI system as a technology capable of inference of the output with varying degrees of autonomy, but the obligations established by the regulation can be assigned to identified individuals or entities, including providers and deployers of the system. The use of the AI system by an employer can be interpreted as deployment of this technology, whereas the provider or the marketer can have another regulatory status. In other words, assigning different duties to the actors involved in the use of the technology does not amount to the attribution of legal personality to it (European Parliament and Council, 2024a, Article 3).

Such approach allows making a more grounded discussion of the question of accountability than presupposing that the algorithm can become the bearer of the

employer's obligations. While the participation of the provider of the technological solution might give rise to additional issues of contractual or regulatory nature, such participation alone does not define the legality of the employer's decision towards the employee. As far as the AI Act expressly preserves the relevance of the labour law, and allows establishing the more favourable rules and collective agreements in respect of employers' use of the AI system, the regulatory regime of the Act allows adopting the cumulative approach to the question. In other words, the obligations related to the use of the technology should be satisfied alongside the obligations arising out of the employment (European Parliament and Council, 2024a, Article 2(11) and recital 9).

Thus, responsibility should be discussed in the terms of the functions performed by each particular actor, not in terms of the technological system's autonomy as a decision maker. The selection of the technology, its purpose and the weight of its output as a basis of the decision can be taken into account. The invocation of an algorithm's recommendation as the ground of a decision is no substitute of the required legal grounds of the measure adopted. It becomes particularly relevant if the outcome of the decision impacts the employee's professional aptitude, right to employment or continued employment.

International standards demonstrate that employment protection and organisational adaptation are not necessarily incompatible. Article 4 of the ILO Termination of Employment Convention, 1982 (No. 158), requires a valid reason for termination connected with the worker's capacity or conduct, or with the operational requirements of the undertaking. Its preamble expressly acknowledges the difficulties associated with economic conditions and technological change. The Convention consequently offers a framework for examining automation without treating technological restructuring as either inherently unlawful or automatically sufficient to justify dismissal (ILO, 1982).

The protection established by the Convention also has a procedural dimension. Article 7 requires, subject to its stated qualification, an opportunity for workers to defend themselves against allegations concerning conduct or performance before termination. Articles 8 and 9 provide for recourse to an impartial body and examination of the reasons for termination, while Article 10 addresses remedies where termination is found unjustified. Applied as an analytical benchmark to algorithmic assessments, these provisions direct attention towards the employee's ability to understand the allegations, challenge the evidence and obtain an independent assessment of the employer's justification. These are interpretative implications of the Convention's safeguards, not express rules on artificial intelligence (ILO, 1982, Articles 7–10).

The Convention's relevance to Romania nevertheless requires a clear qualification. Romania has not ratified Convention No. 158; it must therefore be used as an international reference standard rather than presented as a treaty directly binding on Romania by virtue of ratification. This distinction preserves the usefulness of international comparison without confusing it with the identification of enforceable domestic obligations (ILO, n.d.).

At European Union level, the Charter of Fundamental Rights supplies a complementary framework. Article 15 protects the right to engage in work and pursue a freely chosen or accepted occupation, while Article 30 recognises protection against unjustified dismissal in accordance with Union law and national laws and practices. Article 31 protects working conditions that respect health, safety and dignity. These provisions support a conception of employment stability grounded in justified decision-making and

protection against arbitrary termination, rather than an unconditional entitlement to preserve a particular position. Their interpretation must also acknowledge the freedom to conduct a business recognised by Article 16 (European Union, 2012).

The relationship between these rights becomes especially relevant when an employer invokes technological efficiency to justify measures affecting employees. Neither commercial freedom nor employment protection should be treated as eliminating the other. Article 52(1) requires limitations on Charter rights to respect their essence and satisfy the principle of proportionality. At the same time, Article 51 limits the Charter's application to Member States when they are implementing Union law; it should not be invoked as though every domestic employment dispute automatically falls within its scope. Where applicable, Articles 27 and 47 further connect protection with timely information and consultation and access to an effective remedy (European Union, 2012).

The GDPR outlines a horizontal safeguard relevant for employment-related decisions that involve personal data. Article 22(1) states the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects or similarly significant impacts on the individual. An automated dismissal satisfies the criterion of legality. Nevertheless, the provision does not serve as a general prohibition of any algorithm-based decision-making for HR purposes; its applicability depends on the nature of the processing, the impacts of the decision, and whether it is based solely on automated processing (European Parliament and Council, 2016, Article 22).

There are exceptions in Article 22(2): when the decision is required for entering into or performance of a contract, authorized under Union or Member State laws with appropriate safeguards, or based on explicit consent. Such exceptions cannot be considered as alternatives to each other. If the decision was necessary for entering into or performance of a contract and/or based on explicit consent, according to Article 22(3), there are required some safeguards such as the right to human intervention, to state one's viewpoint, and to challenge the decision. When a law authorizes the decision, the law shall establish some appropriate safeguards. Additionally, the disparity of interests existing in some relations between data controllers and data subjects demands caution in determining whether the consent was given freely (European Parliament and Council, 2016, Article 22 and Recital 43).

The protection of individuals does not cease just because a decision is outside the scope of Article 22. Processing is still subject to general requirements of the GDPR, including lawfulness, fairness, transparency, purpose limitation, data minimization, and accuracy. Articles 13–15 include obligations of providing information, among others, regarding the automated decision-making, whereas Article 35 requires data protection impact assessment if processing poses a high risk to the rights and freedoms of individuals. Hence, the presence of human participation does not reduce the scrutiny of data and the procedure of evaluation of employees (European Parliament and Council, 2016).

The AI Act regulates technological risk. Annex III, point 4, lists particular employment-related applications, such as the systems designed for recruitment and selection, decisions affecting employment terms, promotion or termination, certain types of task allocation, and performance and behavior monitoring and evaluation. Nevertheless, classification should be understood in the light of Article 6, including its conditions and exceptions; not all the AI tools used in workplaces are necessarily high-risk systems. The regulation targets the purpose and potential impact of certain applications, but not the employment technology as a whole (European Parliament and Council, 2024a).

Human oversight constitutes the cornerstone of this approach. According to Article 14, high-risk systems should be designed and developed in such a way that allows for human supervision of their operations. It deals with the understanding of the limitations of the system, the recognition of the risks of overreliance on automated outputs, and, where applicable, ignoring, overriding, or reversing of these outputs. To Article 14, Article 26 adds the obligations of the deployers of high-risk AI, such as assigning the oversight to competent, trained, authorized, and supported individuals. Moreover, Article 26(7) includes informing workers' representatives and affected workers prior to the deployment or use of the high-risk AI system in the workplace. Together, these provisions distinguish substantive human oversight from merely formal participation of humans in the decision-making process (European Parliament and Council, 2024a).

Directive (EU) 2024/2831 provides a more detailed model for platform work. Article 10(5) requires that decisions that restrict, suspend, or terminate a person's contractual relationship or account and decisions of equal detriment are to be made by a human. Article 11 supplements this requirement with granting rights to explanations and human review of the decisions made or supported by automated systems. The value of this article is in addressing automated decisions as well as decisions supported by automation, reserving particularly detrimental decisions to human decision-makers (European Parliament and Council, 2024b).

The sectoral and temporal limitations of this instrument should be kept in mind. The Directive does not introduce a general human-decision requirement for all employment relationships, and its deadline for transposition is 2 December 2026. Thus, the role of this Directive as a model for further reform should be distinguished from any obligations enforceable already against every Romanian employer. However, the combination of human oversight, understandable explanations, and review constitutes a solid legislative base for introducing human safeguard clauses beyond platform work, regardless of whether this happens through legislation or collective bargaining (European Parliament and Council, 2024b).

These instruments altogether indicate that protection of employment stability requires much more than mere verification of the technological reliability of the system. The legality of processing, justification of employment measure, and the effectiveness of the possibility for the employee to challenge this measure constitute three different matters. Normative message is that technological outputs should be used to support the judgment of the manager, not substitute an independent source of lawfulness. Human intervention protects employees only when it is backed by enough information, decision-making power, and procedures able to correct an unjustified decision.

3. Employment stability and employer liability in Romanian law

Romanian labour law provides a regulatory framework for assessing the usage of AI from the standpoint of pre-existing distribution of rights and obligations between the parties. Under Article 40(1), the employer has the right to organise the enterprise, impose obligations upon the employees, issue binding orders provided that they comply with the law, oversee work performance, and establish individual objectives and criteria for evaluation. There are limitations to these powers – Article 39 guarantees, amongst others, the dignity, professional training, information, and consultation of employees. Technological instruments thus may serve to assist in exercising managerial prerogatives, but their usage will be regulated by the rules governing such prerogatives (Romanian Parliament, 2003, Articles 39-40).

Professional evaluation is a good example. According to Article 17(3)(e), employees are to be informed of the criteria for professional evaluation of the performance, while Article 242(i) imposes a duty on internal regulations to determine the criteria for evaluation and the way how it is done. Thus, when an employer introduces an AI-supported evaluation system, it is important to distinguish whether it modifies the technical means for applying existing criteria or the criteria themselves. The automated score thus cannot be a valid substitute for identifying what exactly is being evaluated and how this is done. If technological implementation changes the contractual terms, then the requirements for their modification have to be taken into account as well, and not the assumption that the employer's organisational prerogatives allow any change (Romanian Parliament, 2003, Articles 17, 41 and 242).

This approach corresponds to the approach of Spulbar (2026) according to whom the legal requirements have to be integrated into the internal architecture of AI-assisted management decision-making, not just be taken into account externally after the implementation. Spulbar stresses the importance of traceability, accountability, and sufficient explanation of the decision made in order to achieve organisational control. This approach translated into the employment context implies the integration of legal requirements into the process of choosing, configuring, and using the evaluation system. It does not constitute an independent grounds for dismissal but allows explaining why the employer has to possess a justification for transforming technological output into employment-related decision.

One specific national protection relates to the workplace monitoring. Law No. 190/2018, Article 5 regulates the processing of personal data of employees carried out by means of electronic communications monitoring and/or video surveillance in case that the employer acts on the legitimate interests. This kind of processing may be justified only under a set of cumulative conditions: the interests pursued have to be sufficiently justified and superior to the interests or rights of the affected persons; employees are to be informed about it prior to its implementation; trade unions or employee representatives have to be consulted prior to the implementation; and less intrusive measures have to be considered and found inadequate beforehand. The retention period is to be limited to 30 days, excepting the statutory exceptions and justified cases (Romanian Parliament, 2018).

However, the scope of this provision has to be kept in mind. Article 5 regulates neither all applications of AI nor all kinds of processing of the employees' data. It is relevant when monitoring and legitimate interest are concerned. In case of AI-assisted monitoring system falling under the scope of the provision, no analytical sophistication may exempt the employer from justifying the monitoring, informing the employees, and considering less intrusive measures. Legal data collection and legal employment decision-making are two different things – satisfaction of the former requirement does not mean satisfaction of the latter (Romanian Parliament, 2018, Article 5; European Parliament and Council, 2016).

Legal consequences of the use of artificial intelligence are dependent on the ground invoked for dismissal. The employer may terminate the employment because of a negative professional evaluation of the employee, due to disciplinary violations, or due to organizational reorganization resulting in the abolition of the employee’s job position. Even though comparable technological means may provide some input into these processes, their legal rules are different. The legal conditions of these three situations and the issues to prove should not be confused within one category of "algorithmic dismissal" (Romanian Parliament, 2003, Articles 61–65).

In case of professional inadequacy invoked by the employer according to Article 61(d), Article 63(2) requires a prior evaluation carried out in accordance with the procedure provided by the respective collective agreement or, failing such an agreement, by the internal regulation. Algorithmic ranking may be used for that purpose, however, the legal value of that ranking is dependent on its correlation with the respective criteria and procedure. Low score, assessed independently, does not prove the lack of professional adequacy of the employee for the job position in question. Such assessment has to correlate the information about the employee's performance with his/her duties and the legal ground of dismissal. Similar requirements are stipulated by Article 64, regarding the obligation of offering job positions compatible with the employee's professional training (Romanian Parliament, 2003).

Another situation is dismissal on disciplinary grounds. In accordance with Articles 247 and 250, it has to be correlated with culpable breach and proportional response to it taking into account the circumstances of such breach, the degree of its faultiness and its consequences. Article 251 provides for a preliminary investigation of the employee's behavior before the dismissal. System-generated alert may signal about the behavior to be investigated but cannot substitute the assessment of culpability and proportionality of the response. For instance, discrepancy between the expected and the performed activity will have to be assessed in terms of its real circumstances to be able to conclude on that issue (Romanian Parliament, 2003).

By contrast, the ground of reorganization stipulated by Article 65 is applicable to cases when termination is due to the abolition of the employee's job position and is unrelated to that person. The abolition has to be real and have the legitimate and serious cause. The legal assessment here is focused on the organizational changes and the grounds of abolishing the position and not on proving professional inadequacy via another procedural path. The use of artificial intelligence can be the factual background of such changes, however, the employer has to prove the existence of statutory conditions in any way. On the other hand, it cannot be interpreted as the inherently illegal basis of organizational change (Romanian Parliament, 2003, Article 65).

These differences have significant evidentiary implications. According to Article 76, the dismissal decision has to be made in writing in accordance with the statutory conditions, including the grounds of dismissal. Under Article 79, the employer cannot refer to any other facts or legal grounds, besides those included in the written decision, while litigating the case. Article 272 puts the burden of proof in labor disputes on the employer. Therefore, these provisions are the basis of the argument that technological opacity cannot be considered as the exemption from the justification obligation. The employer has to prove the ground of the dismissal actually invoked and not merely point to the recommendation made by the system (Romanian Parliament, 2003).

The judicial protection restricts even more the possibility of shifting the consequences of flawed decision-making onto the employee. According to Article 80, an illegal or unjustified dismissal is nullified and the compensation is awarded for the loss of salary and other rights of the employee; reinstatement of the employment relationship is ordered upon the employee's request. On the other hand, Article 253 envisages compensation of material or immaterial damage done to the employee by the employer because of his fault related to the employee's work. Any potential liability of the employer to a technology provider is a totally separate issue which should not be confused with the employee's rights and obligations under the employment contract (Romanian Parliament, 2003).

The proposed framework of protections should include the issues of the quality of employment decisions and the possibility of adaptation before it becomes impossible to avoid the necessity of termination. In their study, Spulbar and Mitrache (2025) propose the balance between human labor and AI, including professional training, redesign of jobs, and workers' participation in changes in technologies. Their research has practical value regarding organizational and policy aspects of adaptation, but not as a definition of workers' rights under the labor law.

In Romanian legislation, there are elements related to adaptation as one of the components of professional training. For instance, according to Article 192, adaptation to the requirements of work and obtaining of high knowledge and skills, as well as mastering modern work methods, is one of the purposes of professional training. At the same time, Article 194 states that employers shall guarantee the participation of workers in training programs on a regular basis. Also, according to Article 195, the annual training plan of employers who have more than 20 workers is regulated after consultations with the trade union or the employee representative (Romanian Parliament, 2003). However, these provisions should not be interpreted as the obligation to train all employees prior to each dismissal according to Article 65.

The collaboration principle suggested by Spulbar and Mitrache (2025) may be used to create more effective protections through negotiation. The collective agreement could contain the rules for determining the needs in training, considering the possible internal transitions and discussing the effects of large-scale automation. According to Article 69, in case of planned measures, the obligations of consultations require the discussion of the possibilities to avoid or reduce dismissals and mitigate their effects, including measures for retraining or professional reconversion. More negotiated commitments could allow considering the risks associated with the implementation of AI without converting every desirable protection measure into the current general legal requirement (Romanian Parliament, 2003).

The human safeguard clauses could be the means of protecting employees by defining how significant employment decisions based on AI should be reviewed. The proposals for a contractual, collective, or legislative development should include the identification of the decision maker, the right to access the information, the opportunity to correct inaccurate data, and the right of the reviewer to deviate from the system's recommendation. The aim of these clauses would not be prohibition of technological support, but exclusion of formal approval of the outcome of any decision made with the participation of any identified person.

These clauses should separate the issue of the possibility of an internal justification and the legal requirements regarding the decision. A procedure for reviewing the decision should require the written justification of the contribution of the system, information considered in the context, and reasons for adopting or rejecting the output of the system. The document will not guarantee the legality of the action but will make the process of compliance control and judicial review more effective. Thus, this proposal expands Spulbar's (2026) emphasis on traceability and verifiable governance while maintaining the employees' rights as the standard for the evaluation of the decision.

Each negotiation protection should not conflict with the mandatory nature of labor law. The prohibitions of Article 11 of the law prevent contracting the provisions contrary to legislation and inferior to the minimum rights provided, and Article 38 makes the waiver of rights guaranteed by the legislation impossible. Therefore, the human safeguard clause should only increase, but not replace the legal protections concerning dismissal, data

processing, and judicial remedies. It should not turn into the pre-acceptance of the decision from the employees if the adverse decision is made with the help of technology (Romanian Parliament, 2003).

The resulting model maintains the freedom of discretion of managers while requiring the legal attribution and control of its exercise. The employment continuity does not require the stop of innovations, but it requires the inability of organizational innovations to bypass the conditions of evaluation, discipline, restructuring, and compensation. The proposed contribution is a framework of strengthened human responsibility: technological systems may assist the assessment of work and organization of production, while the employer remains responsible for the legal grounds, procedure, and consequences of the taken measures.

4. Judicial safeguards against technological control: Bărbulescu v. Romania

The Grand Chamber decision in Bărbulescu v. Romania provides an important basis for analyzing the boundaries of technological employer control. It was pronounced on 5 September 2017 and pertained to the issue of electronic communication monitoring of the applicant and protection provided by Romanian courts after his termination of employment. From the point of view of artificial intelligence, an accurate methodology should be specified – the dispute did not concern an AI-based system or automated termination of employment, but set standards for evaluation of workplace monitoring which would be relevant in case of algorithmic supervision (European Court of Human Rights [ECtHR], 2017a).

The applicant, Bogdan Mihai Bărbulescu, worked as a sales engineer in a private company. At the request of his employer, he created an account on the messaging platform Yahoo Messenger in order to communicate with his clients. The internal regulations of the company forbade any personal use of company resources, but it contained no information about the possibility of monitoring employees' communications. During 5-13 July 2007, his communication were monitored in real time. Responding to an inquiry about the use of company resources, Bărbulescu claimed that he had used it only for professional purposes. Afterwards, the employer presented a 45-page transcript of the communication with his brother and fiancée, which included messages with personal content. On 1 August 2007, his employment contract was terminated (ECtHR, 2017a, paragraphs 11-23).

Bărbulescu complained about his termination of employment to Romanian courts claiming, among other things, violation of the secrecy of his correspondence. His complaint to the Bucharest County Court was refused on 7 December 2007, and his appeal to the Bucharest Court of Appeal was dismissed on 17 June 2008. Domestic courts acknowledged the rights of employer to supervise work and considered such supervision legitimate under the circumstances. Further, the applicant appealed to the ECtHR claiming that Romanian authorities had failed to protect his right to respect for private life and correspondence guaranteed by Article 8 of the European Convention on Human Rights (ECtHR, 2017a, paragraphs 24-30).

The procedural distinction between the two Strasbourg decisions should be noted. By a decision of 12 January 2016, a Chamber found no violation of Article 8 of the Convention by six votes to one. Referring the case to the Grand Chamber, the latter pronounced an opposite verdict on 5 September 2017, finding a violation of Article 8 by eleven votes to six. In this case, the responsibility of the Romanian state for the lack of effective protection of convention rights, rather than a direct responsibility of the private

employer, was at stake. Thus, the case was examined in accordance with the positive obligations of States under Article 8 of the Convention (ECtHR, 2017a; ECtHR, 2017b).

Such approach defines the boundaries of the relationship between privacy protection and job security. ECtHR did not play the role of domestic labor court which would consider anew each substantive criterion of dismissal. Instead, it was concerned with the question of whether national authorities have ensured the proper balance between the rights of the employee and the interests of the employer. Thus, the case shows that the judicial review of technologically based dismissal should take into account the rights engaged by the creation and usage of evidence, and not just the existence of workplace rule and its violation.

Communication carried out in the course of work can also be regarded as belonging to the sphere of private life and correspondence. Restrictions imposed by an employer on the use of communication devices for personal purposes do not deprive this communication of the protection guaranteed by Article 8 of the Convention. Even if there are reasonable limitations to the rights to privacy, managerial orders cannot deprive social relations in the workplace of its significance. Therefore, the mere existence of the restriction on personal communication will not be enough to make monitoring of the content of such communication justified (ECtHR, 2017a; ECtHR, 2017b).

The Court's approach has been based on the principle of proportionality and guarantees against arbitrariness. Six factors, specified in Paragraph 121, should be taken into account by the national authority in considering workplace monitoring:

- Whether the employee has been informed in advance of the possibility of monitoring and the scope thereof.
- The scope of monitoring and the level of interference in privacy, in particular, whether the employer has examined communications traffic or communications content.
- Whether there are grounds for such monitoring and, in particular, whether the examination of communications content is justified.
- Whether it was possible to reach the aim by other means, less interfering with privacy.
- The consequences for the employee and the use made of the results of monitoring.
- Whether sufficient guarantees were provided to the employee in case of intrusive monitoring (ECtHR, 2017a, § 121; ECtHR, 2017c).

All of the factors listed above should be considered together as a whole. Advance information may be very important, but it cannot guarantee proportionality per se. In turn, a legitimate organizational objective does not mean access to any information that can be obtained using a technical device. Distinction between communications traffic and their content is rather illustrative: as the intensity of intrusion increases, the justification should correspondingly increase (ECtHR, 2017a, § 121; ECtHR, 2017c).

Ineffective investigation in the Romanian case demonstrates practical importance of such an approach. Domestic courts have not considered well enough whether the applicant was informed in advance of the nature and scope of monitoring, in particular, the possibility of accessing communication content. They have not also evaluated sufficiently the level of intrusion, specific justifications for monitoring and the presence of other ways to achieve this goal. References to the risks related to company's information system were not enough without evaluation of their relevance to the situation. Also, they

have not sufficiently considered the consequences, in particular, dismissal and the time when employer accessed the communications (ECtHR, 2017b).

Connection with employment security lies in the character of justification and review of the disciplinary act. Information obtained during monitoring can be convincing evidence of conduct, but not always the issue of whether monitoring was justified and the consequences were proportional will be solved. Such an adjudication requires a careful consideration of these questions; it does not mean that employees can neglect workplace rules and employers cannot monitor communications or apply dismissal under certain conditions (ECtHR, 2017c).

Application of the judgment in Bărbulescu to algorithmic management should be done by analogy rather than the imposition of rules that the judgment itself did not make. What is relevant here is the use of technologically produced information to exert managerial power over workers. Whenever AI systems are used to analyze the communication, observe the worker, or produce a profile of their conduct, the issues of notice, purpose, intrusiveness, and consequences remain legally significant. They do not depend on the fact whether the employer personally reads information or gets its technologically produced interpretation.

First, there is the question of the notice provided to the employee. A generic claim that the company's resources are being monitored may be insufficient to inform about the true nature of the system that classifies the behavior and provides indicators for the employment decisions. In the light of the court's focus on adequate notice, what can serve as an appropriate safeguard here is the information about categories of the activity being assessed, the purposes of such monitoring, and potential uses of such information in employment decisions.

Second, there is the issue of alternative measures. An employer should not assume that the availability of detailed information necessarily means its necessity for the achievement of the stated goal. When the legitimate aim is verifying the completion of the assigned tasks, continuous monitoring of communications may require stronger justification than the focus on the result. Again, the principle derived from the judgment is the necessity of contextual evaluation, not a generalized hierarchy whereby certain technologies of monitoring can always be used but not others (ECtHR, 2017a, § 121; ECtHR, 2017c).

Third, there is the problem of the transformation of monitoring into the employment decision. Assume that an employee received an alert about the particularly low level of their activity. Such an alert may indicate the need for additional investigation, but it does not say whether the information is reliable, whether the metric reflects their work assignments, or whether there are other reasons for the results. A proper human assessment needs to take care of all these issues before the indicator is used to prove any misconduct or lack of competence. Proposed safeguard responds to the risk that the seeming precision of the output will overshadow the need for individualized legal reasoning.

For Romanian courts, the above-mentioned approach should be done together with the applicable domestic legal rules. According to Article 272 of the Labour Code, it is the employer who bears the burden of proof, while the rules concerning professional evaluation, disciplinary investigation, and the grounds enumerated in the decision of dismissal cover the issues that the employer needs to prove. Under Article 5 of Law No. 190/2018, there are certain conditions when monitoring of electronic communications and video surveillance are allowed in the interests of the employer. These obligations need to

be considered as a whole, not as separate sets of requirements whose satisfaction guarantees compliance with all of them (Romanian Parliament, 2003, 2018).

Chronological distinction is also important here. The facts of Bărbulescu case happened in 2007, before the applicability of the GDPR, as well as Law No. 190/2018 and AI Act. It means that these instruments cannot be mentioned as the legal basis of the court's decision in this historic case. What can be done on the basis of the judgment is the assessment of the comparable practices under today's legal framework, whereas the court's decision gives its independent Convention-based analysis of privacy protection and the adequacy of the domestic judicial review.

Finally, the judgment cannot serve as a basis for the ban on dismissals based on automated processes and the absolute right to the particular job. Its principal lesson for algorithmic management is that neither managerial prerogatives nor technological capabilities can eliminate the necessity of justifying the intrusion and evaluating its employment consequences. The employment protection will become more efficient when courts evaluate not only the employment decision itself but also the informational and procedural process of its formation (ECtHR, 2017b, 2017c).

5. Conclusions

In addition to worker displacement, the impact of artificial intelligence on employment protection is connected with the change in the nature of managerial power. As technology becomes involved in task distribution, monitoring of employees' behaviour, and evaluation of their performance, the working conditions and the means of sustaining employment become dependent on information and assessments which might be unclear and hard to contest. Employment protection needs to be understood as the prevention of unjustified and insufficiently accountable decisions instead of guaranteeing the perpetuation of the existing employment.

The standpoint corresponds with the statement of De Stefano (2018) about the necessity to move the automation debate beyond counting the losses in employment numbers. The quality of work performed, protection of the human dignity, and restrictions on the managerial discretion are important regardless of whether technology leads to employment loss. Thus, the main challenge of employment protection in such circumstances is not to oppose the innovation, but to make sure that the organizational benefits of technological development are achieved without reducing the ability of the employee to understand, contest and influence decisions concerning their professional life.

The above-mentioned analysis implies an accountancy-based model of protection in which the technological assistance does not exempt the employer from responsibility for the measures introduced. It is crucial to distinguish between the technical creation of a certain output and legal justification of employment decisions. Professional inadequacy, disciplinary violation, and employment redundancy are three different concepts which cannot be established simply based on the idea of the efficiency of a certain algorithm. The apparent objectivity of scores or recommendations made should not conceal choices underlying the data collection, definition of performance criteria, and imposition of consequences depending on a particular result.

Similarly to the approach taken in the present work, Prassl (2019) finds algorithmic management to be an issue which challenges traditional regulations of employment relations. His work makes the differentiation between problems that could be solved by the adaptation of the existing regulation framework and those that involve the reconsideration of the principle of managerial accountability. Such division helps to find

the balance in dealing with the problem: technological mediation does not make employment guarantees outdated, but it shows the weak spots of their realization if the bases of a decision-making process become unclear. The combination of the proper application of current guarantees and the targeted protection mechanisms can solve the problem.

Human involvement is one of the key factors in such approach, but its protective function depends on its quality. Just confirmation of the algorithm's suggestion does not constitute the sufficient review. For the adequate review, it is necessary to have sufficient information, the possibility to assess the employee's situation, and the authority to alter the suggested measure. Human safeguards clauses could make it possible to implement these requirements and give the employee the opportunity to question wrong information or unjust assessment. The objective of such safeguards is to prevent the technological mediation from becoming an obstacle on the way between the authority and its consequence.

Another important factor is the organizational dimension of the problem. According to the ideas of Kellogg et al. (2020), algorithms could be considered as part of a contested territory of work organization which shows how the use of such tool can change the nature of the relationship between managerial direction and workers' response. From this perspective, transparency is necessary but not sufficient: awareness that monitoring takes place does not mean that employees have the influence on its purpose and results. Workplace dialogue could supplement individualized review by involving the discussion of the design and implementation of technological management in this process.

Thus, for Romania, the approach proposed above constitutes neither a general ban on the automation nor an acceptance of the technological restructuring as being self-justifying. Instead, it presents the framework which makes possible to reconcile innovation with individualized justification, proportionate control, and effective remedies. Training, task modification, and internal transition programs could promote employment stability, while increased procedural protection could reduce the risks of imposing consequences on the basis of opaque or inadequately analyzed assessment. Such measures should be developed taking into account the specifics of the particular workplace instead of being seen as universal solutions to any technological change.

At the same time, the limits of the analysis should be identified. The doctrinal and jurisprudential approach applied here helped to develop standards and proposals, but did not provide the information about the actual practices of employers in regard to them. Empirical research concerning the workplace implementation, collective bargaining, and resolution of disputes connected with the use of AI could give more information about the effectiveness of these safeguards. In this respect, the main value of labour law in the context of technological developments is in keeping the power accountable and preserving the human dignity and voice of the employee.

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ORIGINAL PAPER

Pragmatic Aspects of Irrealis Tools in the Language of Information Technology

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Abstract
In post-communist EFL instruction, focus has shifted from the grammar translation approach to the communicative approach in order to satisfy the increasing need for globalisation in trade and communication. The current article seeks to investigate a set of pragmatic aspects regarding the way in which the English language associated with the Information Technology field makes use of the wide range of irrealis tools and hedging to convey non-factual information. The need for the current research derives from the inherent factuality engineering fields, i.e. from the declared focus on **what is** rather than **what is desirable** or **possible**. Nonetheless, a stringent need for non-factuality is manifesting through a wide range of presumptive tools, both epistemic and deontic, which the current research will attempt to analyse pragmatically within the framework of native Romanian students studying English for Computer Science.

Keywords: *conditional, EFL, ESP, ICT English, Irrealis, non-factual, subjunctive*.

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1. Introduction

As the field of technology advances and permeates every aspect of modern living, students enrolled in English study programs related to information and computer technology are experiencing a dire need to master English as it will become part and parcel of their daily communicative exchanges in the field of work. Post-communist EFL instruction saw the rise of English for Specific Purposes as a newly emerging necessity with an array of challenges for students and teachers alike. Technical English instruction, particularly specific of the Information and Computer Technology field, has been developing alongside technology itself and has provided a wide variety of learning and teaching tools and aids in the attempt to keep students up-to-date with what in new in the field. What seems to be obvious about the ICT field is that it is primarily concerned with what **is** rather than what **might be**, with the factual rather than the non-factual. The present paper seeks to clarify some aspects regarding non-factual grammaticalisation in English and how it lends itself to the teaching and learning of Computer English.

The linguistic manifestations of **irrealis** are often overlooked during ESP classes, resulting in the incomplete or incorrect understanding of irrealis tools (moods and other markers) particularly subjunctives and conditionals, which the current paper will investigate more in depth. It is often the case that students are not aware of the difference between the factuality of the indicative and the counter-factuality of the irrealis moods, which often results in misunderstanding the message or in ill-formed statements. Consequently, it is of great didactic interest that the source of misunderstanding be clarified and tackled during ESP classes.

In linguistics, **irrealis** is represented by the set of grammatical tools (moods and markers) indicating that a particular situation or action is not known to be factual or is explored as hypothetical at the moment of the utterance, in contrast with **realis**, which refers to past or present factual occurrences and events. An irrealis category has been defined as mapping "potential and counterfactual meanings and no actual meanings" onto an utterance, or it acts as a semantic domain describing possible and counterfactual worlds (Prince, Krajinović, Krifka, 2022:221). The term was traced back to the late nineteenth century, to the German literature based on Greek and Latin academic writings. According to Autenrieth (1875:5) '***irrealis*** means that, for the speaker, the action is excluded from reality, probability and possibility, that it is untrue or impossible or is thought of that way'. At the beginning of the 20th century, the term is used by Sapir to make reference to a suffix in Paiute rendering ***irrealis*** as follows: 'This element indicates that the activity expressed by the verb is unreal, i.e. either merely potential or contrary to fact (potential in past time)' (Sapir 1930:168). In subsequent years, the term ***irrealis*** was also further employed by Bickerton (1975), Dixon (1980), Johnston (1980), Givón (1982), Chung & Timberlake (1985), Foley (1986), Blewett (1991), Kimball (1991) and Mithun (1995) to makes reference to "constructions encoding some type of unrealized states of affairs, e.g. possible or future states of affairs... roughly equivalent to more traditional terms such as, e.g., future, subjunctive, or conditional" (Kimball, 1991: 190). Irrealis tools are used in statements about events that are desired, conditioned, mandated and hoped rather than factual (in conditionals, subjunctives, future, imperatives, interrogatives etc.). Though every natural language displays grammatical ways of expressing unreality and counter-factuality, literature seems to reserve the term ***irrealis*** for particular morphological markers or clause types that introduce non-factuality into a statement.

A variety of elements across languages have been argued to act as proof of a grammatical category of ***irrealis***, directly referring to the way in which speakers render the states of affairs in terms of actuality, such as the marking of TAM (tense, aspect, mood), polarity (positive vs. negative sentences) and illocutionary force (declarative in opposition to imperative and interrogative sentences). While traditional grammars examine ***irrealis*** as a strict morphological or syntactic category (like verb inflections for the subjunctive or conditional), pragmatics is more focused on how speakers use irrealis structures to convey social, epistemic, transactional and interactional meanings (McGregor, Wagner, 2006:340):

• **Speaker Stance/Attitude**: Irrealis markers reflect a speaker's subjective degree of low certainty, doubt, hope, or fear regarding a statement. For instance, an utterance such as "If I were you..." uses a subjunctive form not just to state a condition, but to pragmatically signal distance and detachment from the situation, a polite word of advice or an encouragement to pursue a particular course of action.

• **Contextual Inferences**: Irrealis meanings are evidently contextually-bound, i.e. they do not always render a singular rigid truth-value. Instead, listeners calculate pragmatic inferences (**implicatures**) within the framework of a particular context— an irrealis form may imply a polite request, a remote possibility, a warning, or a counterfactual impossibility. For instance, a statement such as "If I knew who hacked into the website I would go to the police myself" can be 1.a request for a name, 2. possibility that I might find the name one day 3. warning to anyone who might attempt this again 4. statement of impossibility on account of lack of knowledge.

• **Epistemic** vs. **Deotic** overlap: the Epistemic notions of probability, possibility and deontic notions such as obligation, permission, often merge with irrealis marking. Pragmatics is often concerned with distinguishing between the illocution and the illocutionary effect (intention) and the perlocution (actual effect) an utterance has on the other participants when "unrealized" event shifts in conversation between "you should do this" or "it might be true."

Example:

"It is expected that the project **be finished** by noon."

-Deontic reading (Obligation / Rule): It is a requirement, duty, or rule set by someone in authority that the deadline be at noon (team members are required by rule to complete the project by noon).

-Epistemic reading (Inference / Likelihood): Based on the evidence or logic available, we conclude that the project will be already finished by noon (Given the facts, tem members will probably finish)

2. Irrealis marking and contextualisation of irrealis meaning

A variety of meaning clusters becomes apparent when counterfactual utterances are made depending on the pragmatic intentionality of the speaker, as identified in the following list with examples specific to English for Computer contexts:

Irrealis marking	Meaning, as intended by speaker	Example
Subjunctive • **Present** • **Past** • **Perfect**	Event is considered unlikely (mainly used in dependent clauses).	"It is essential that he **finish** the debug on time." "The manager recommended/advised/ urged that the debug **be** done."

Irrealis marking	Meaning, as intended by speaker	Example
		"I wish this update **weren't** necessary." "It's time they **had finished** the update."
Conditional Type 0,1,2,3, mixed	Event depends on a stated condition.	0 "If we enter the password, we log in." 1 "If I enter the password, we'll log in." 2 "If entered the password, we'd log in." 3 "If I had entered the password, we would have logged in." Mixed "If I **had entered** the password, we would be logged in."
Imperative Prohibitive	Event is directly ordered, requested or prohibited by the speaker.	"Start the update!" "Do not reboot now!"
The following meaning clusters are not grammaticalised in English and are often induced by contextual elements such as modal adverbs or verb semantics that render the state of affairs desirable, doubtful, presupposed therefore non-factual:		
Desiderative	Event is desired/ wished by a participant in the state of affairs referred to in the utterance.	"More time was needed for developing that feature." "Hopefully the updates resolve the issue!"
Dubitative	Event is uncertain, doubtful	"She seems to ignore the viral threat messages." "The software appears to have been updated."
Hypothetical	Event is hypothetical or counterfactual, but possible.	"I might be able to solve this issue." "The key should be in that folder"
Presumptive	Event is assumed, presupposed by the speaker based on known information	"Knowing the way this code works, I wouldn't bet on it." "That code alteration might/can't work."
Permissive	Event is permitted by the speaker.	"You may [not] reboot the system now!" "The system can be rebooted now."
Mirative Admirative	Event is surprising or amazing (literally or sarcastically).	"Wow! They might actually know programming!" "Apparently, they know programming."
Inferential	Event is not witnessed and not confirmed.	"Something tells me the problem lies between desktop and chair." "The issue seems to be that code line."

Irrealis marking	Meaning, as intended by speaker	Example
		“It looks as if there is a problem with the CPU.”
Interrogative	Event is asked or questioned by the speaker	"Does the program do its own updates?" “Is there smoke coming from the CPU?”
Concessive	Event is presupposed or admitted as part of a refutation.	"Even if they troubleshoot the CPU, the issue will persist."; "Although she solves the key issue, it will not work."

2. The Subjunctive in English for Computer Science

The **subjunctive mood** represents a particularly powerful irrealis tool in technical writing and is often used in computer science documentation. While the indicative mood states factual information ("The server *is* active"), the subjunctive renders hypothetical scenarios, i.e. contrary to fact situations, explorations, necessary requirements, dependencies as well as ideal system states. ESP classes often include technical writing tasks that might benefit from clarifications regarding the variety of tools for expressing irrealis that students can employ to render their technical writing more powerful.

The semantic charge of irrealis for the **present subjunctive** is generated by the occurrence of impersonal constructions with adjectives and nouns instantiating urgency or necessity but also by verbs within the semantic field of persuasion (to recommend, advise, urge, suggest, propose, advise etc.) followed by a that-clause. In these structures, the base form of the verb is used and no agreement is made between subject and verb.

Examples:

It is critical/mandatory/necessary that the server **be** active when the update starts.

It is of great/the utmost importance that the server **be** active.

They recommend/ advise that the server **be** active.

The protocol requires that each client **send** an authentication token before initiating a stream.

It is essential that every payload **contain** a valid checksum field.

The absence of a that-clause following adjective, nouns in impersonal constructions or mandating verbs suspends the need for a subjunctive.

Examples:

Subjunctive: It is vital **that** the migration script **run** inside a transaction block to prevent partial database updates.

No subjunctive: It is vital **for** the migration script **to run** inside a transaction block to prevent partial database updates.

Subjunctive: We suggest that the function **return** an empty array rather than null on failure.

No subjunctive: We suggest the function **to return** an empty array rather than null on failure.

When using the subjunctive construction, what often baffles students is the instinctive need to form the indicative subject-verb agreement as they do not realize the presence of the ***irrealis*** in the occurrence of the subjunctive and interpret the statement as factual rather than desirable or hypothetical. An essential idea to be retained is that the subjunctive, be it present, past or perfect, illustrates the idea that the speaker is actively trying to mandate or alter a course of action or state of affairs through the statement that tries to contrast with what actually is.

Contrast: **Subjunctive** (non-factual= desirable) vs. **Indicative** (factual- as is)

Example 1

Subjunctive (Rule/Requirement): "The configuration specifies that the timeout **be** set to 30 seconds." (Meaning: This is the mandated rule) **Indicative** (Statement of fact): "The configuration specifies that the timeout **is** set to 30 seconds." (Meaning: It is currently a known fact that it is set to 30 seconds)

Example 2

Subjunctive: The security team insist that the application **not store** plaintext passwords in local storage. (Meaning: it is important that the feature of not storing be implemented into the app)

Indicative: The security team insist that the application **does not store** plaintext passwords in local storage. (Meaning: the application does not store plaintext passwords at present but some participants are not convinced that this is true).

More examples in contrast:

Indicative (Fact/Reality) = what is	**Subjunctive (Requirement/Hypothetical)=what might/should be**
The algorithm **processes** data in real-time.	It is vital that the algorithm **process** data in real-time.
The user **toggles** the dark mode switch.	The UI design demands that the user **toggle** the switch to proceed.
The secondary server **is** ready.	It is of dire need that the second server **be** ready so we can run the test.

The use of the subjunctive allows technical writing to be more polished and oftentimes clearer in establishing rapport, drafting responsibilities and formulating tasks.

Area of computing	**Subjunctive – formal**	**Alternative- no subjunctive- informal**
System Requirements and Limitations, Constraints	The protocol requires that the client **send** an authentication token with every request. It is recommended that antivirus **be** installed.	The protocol requires the client to send an authentication token with the request. Antivirus must/ should be installed.

System Criticality	It is essential that the database **be** backed up before the migration begins.	It is essential for the database to be backed up before the migration begins.
User Mandates	We recommend that the administrator **restrict** root access to unauthorized IP addresses.	We recommend the administrator to restrict root access to unauthorized IP addresses.
Software Specs	The specification demands that the payload **conform** to JSON standards.	The specification demands the payload to conform to JSON standards.
Error Handling	Safety guidelines insist that the application **terminate** the process if a memory leak is detected.	Safety guidelines insist on the application terminating the process if a memory leak is detected.

Past and **perfect subjunctive** are instantiated by the same set of expressions, but while the past subjunctive indicates a present hypothesis, the perfect subjunctive renders a hypothesis about a past that is parallel to the factual past, therefore unreal.

1. **Past Subjunctive** hypothetical **present** – contrary to facts Looks like **Past tense** of the indicative To be= WERE in all persons Often occurs in 2-nd type conditionals	2. **Perfect subjunctive**- hypothetical **past** – contrary to what really happened Looks like **past perfect** of the indicative Often occurs in 3-rd type conditionals
1. and 2. occur after *the same phrases*, with a difference in meaning: IF ONLY.. IT'S (HIGH TIME)... I'D SOONER +different subject !(same subject calls for short infinitive: I'd sooner/rather (not) go.) I'D RATHER + different subject ! I'D BETTER (I/YOU HAD BETTER) + SHORT INF.: I/you'd better go. I'D PREFER IT IF YOU... ...AS IF ... I WISH...	

PRESENT MEANING	**PAST MEANING**
If only they solved the issue!	If only they had solved the issue!
It's time we finished the meeting. (the meeting is now over)	It's time we had finished the meeting.(the meeting is long overdue)
I'd rather we installed the app.	I'd rather we had installed the app.

I'd sooner he wrote the code...	I'd sooner he had written the code...
He acts as if he owned the place. (he doesn't own it)	He acts/acted as if he had owned the place. (he didn't own it)
I'd prefer it if you didn't reboot the computer.	I'd prefer it if you hadn't rebooted the computer.
They wish the computer didn't break down so often.	They wish the computer hadn't broken down so often.

Area of computing	**Past subjunctive-hypothetical present**
Simulations and Testing	**I wish server were** offline so the API **would not return** a 503 error. *Meaning:* The server is online right now, but we are testing or describing a hypothetical alternative.
Configuration and functionality drawbacks	The app behaves as if it **ran** in a sandboxed environment." *Meaning:* The app does not run in a sandbox, but its behavior is awkward.
User Preferences and State Checks	**I wish this database supported** real-time streaming. *Meaning:* The database currently lacks this feature.
	Perfect Subjunctive – hypothetical past
Post-Mortem Analysis & Log Review	**I wish the packet had arrived** on time so the transaction wouldn't have timed out. Meaning: The packet arrived late, so the transaction timed out.
Error Handling & State Reversals	The compiler acts **as though it had parsed** the syntax tree already. Meaning: It has not parsed it yet.
Configuration Regrets in Documentation	**I'd rather we had enabled debug mode** before the crash occurred. Meaning: We did not enable debug mode, and the crash occurred.

3. The Conditional

During technical English classes, it is often overlooked that the verbal mood in conditional subordinate clauses is, in fact, the subjunctive. That is probably why students are rarely aware of its ***irrealis*** nature and often mistake it for the indicative and its factual interpretation. Moreover, failure to identify the subjunctive as an irrealis tool is possibly

the reason why students have difficulty remembering the tenses they are supposed to use when marking conditionals.

0 type If the server ***is*** active it updates its parameters.
1st type If the server ***is*** active, it will update its parameters.
2nd type If the server ***were*** active when it would update its parameters.
3rd type ***Had*** the server ***been*** active, it would have been able to update its parameters.

Employing subjunctives allows engineers and technical writers to describe how systems are expected to behave under specific, ideal conditions without claiming that they are currently doing so. What is interesting about the subjunctives occurring in conditionals is the fact that they are often mistaken with indicatives (present, past and past perfect of the indicative).

3.1 Type 0 conditionals

Example: If the server ***is*** active, it updates its parameters.

0 type conditionals are used to depict what is expected to happen **every time** the condition is met. Though this may seem factual, it is not. It is certain to become factual, though, as soon as and only if the condition is met. 0 type conditionals are particularly useful in describing what is to be expected if the condition is met.

More examples:

• If you **press** Ctrl + S, the file **saves** automatically. =what to expect if you press…
• The system triggers a low-power warning if the battery level drops below 5%,. =hypothetical scenario conditioned by a drop below 5%
• If the input is null, the function returns an error.= what to expect when/if the input is null

3.2 Type 1 conditionals

Example: If the server ***is*** active, it will update its parameters= the server is not active, only if it becomes active will it update its parameters.

The subjunctive explores what is likely to happen in the future when and if the server becomes active, which it is currently not. In fact, what the subjunctive does is to borrow the future meaning from the main clause in exploring what is to be expected in the future if/when the condition is met. 1st type conditionals act as promises or likely-to-happen projections into the future.

More examples:

• The app will grant access if the user **enters** a valid password.=promise
• If the server response **takes** longer than 30 seconds, the client will timeout.= warning
• If this script **is** compiled, a syntax warning will appear.=likely scenario
• The script will fail unless you **install** the required dependencies.=warning

An alternative type one conditional includes instructions formulated with an imperative in the main clause replacing the future. In opposition to the previous exmples, the imperative urges action to prevent potential negative scenarios depicted by the conditional or to enable action following a sequence of hypothetical events:

Examples:

- Always **back up** your database in case the migration crashes.=prevent hypothetical mishap
- **Compile** the script now if the error appears on the screen.= if clause triggers action
- If the application crashes on launch, **clear** the cache and restart your device.= the hypothesis in the conditional clause triggers a sequence of actions
- Should a 401 error occur, **redirect** the user back to the login screen immediately.=hypothetical unlikely scenario

3.3 Type 2 conditionals

Example: If the server ***were*** active, it would update is parameters= the reality at present is that the server is not active.

The past subjunctive looks like past tense but it is not past (in fact it is often called **unreal past**), but rather borrows the meaning of present conditional in the main clause to explore an alternative reality, a parallel world that is:

a. purely hypothetical at present, i.e. in contrast to factual reality.
b. more tentative than 1st type likely conditionals

More examples:

• **If we had** more RAM, this virtual machine would run much faster.= we don't have more RAM, it is also unlikely we'll get more, just exploring a hypothetical scenario=complaining

• **If I were** the system administrator, I would disable guest access immediately.= word of advice

• **If the API supported** GraphQL, we wouldn't need so many REST endpoints.=wishful thinking/complaining

Inverted type 2 conditionals lose the explicit IF and can only occur with **were** positioned before the subject. These structures render an increased level of improbability.

Standard Type 2 Conditional Exploratory/hypothetical	**Inverted Type 2 Conditional Highly unlikely scenario**
If a data breach exposed customer PII, the company would face substantial regulatory penalties.	**Were a data breach to expose** customer PII, the company would face substantial regulatory penalties.
If we migrated our entire database infrastructure to a distributed ledger, latency would increase significantly.	**Were we to migrate** our entire database infrastructure to a distributed ledger, latency would increase significantly.
If the integer were larger than 64 bits, it would cause a buffer overflow. (Implies it currently fits within the boundary, explores hypothetical event).	**Were the integer larger than 64 bits,** it would cause a buffer overflow. (Implies it is unlikely it will ever exceed the boundary).

Further examples of computing situations in which second conditional sentences sound natural in discussing hypothetical, imaginary or currently unfeasible scenarios:

a. Project Management & Deadlines (The "If We Had More Time/Money")

Software Development teams frequently use the second conditional to discuss ideal features or scope changes that cannot happen due to strict deadlines or budgets.

- **If we had a bigger budget**, we would implement machine learning algorithms.
- **If the deadline weren't** next week, we would rewrite this entire module.

b. Cybersecurity & Threat Modeling (The "What If" Breach Scenario)

Security analysts use the second conditional to discuss theoretical vulnerabilities and the hypothetical fallout of cyber-attacks.

• **If a hacker gained root access**, they would delete the entire database.

• **If users chose stronger passwords**, phishing attacks wouldn't be as successful.

c. System Architecture & Tech Stack Choices (The "Alternative ")

Engineers use second conditionals when comparing their current tech stack to an alternative architecture they aren't actually using.

• **If we hosted the app** on our own hardware, maintenance would take too much time.

• **If the platform used a microservices architecture**, scaling specific features would be much easier.

d. Code Debugging & Troubleshooting (The "Missing Pieces" Problem)

Software developers use it during code reviews or debugging sessions when they lack the tools, permissions, or data needed to fix a bug immediately.

• **If we could replicate this bug locally**, we would fix it in five minutes.

• **If the error logs were more detailed**, we would identify the root cause instantly.

e. User Interface Design & User Behaviour (The "Ideal User/Machine" Assumption)

Product designers often use second conditionals to explore how users might interact with an interface if it were designed differently.

• **If the checkout button were brighter**, more users would complete their purchases.

• **If the app supported dark mode**, it would look much better at night.

3.4 Type 3 conditionals for unreal past

The 3rd type conditional explores an alternative past world that might have been if the condition had been met, therefore it projects the imaginary exploration of some events subsequent to the hypothetical fulfillment of a past condition.

Example: If the server ***had been*** active, it would have updated its parameters.= The server was not active therefore it failed to update its parameters.

In programming logic and architecture planning, students often explore "what-if" scenarios that are contrary to the reality of the indicative. The perfect subjunctive is used to introduce events that never took place, realities that could have been but never were. The challenge in these cases is double fold: to acknowledge the fact that the unrealized scenario is an exploratory past reality and that the apparent past perfect tense is not genuinely an anterior past. 3rd type conditionals often display the illocutionary effect of **regret** or **reproach**.

Making a Reproach

• **If the DevOps team had configured** the monitoring alerts correctly, they would have detected the memory leak before the server crashed.

• **If the security patch had been deployed** to the staging environment first, the QA team would have noticed the dependency conflict.

Expressing Regret (Ist person singular or plural)

• **If we had automated our database** backups daily, we would not have lost three days of production data during the ransomware attack.

• **If our team had limited incoming requests**, the infrastructure would have survived the unexpected traffic spike.

Inverted Type 3 Conditionals (Highly Formal Technical Writing)

Just as Type 2 conditionals can be inverted, Type 3 conditionals can drop the IF and instantiate HAD in initial position, frequently used in formal executive summaries of technical incidents.

Examples:

• **Had** the load balancer **distributed** the traffic evenly, the primary node would not have become overwhelmed.

• **Had** the user **updated** their browser to the latest version, the cross-site scripting (XSS) vulnerability would not have executed.

• **Had** we **refactored** the monolith earlier, scaling the micro-services would have been much easier during the product launch.

Common computing contexts for 3rd type conditionals:

- **Post-Event & Error Analysis:**

If the developer **had sanitized** the input, the server would have survived the injection attack. (Reality: The developer didn't sanitize it, so the server crashed).

If we **had updated** the firmware, the memory leak wouldn't have occurred.(Reality: We didn't update it, so it leaked).

- **Performance & Optimization Regrets, cause/effect=regret:**

If the query **had been indexed** properly, the database could have finished the lookup in milliseconds. (Reality: It wasn't indexed so it timed out).

If we **had allocated** enough RAM, the container might not have thrown an OutOfMemory error. (Reality: RAM wasn't allocated so it crashed).

- **Version Control / Deployment Scenarios:**

If CI **had caught** the syntax error, we wouldn't have pushed the broken build to production. (Reality: CI/CD missed it so we pushed the product into production).

3.5 Mixed conditionals

A mixed conditional combines a second conditional and a third conditional to connect a hypothetical past event to a present result, or an unreal present state or situation with a past result with irrealis embedded in both situations.

a. Past Condition → Present Result

Meaning: speaker imagines an alternative past event and how it would change the present non-factual situation.

Example

If he had backed up my database yesterday, **he would not be** panicking right now.

Reality: He didn't back it up yesterday, so he is in panic mode now.

b. Present/General Condition → Past Result

Meaning: speaker imagines a different present state or habit and how it would have changed a past event.

Example

If I were a better programmer, **I would have solved** that memory leak last week.

Reality: I am not a good programmer, so I didn't solve the memory leak last week.

In the computing world, mixed conditionals are frequently used in post-mortem analyses, debugging sessions, user stories and system architecture reviews.

Computing Context	**Unreal Condition (If-Clause)**	**Unreal Result (Main Clause)**	**Example Scenario**
Reporting Incidents	Past Action	Present State	If we **had run** the load tests, the site **would be** online.
Creating Technical Debt	Present Reality	Past Outcome	If the code **were** documented, onboarding **would have taken** less time.
Debugging	Past Action	Present Error	If the container **had started**, the logs **would be printing** data.
Product Strategy	Present Capability	Past Milestone	If we **owned** the IP, we **could have integrated** it sooner.

A Structural Comparison between conditional types

The following table explains how a hypothetical past incident (Type 3) differs from future planning (Type 1) or hypothetical present scenario (Type 2):

Conditional Type	Computing Context	Example
Type 1 (Likely Future)	Planning ahead	If we **implement** a firewall, it **will block** malicious traffic.
Type 2 (Hypothetical Present)	Brainstorming	If we **implemented** a firewall right now, it **would block** this traffic.

Type 3 (Past Post-Mortem)	Analyzing the error	If we **had implemented** a firewall, it **would have blocked t**he traffic.
Mixed type (3+2)	Hypothetical Past affecting the present	If we **had implemented** a firewall, the traffic **wouldn't be blocked**.

4. Conclusions

The current paper has attempted to investigate manifestations of the grammatical category of ***irrealis*** ant its pragmatic implications in the ESP area of English for Computers and Information Technology with a special focus on the subjunctive and conditional clauses. The peculiarities of the aforementioned verbal moods in contrast with the factuality of the indicative, the most commonly used and taught verbal mood, have constituted the subject of interest for the present paper as they are often a source of misconception for ESP students and are of particular importance to technical writing. As students migrate into computing professions that entail the writing of software code and technical documentation to accompany it, they are required to acknowledge and correctly employ the manifestations of ***irrealis*** in formulating technical specifications with power and grit. Hence the need for the present research that might prove useful to ESP teachers and students in clarifying and refining the semantic realms of possibilities instantiated by ***irrealis*** marked statements.

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ORIGINAL PAPER

School dropout among students: how to prevent it

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Abstract
School dropout can be understood as the failure or irregular use of education and training services by school-age young people. It must be analyzed in holistic and multidimensional terms, as it cannot be traced back to a single cause (be it biological, psychological, or social), requiring a broad and multidisciplinary perspective. A key role in combating school dropout is guidance, which must be ongoing and integrated into the various subjects included in the curriculum, both as an enrichment of the curricular subjects and as a stand-alone subject. For guidance to be truly effective, it is necessary to create a shared framework of essential content for strengthening the self, understanding one's aspirations, and gaining a deeper understanding of the world of study and work, as well as the local context. This development of self-direction skills and the ability to plan actions to achieve the personal and professional development generated by guidance is crucial. To combat the phenomenon of early school leaving, promoting the well-being of young people and their active participation in their educational and social journey, it is necessary to adopt a comprehensive action based on a systemic, consistent, and ongoing approach that addresses educational challenges by investing in individuals and their living environments. Specifically, it is necessary to develop integrated educational systems involving schools, families, and the local community (local authorities, social and health services, associations, educators, and the business community). This will provide an integrated and comprehensive response to the problem through collaborative networks that adopt long-term planning (to ensure continuity in school transitions and support during critical moments) and include monitoring activities to refocus and optimize efforts over time.
Keywords*: school dropout, guidance, support, monitoring activities, aspirations*

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Introduction

When a student drops out of school, the process usually starts years before they actually leave the building. Poor attendance, falling grades, and behavioral changes signal early disengagement. To prevent school dropout, schools and teachers need to recognize these warning signs and apply structured interventions early.

Traditional academic methods often fail students who face financial pressure, family responsibilities, or mental fatigue. Educators must adapt their instructional approach. Offering flexible learning schedules, practical vocational training, and project-based tasks gives students a clear reason to stay enrolled. Real-world tasks, like creating digital resources for local nonprofits, show students the immediate value of their education and provide an authentic audience for their work.

Furthermore, educational institutions cannot rely entirely on classroom teachers to solve this problem. Building a strong prevention system requires involving parents, school counselors, and local authorities. Regular communication with families helps schools track academic progress at home. Using early warning systems powered by attendance and performance data allows administrators and teachers to step in before the student completely disconnects. By combining data monitoring, practical learning, and consistent psychosocial support, schools give students the necessary tools to graduate and secure a stable future.

Unmanaged virtual learning environments contribute to student exhaustion and subsequent disengagement. To counter this, educators must actively manage screen-based instruction. Chiriţescu and Păunescu (2026: 77) argue that teachers must become digital mediators, adjusting their methods specifically to „prevent cognitive fatigue and school dropout in the virtual environment." Addressing student burnout is a necessary step for maintaining retention rates. „This period of crisis also highlighted the need to rethink the teacher's role, who shifted from being a knowledge transmitter to a digital mediator".

As Andreea Mihaela Stoian (2019: 132) notes, preventing dropout caused by rigid classes requires schools to balance standard lessons with hands-on learning, emotional support, and personal mentoring that match students' real-life needs. „The teacher is and will remain a mentor and a guide for his students no matter the subject that he/she teaches. Today's teachers represent the contemporary school that has to offer balance – a balance between its curriculum and all the other alternative methods of learning."

School dropout rates remain highest in low-income and rural areas. These school districts operate with heavily restricted budgets. Many modern dropout prevention programs depend on complex artificial intelligence to track student progress. Under-funded schools struggle to pay for the required technology. A functional digital system requires stable internet connections, modern hardware, and continuous technical support. When schools lack these basic elements, the digital systems fail. When the system breaks down, the learning process stops entirely. Struggling students suffer the most in these situations because they rarely have additional educational resources or internet access at home.

Adopting artificial intelligence requires long-term financial commitments. Buying the initial software represents just a fraction of the total cost. Schools must pay for continuous updates, server costs, and technical repairs. Bărbuceanu (2025: 195) explains this reality clearly: „Furthermore, running AI in schools isn't simple or cheap, schools need reliable infrastructure, ongoing training, constant updates, platform maintenance, making all of this straining budgets, and if the system goes down, learning also pauses. Policy brings its own questions because nobody really knows who actually

owns the data and who is in charge of the AI, moreover the whole debate keeps spinning in circles, with people talking about the need to tackle uncertainty and take responsibility for the ethics of using AI in classrooms". When schools spend their limited funds on maintaining software, they have less money available for direct student counseling.

Modern educational institutions rely on digital early warning tools to monitor student behavior. These programs scan databases to spot attendance problems and falling grades long before a student actually quits. The goal is to alert teachers the moment a student needs help. However, depending entirely on software is risky. If AI tracking tools break down, experience technical glitches, or lack clear maintenance plans, the safety net disappears. Teachers lose sight of struggling students and cannot intervene in time. A technical error can cause a school to miss a critical window for dropout prevention.

Students at risk of dropping out are often the most vulnerable children in the educational system. Using artificial intelligence to monitor them introduces severe privacy risks. Schools face unclear rules regarding who owns student data and how personal information is protected. We also lack clear guidelines on who is ultimately responsible for the decisions generated by artificial intelligence. These automated tracking systems can easily lead to unfair profiling. A poorly programmed system might flag a student based on biased data, creating an unfair permanent record. Technology in schools requires strict ethical rules and active human guidance. Teachers and counselors must always verify automated alerts and make the final decisions on how to support their students.

A historical analysis of school dropout research

School dropout is rarely a sudden decision. It is the final step in a long process of disengagement. Over the past six decades, academic research on this topic has evolved significantly. Early studies focused on the individual traits and backgrounds of students. Today, research focuses on how educational institutions can build better support systems. By examining the history of this research in chronological order, we can understand which interventions work and why they are necessary.

During the initial period of dropout research, scholars treated leaving school as a symptom of a student's personal life. Researchers spent the 1960s, 1970s, and 1980s trying to identify the individual characteristics and family backgrounds that correlated with quitting school. Two key papers defined how the academic world viewed the problem during this era.

In 1975, Vincent Tinto published „Dropouts from higher education: A theoretical synthesis of recent research." Tinto introduced the Institutional Departure Model. This model suggested that students drop out when they fail to integrate into their school environment. Integration meant both passing classes and making friends. If a student felt isolated, they were at a high risk of leaving.

Later, in 1987, Russell W. Rumberger published „High school dropouts: A review of issues and evidence." Rumberger summarized the empirical data collected throughout the twentieth century. He mapped out how demographic factors, family structures, and individual academic performance acted as predictors for early school departure. Together, Tinto and Rumberger established the baseline understanding of the dropout crisis. Their era of research measured static background markers, leaving schools with few tools to actually change a student's path.

As the 1990s approached, the academic perspective shifted. Scholars realized that a student's background did not dictate their destiny. Researchers began to view dropping out as a dynamic process of disengagement. Rather than treating a dropout as an isolated

event, they started tracking student behaviors over time to identify early behavioral signals.

In 1989, Jeremy D. Finn published „Withdrawing from school." Finn introduced formal theoretical models explaining the psychological process of leaving school. He showed how early academic frustration and a lack of participation in the classroom gradually turn into emotional detachment. A student who struggles to read in early grades stops raising their hand, then starts skipping class, and ultimately departs from the school system entirely.

This process oriented thinking culminated in a 2007 study by Elaine M. Allensworth and John Q. Easton titled „What Matters for staying on track and graduating in Chicago public high schools." Based on a five year study from the Consortium on Chicago School Research, they proved that schools could predict graduation rates years in advance. They found that tracking specific ninth grade indicators, specifically attendance, behavior marks, and course performance, provided a highly accurate prediction of who would drop out. These indicators became known as the ABC metrics. This research established the foundation for modern early warning systems.

Armed with early warning indicators, the research of the 2010s moved toward evaluating actual prevention programs. Scholars expanded their focus to see how systemic frameworks and targeted interventions could improve retention.

In 2013, Emily E. Tanner-Smith and Sandra J. Wilson published a large review titled „A meta-analysis of the effects of dropout prevention programs on school absenteeism." They reviewed 74 different studies covering primary and high school students to determine if these prevention programs actually helped children attend class more frequently. Their findings provided a clear roadmap for educators. The programs did work, but only when applied correctly. They discovered that prevention strategies work best when they focus directly on students who are already missing a lot of class or struggling with their grades. Treating every student in the building the exact same way proved ineffective.

Tanner-Smith and Wilson found that keeping close track of attendance, talking regularly with families, and offering extra tutoring helped students stay on track. Furthermore, they proved that timing matters. Starting these helpful programs early, in middle school or early high school, brings significantly better results than waiting until a student's senior year.

Adding to this systemic approach, in 2015, Jennifer Freeman and Brandi Simonsen published „Examining the impact of school-wide positive behavior interventions and supports on student dropout rates." They demonstrated the effectiveness of Multi-Tiered Systems of Support (MTSS). This model combines universal school climate initiatives with highly targeted behavioral support for students showing early warning signs. By the end of the 2010s, research confirmed that building evidence based support systems offered the most reliable path toward keeping students in school.

In recent years, researchers have continued to refine our understanding of what interventions provide the best return on investment, particularly regarding older students and university retention.

In 2024, Kristoffer Ibsen and Michael Rosholm published a study titled „What works? Interventions aimed at reducing student dropout in higher education." They looked at different ways universities attempt to stop students from dropping out. After evaluating a wide range of rigorous experimental studies, they made several discoveries about which programs actually help students finish their degrees.

Ibsen and Rosholm found that many general, broad scale prevention programs have very little effect on overall graduation rates. Instead, the single most effective approach for keeping students enrolled until graduation is connecting students with teachers through personal mentoring. This one to one connection provides the academic and social integration that Vincent Tinto first wrote about back in 1975.

The 2024 study also evaluated other popular interventions. They found that providing financial assistance to students in need or offering extra academic tutoring does help, but to a much smaller degree than direct mentorship. More importantly, the researchers issued a strong warning about punitive measures. Punishing struggling students with academic warnings or probationary statuses often has the exact opposite effect of what the school intends. Instead of motivating the student to work harder, these warnings push the student to quit school entirely.

Ultimately, Ibsen and Rosholm confirm that educational institutions need clearer evidence when choosing their prevention programs. Schools and universities must focus their budgets and efforts on direct guidance and personal support systems.

The progression of dropout research from the 1970s to 2024 shows a clear evolution in how we understand student success. Fifty years ago, the educational system looked at personal background and demographic data to explain why a student failed. By the 1990s and 2000s, researchers recognized that dropping out was a slow process that could be tracked and predicted using early warning metrics like attendance and course performance. In the 2010s, massive data reviews proved that targeted, early interventions and communication with families were the best tools for high schools. Today, the latest research confirms that human connection remains the most powerful prevention tool. Punitive measures fail, while structured, personal mentorship succeeds. By applying this chronological evidence, modern schools can build effective, supportive environments that guide every student to graduation.

Early school dropout in Romania: Causes, inequalities, and systemic solutions

Romania faces a significant structural challenge regarding school dropout and early school leaving. Statistics provided by Eurostat and the Romanian Ministry of Education indicate that the country consistently records one of the highest rates of early school leaving within the European Union. This rate fluctuates between fifteen and sixteen percent, which sits far above the European Union target of reducing early school leaving to below nine percent. As Serban (2024) notes in analyzing the societal implications of this phenomenon, fully understanding the Romanian educational context requires examining the structural drivers of dropout, the regional and social disparities affecting students, and the modern systematic interventions designed to keep children in school.

Sociological literature and research from the National Institute for Research in Education show that leaving school is rarely a sudden or isolated decision. Instead, it is the cumulative result of continuous social and economic pressures acting upon a student. Zamfir and Mocanu (2020) demonstrate that high poverty levels and the limited educational background of parents severely reduce a student's academic self-efficacy and long-term retention. Consequently, low household income remains the single strongest predictor of early school leaving. While public education in Romania is technically tuition-free, the indirect costs of schooling place a severe and often unmanageable burden on vulnerable families. These daily expenses include paying for transportation from isolated rural areas, purchasing necessary school supplies, and providing adequate

seasonal clothing. For families managing a tight budget, these accumulated indirect costs can make long-term school attendance financially impossible.

Beyond direct financial constraints, low educational capital within the household plays a critical role in student retention. In socioeconomically disadvantaged families, parents may have low literacy levels or incomplete secondary education themselves. This background makes it difficult for them to offer academic support with homework or to navigate the educational system alongside their children. In many of these households, the immediate need for income pushes parents to prioritize seasonal agricultural work or manual labor over the long-term benefits of schooling, leading older children to abandon their classes to help support the family financially.

These family struggles become even worse when the schools themselves lack basic resources. Many under-resourced schools operate without adequate support staff. They frequently lack educational professionals such as school counselors and school mediators. These professionals are essential for identifying early signs of distress and mediating communication between the school and the parents. Without them, learning gaps remain unaddressed, chronic absenteeism goes unnoticed for too long, and struggling students easily slip through the cracks of the administrative system.

The educational landscape in Romania is also characterized by sharp regional and demographic inequalities, with the rural-urban gap being the most prominent. The early school leaving rate in rural communities and small provincial towns is significantly higher than in major urban hubs. As Petre, Teodorescu and Cioclu (2024) highlight in their research on satellite towns and rural communities, daily travel difficulties and the physical distance to school act as direct causes of absenteeism. Rural schools frequently face severe infrastructural challenges and struggle with teacher retention. Many educators make the daily trip from nearby cities and transfer out as soon as an urban position opens, creating a lack of continuity for the students. Furthermore, these rural institutions have limited budgets, meaning they can rarely offer extracurricular activities or remedial tutoring to help students catch up.

Specific vulnerable communities within these regions face even higher risks of educational disengagement. Children from marginalized ethnic minority communities historically experience lower school completion rates due to systemic barriers. Additionally, students living in single-parent households or families where both parents have migrated abroad for work lack consistent adult supervision and emotional stability. The psychological toll of having parents working in other countries often translates directly into lower academic performance and a much higher probability of early dropout.

To address these deep-rooted challenges, the educational system has shifted its approach. Instead of relying on isolated local initiatives, the government now implements systemic, evidence-based frameworks supported by national funding. One major development is the implementation of the Early Warning Mechanism in Education. This digital system tracks early indicators of dropout risk across the student population. By monitoring specific metrics such as chronic absenteeism, sudden grade declines, and behavioral issues, educators receive alerts allowing them to step in and offer support long before a student actually decides to leave school.

Coupled with this tracking system is the National Program to Reduce School Dropout. Funded largely through the Recovery and Resilience Facility, this program provides direct financial grants to thousands of high-risk and medium-risk schools across the country. School administrators use these funds to organize remedial classes, offer socio-emotional counseling, invest in teacher training, and create engaging extracurricular

activities. By injecting capital directly into the most vulnerable schools, the program aims to build a more supportive and attractive learning environment.

Beyond high school dropout: pathways to university success for rural youth

However, preventing high school dropout is only one part of the educational challenge. Encouraging young people from rural areas to pursue and complete a university education requires addressing a different set of structural barriers. As Hatos (2021) observes in his sociological analyses of Romanian educational disparities, these students face economic hardship, socio-cultural expectations that favor immediate employment, and a significant academic transition gap between their rural high schools and higher education institutions. A comprehensive solution to increase university enrollment and graduation rates among rural youth must operate across three distinct levels, focusing on high school preparation, financial security, and on-campus retention.

The first level involves targeted high school transition and awareness programs. Rural students often lack exposure to university life and receive little career guidance, making higher education feel out of reach or irrelevant to their daily reality. Universities can change this perception by expanding summer immersion camps, similar to earlier secondary education projects. Bringing eleventh-grade students from rural areas to spend a week on a university campus makes the academic environment less intimidating. When they stay in campus housing, attend sample lectures, and meet student mentors, university life becomes tangible. Matching these teenagers with current university undergraduates who also come from rural backgrounds provides highly effective peer guidance. Another solution is bringing career counselors directly to rural high schools. These counselors can show students how a degree leads to practical local jobs, such as modern farming or digital technology, making the financial benefits of university clear.

The second level focuses entirely on removing financial and logistical barriers. Economic constraints, including the cost of housing, food, and daily living in major cities, are the primary reasons rural youth enter the workforce early instead of attending university. (Petre, Teodorescu and Cioclu 2024) Universities must guarantee campus housing grants, as rent is often the major barrier. Reserving dedicated, fully funded rooms on campus for rural students with low family income removes a massive financial burden. Furthermore, expanding government allocations for tuition-free state-funded places dedicated specifically to rural students is essential. When combined with monthly financial support funded through European Social Fund programs, higher education becomes financially viable. For those who cannot relocate, universities should develop decentralized extension centers or hybrid learning options for non-laboratory disciplines.

The third level addresses on-campus retention and academic support. Once enrolled, rural students face a higher risk of dropping out during their first year due to academic adjustment and social isolation, a process of institutional departure formally modeled by Tinto (1975). Universities need to offer academic transition and remedial support during the first semester, focusing on academic writing, research methodologies, and digital literacy to close any gaps in high school preparation. Faculty mentoring programs are also crucial. As Ibsen and Rosholm (2024) conclude in their meta-analysis of university interventions, structured student-faculty mentoring is the most effective single strategy for retention. Assigning a dedicated academic advisor to first-generation rural students ensures continuous support. Finally, expanding dual higher education programs combines academic study with paid apprenticeships at regional companies. This

provides immediate income while completing a degree, aligning the need to earn a living with the pursuit of higher education.

At the university level, traditional lectures often feel disconnected from reality. When students fail to see the practical value of their degree, apathy sets in, increasing the risk of university dropout. To keep vulnerable undergraduates engaged, universities must assign projects that carry an immediate social impact.

Connecting academic theory to community needs gives students a clear sense of purpose. Lăpădat and Lăpădat (2025: 15) explain how educational institutions can integrate practical tasks into their programs: „Schools can collaborate with cultural institutions, local nonprofits, or municipal agencies on small language tasks such as translating signage, creating welcome resources, or documenting local histories. Students negotiate scopes, draft and revise with stakeholders, and release their work under appropriate licenses".

By giving students authentic audiences, these collaborative projects make the social value of their digital skills visible. This directly prevents the academic disengagement that leads to leaving higher education prematurely.

Conclusions

School dropout is a gradual process of disengagement driven by profound socioeconomic pressures and institutional resource gaps, rather than a sudden individual failure. Over six decades of educational research confirm that preventing early school leaving requires schools to directly address student isolation, financial difficulties, and academic frustration before the student completely abandons their studies.

Solving this crisis requires a major change, moving away from strict punishments toward proven support systems. Digital tracking tools, such as early warning systems, provide essential data for identifying vulnerable students through frequent absences and falling grades. However, technology alone cannot solve the dropout crisis. Schools must pair digital alerts with real human support, as structured, personal mentorship remains the best way to keep students in school. This human connection is especially critical in poorly funded rural and minority communities across Romania, where hidden school expenses and a lack of support staff act as major obstacles to graduating.

Tackling these deep-rooted inequalities also applies to higher education. Helping rural and marginalized youth move to university requires a complete plan focused on early campus visits, making school affordable, and keeping students enrolled. Universities must make the academic environment feel accessible through introductory campus programs and career counseling that connects degrees to practical regional jobs. Furthermore, educational institutions must remove financial burdens by providing fully funded rooms on campus, free government-funded spots, and monthly living grants. Once students enroll, universities need to offer specific academic help and assign individual professors as mentors to prevent first-year isolation.

Ultimately, keeping vulnerable students in school requires a fully supportive environment. By combining student progress tracking, ongoing financial help, and practical community projects, schools and universities can successfully build a strong sense of belonging and a clear reason to learn. When educators focus on real human connection alongside clear career paths, they give every student the necessary tools to graduate and secure a stable, productive future.

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ORIGINAL PAPER

Lexicalised or Dead Metaphor and Metonymy in the Specialised Language of Law

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Abstract

Metaphor is a privileged tool in the process of lexical creation, which finds its utility in various linguistic domains, as well as in specialised languages, where it is favoured by linguistic arbitrariness. The phenomenon of metaphorisation involves the establishment of connections between different things, entities, notions or roles based on similar elements, on certain common qualities. Metaphor in specialised language rests on an equivalence relation and is developed through analogical reasoning in the sphere of mental constructs enabling a process of conceptual abstraction. Lexicalised metaphor, which is not the same as lexical metaphor, is also called dead/ frozen metaphor in the literature. The name comes from the fact that, due to frequent, repetitive use, this figure of speech has lost not only its vividness and savour, but also its original meaning. Thus, its earlier metaphorical nature has been obscured by overuse and people are no longer aware of this metaphoricity. In legal language, it comes to function as a standard term, encasing abstract legal notions. Metonymy is another type of figurative language that relies on analogy, but in this case, it is a way of comparing and bringing together concepts, entities or things which do not share similar qualities. A word or term is used as a substitute meant to designate an object or a concept with which it is associated or to which it is somehow related. The purpose of this article is to discuss several lexicalised metaphors and metonymies that pertain to legal language.

Keywords: *linguistic arbitrariness, legal arbitrariness, specialised language of law, lexicalised/ dead metaphor and metonymy*

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1. Linguistic arbitrariness vs. legal arbitrariness and the relationship to metaphor

The intersection between linguistic arbitrariness and legal arbitrariness shows how metaphor works in the language of law. While the former favours the creation of metaphors, allowing the law to borrow words and concepts from the common lexicon just to assign them complex legal significance, the latter freezes the meanings of these metaphors, putting a bridle on the fluidity and unpredictable nature of linguistic arbitrariness.

In translation, as well as in teaching or learning a foreign language, the principle of linguistic arbitrariness is a source of difficulty, reflected in the creation of new terms and in the understanding of existing ones. This explains the partial autonomy of languages and their connection with the culture and experience they express, shaping each other, since each has its unique, specific structure. Whether in everyday language or in specialised languages, the difficulty is the same (Tamine, 2007: 13).

As an adjective, arbitrary designates a quality or characteristic of something opposing to the conventional, "based on chance rather than being planned or based on reason; using unlimited personal power without considering other people's rights or wishes" (*Cambridge Dictionary*). Legally speaking, although the term arbitrary does not have a formal definition, it has been developed by case law and legal practice, where it means "a decision or action taken without a rational basis, relevant reasons or fair process - essentially, one resting on whim or caprice rather than lawful, evidence-based judgment" (*LexisNexis*).

Legal arbitrariness usually signposts illegality for irrationality, lack of proportionality, focus on irrelevant elements, failure to provide reasons, inconsistency (*LexisNexis*) or the discretionary power the legislature gives to the conscience of the judge, rejecting a certain dose of bad faith which might affect the interpretation of legal texts (Guță, 2006: 105).

With this second meaning, the concept has logical and linguistic implications, because the judge performs an interpretation process through a syllogism, the goal being to detect the meaning of the norm, its scope, and the production of legal effects.

Legal arbitrariness is a component of the legal norm/ rule, its functioning is fuelled by the synergistic link between two important elements of the latter, namely the linguistic expression and the logical content, closely related to the authority who seeks to act on and transform the situation that the rule aims to regulate.

Coming back to linguistic arbitrariness – which means that there is no natural connection between what we hear or read, the sounds or written form of a word or sequence of words, on the one hand, and the actual meaning, on the other - an example of the difficulties which this concept entails leads us to metaphor and another figure of speech often discussed with the former, metonymy.

As a privileged and very useful tool in the lexical creation, metaphor is the expression of an essential feature of language, creativity, the power to form new sentences without limits, even if one has never heard them before. Recalling Hockett (1958), Tamine (2007: 13-14) believes that, together with creativity, semanticity - the power to assign meaning to well-constructed combinations which bring together terms having nothing to do with each other – explains the presence of metaphor in various languages and registers, in common as well as specialised and technical language. However, semanticity is challenged at present. Words were considered to have specific meanings, characterised by fixed associations with elements from the surrounding reality, as argued

by Hockett (1960), who proposed a set of 13 'design features' (semanticity among them), distinguishing between the supposed similarities and differences between human (spoken) language, other human signalling systems (e.g. music), and animals' communication systems. On the contrary, linguistic expressions acquire significance through a process of inference in which both linguistic and extralinguistic context plays an essential part. Meanings prove flexible, they are not firm and fixed (Pleyer, Perlman, Lupyan, de Reus, Raviv, 2026: 611-612).

The concept of linguistic arbitrariness still holds true, but it requires in-depth analysis and completion. In contradistinction to Hockett's view that there is no resemblance between word form and word meaning, language containing 'arbitrary' signals, the idea that arbitrary elements combine with motivated ones is widely accepted in current research. Iconicity, in the sense of "motivated resemblance between form and meaning" prevails in spoken and signed languages (Pleyer et al., 2026: 611).

2. Lexicalised metaphor and metonymy in the legal field

2.1. Metaphor plays a crucial part in the process of lexical creation, finding its utility in various linguistic domains. The phenomenon of metaphorisation involves the establishment of connections between different things, entities, notions or roles based on similar elements, on certain common qualities.

For Lakoff and Johnson (1980), metaphor is a fundamental instrument for structuring cognitive systems. They ground their arguments on essentially metaphorical expressions which usage has transformed into common metaphors. Their role is to reconstruct a model of thought, a conceptual correspondence between two distinct domains: the source domain and the target domain. This set of correspondences between metaphorical concepts - mapping - becomes a way of deciphering metaphor.

In specialised language, metaphor rests on an equivalence relation and is developed through analogical reasoning in the sphere of mental constructs enabling a process of conceptual abstraction (Butiurca, 2015: 114). Although there are voices that blame metaphors for rendering legal language cryptic and ambiguous, there are advantages that lawyers can enjoy, i.e. they act as "mnemonic devices" (Richard 2014: 3), which trigger connections with familiar patterns or images easy to remember, this analogical process often having a surprising or symbolic impact.

Lexicalised metaphor, also called dead/ frozen/ fossilized metaphor, derives its name from the fact that, due to frequent, repetitive use, this figure of speech has lost not only its vividness and savour, but also its original meaning. Thus, its earlier metaphorical nature has been obscured by overuse and people are no longer aware of this metaphoricity.

Most metaphors in legal speech, and in specialised languages in general, are "used" or "dead", they "go unnoticed because they belong to the legal lexicon", as distinct from "living" or "live" metaphors (Richard, 2014: 3). Although a lexicalised metaphor is harder to decode and interpret in less revealing contexts, it comes to function as a standard term, encasing abstract legal notions.

It has been noticed that metaphors, as a particular aspect of legal style, are quite frequent in judgments, but not so numerous in contracts or legislative texts (Richard, 2014: 4). Yet, "legal discourse, be it expressed through formal written language of legal acts, the language of legal proceedings at the court of law or police statements of spoken interactions with victims of abuse or violators, inevitably employs metaphor and discusses abstract notions in terms of concrete" (Šeškauskienė, 2022: ix).

This author notes that the spatial expression *under the law* means 'obeying the law', therefore being subject to the authority and power of the law, which implies a social hierarchy understood as a vertical configuration of items in abstract context.

The preposition *under* is also used with different branches of law, as in *under civil law, under criminal law* (meaning governed by civil or criminal law), specific statutes or paragraphs, as in *under Section 10, under the Mental Health Act, under article 7*, contractual terms, as in *under the contract, under the terms of the lease, under contractual obligations*, case law or doctrines, as in *under recent case law.*

Another preposition which acquires metaphorical values in legal language is the preposition *on.* In ordinary language, one imposes something *to* somebody, but in the legal sphere, a sanction is imposed *on* somebody, a punishment is inflicted *on* an offender. The idea of a controlling authority which lies above all, feeling somehow 'heavy' on those who have to observe the law and are under the law, is always present.

Certain verbs that primarily have a concrete meaning combine with legal terms, creating new images and significances so ingrained in legal terminology that people seem to be hardly aware of their metaphoricity. The verb *to breach* refers to breaking through a physical barrier, making an opening, but in the expression *to breach a contract* it means "to violate contractual terms, obligations". *To break the law, to uphold the law, to uphold a decision, to extinguish a legal duty, to enter into a contract, to bring an action, to weigh the evidence, to cast doubt on evidence, to drop charges* are just a few other examples in which abstract nouns are treated as objects and material manifestations.

Higher courts are superior courts whose decisions are *binding* on *lower* or inferior courts, they are not taller than other buildings. The *Upper House* is not a construction at a higher level than other houses, it refers to the House of Lords in the British Parliament, whose membership is mostly appointed and which includes experts in many fields. If an agreement is *binding*, it creates enforceable obligations, if a decision is *binding*, this does not imply tying someone with ropes, but making a person comply with it. "All of these expressions are motivated by metaphor: abstract entities are understood in terms of more concrete, of those closer to the human body, and humans as social beings, members of society" (Šeškauskienė, 2022: ix).

The parts of the human body are a conceptual subsystem developed by the anthropocentric model, representing the source of many conceptual or terminological metaphors, in most specialised languages (Butiurca, 2015: 129).

The organicist metaphors, referring to the body and its organs, agglomerate meanings into a whole that becomes homogeneous as the images are shared. Legal institutions become nerve centres, decisions are made by organs, established bodies are like persons. When the preposition used for comparisons disappears, the bodies become legal persons (Boudot, 2026: 3).

In legal English, in such phrases as *body of law* (often referred to as *corpus juris*, a Latin expression designating a comprehensive collection of legal rules, enactments, regulations, judicial precedents within a jurisdiction or legal field), *body of laws* (set of legal rules), *body of rules/regulations,* nobody thinks of *body* as "trunk of a man or beast; the whole physical structure of a human or animal; material frame, material existence of a human; main or principal part of anything", actually the original meaning of Middle English *bodi*, from Old English *bodig* (OED). The word evolved to denote a human being, then the "main part of a group", of individuals seen as a community, and from 1660s the "main portion of a document" (OED).

The metaphorical expressions that contain the word *body* may denote official entities and organisations (*governing body* – an authoritative, official organisation whose main role is to manage and enforce rules relating to a specific institution or group*, administrative body* – which implements rules, policies, may issue specific regulations*, legislative body* – an organised, official group like parliament or congress, empowered to pass laws*, regulatory body* - a controlling organisation, dealing with aspects of human activity, *public body, public sector body, advisory body, disciplinary body, funding body, corporate/artificial body* meaning "legal person"), as well as documents, texts, writings, acts (*body of law, body of a text/ document/ act/ contract/ agreement, body of a deed, body of an instrument* etc.), or evidence (*body of evidence* – a collection of writings, facts, testimonies meant to support a point in a case).

Body politic is an archaic term, formally used in politics and representing "the nation, the state, whole body of people living under an organized government" (OED), a group organised under a rule of law.

The metaphors of the human body are easy to identify and abound in legal discourse and discourses on the law, creating many 'avatars' in various legal systems, if not all, in both private and public law. Rhetorically, they facilitate the emergence of hypostases (reification), enabling us to bring ideas into a sphere perceived and described by our senses, to internalize abstractions, to grasp virtual realities, and to reach an intellectual understanding of them comparable to a physical, sensory apprehension (Boudot, 2026: 7).

In French private law and not only, metaphors relating to the political content of the norm are most often lexicalised. They become part of legal rules or case law after crossing the lexical fields of other areas of human activity, being transferred from economics, medicine, biology into commercial or public health regulations, environmental legislation, etc. (Boudot, 2026: 3-4). They are not intrinsically legal, but migrate from other domains, acquiring a degree of technicality with the norm containing them.

2.2. Metonymy is another type of figurative language that relies on analogy, but in this case, unlike metaphor, by which it is often eclipsed, metonymy is a way of comparing and bringing together concepts, entities or things which do not share similar qualities. A word or term is used as a substitute meant to designate an object or a concept with which it is associated or to which it is somehow related.

If "with metaphor, correspondences are established between two different domains (or frames, for some linguists), (…) with metonymy, the correspondences are established within the same frame" (Terry, 2020). There are expressions that cannot be described as wholly metaphorical or fully metonymic, therefore metaphor and metonymy do not exclude each other, they can coexist and "should be seen as prototypical categories at the endpoints of a metaphor-metonymy continuum" (Radden, 2000: 93-94, in Terry, 2020).

In this article, we will analyse the following conventionalised or institutionalised metonymies: *the Crown, the Bar, the Bench*.

Metonymically, *the Crown* does not denote an object, on the contrary it is a symbol of authority, making reference to the sovereign, whereas in criminal proceedings, it stands for the prosecuting authority (e.g. *The Crown against Smith*).

As for the word *bar*, its original meaning traces back to late 12th century, meaning "stake or rod of iron used to fasten a door or gate", from Old French *barre* (OED). The legal meaning of *Bar*, "whole body of lawyers, the legal profession" (OED) is from the

16th century and derives from the physical railing or barrier separating the general public, on the one hand, and the judges, jury and lawyers, on the other hand, in the Inns of Court in medieval England. Students who proved to have reached a certain standing, as well as qualified lawyers would earn the privilege of being called to the bar, where they stood to plead and address the court. At present, *the Bar* refers to "lawyers who are allowed to argue a case in a higher court" (UK), or "all lawyers thought of as a group" (US) and the expression *to be called to the Bar* means "to gain a qualification as a lawyer" (CD).

Similarly, with respect to solicitors (UK), *to be admitted to the roll* defines the admission to the legal profession, based on the association of the physical object, i.e. a document containing a list of names, with the abstract concept of membership in that professional group. Historically, a "rolled-up piece of parchment or paper, scroll" (OED), a roll was used to register and archive the names of qualified lawyers.

A *bench* is a long, hard, usually wooden seat for two or more people, but around 1300 it was attested as an item of furniture for the judges in court, hence the metonymical use of the word as "judges collectively, office of a judge" (OED). Even today *to serve on the bench* means "to work as a judge or magistrate" and *to take the bench* in American English means "to become a judge" (CD).

In the legal field, metonymy exploits the association between an institution (the metonym) and its members (*court, jury, Parliament, Congress*), it uses the place for institution (*the House*), the physical document for its content (*the contract*, actually the mutual agreement of the parties and the obligations expressed in it), the symbol for authority (*the Crown, the seal*), the legal role for the person who performs it (*the prosecution, the defence*).

3. Conclusions

Any specialised language exists on account of a corresponding specialised domain, the knowledge of which, especially from a didactic perspective, goes beyond learning specific grammatical structures and vocabulary items. Understanding lexicalised metaphors, which are quite numerous in such languages, is an obstacle, but also a necessity for accessing the domain. Metaphor takes on a role of binder that creates a "profound unity of usages and registers" (Tamine, 2007: 18). An excellent and powerful communicative tool, it contributes to the entrenchment and dissemination of legal concepts more strikingly and "probably more efficiently than a literal description" (Richard, 2014: 7).

One should keep in mind that any dead metaphor was once alive. The vividness of metaphors manifests itself in both legal discourse and meta-legal discourse, before they are shared. The discourse of jurists may be analytical, when describing a concept or an institution and thus avoiding or dominating the use of metaphors, or it may be rhetorical, even polemical, while pronouncing value judgments, making commentaries and construing concepts, prone to "unleash a swarm of metaphors" (Boudot, 2026: 4). Other authors have also noted a more pervasive presence of metaphors in judgments, where they meet rhetorical needs and represent a persuasive and memorable way of expressing judicial opinion and authority, since "a critical component of a judge's toolbox is metaphor" (Berger, 2002: 30).

However, there are no elements or criteria that clearly indicate the existence of metaphor and metonymy only in certain registers or types of discourse. Although metonymy is outshined by metaphor in terms of frequency and impact, these two stylistic devices are inherent to the legal domain, it only takes scientific curiosity, patience and

thorough research to (re)discover them, to add new dimensions to their understanding and knowledge.

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ORIGINAL PAPER

Active Learning Strategies for Increasing Student Engagement in English Language Teaching

Costina Denisa Bărbuceanu[1)]

Abstract
Keeping students engaged has always been a challenge, and it has only gotten tougher with hybrid and online classes everywhere. The old routine-teachers talking, students quietly listening-just doesn't work anymore. Students want and need more, like multimodal affect prediction, analytics powered by large language models, and real-time data from environmental sensors. The idea is to build a system that actually knows the instant a student starts drifting, when that happens, teachers can jump in right away with targeted, personal strategies to pull them back in. Some use sensors to pick up subtle emotional changes, others tap into the huge flow of data from learning management systems. They're useful, but on their own, each one is limited. What we really need is a model that blends social, behavioural, and emotional cues-a full, layered picture of what's going on with students. This goes deeper than just noticing when someone loses focus. It helps teachers figure out what makes students jump in, stick around, or totally check out, furthermore, the goal is straightforward: turn English Language Teaching classrooms into dynamic, responsive spaces that change as students do. In these classrooms, the way teachers teach and the way students interact can shift in real time, guided by actual data about what's working. Accomplishing that means letting go of the old idea of classrooms as fixed spaces and see them as living systems where technology and teaching move together, meeting every student right where they are and ensuring active participation in the pedagogical process, supported by machine learning systems that optimize the learning environment.

Keywords: *active learning, student engagement, learner-cantered pedagogy, collaborative learning, communicative competence.*

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Introduction

Student engagement stands out as a key marker of success in today's classrooms because true engagement is visible in how much they participate, how motivated they feel, and how well they navigate with their learning, their exam results and confidence, as well. This matters even more in English Language Teaching (ELT), as language is active, built on listening input, conversation, practice, and real interaction towards better communication skills. Yet, many traditional methods such as endless lectures, rote memorization, fill-in-the-blank drills, leave little room for real conversation or meaningful practice, given the reason, both researchers and teachers keep turning toward active learning. They see how students come out of lessons that have them talk, collaborate, solve problems, and reflect on what they're doing (Bonwell & Eison, 1991). Active learning moves students to the centre of learning, powering both their minds and their motivation and adding technology takes learning and teaching to a whole new dimension. With the spread of educational technology, learning analytics, and AI tutors, we now have more ways than ever to track and support engagement so that students - whether online or in person- perform better (Moubayed et al., 2018). Meanwhile, tools like AI and digital platforms can fuel and boost active learning, provided that teachers use them accordingly, (Chen et al., 2026; Johnston et al., 2024). This article presents how active learning strategies drive engagement in English Language Teaching, laying out the main theories behind active learning and why engagement matters, then dive into some of the best classroom strategies. Along the way, the article emphasises how technology and AI fall into the picture weighing the real advantages of making active learning part of today's language classrooms.

Understanding Student Engagement in Language Learning

Student commitment isn't just a catchphrase - it covers three big areas: student's behaviour, student's feelings toward what they are being taught, and how deeply they think (Fredricks et al., 2004). Behavioural engagement shows up in presence, determination, and contribution; emotional engagement is about awareness, eagerness, and that sense of fitting in class but cognitive engagement goes profound: it's the cerebral investment and approach students bring to their education. In language classrooms, engagement really matters because language is not acquired if students aren't interrelating in noteworthy ways. Those who engage into talkative tasks get more chances to elucidate connotation, acquire feedback, and practice their expertise, furthermore this is related to Vygotsky's sociocultural theory - learning is produced and grows out of social communication and cooperation (Vygotsky, 1978), so engagement isn't additional, it's crucial for developing language. Recent research keeps showing the same pattern of engaged students who perform better, for example, (Moubayed et al. 2018) looked at e-learning and found strong links between active learning, commitment and academic performance. Students who interrelate with materials, join deliberations, and are active with engagements consistently produce higher exam grades thus proving that active engagement contours how well students absorb a foreign language. The same is valid for large-scale digital platforms, such as Moodle, where Johnston et al. (2024) examined the activity and concluded that students who participated regularly, submitted projects on time, and intermingled with course resources also scored higher. Active learning rests on the idea that students shape their own understanding through practical involvement and communication (Piaget, 1972; Vygotsky, 1978) since meaning doesn't just occur -it gets fabricated as students solve problems, deliberate, and mirror together. Bonwell and Eison

(1991) stated a short definition of active learning, that while performing and discerning, students get tangled, dispute, work together, challenge cases, and imitate, instead of just listening, furthermore students don't just learn, they really comprehend by relating, scrutinizing, and assessing. Contained by language teaching, this methodology aligns with Communicative Language Teaching (CLT), and Task-Based Language Teaching (TBLT), which impulsions for meaningful communication as the real objective (Richards, 2006) - in CLT, and makes learners use language authentically, through interaction and teamwork, and TBLT, which focuses on realistic tasks that necessitate active language usage in unpretentious situations (Nunan, 2004).

Active Learning Strategies

Collaborative learning, one of the most used strategies in English language teaching gets students working in pairs or groups or even "vulnerable groups" (Paraschivu, Cotuna, 2021:573) to attain shared goals by swapping ideas, debate over meaning together, solve problems, "boost personal, social and professional growth in future career and social interaction within the academic environment or imminent job" (Bărbuceanu, 2019:46) to build language confidence and knowledge as a team. According to Vygotsky (1978), students grow academically when they interact within their "zones of proximal development"-that is, just beyond what they manage to do alone. In these group settings or classes, more advanced students are paired together with less advanced ones and can even guide their peers, which sparks both language progress and cognitive development through small-group discussions, peer editing, information-gap tasks, and group projects, activities which push students to use language for realistic purposes, while they practice listening, speaking, reading, and writing, all at once. Working together doesn't just improve and sharpen language skills but it also helps students feel more involved or part of a group thus increasing motivation and giving learners a sense of belonging. Collaborative work lowers the level of language anxiety and determines students, who feel emotionally connected to their classmates, to stick with their studies and be more prone and willing to speak in English. "Students who account to have warm interactions with their peers and teachers also have the inclination to show better academic self-drive and engagement than students who lack this reciprocal affect." (Bărbuceanu, 2022: 185). Many students feel more comfortable debating and sharing ideas in a small group than speaking in front of the whole class, making collaborative learning a relaxed setting that boosts confidence and keeps students engaged in using the target language through genuine interaction. Task-Based Language Teaching (TBLT) stands out as another influential approach in today's language teaching with the focus being on real tasks that require students to use language to accomplish something-whether it's planning something, interviewing someone, solving a problem, prepping a presentation, or managing a research project. These tasks are quite realistic, they look a lot like what people actually do outside the classroom, making language practice feel real and goal centred, moreover keeping students engaged by making choices, find information, and figure things out together, instead of focusing on small, unimportant details, disapproving grammar, students aim to get their message across. The result is the rise in motivation when students see how lesson activities connect with real-world needs, they become increasingly interested. "Increase of motivation and enthusiasm of students and teachers through active involvement in the process of live communication, possibilities of language acquisition are increasing thanks to the cooperation, interaction and communication in learning language." (Chiriţescu, Păunescu, 2017:376). TBLT tasks often involve

teamwork, problem-solving, and creativity, which draws them in on a deeper, cognitive level and technology takes this approach even further: digital storytelling, online research, collaborative writing, and virtual exchanges - these open up ways for students to use English with real audacity and audiences and for authentic purposes, reaching far beyond the four walls of the classroom. Role-play and simulation push and put students right into the middle of communication - they have to use English in situations that feel real: mock job interviews, pretend business meetings, or even rehearsed customer service chats, a lively debate, a medical consultation, if it is ESP language use. The point of these events it to force language out of students' mouths because the situation demands it, not because a textbook says so. In role-plays, students are subjected to listening-to each other, to the changing mood-and adjust language as they go. They have to think on their feet, make judgments, and sometimes improvise, thus boosting student personality here, even some resourcefulness and imagination, grabbing attention and keeping the students emotionally invested. Role-plays do more than just spark engagement, they sharpen communicative skills, too, as students learn to start and accomplish conversations, negotiate, get their points transversely, and solve problems - all in English, "this result can be accomplished by personal and social awareness and proper emotional feedback in specific circumstances." (Buşu, 2020:205). Harmer (2015) points out that as students dramatize different circumstances and repeat these activities, their self-assurance rises, furthermore they stop worrying so much about mistakes, and start focusing on the real conversation. Think about Project-Based Learning (PBL) where, students don't just memorize rules or fill out worksheets-they are actively engaged and cognitively prone to dig into tough questions. There aren't easy answers, and the tasks aren't simple and maybe they dive into researching a cultural tradition, design a website from scratch, produce a video, or run a survey in the community, along the way, they're practicing language but they're also sharpening their critical thinking**.** PBL isn't just about grammar drills, it's about creating something real: a presentation, a detailed report, or some other meaningful outcome that actually matters where students drive the whole process, organize, plan, and put everything into motion, thus active learning at its core. The length of these projects stretches over weeks or months, which keeps students actively tangled and with genuine care about their work; much more than unmemorable assignments- because "it is the human nature itself to pursue the maximal outcome at the minimal amount of effort." (Buşu, 2022:98). Furthermore, project-based learning sparks true enthusiasm because it never occurs in isolation, students talk to each other, share ideas, rethink their approaches, and change course when needed, take on different roles, learn to appraise how things are going, and end up involved on all levels - behaviourally, emotionally, and cognitively. Learning management systems, online platforms, instructive apps, and artificial intelligence make active learning not only easier but often more exciting for everyone involved. Scholars are paying more attention to this intersection between technology and student engagement, Johnston et al. (2024) found that the way students interact in platforms like Moodle tells us a lot about their learning habits, and more interaction with digital resources leads to better academic results through "activities that are meant to encourage the student's creativity, critical thinking and communication skills." (Stoian, 2019a:131). Similarly, Moubayed et al. (2018) showed that engagement procedures in e-learning surroundings closely track with academic success, so, it makes sense to use technology-driven active learning approaches that keep students involved repeatedly. Technology opens the door to all kinds of paths for students to work together-writing, discussion boards, peer reviews, multimedia assignments, and virtual communication.

Recent studies highpoint a clear link between engagement and stronger academic results (Moubayed et al., 2018; Johnston et al., 2024). New technologies like artificial intelligence keep escalating making it easier to personalize learning and keep students attracted (Chen et al., 2026; Hamdi et al., 2024). These implements push education beyond classroom walls and give students fresh occasions to put their language skills to use, thus "From a social constructivist perspective, the learner builds his knowledge through active interaction with his physical and social environment." (Scorţan, 2021:143). But just having technology isn't enough to spark real engagement-teachers still need to design their lessons attentively to make that materialise. Now, artificial intelligence is starting to play a greater role in education, "in order to obtain better student outcomes" (Stoian, 2019b), one can see AI tutors, chatbots, systems that produce feedback spontaneously, and adaptive learning platforms-each one helping produce a more tailored learning experience. AI can help adapt learning to fit specific necessities, making education feel a lot more subjective, moreover the study by Chen et al. (2026), for instance, looked at how students at different colleges interrelated with generative AI tutors and found that students actually didn't all use these tools the similar way. Hamdi et al. (2024) developed a sentiment-based metric that lets large language models analyse how engaged students are with e-learning systems. This highpoints how artificial intelligence implements help instructors spot engagement inclinations and identify students who need more sustenance. In English Language Teaching, AI opens a lot of doors, from conversational AI, students can work on their speaking and writing skills on their own, to intelligent tutoring systems that give targeted feedback-on grammar, vocabulary, and pronunciation, overall, this kind of support builds self-reliance, since it gives learners a space to practice language without feeling anxious so that "active and constructive learning can be applied later in social, professional and cultural terms." (Lăpădat, Lăpădat, 2020a:142).

Teachers have to make sure AI doesn't push out real human collaboration because language learning thrives on people talking and connecting-it's always been social, furthermore students need genuine, thoughtful back-and-forth with their teachers and classmates to build their communication skills. The classroom itself plays a big role, not just the teaching style, moreover Gao and colleagues (2022) explored how seating arrangements shape student engagement and group work in different classes. The findings were conclusive, the way students sit really changes how much they participate, join teams, and stay interested because flexible classrooms-where students can shift seats, build groups, and actually talk, spark much more commitment than the old-school setup of rows staring at one teacher. "The present tense conditions the listeners to actively listen and be involved in the activity of learning in the present with a view of improving the future." (Chiriţescu, Păunescu, 2021:102). When students sit in the vicinity of their peers, they're more likely to interconnect and work through problems together, with low levels of nervousness. So, language teachers should focus on creating spaces that embolden real collaboration, such as movable desks, group computer terminals, and technologically-friendly arrangements to spark active learning.

Challenges in implementing Active Learning

Active learning has plenty of advantages, but actually using these strategies presents real hurdles-and one needs the right setup and planning to make it work moreover teaching a big class only adds to the complexity. Teachers struggle to keep track of participation and make sure everyone gets involved, not just the same few students every time. It's easy for a handful of students to dominate while others fade into the background.

Some students pull back, especially if they're used to the teacher carrying the conversation, suddenly shifting responsibility onto them feels unfamiliar, maybe even awkward at first. Change takes effort, for everyone in the room. "In the universe of communication, there is practically a vulnerability of reception of the individual who perceives himself to be a unique and original snowflake." (Lăpădat, Lăpădat, 2020b:121). Language anxiety, cultural differences, and varying skill levels all shape whether students actually want to join in even if there's no escaping it, these barriers influence participation. The presence of technology into the mix makes everything more complicated than it seems. Not every student has a reliable device or feels comfortable with new tech, so some end up side-lined, thus, for active learning to really take place, teachers must introduce strategies gradually, give straightforward instructions, and create a classroom where students feel supported. Activities should always be related to the course objectives-that connection matters moreover making sure activities fit the goals of the course is also of uttermost importance because teachers themselves face obstacles-integrating technology, ensuring students are ready, managing resources, the need for support and "social well-being" aimed to increase the resilience status of the communities." (Olimid, Olimid, 2022:91).

Conclusion

Student engagement sits at the heart of English Language Teaching-it's what shapes real success in the classroom, especially when teachers use active learning strategies, everything changes. Suddenly, students become from reluctant to involved, responding, and thinking more deeply. These methods stem from constructivist and sociocultural theories, emphasizing the importance of genuine interaction with both concepts and classmates because it's not enough to memorize facts-students need to connect, question, and explore together, furthermore "Emotions therefore accompany the students (…) and may interfere with learning or consolidate it." (Scorţan, 2022:146). Collaborative learning, task-based language teaching, role-play, project-based learning, and technology-driven activities actually pull students into the action, shifting the paradigm from just watching to involvement, talking, figuring things out, and standing on their own two feet. As classrooms keep evolving, teachers who remain faithfully to active learning give students space to speak up, ask questions, and build confidence. They aren't just memorizing; they're learning how to connect and communicate in real life and society today. In a world where being linked matters more than ever, creating these kinds of teaching spaces equips students with what they need to thrive.

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ORIGINAL PAPER

Reading Beyond the Text: The Role of Critical Literacy Skills in English Language Education

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Motto: *To speak a true word is to transform the world.*
(Paulo Freire, 2005: 87)

Abstract
It is well known that words have power, the power to influence people by promoting certain ideas and individual messages meant to shape readers'/ listeners' viewpoints. In this light, language is never neutral, and words always have contextual and subtextual meanings that can be decoded by critical literacy. In our increasingly globalised world, information floods in from all possible sources which are more or less reliable; therefore, we need to be equipped with the right skills to approach a text and read beyond the words in order to understand the writer's cultural and political background, motivation, intention and overall aim. As globalisation is closely linked to English as the main means of communication around the world, English language teaching have broadened the core competencies in language acquisition to include a number of literacies, such as digital and critical literacies, along with biliteracy and multilingual literacies. The aim of this article is to explore critical literacy in English language education. We shall start by scrutinising the literature on the topic in order to define the concept, its tenets, benefits and challenges in the classroom. The theoretical presentation is backed by practical advice on the strategies and activities that teachers can use in order to develop their students' critical literacy skills. The conclusion is that EFL education can make learners critically literate citizens who have a saying in the global civic discourse.
Keywords: *critical literacy, fake news, language learning, meaning making, power*.

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Introduction

We live in a world blessed with the rapid growth of technology that, in the context of "the fast forward dynamics of globalization" (Giroux, 2005: 21), has facilitated and greatly enhanced communication across borders, be they geographical, political, social, ethnic, racial, gender, religious, or personal. At the same time, as Diana Marcu points out, "the advancements in technology, the IoT [the Internet of Things] together with the appearance of smart devices have turned the 21st century into an era known for its digital revolution" (Marcu, 2026: 227). In the era of digitalisation, social media connects people around the globe, news is spreading even before being officially released, people can react instantly to events and statements, businesses are expanding online, and the AI can offer advice on any subject that we can think of. Yet, the blessing comes at a cost, since this very easy and rapid access to information and the speed at which any news or comment is consumed, leave no space or time for thinking, reflecting on, or questioning the validity of the online content. Fake news and misinformation are not accidental; on the contrary, they can be carefully orchestrated and used as weapons of mass manipulation for the benefit of specific social, political or economic interests. While many fake articles are spread online in order to drive website traffic and generate income from numerous online ads, others are designed on purpose to cause confusion, undermine trust in governments and other official institutions, and ultimately trigger social division. History has proved that carefully designed discourses have the power to influence masses and change people's thinking and feeling, and nowadays, the internet enhances the chances of any sort of propaganda to reach far and deep into public consciousness.

In this context of massive manipulation, the ability to analyse information and its sources has become a necessary skill, known as critical literacy. Understanding a text is no longer a matter of reading comprehension alone, but it implies the identification of the power structures embedded within language (Janks, 2012), and the examination of the writer's cultural and political background, motivation, intention and overall aim. As English is the main language of communication around the world, dominating international business, media and academia, learners of English as a Foreign Language (EFL) need to know how to approach the information provided by the texts they read in the target language. Developing EFL students' critical literacy skills is crucial, since they need not only to succeed in their academic and professional lives, but also to be actively involved in the global civic discourse (Alhamdi & Albishri, 2023). Rizqiani and Elida stress the importance of addressing critical literacy in the context of teaching and learning English, arguing that: "Without strong critical literacy skills, these learners may struggle to discern credible sources from misinformation, recognize subtle biases, or fully engage with diverse perspectives." (Rizqiani & Elida, 2025: 828)

Given the fact that critical thinking and analysis are vital in decoding the hidden implications of texts, this paper focuses on presenting critical literacy skills in the context of English language education. It starts by mapping the territory of investigation, that is, by presenting a general theoretical overview of critical literacy with the aim of providing background knowledge on the topic. It then addresses a number of strategies and activities that teachers can use in the EFL classroom in order to foster global awareness and critical consciousness among their students.

Theoretical Framework

A variety of teaching methods has been employed in ELT throughout its history, from the old Grammar-Translation Method to the very popular Communicative Language

Teaching, all mirroring different theories and approaches to language teaching and learning (Larsen-Freeman, 2000). In the 1990s, the language teaching profession started to take into consideration sociolinguistics' research that had underlined the close connection between language and culture. As Perkins pointed out, "language doesn't exist outside a cultural context" (Perkins, 1988: 25), and the intercultural approach to language learning has given rise to a "critical turn" (Dasli & Diaz, 2017) which suggests that "language education needs to address culture as intrinsically linked to meaning-making" (Brown & Alford, 2023: 36). From a sociological perspective, the meaning-making varies, being shaped by social factors, such as age, gender, ethnicity, education, or social class. Apart from being a social act, communication is also political, used to influence people's beliefs and choices, thus leading to social change. The power of words resides in their contextual and subtextual meanings, and critical theory provides the key to unlock all these. Critical literacy has consequently emerged with the aim of critically analysing the connection between language and society (Ada & Campoy, 2017; Shor, 1996; Wink, 2005), and therefore, researchers argue that the introduction of critical literacy pedagogy into the ELT curriculum will "foster social justice by helping students realize how language is affected by and affects social relations" (Derince, 2023: 395).

Although teaching critical thinking as a basic language skill has become a big "buzz" (Fisher, 2001: 7) in educational settings in the past two decades, its roots can be traced back to ancient times, when Platon, for instance, was critical of some of the traditions of Homer (Abedina & Crookes, 2019). Modern critical literacy emerged out of the work of Paulo Freire (1970), the famous educator and philosopher who got involved in the process of educating people in marginalised rural communities in Brazil. It was in that environment that he closely observed what he called "the banking model of education" (Freire, 2005: 72) where knowledge and skills that served upper class interests were "deposited" in learners' minds as money is deposited in the bank. To this model of oppression, Freire proposed "the problem solving education" alternative which encourages readers/learners to take active part in the reading process by inviting them to ask questions, think beyond the text, examine its authority and its influence on readers. People must be allowed to speak their word, because the word has the power to transform the world (Freire, 2005: 87-88). In this context, the teacher ceases to be the main source knowledge, and becomes instead the guide on the side, the one who assists students in the process of learning. As Mihaela Chiriţescu and Anca Păunescu point out, "teaching does not consist merely in transmitting information, but in establishing a meaningful social interaction between teacher and learner" (Chiriţescu & Păunescu, 2026: 78).

Modern critical literacy is broadly viewed as "an approach to literacy that places particular emphasis on the social and cultural contexts of text production and reception" (Brown & Alford, 2023: 40). Reading goes beyond text comprehension, and becomes a dialogue between the reader and the text, a fact which increases learners' motivation to engage in the process (Ada & Campoy, 2017: 116). Texts, be they written or oral, images or signs, are regarded as a means of "representing and reshaping possible worlds" (Luke, 2013: 145); hence, the importance of readers' decoding texts and uncovering their agenda. From this perspective, in the context of online fake news, critical literacy becomes a valuable skill in evaluating content, its credibility and the writer's hidden intentions.

It is worth making a distinction between critical thinking and critical literacy. Critical thinking is the process of thinking about a piece of information, event or idea in order to fully understand them. The skills involved refer to predicting, analysing, questioning, synthesising, identifying values, considering options in a particular situation.

Fisher and Scriven stress the idea that critical thinking is "skilled and active interpretation and evaluation of observations and communications, information and argumentation" (Fisher & Scriven, 1997: 21). By mastering these skills, learners will be able to deal with complex issues in the future. Critical literacy means looking beyond the text in order to understand the intentions of the author. It is a thinking skill that explores issues of fairness and social justice, thus becoming a useful instrument in the process of "awareness raising and rejection of violation and discrimination against people" (Aliakbari & Faraji, 2011: 77). In this light, critical literacy acquires social and political dimensions.

Benefits and Challenges of Critical Literacy in EFL

In the process of teaching and learning English, one of the main goals of the critical literacy approach is to make students aware of the power of words in promoting certain discourses, and teach them how to read texts with a critique eye. Learners need to see that texts are never neutral; they work to make the reader embrace the writer's viewpoint. At the same time, reading is not neutral either, since when we read, we draw from our own knowledge, cultural background, ideological perspective, or past experiences (Wardani, 2021: 48). To be critically literate thus implies reflecting on the position from which we engage with the text. Tung and Chang underline the idea that reading is a complex process that requires readers' ability "to recall, retrieve and reflect on their prior experiences or memories to construct meanings of the text" (Tung & Chang, 2009: 291).

Teaching critical literacy skills has many benefits:

- It teaches learners that meaning is not found in a text in isolation, but must be interpreted contextually, taking into consideration the time and place of events.
- It makes students aware of social, cultural and political issues around the world.
- It encourages learners to analyse texts from different perspectives.
- It increases students' motivation and active participation in class due to the fact that they are engaged in topics that are relevant to their age and interests.
- It offers teachers and learners the practical alternative "to reconnect literacy with everyday life" (Luke & Woods, 2009: 13).
- Given the relationship between critical literacy and intercultural competence, critically literate students have more chances to become effective global communicators.
- Critically literate learners understand that texts reflect the writers' viewpoint and can serve as a means of manipulation and propaganda.
- Faced with the flow of digital information, learners who have critical literacy skills are unlikely to take everything for granted and believe blindly what they read. In other words, they are equipped to spot fake news and resist manipulation.
- It gives students a voice, that is, it provides them with the space to express their ideas and beliefs, instead of learning and echoing what the teacher says.

In spite of these benefits, there are a number of challenges when implementing a critical literacy approach in the EFL classroom. First of all, critical literacy skills are closely linked to language proficiency. Higher-order text analysis requires certain levels of linguistic competence (Park, 2020) and, as Ada and Campoy comment with reference to reading skills, "a large number of students do not attain these levels" (Ada & Campoy, 2017: 116). In this context, critical literacy cannot be integrated into all EFL programmes.

In order to develop learners' critical literacy skills, teachers should place greater emphasis on critical literacy work in the design of teaching materials and classroom

activities. This is quite a challenge since teachers around the world usually complain about having to navigate a crammed curriculum. Moreover, school curricula generally revolve around printed texts; yet, it is the social media, websites and apps that present great opportunities for critical literacy instruction in EFL classes. Researchers point out that: "This digital turn necessitates a rethinking of traditional literacy pedagogies to encompass a broader range of text types and media." (Rizqiani & Elida, 2025: 829) Meanwhile, it is teachers' responsibility and challenge to integrate various types of texts in their teaching, a task which considerably burdens their already busy agendas.

The implementation of critical literacy in EFL also raises the issue of assessment. How are these skills going to be evaluated? Traditional language proficiency tests do not measure the higher-order skills involved in a critical analysis; hence, the necessity of developing more sophisticated assessment tools (Rizqiani & Elida, 2025: 829).

Another challenge may be the political, emotive or controversial content of the texts analysed. Teachers may feel uncomfortable to tackle certain topics with their students, while parents may be opposed to exposing their children to sensitive issues. Moreover, critical literacy borders on cynicism and, while the cynical spirit may be useful for unlocking critical thinking skills, it may also be too harsh for children at a tender age. At the same time, in multi-ethnic/multilingual groups, there are political issues that can "inflame" the spirits in the classroom. It is therefore advisable for teachers to ensure that learners have the appropriate age and the prior knowledge to engage with certain topics.

A further challenge would be implementing critical literacy in EFL classes within dictatorial or authoritarian regimes around the world. In these contexts, education serves as a tool for supporting and disseminating the state policy, and teaching learners to uncover power structures and biases and question underlying ideologies in a text can carry serious risks for both teachers and learners. One possible way of dealing with this challenge and implement critical literacy safely would be to focus on texts that carry low political risks, such as commercial advertisements, speculative literature like science-fiction, or texts on neutral topics, such as sports or the global warming. The aim is to teach students to detect manipulation and hidden agendas, building critical literacy skills that they can later use to question dominant political narratives.

Critical Literacy in the Classroom Environment

Critical literacy is "overtly a theory for practice" (Morgan & Wyatt-Smith, 2000: 124); that is, a theory that needs to be implied in practice. In order to help students think critically about the world, teachers should combine language teaching with soft skills development. We shall therefore look at a set of five practical activities designed to encourage students' critical literacy in an EFL classroom.

Real-life articles

Students are presented with a real-life article from an English-language newspaper or website, and asked to analyse it and find the underlying message and see how it attempts to shape opinions. The article may criticise a famous British politician, or refer to current events like students' street protests in France. Students have to underline keywords that suggest whether the piece of writing supports or undermines the mainstream discourse of the British government. It is an activity that encourages learners to think critically about biased information, and approach any piece of information from different perspectives.

One side of the story

Students listen to an interview that presents one side of a highly controversial topic, such as Tucker Carlson's interview with Russian President Vladimir Putin in February 2024. The first task is to find evidence of a one-sided interview, such as the uninterrupted monologue, the lack of any incisive questions, or the lack of fact-checking. It is important for students to notice what is said and what is left unsaid or unquestioned. The second task is to investigate the opposing side and find counterarguments in order to form a more balanced viewpoint on the topic. The activity uncovers the mechanisms of political propaganda, and underlines the importance of perspective.

Fake videos

Students watch a couple of fake videos such as AI-generated news or conflicts, or deepfakes where words are put into the mouths of public figures, and then are asked to analyse the specific visual, auditory and contextual inconsistencies that might indicate that the materials are fake. They have to uncover the hidden reason for spreading such videos online. It is an activity which raises students' awareness regarding distorted reality, and underlines the importance of checking sources.

Fake text messages

Using online tools like *https://ifaketextmessage.com/,* students are required to work together and write convincing scam texts. The goal of this fun engaging activity is to make students understand the inner mechanisms of online misinformation, and to show them how easy it is to fabricate a realistic screenshot. At the same time, it teaches them why even a simple image cannot be trusted as being real, and consequently builds their scepticism of digital evidence.

The case of influencers

The power of social media influencers is an undeniable fact. Students watch the content of a top-tier digital creator, such as Kim Kardashian, the architect of influencer marketing, who promotes dieting supplements, luxury cars, beauty products, tech accessories, without being a specialist in any trade. Students have to identify the promotional content and subtle marketing techniques. By analysing how influencers shape opinions, students can begin questioning their own shopping habits and understand the manipulative power of the multi-million businesses behind popular influencers like Kim Kardashian.

These classroom activities offer students the opportunity to tackle real-life issues, to interrogate the meaning making of texts, to analyse information from different perspectives, to voice their own ideas. The goal of such activities is to equip students with the skills they need to critically approach any kind of discourse.

Conclusion

Paulo Freire's 1970 work grounded in exposing the dichotomy between the oppressors and the oppressed argued that education is never neutral; it is a political act focused either on domesticating people, or empowering them for liberation. The emergent critical literacy pedagogy is a teaching approach that sees language as a vehicle of power, ideology, misinformation or manipulation for various social or political reasons. Its main focus is on teaching students to read against the grain, interact with a text, interrogate the writer's intentions, and expose underlying social ideologies. Applied in the EFL classroom, critical literacy combines the teaching of traditional language skills – reading,

listening, speaking, writing – with higher-order skills involved in the critical analysis of texts provided by social media, websites and apps. In the context of our highly digitalised world, the ultimate goal of the critical literacy approach is to develop the skills that learners need to navigate a world filled with incomplete, misleading, manipulative information, and become actively involved citizens in the global discourse.

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ORIGINAL PAPER

The Integration of AI into the Lives of Engineering Students: A Case Study

Diana Marcu[1)]

Abstract
In a world of technological innovations, the artificial intelligence (AI) has become more and more present in people's lives, be it for personal entertainment or for professional reasons. The educational system is part of this change as well, with both students and teachers relying on AI-platforms for various activities and tasks. The aim of the present paper is to analyse students' attitudes and expectations related to the use of AI in their personal and academic lives. The focus group consists of undergraduate students from the Faculty of Electrical Engineering, University of Craiova, Romania. The analysis is based on a survey among first and second-year undergraduates and is meant to assess how frequently students use AI-powered platforms, to what end, as well as the benefits and drawbacks of such platforms. At the same time, students are asked to offer their perspectives on the future of AI in the educational process. The results are of importance to both educators and decision-makers when it comes to reshaping the academic world.
Key words: *academic studies, artificial intelligence, AI- powered learning platforms, benefits, drawbacks*

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Introduction

Our world today is constantly shaped by technological innovations in diverse fields, such as medicine, engineering, agriculture or education and, in this rapidly-changing scene, artificial intelligence (AI) has emerged and changed the way people live, think, communicate or learn. Step by step, AI has become a visible helping tool in everyday life and the educational field is no exception to this tendency. Students nowadays use AI platforms for different reasons, be it to find further explanations to certain concepts, to summarize specific information, to translate languages, solve mathematical problems, or even for leisure time. Thus, AI-tools seem to become more indispensable for students since they do not only assist their academic pursuit but they also offer fun-time activities. The academic world has also been impacted by the advancements of AI platforms, with both students and educators using them to enhance the educational process.

Being incorporated into the broad field of STEM (Science, Technology, Engineering and Mathematics), the undergraduates of engineering, including electrical engineering ones, are already familiar with the use of advances in technology and human-machine collaboration in their tasks and research. Though students rely on generative artificial intelligence (GenAI) in their workflows, especially in research projects, there is the need of substantial qualitative research on their perceptions on how the technology will change their skills, as, according to Quince et al., "[…] students are not only current users of GenAI in educational settings, but also future professionals who will be expected to use GenAI-supported tools while maintaining technical judgement, accountability, safety, and ethical responsibility" (Quince, Chen, Lindors, 2026, 1-20). But, in order to become proficient in their future careers, it is of high importance to grasp an understanding of students' perceptions related to the use of AI tools, both personally and professionally. Therefore, the present study focuses on how familiar the students in the engineering field are with the use of AI-tools, how often they utilize such technology and specifically, how they perceive the integration of AI in education.

Literature review

AI-technologies and their impact on our lives have become the subject of numerous studies, especially since 2020 when people started relying more and more on technology advancements due to the lockdown period imposed by Coronavirus. Various surveys have centred on the attitudes and perceptions of academic students on the use of AI-tools, yet an area to be further analysed for broader data so that the innovative technology be employed in the educational setting at its highest potential. As a result of a survey conducted in India on how students feel about the use of AI-tools in their academic and research endeavours, Panduranga Swamy, Gnanasekaran and Jain (2024) conclude that such tools are primarily used for writing research papers, reviewing literature and detecting plagiarism, encountering, at the same time, certain difficulties in the level of productivity. In another research among Romanian students on the integration of artificial intelligence in the academic educational process, Pană-Micu infers that, "the use of artificial intelligence in education is perceived as a major opportunity to modernize and streamline the learning process, but it requires responsible implementation, adequate training of teachers, and clear regulation" (Pană-Micu, 2025: 382), similar findings with another survey performed among students majoring in Aerospace and Medical Engineering from the National University of Science and Technology Politehnica, Bucharest, Romania, where the authors conclude that, "AI has become a critical component of the modern academic landscape offering significant benefits such as

personalized learning, enhanced engagement, and improved access to educational resources", yet with challenges "regarding the accuracy of AI outputs, the risk of over-dependence and the potential erosion of critical thinking skills" (Vieriu, Petrea, 2025: 10). Another study carried out among Greek social sciences students on the cognitive, emotional and behavioural dimensions of AI attitudes confirms the existence of such indicators and the value of a multidimensional measurement of attitudes towards AI (Katsantonis & Katsantonis, 2024: 1-14). A study performed in Slovenia, on 422 participants, which included statistical analyses of responses, such as Analysis of Variance, finds that students recognize the efficiency of AI, with some concerns expressed on learning quality and academic integrity, therefore emphasizing the need of a responsible integration of AI in education. At the same time, the results of the study indicate various frequencies in using AI, depending on the field of study and academic level. It's been shown that, first and final-year undergraduates use AI tools more frequently than the other students, while, in the case of the field of study, the social and natural science students use such tools more often than those majoring in humanities. (Fošner, 2024).

In a study carried out among accounting students from a university in Peru on the determinants of attitude towards the use of AI, the results indicate that, "students have a positive attitude toward AI, which significantly influences their behavioral intention to use this technology. The perception of usefulness, the entertainment associated with the use of technological tools, and the availability of facilitating conditions in their academic environment mainly explain this favorable attitude" (Hernandez-Pajares, Jara-Sarrua, Chau-Miyakavoa, 2026: 17).

Apart from the academic world, where students turn to artificial intelligence platforms for various reasons, such as assignments, research, quick answers or personalized learning experiences, the area of entertainment and spending leisure time in a fun and interactive way is also present in their lives, some apps or virtual communication tools being also based on AI, which leads to the major role this technology plays in youngsters' everyday activities. In their studies, Bhutoria (2022), Dwivedi et al. (2023), Nakshine et al. (2022) or Chan and Hu (2023) draw attention not only on the benefits of such technology but also on the drawbacks it entails, such as isolation, anxiety, digital fatigue or the impossibility to maintain a healthy balance between their personal and academic lives.

On the other hand, the integration of artificial intelligence in education also depends on teachers' perceptions to the benefits and drawbacks of this technology. Teachers' attitudes impact students' use of technology for different tasks in their educational endeavor. As a result of a quantitative and qualitative study performed among 250 teachers in the primary, secondary and higher education institutions, Shakeel, Waheed & Inam (2026) conclude that, "although teachers are aware of the possible advantages of AI, such as personalized learning, effective assessment, and adaptive feedback, they also state that they have such issues as limited training, insufficient infrastructure, and fears related to deskilling" (Shakeel et al., 2026: 363).

Yet, to be able to integrate AI technology into the academic world properly, we need to further research the topic, to analyze the attitudes of both students and teachers on the efficiency of such platforms to be used, to take into consideration the drawbacks related to inaccuracy, safety, over-dependence which might lead to serious health problems as well as issues regarding the available infrastructure in universities. Therefore, there is the need of substantial research in the matter to meet the expectations of the future.

The Case Study

The purpose of the study

The purpose of the present study is to offer valuable insights into how AI-technologies are integrated in the academic world of students, taking into consideration factors such as the frequency of using the AI tools for various reasons in their education, the platforms they are familiar with, the reliance on AI for assignments, projects or homework, the benefits and limitations of AI in education, as well as students' opinions and expectations regarding the future implementation of AI in the educational process. It is meant to be of help in the broader attempt to research this new field, yet necessary to a successful and meaningful future education. It is to be stated that the answers of the focus group are only a mere part in the general picture, yet the results could be of guidance if included into the whole effort of potentially integrating AI-tools in the educational pursuit. It offers a view on the attitudes students in engineering have towards the use of AI in education and the prospect of it becoming essential in the future.

Participants

The focus group of the present study consists of a number of 160 students, first and second year undergraduates, majoring in Electrical and Power Engineering at the University of Craiova, Romania, precisely 72 students studying Electrical Engineering and Computer Sciences, 21 in Aviation Equipment and Installations, 25 majoring in Power Engineering, and 42 students in Electromechanics.

Concerning the age of the respondents, 114 students are between 18 and 22 years old (71.25%), 20 students (12.5%) are aged 23 to 27, while 26 students (16.25%) are older than 27. The majority of students are attending university for the first time while some, either follow a second academic specialization, or already work for local or national companies, and need an academic degree to promote in their careers.

The information was gathered as a result of an in-person survey, in the form of a questionnaire that the participants received during courses. The study was conducted during the academic year 2025-2026.

Description of the questionnaire

At the beginning, information on the age of the students, their academic year, as well as their specialization is gathered for a better identification of the target group. The body of the questionnaire consists of ten structured and unstructured questions which target how frequently students use AI applications for personal, general information and for educational purposes, their opinion on the usefulness of AI platforms in education, the degree of familiarity with various AI platforms, the end they use different platforms for, as well as how much they rely on such apps for assignments or projects. At the same time, the questionnaire targets their perspectives on the benefits and limitations of using AI in education. At the end of it, students are asked to offer their predictions on the future integration of AI in the academic world to such an extent that it becomes essential in the educational process.

The majority of questions are closed-ended, offering limited response options, including multiple-choice or rating scales questions to be able to gather valuable quantitative data in a clear and easy way to interpret. Such questions are of help in pinpointing how participants perceive the use of AI in education, the platforms which are

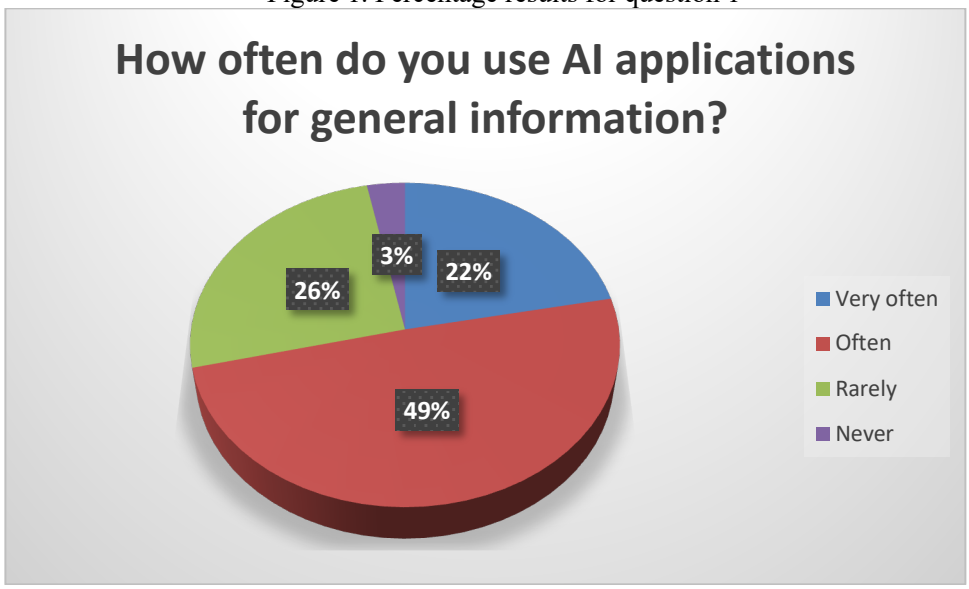
mostly used in this process, the positive and negative aspects they consider when using the AI technology.

The open-ended questions capture new ideas and insights which might not have been anticipated. They target the usefulness of AI platforms, to what purpose participants use various AI-platforms and how they see the future of AI in education. Such questions are of great help in understanding the attitudes of students towards the use of artificial intelligence in their educational development.

Presentation of main results

The first question aims at gathering data on the frequency of using AI applications for general information. It is important to grasp an idea of how often students rely on AI for daily purposes, whenever they need to find out the answer to a topic they are interested in or to seek advice on daily chores. Approximately 49.37% of respondents use AI apps to search for general information on an often basis, while a percentage of 25.62% use them on rare occasions and 21.87% very often rely on such applications. An interesting 3.13% states that they never seek help from the artificial intelligence apps. Thus, it is shown that the majority of respondents turn to AI for their general needs, a habit that is becoming more and more present in our lives.

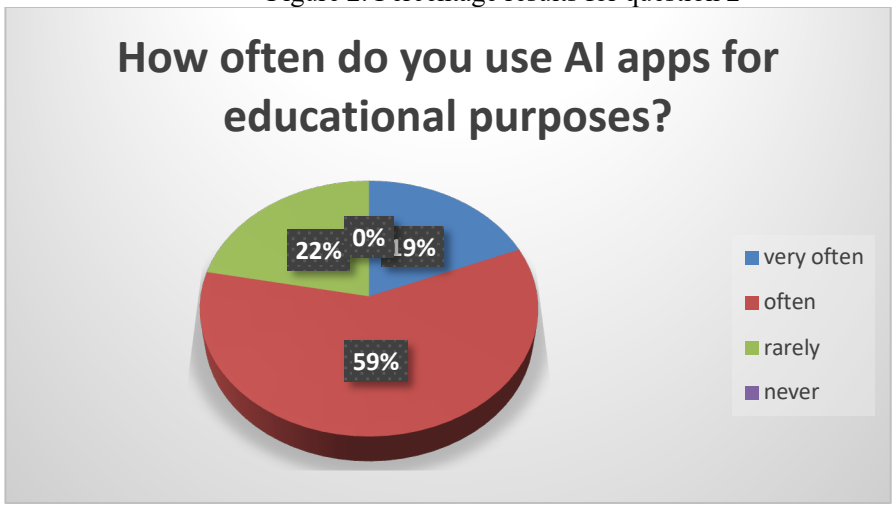
Figure 1. Percentage results for question 1



The second question refers to the transition of using AI apps from general use in respondents' daily lives to the more specific goals, in this case, the educational field. Various applications and platforms are utilized to explain more difficult concepts, correct work, organize information or provide help with math and physics equations. The frequency students use such applications is an indicator of how much they rely on them in the process of acquiring valuable information. As it is shown in Figure 2 below, most students use AI applications often (59.38%) and very often (18.75%), while only 21.87% of respondents use them rarely. Since no participant chose "never" as an option, we can easily deduct how present AI is in students' learning experience.

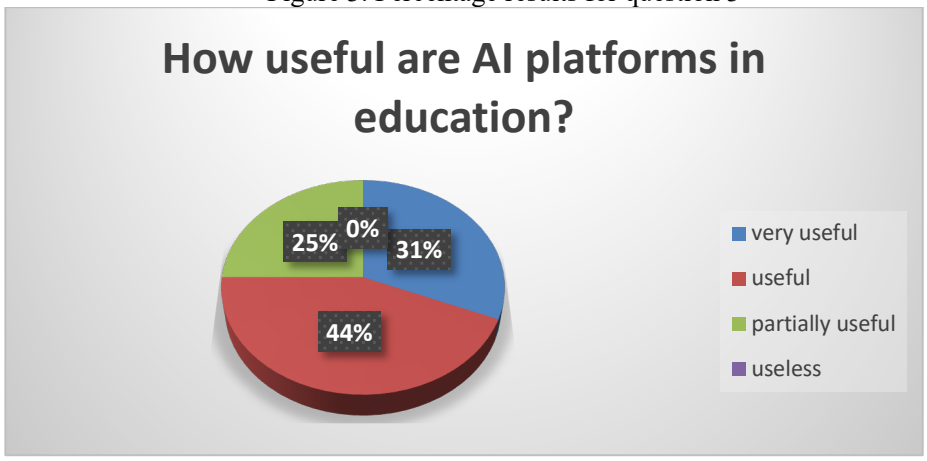
If we compare the two figures, it is easily understood that the overall percentage of using AI applications for educational purposes slightly increases than for general information. At the same time, if in the case of searching for general information, a low percentage responded that they never use AI apps, this situation is not encountered for the educational purposes. All respondents seem to resort to artificial intelligence to help them in their studies.

Figure 2. Percentage results for question 2



The next item in the questionnaire aims at finding out students' perceptions on the usefulness of AI platforms. According to their options, 43.75% find the platforms as being useful, followed by 31.25% who consider AI very useful, and a percentage of 25% who regard such platforms as being partially useful. No answers were registered for the useless option offered by the questionnaire.

Figure 3. Percentage results for question 3



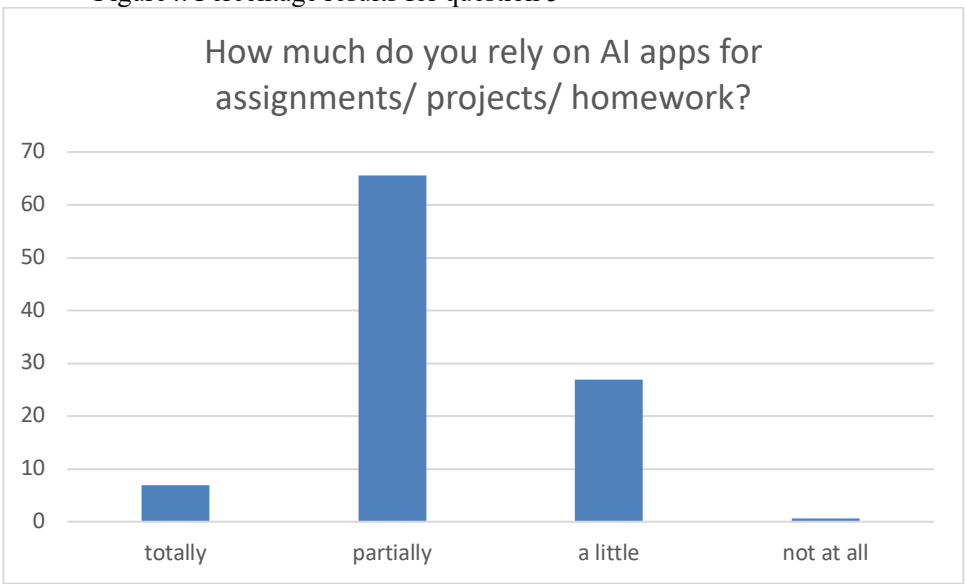
When being asked to offer reasons for their choices, the answers varied. Among those who consider the AI platforms as being both very useful and useful, the main reason expressed by the majority of students was that AI offers quick access to information and

its instant answers represent a great plus in saving time. Students prefer AI apps rather than browsing the internet or the traditional method of searching for specific information in textbooks. As one student motivates, *it's great to have knowledge at your fingertips.* Another reason mentioned by many is the fact that AI offers clear explanations in an easy way to be accessed, since *everyone has access to an expert that can break down complex topics and explain them at any level of difficulty,* or, as another student states, AI is capable *to compress large amounts of information into easier to understand chunks.* The self-directed learning benefit is also mentioned by some students, one of them saying that AI acts *like a private tutor*, while another considering that *if it's used correctly, it can become like a second teacher, available 24/7.*Other reasons mentioned by students are: instant feedback, autonomous practice, a great help with projects and assignments, the possibility to summarize long courses, even generate quizzes to test the acquired knowledge, as well as great assistance when students lack ideas and need help. On the other hand, some of the reasons mentioned by those students who find AI platforms partially useful, are: the lack of precision, incorrect answers at times, the hindering of critical thinking, or issues related to addiction and plagiarism. One student considers that *we should rely more on our thinking,* while another motivates his decision by stating that, *the usefulness of AI platforms is directly proportional to the person's knowledge in the domain he/she is studying.*

In terms of familiarity with various AI platforms (question 4), ChatGPT and Gemini come first in students' responses. Most students are very familiar with these two platforms, followed by Copilot, Claude AI, Grok and DeepSeek. A few of them expressed familiarity with platforms such as Notebook, Merlin, Meta AI, Perplexity and Jarvis. Such answers lead to the conclusion that students are aware of all the possibilities AI technology brings, switching platforms depending on their needs and preferences.

A topic of robust discussion among educators nowadays is the issue of plagiarism and lack of originality when it comes to the integration of AI tools in the educational process. Many teachers, at all levels, fear that the moment they give assignments or projects, students will not leave their mark on the topic, just ask AI tools to generate content for them, without synthetizing the received information, just copying the result and handing it to them. Such a practice hinders the thinking and evolves into unhealthy and inappropriate habits. Thus, the following question aims at investigating students' degree of reliance on AI apps for assignments, projects or homework. As a result of their options, 6.87% of students rely on such apps totally, 65.63% use AI tools partially, 26.88% a little, while only 0.62% never count on these tools for their projects.

Figure4. Percentage results for question 5



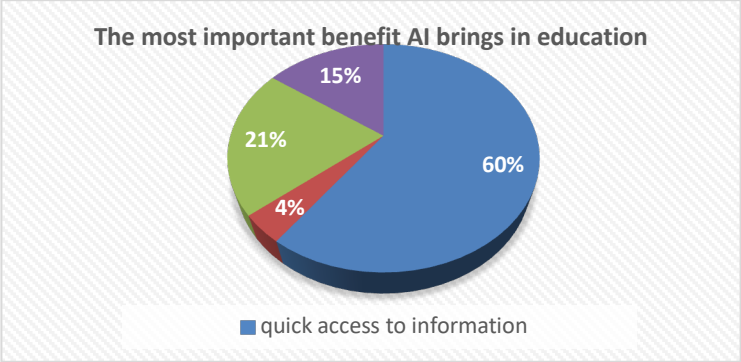
To better understand students' attitudes towards AI-tools, question number six addresses the topic of what the respondents use AI platforms for. Their habits in using specific platforms indicate the needs that AI meets for them. Students use various apps and switch them depending on their necessities. Their responses place ChatGPT and Gemini on the top of their preferences, being used regularly for different tasks. While ChatGPT is mainly used for general information and help with essays or homework, Gemini is preferred when it comes to academic research, complex math and physics equations or for diagrams in AutoCAD, graphs on Matlab, coding and debugging. Both AI platforms are used to generate images and edit photos. Students also prefer DeepSeek AI for maths and physics and Grok AI to send and generate pictures, for optimal game tips and solutions for a bug in operational systems.

The next question refers to the AI platforms used by students for foreign languages, be it to improve knowledge, learn a language for the first time, or deal with texts written in another language. The participants show familiarity with diverse chatbot platforms, Google Translate being their first preference when they need to translate a text, followed by Chat GPT. In order to practise foreign languages, students rely mainly on Duolinguo, while a few interested in improving their grammatical knowledge access Grammarly. Platforms such as Gemini and DeepL are also mentioned as being frequently used. At the same time, the respondents are not aware of what ELSA Speak tool involves.

The integration of AI in education comes with several benefits, overall enhancing the learning experience of students. As Bălănescu outlines, „ít is evident that the entire 21st century discourse on knowledge and competence is shaped by the advance of digitalisation and the myriad of learning opportunities that it offers" (Bălănescu, 2026: 8). According to the respondents (60%), the most important benefit AI brings is the quick access to information, the possibility to receive instant answers without having to search for too long to find the necessary data. 21% of students choose self-directed learning as the primary benefit of AI tools. The fact that AI platforms adjust difficulty levels so that they meet each student's learning needs, help them set goals and manage the learning

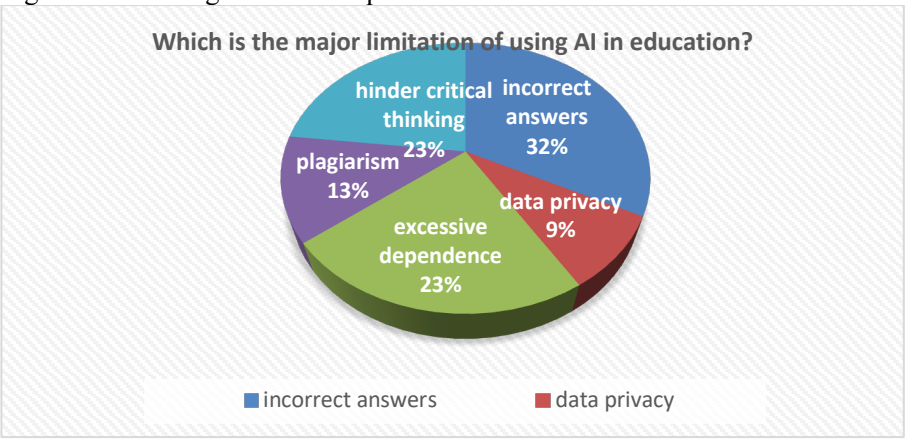
objectives, is relevant to students. Instant feedback is seen as important by 15% of students since, besides the advantage of providing a real-time response, it offers the possibility to improve on the spot. Autonomous practice, though a notable benefit that AI brings, is considered the most important by only 4% of respondents. It should be mentioned that all the options offered to students are major in discussing the benefits that AI brings in the educational setting, hence the difficulty in choosing only one option which students perceive as being 'the most important'.

Figure 5. Percentage results for question 8



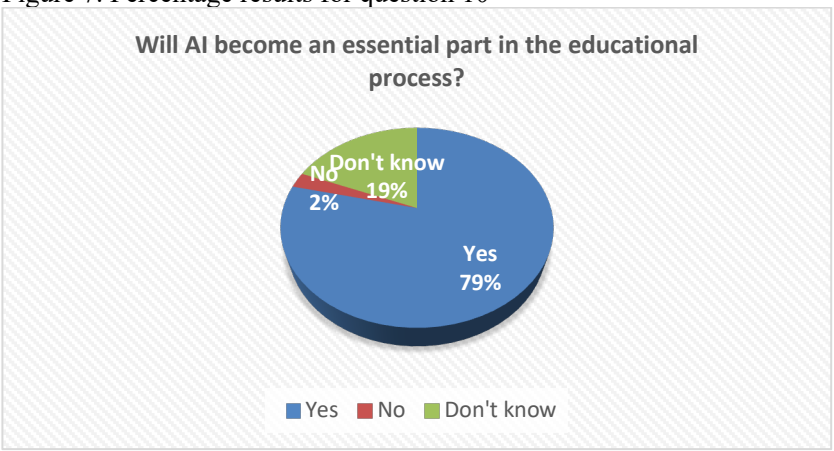
Though most people admit that AI technology improves our standard of living, giving a hand with advice and information when needed, saving precious time in search of relevant data, its use in education brings on several limitations and drawbacks. Respondents were asked to choose from several drawbacks the AI limitation which they consider as being the most important. Thus, question nine focuses on some weaknesses that AI tools might bring in the educational endeavour. The answers are balanced, yet, most students perceive incorrect answers as the primary drawback of AI (32.5%), followed by excessive dependence on a par with the hindering of critical thinking (23.12% each), while plagiarism is taken into consideration by 12.5% of the respondents. Data privacy is considered a major drawback by 8.76% of the students surveyed.

Figure 6. Percentage results for question 9



As for what future reserves and whether AI technology will become an essential part in education (question 10), the majority of responses are directed towards a positive answer. A number of 126 students (78.75%) consider that AI will be essential in the future educational systems, motivating their choice on various reasons. Most of them consider that, since it is used in several classes and projects, it has already become essential, while others are positive that, with the evolution of society as a whole, AI-tools will become better and better, therefore being more and more integrated into the educational process. Some participants perceive AI-platforms as a great support for both students and teachers and, due to the completion of various tasks, such as interactive videos, creation of flashcards, AI not only functions as a tutor but it has the potential to replace teachers in a few years. 18.75% of respondents are unsure of the possibility for AI to become essential in education. They motivate their choice based on several reasons: *it will never replace teachers; it has disadvantages especially for early-stage learners; only if it is improved and functions under clear legislation, it can turn out to be a really useful tool.* A low number of students (2.5%) consider that AI will never be essential in the education of the future. The reasons offered state that AI is unable to fulfil the tasks of teachers while the traditional ways of studying, such as specialised textbooks or reading books, are more valuable in developing the ability of acquiring knowledge. One student considers that, *the living experiences cannot ever be replicated by AI.*

Figure 7. Percentage results for question 10



Conclusions

Based on the results of the present survey, several conclusions may be drawn. The majority of students, irrespective of age, assume a favourable attitude related to the usefulness of integrating AI-tools in the educational process. The respondents use AI applications frequently, they are familiar to various platforms that they utilize and switch them depending on their needs. Chat GPT and Gemini come first in their preferences, the latter being chosen for more difficult concepts and theories. More specific to their field of study, respondents resort to AI-platforms such as Claude and Deep Seek for math equations, complex projects, programming and coding. At the same time, according to their answers, it is clear that the majority depends on the help of AI-tools for assignments

or homework, the percentage of those who try to fulfil such tasks only by themselves being extremely low.

AI offers many benefits in education by providing autonomous practice, instant feedback or self-directed learning. Yet, students perceive the quick access to information as being the most important benefit of all, saving them time and acting as a virtual assistant available whenever they need help. Yet, challenges related to excessive dependence, plagiarism, the hindering of critical thinking or data privacy should not be overlooked. Among several limitations that AI technology brings on, students find the risk of inaccurate information as being a major drawback.

Overall, the vast majority of respondents consider that AI technology will be essential in the future educational process, with only a few expressing concerns on the replacement of individual thinking. Therefore, substantial research is highly needed so that the entire educational system to really benefit from what AI has to offer. Careful planning, training for both students and teachers, the establishment of clear rules on the use of AI tools are just some prerequisites to ensure an educational approach that maximizes AI benefits while it minimizes its risks.

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Appendix

Questionnaire
The Integration of AI into the Lives of Engineering Students

Academic year: Field of study:
Age:

1. How often do you use AI applications for general information?
   Very often Rarely
   Often Never
2. How often do you use AI apps for educational purposes?

   Very often Rarely
   Often Never

3. In your opinion, how useful are AI platforms in education?
   Very useful Partially useful
   Useful Useless

   Why?
   ……
   ……
   ……
   ……
   ……
   ……

4. Which of the following platforms are you familiar with? (Number from 1 to 5; from 1 – most familiar to 5 – unfamiliar)

ChatGPT	Microsoft Copilot
Google Gemini	NotebookLM
Jarvis	*Another/other:*

5. How much do you rely on AI apps for assignments/ projects/ homework?

Totally A little
Partially Not at all

6. Give examples of AI platforms you mostly use and for what needs (e.g.: general information; research; explanation of academic theories; edit academic essays; solve math & physics equations, etc.).

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7. When it comes to foreign languages, which of the following platforms have you used? (from 1 most frequently to 5 least frequently).

Google Translate		ELSA Speak	
Duolinguo		ChatGPT	
Grammarly		Another:	

8. Which is, in your opinion, the most important benefit of using AI in education?

Quick access to information	Self-directed learning
Autonomous practice	Instant feedback
Other:	

9. Which is the major limitation of using AI in education?

Incorrect answers	Plagiarism
Data privacy	Hinder critical thinking
Excessive dependence	Other:

10. Will AI become an essential part in the educational process?
Yes

No
Don't know

Reason for your choice:

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ORIGINAL PAPER

The Impact of Artificial Intelligence on the Quality and Transparency of Corporate Reporting

Lucian Mituca[1)], Lucian Spulbar[2)]

Abstract:
The transition to the digital economy has generated an unprecedented volume of financial data, making traditional audit methods, based on statistical sampling, partially obsolete. We aim to investigate the disruptive impact of artificial intelligence (AI) technologies on corporate audit processes, analyzing how automation and machine learning algorithms recalibrate standards of accuracy and rigor.
It is important to understand that there is a shift from retrospective auditing to continuous auditing, an innovation that allows us to monitor transactions in real time. Specific AI capabilities are analyzed, such as natural language processing (NLP) for automated contract review and anomaly detection algorithms, capable of identifying fraud attempts or human errors that conventional methods might miss. By analyzing datasets, artificial intelligence manages to eliminate sampling risk, providing superior assurance on the integrity of financial statements, but as a tool used by the human factor.
We also try to address the challenges related to the implementation of these technologies. Particular attention is paid to the interpretability problem (the Black Box concept), where the complexity of algorithms can make it difficult to logically explain audit conclusions to regulators. The implications for human capital are also discussed, arguing that the role of the auditor is transforming from that of data processor to that of risk interpreter and strategic consultant.
Although artificial intelligence exponentially enhances the efficiency of corporate auditing, the success of its integration depends on the creation of a new ethical and normative framework. Thus, we argue that a synergy between human professional judgment and algorithmic precision represents the sustainable future of corporate governance, ensuring increased transparency in an increasingly complex global business environment.
Keywords: *Machine Learning, Continuous Auditing, Artificial Intelligence, Anomaly Detection.*
JEL Classification: G34, M42, O33.

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1. Introduction

AI technology has moved from a future technology into being an essential part of auditing. It is becoming an intrinsic part of the actual environment within which financial information is prepared, reviewed, analyzed and communicated to various stakeholders such as investors, regulators, creditors among others. The more businesses prepare more data that is either structured or unstructured, the greater the pressure for change that the current audit practice faces. No longer is the debate about whether technology will impact auditing; it is rather how auditors, businesses and regulators can use it without compromising professional judgment, responsibility and integrity.

Corporate reporting requires credibility. Financial reporting becomes useful based on the ability to ensure that it accurately reflects the position and performance of the entity. This is made possible through auditing that provides assurance on the information prepared by companies. However, given the complexity of the transactions, digital platforms, operations in different countries and real-time data flow within the business environment, conventional audit practices are not sufficient in being able to review all data available at the same pace as they become available. While sampling remains an important aspect of most audits, it raises the probability of missing exceptions and errors.

Artificial intelligence (AI) could have considerable influence in the field of auditing. AI-equipped tools can help auditors process vast sets of data, spot anomalies in transactions, examine journal entries, analyze unstructured data, and point out areas which require additional attention of auditors. Machine learning techniques could be used for anomaly detection and natural language processing could facilitate the examination of contracts, reports of management, accounting policies, documents of the board, and other documents which would normally take considerable effort of an auditor. These new opportunities do not imply only acceleration of some routine operations but the change in the very nature of the auditing activity, moving its focus from the verification to risk assessment, interpretation, investigation, and professional judgement.

One of the most important implications of such a shift in approach is the growing importance of the continuous auditing. Instead of the examination of evidence at the end of the reporting period, organizations will increasingly use data-based tools for monitoring which detect exceptions almost immediately after they happen. In theory, it allows getting a proactive and timely kind of assurance. This approach could help detect problems with internal controls, unusual transactions, and make the reporting process more transparent. Such a value is especially high for industries characterized by high volume of transactions, short reporting periods, and costly undetected mistakes or frauds.

The digital transformation of financial functions is not limited to the automation of accounting and reporting procedures. It is also connected to broader changes in corporate decision-making, risk management, and value creation. Spulbar and Mitrache (2023) argue that corporate finance has evolved beyond a purely technical function, becoming a strategic mechanism through which organisations allocate resources, integrate sustainability-related risks, and support long-term resilience.

Nonetheless, technological capability should not be mistaken for automatic reliability. While an AI system can identify patterns, evaluate the risk level, or issue alerts, it cannot interpret the business environment, materiality of the event, ethics, and professional ramifications of the auditor's conclusion. Anomaly does not mean misstatement, while an algorithm-generated recommendation is not sufficient evidence by itself. It is up to the auditor to assess the appropriateness of the information generated, raise questions about atypical conclusions reached, be aware of limitations of the

technology used, and make a professionally sound conclusion. In that sense, the best scenario for the future is not a situation when human auditors will be substituted by algorithms, but when both elements complement each other.

It is necessary to note that this interrelationship also carries certain risks. The quality of the AI-assisted auditing process will depend on the quality, completeness, and integrity of the source data. It will be impacted by design of the algorithm, risks of bias in it, cybersecurity measures related to the confidential information, and understanding of how the tool works on the part of the users. Black box problem is especially relevant in the case of audits since the conclusions reached need to be explainable not only to the members of the engagement team, but also to the client and audit committee, regulators, and other parties where necessary. If the auditor cannot adequately explain the reasons why the system flagged the transaction as being of high risk or why an AI-generated output affected the audit procedure performed, the use of such technology will do more harm than good.

The broader financial-services sector already demonstrates that AI can improve data-driven decision-making by supporting the interpretation of large information flows, customer insights, and more personalised service strategies. Popescu et al., (2024) examine how AI technology is reshaping marketing strategies in financial services, illustrating that the value of AI increasingly derives from its capacity to transform raw data into operationally relevant insights.

There have been changes in the regulatory regime. In Europe, the Artificial Intelligence Act creates a risk-based regime for regulating AI systems that includes transparency, human supervision, risk assessment, data management, technical documentation, accuracy, robustness, and cybersecurity of AI. Some provisions of the act have been phased in already, and others are coming into effect progressively. Although the AI tools used in auditing have to be considered in terms of their particular uses and associated risks, it is important that the principles suggested by the EU regulation are highly relevant to using the technology responsibly in the course of audits and assurances. The technological development must be paired with protective mechanisms ensuring the safety of individuals, organizations, and public interests.

Standard setters are also responding to the growing intersection between technology and assurance. Specifically, the International Auditing and Assurance Standards Board has established its Technology Position that is aimed at making sure that the auditing and assurance standards continue to be relevant in light of the rapid development of technologies. It is clear that responsible use of technology is to be ensured while maintaining the quality, integrity, and public interest nature of the audit engagement. According to the current professional literature, artificial intelligence, data analytics, automation, and cloud technologies have changed the work of an auditor, but have not made it redundant. It is important now to possess knowledge about technologies along with skepticism, ethics, and risk communication skills.

The study examines the effect of artificial intelligence on the quality and transparency of corporate reporting by virtue of its application in corporate auditing. It analyzes the possibilities for enhancing anomaly detection capabilities, expanding the reach of transaction population sampling, facilitating continuous auditing, and ensuring timely and traceable execution of audit processes. In addition, it takes into account the problems associated with explainability, data security, accountability, professional expertise, and continued human supervision.

The mixed method is used in the research. To begin with, a set of case studies involving selected documentation is studied to examine real-world applications of AI-based technologies in auditing, control, detection of fraudulent activities, and processing financial information. Then a survey and interviews of professionals who deal with auditing, accounting, financial management, internal control, and corporate reporting are conducted. Attention is given to the opinions of financial auditors, accountants, relevant professional associations' members, and financial directors of public and private enterprises. Participation in the study is voluntary, and anonymity of the respondents is protected.

Through a combination of theoretical, regulatory, and empirical approaches, this paper seeks to provide a balanced view of AI in corporate auditing. This research does not intend to portray AI as a cure-all for every problem in auditing. Instead, the intention here is to determine the situation where the use of AI would result in a significant improvement in audit quality and information disclosure. The point here is that there are situations where the application of AI will be of great benefit because the use of AI becomes valuable only when it operates under a governance system that provides reliable data, clear procedures, strong controls, ethical assurances, and clear human accountability.

2. Conceptual and Regulatory Framework for Artificial Intelligence in Corporate Auditing

The importance of artificial intelligence in auditing has increased due to the practical challenge facing the auditors as companies generate a much larger volume of data than can effectively be reviewed using the traditional manual approaches. The transactions are recorded in enterprise resource planning systems, electronic payment systems, cloud computing applications, client databases, and more complex supply chains. In this regard, the key question has shifted from the issue of the amount of available information to the way this information can be turned into meaningful and understandable audit evidence.

Artificial intelligence is an umbrella term for the suite of computational techniques allowing machines to complete tasks that traditionally involved human cognitive abilities, including pattern recognition, prediction, classification, natural language processing, and learning from the data. As claimed by Brynjolfsson and McAfee (2014), the intelligence of machines affects the economic nature of technology by augmenting the tasks requiring cognition rather than manual work. In auditing, the issue is important in that AI is not only capable of speeding up the process but also helps auditors detect connections that are invisible through other techniques.

Machine learning is one of the applications of artificial intelligence in the audit practice due to the possibility of using it to analyze historical and contemporary data and detect patterns related to normal and abnormal behavior. Unlike a process based on following a specific chain of actions, a machine learning algorithm can be used to find correlations between different variables and classify different observations depending on the level of their riskiness. According to Issa et al., (2016), AI technology can help with audit procedures because of the ability of this approach to analyze large and complicated datasets that cannot be analyzed using traditional approaches. The mentioned capabilities are very helpful in conducting journal entry tests, transactions monitoring, evaluating the risk of fraud, as well as recognizing accounting entries that need further analysis by professionals.

Natural language processing is another important application of AI in the auditing process because a significant amount of information that can be helpful for auditors is not represented in numerical form. Auditors often have to analyze various contracts, accounting policies, minutes of the meetings of the board of directors, management reports, internal communications, legal materials, and explanations to the financial statement provided by the management. Zhang (2019) shows how intelligent process automation can help audit teams extract, classify and process the information obtained from structured and unstructured sources. If used properly, NLP can help in saving time during document analysis and finding unusual clauses, contradictions, lack of information, or risky language.

The deployment of artificial intelligence makes anomaly detection more relevant in auditing. An anomaly does not imply either fraud or mistake but refers to a certain observation, transaction, pattern or relationship that deviates substantially from the expected normal state and requires further investigation. According to Appelbaum et al., (2017), through the employment of sophisticated analytics, audit teams can break free from the limited sampling since it allows performing broader transactions population analysis and identification of exceptions requiring testing. The importance of this is reflected in the statement about the possibility of better investigating of risky transactions through the application of data-driven solutions to prioritize abnormal transactions based on their amount, timing, frequency, counterparties, account combinations, and behaviors.

Additionally, the transition from periodic auditing to continuous auditing is regarded as one of the most common consequences of the advancement of technology in the field of assurance. Periodic audits typically are carried out near the end of the reporting period and may result in discovering of mistakes, deficiencies or abnormalities after they occur or affect the financial statements. Continuous auditing is described by Vasarhelyi et al, (2004) as a technologically enabled process when audit-related evaluations and controls are performed more frequently or continuously. By combining AI-assisted analytics with sound information systems and appropriate internal controls, the audit process gains timeliness and allows companies to detect potentially material exceptions sooner.

While the advantages of continuous auditing go beyond increased efficiency in terms of speed, they include, among others, improving the quality of reporting. With the ability to detect risks earlier and strengthen the audit trail for critical conclusions, continuous auditing could improve the overall integrity of reporting. According to Chan and Vasarhelyi (2018), continuous auditing may be described as the approach that helps in continuously evaluating data and controls and allows reporting the relevant exceptions within a relatively short period. In case of the corporation's stakeholders, the potential advantage consists in the creation of the more responsive assurance environment in which any deficiencies of controls or unusual activities can be explored before they become material issues in terms of reporting.

Digital transformation may also strengthen the informational foundations of corporate accountability when it is aligned with transparent governance structures and sustainability-related objectives. Spulbar et al., (2024) emphasise that the synergies between digitalisation and ESG practices can support corporate growth, responsible innovation, environmental sustainability, and regional development. In the audit context, this relationship is relevant because higher-quality data infrastructures and more transparent digital processes may create better conditions for reliable reporting, risk monitoring, and assurance activities.

However, it is important to note that the use of AI in auditing does not mean that professional auditors will cease to exist. The core value of auditing consists not only in data processing but also in demonstrating professional skepticism, considering materiality, understanding the business environment, testing the managers' explanations, and making conclusions where professionals should still take responsibility. As Spulbar and Mitrache (2025) explain, it is crucial that the use of AI should be based on the combination of human experience and technical capabilities, rather than on the idea that AI would substitute the professional activities of people. It is particularly true for the field of auditing, where an algorithm could discover the risk but would be unable to evaluate its relevance, reliability, materiality, and so forth.

Changes in the role of the auditor need to be viewed as changes in professional roles and not as displacements of roles. As the automation of data processing continues to advance, auditors can focus their efforts on identifying signs of risk, analysis of AI model output, evaluation of internal control environment, and communication with management and governance organizations. The model of AI co-piloted auditing by Gu et al. (2024) is the most appropriate in the situation because it incorporates the enhanced analytical capabilities provided by the AI while leaving human judgement crucial in the auditing process. Explainability is the key problem of using AI-supported methods of auditing.

Explainability is one of the most challenging theoretical and practical issues associated with the use of AI in audit procedures. Sophisticated machine learning models might provide very high accuracy when classifying transactions and providing other kinds of predictions but still be difficult to understand. In auditing, this problem becomes particularly acute since it would not be enough to call a conclusion valid because it was derived using some complicated algorithm. Explainable artificial intelligence is necessary for the proper performance of the audit according to Jones and Free (2026). It is impossible to rely on results of any system that has identified a transaction as an anomaly until it is clear what variables and data were used to come up with such a decision.

The black-box problem also has implications for transparency and accountability. A reporting environment cannot be considered more transparent if the systems used to analyse financial information produce outputs that no professional can adequately interpret or challenge. Spulbar (2025) observes that the broader use of AI in economic activities creates persistent legal concerns linked to responsibility, algorithmic bias, transparency, compliance, and market integrity. Within auditing, these concerns require organisations to establish clear lines of responsibility for the selection, validation, deployment, monitoring, and review of AI-supported tools. Technology may facilitate decision-making, but it should not create uncertainty regarding who remains accountable when the technology produces incomplete, misleading, or biased results.

The quality of data is equally important. AI systems are trained, configured, and operated using data; therefore, incomplete, inaccurate, outdated, biased, or poorly governed data can undermine even a technically sophisticated model. Katyal (2019) underline that accountable algorithmic systems require mechanisms capable of supporting meaningful review, validation, and contestability. In an audit setting, this means that firms should not rely on an AI tool merely because it has been acquired from a reputable provider or because it produces visually convincing outputs. They need to understand the origin of the data, the logic of the model, the limitations of its use, the mechanisms for documenting results, and the controls through which human reviewers can challenge its recommendations.

However, the regulatory environment is slowly adapting to the changes mentioned above. The Artificial Intelligence Act of the European Union, Regulation (EU) 2024/1689, sets up a risk-based system of regulation for AI systems, whose declared purpose is promoting trustworthy AI and protecting safety and fundamental rights of people. According to the European Commission (2026), the new regulation differentiates between four types of AI activities - prohibited, high-risk, transparency-risk and minimal-risk. This means that more strict regulation is applied when there is a risk that the consequences of using the AI technology will be higher for people and societies. Even though the specifics of applying any AI tool in auditing have to be taken into account in the particular context, the principles set forth in the Artificial Intelligence Act are directly applicable to auditing, as they connect technological use with risk management, data governance, documentation, traceability, transparency, human oversight, accuracy, robustness and cybersecurity.

Thus, some of the requirements for high-risk AI systems include the following: risk assessment and mitigation procedure, quality of datasets used, logging of activities for traceability, technical documentation, human oversight and high levels of accuracy, robustness and cybersecurity. As per the implementation plan, these requirements will be gradually applied starting with the rules for certain types of high-risk AI systems being introduced on 2 December 2027. However, even though an audit firm may not deal with high-risk AI tools, the above principles can be used as a standard for governance: the AI-enabled audit process has to be explainable, documented, secure, monitored and controlled.

In the context of applying AI in auditing, the General Data Protection Regulation continues to play an important role, as auditors may have access to the personal data of employees, clients, suppliers, shareholders, management and other parties related to the audit process. According to Regulation (EU) 2016/679, processing of personal data must be lawful, fair and transparent, pursued for specified, explicit and legitimate purposes, in line with the data minimisation, accuracy, storage limitation, integrity, confidentiality and accountability principles. Hence, the European Parliament and Council (2016) offer the basis for the responsible processing of data used in the AI-assisted audit process. As concerns the empirical part of the current research, these principles provide the guideline for the protection of participants' identity, their voluntary participation and informed consent, safe storage of the data collected during the research and presentation of the results in the form of aggregation or pseudonymisation.

Finally, standard-setting bodies respond to the technological revolution in audit and assurance processes. The IAASB adopted the Technology Position to make sure that the standards stay relevant and effective in light of increasing use of technologies in the auditing field. IAASB (2024) notes that the goal of this position is to facilitate and support responsible use of technology by practitioners and audit firms and to find possibilities for development of standards and non-authoritative guidance as well as monitoring technological developments. It is very important for audit innovations to be assessed not only in terms of efficiency but also quality, reliability, consistency and public interest orientation.

In regard to the Romanian professional setting, the process of adopting AI technologies in auditing is going to be conditioned by more than just the existence of the technological means. It would also rely on the ability of the financial auditors, professional accountants, finance directors, internal control professionals, and organization managers to acquire proper digital competencies and governance processes. CAFR provides its members with training and obliges them to continue developing their professional

competencies, which constitutes one of the characteristics of the institution, conducive to the adoption of innovations associated with technology. As a result, the empirical part of the research would focus on the assessment of the opportunities and limitations of AI in terms of the effect on audit quality, anomaly detection, continuous auditing, reporting quality and transparency, professional competence, data privacy, explainability, and human accountability.

In general, the theoretical and regulatory framework shows that AI can improve auditing not through the elimination of professional judgment, but through the extension of the analytical capabilities of the auditor. In other words, it can help professionals analyze large amounts of data, find the signals worth investigating, and create new opportunities for investigation. However, it would help to improve the quality and transparency of the corporate reporting only under the condition of good data, good model governance, secure technological environment, relevant professional competencies, compliance with applicable regulations, and the availability of the auditor himself who would interpret the evidence and make a final decision..

3. Research Methodology

This study uses a mixed-methods research design for exploring the consequences of artificial intelligence for corporate auditing at both organizational and professional levels. A mixed-methods design is needed since the implementation of AI technologies in auditing cannot be evaluated only on the basis of quantitative measures or on an individual perspective. Such an evaluation requires a consideration of practical application of new technologies, their pros and cons, as well as the professional reasoning behind the application of new technologies. Creswell and Plano Clark (2023) define mixed methods designs as the inclusion of both quantitative and qualitative data within the same research process so that the researcher could use the strengths of each method.

The first part of the research involves case studies based on selected documents. These cases will be chosen among reports, publications in professional literature, company disclosure reports, scientific evidence, as well as documents produced by audit firms or any other regulator. The purpose of this step is to demonstrate actual applications of AI technologies in such spheres as data analytics, anomaly detection, fraud risk assessment, document review, control, and continuous auditing. All cases will be analyzed using a unified set of analytical questions related to the AI technology being used, the area of audit or control affected, the expected advantages, the existing limitations, as well as control and accountability mechanisms.

The qualitative part will be based on a questionnaire administered online to individuals holding appropriate qualifications and experience in financial auditing, accounting, financial management, internal control, corporate reporting, risk management, and digitalization. Potential participants can include financial auditors or members of professional associations such as CAFR, CECCAR, and ACCA, as well as the finance directors or financial experts working in both public and private sector organizations. Closed-ended questions and Likert scale statements will be used to examine (a) the level of knowledge about AI, (b) its usefulness for audit practices and audit-related tools, (c) the potential influence on audit quality and transparency, and (d) the most significant barriers for implementation. Possible barriers can include lack of access to credible information, insufficient digital literacy, cost of implementation, cybersecurity issues, lack of explainability, regulation problems, and professional accountability concerns.

Statistical methods for the interpretation of quantitative data will include descriptive statistics (frequencies, percentages, means, and standard deviations). In case multi-item constructs are used, their internal consistency can be tested with the help of Cronbach's alpha coefficient. The relationship between respondents' professional background, level of AI knowledge, and perceptions of benefits and risks can be examined using non-parametric tests or Spearman correlation analysis. This study remains exploratory in nature, and therefore results obtained from statistical analyses will be interpreted carefully and will not serve as proof of general causal links.

The qualitative part will include semi-structured interviews with a reduced sample of professionals working in the fields of audit, accounting, finance, internal control, or compliance. Interviews will cover aspects that cannot be easily addressed using surveys, namely, practical constraints of AI implementation, reliability of risks signaled by artificial intelligence, the explainability of models' output, changing role of an auditor, and necessary security measures to maintain professionals' responsibility and independence. The advantage of semi-structured interviews is the combination of consistency in design required for comparison of participants and flexibility needed to allow each participant to speak about his or her experience and concerns in professional language. Analysis of the data will be based on thematic coding and will pay special attention to recurring themes such as efficiency, anomaly detection, data quality, transparency, human involvement, ethical risk, digital literacy, and regulatory compliance.

Evidence obtained from case studies, questionnaire, and interviews will be combined using triangulation. Specifically, the study will compare documentary evidence of actual usage of AI with information about it given by professionals in the questionnaire and during interviews. Such an approach will improve interpretation of the results by highlighting convergences, divergences, and context specifics. In the course of empirical research, all participants will act voluntarily and with their informed consent. No unnecessary personal or organizational information will be gathered, and participants of the interviews will be referred to using pseudonyms or generic titles. Results will be presented in aggregate form; however, all documents gathered during the research will be secured and accessible exclusively for research purposes. These precautions are compliant with the GDPR requirements related to processing of personal data for scientific research.

4. Analysis and Results

The empirical investigation combined three complementary sources of evidence: documentary case studies, an online questionnaire survey, and semi-structured interviews. This mixed-methods design was intended to provide a more comprehensive understanding of the potential contribution of artificial intelligence to audit quality and the transparency of corporate reporting. Documentary evidence was used to examine concrete applications of AI-enabled technologies, while the questionnaire captured the perceptions of professionals involved in audit-related and financial-reporting activities. The interviews were used to explore the practical conditions, professional concerns, and governance requirements that may influence the responsible adoption of AI.

The analysis includes three documentary case studies, 186 valid questionnaire responses, and 12 semi-structured interviews. The survey was distributed electronically to professionals working in financial audit, accounting, financial management, internal audit, risk management, and corporate reporting. A total of 204 questionnaires were received, of which 18 were excluded because they were substantially incomplete or did not meet the eligibility criteria. The final sample therefore comprised 186 valid responses. Interview

participants were selected to provide a diversity of professional perspectives. Furthermore, to ensure confidentiality in accordance with ethical codes and GDPR regulations, neither participant names nor company names are used; instead, all interviewees and their organizations are referred to using pseudonyms or generic titles.

Table 1. Overview of the empirical material

Data source	*Initial material*	*Included material*	*Analytical purpose*
Documentary sources	7 potential cases screened	3 case studies	To identify concrete AI applications in audit and control processes
Questionnaire survey	204 responses received	186 valid responses	To assess professional perceptions of benefits, barriers, and governance conditions
Semi-structured interviews	14 interviews initiated	12 interviews included	To explore practical experiences, conditions, and concerns in greater depth

Source: Made by the authors based on research methodology

The selected documentary cases represented three complementary areas of AI application: anomaly detection in transaction testing, natural language processing for the review of unstructured documents, and continuous monitoring of internal controls. The three sources of evidence were subsequently integrated through a triangulation process in order to identify convergent findings, contextual differences, and complementary insights.

4.1. Documentary Case-Study Findings

The first documentary case deals with a large audit and advisory firm in western Romania, namely in the city of Timisoara, that has applied machine-learning-based analytics in their journal entry testing and transaction risk assessment. The tool was designed for processing large amounts of accounting entries and for identifying observations with unusual features such as unusual posting times, account pairs never observed before, unusual user profiles, transaction value anomalies and reversal entry behavior. The main advantage stated in the case is the ability to help auditors to focus on the transactions that need professional evaluation and analysis without using traditional random or judgmental sampling.

The second documentary case is related to an AI-powered tool for analyzing contracts, policies, management reports and selected financial-reporting disclosures of an organization based in Bucharest. The tool was designed to extract the important parts of those documents, identify the terms associated with accounting risks, and highlight any anomalies or gaps that require manual review. The second case shows the potential of AI to help with the analysis of unstructured information that is often time-consuming and difficult to analyze by hand. On the other hand, this case highlights the importance of the expert review since the understanding of contractual provisions depends on the commercial, legal and materiality aspects that cannot be determined through automated analysis only.

The third documentary case relates to continuous control monitoring in a digital business environment of an organization also based in Bucharest. AI-based analytics were

used to detect unusual payments, duplicate vendor information, abnormal deviations from the approval processes and potential segregation of duties problems. The software generated the alerts for internal control and audit professionals who could review the possible anomalies. The most significant advantage of this case is the potential for transitioning from the verification of risks and controls to their continuous monitoring. However, this case also demonstrates that requires complete and standardized data and a clear escalation procedure.

Table 2. Comparative analysis of documentary case studies

Analytical dimension	***Case 1: Transaction analytics***	***Case 2: NLP document review***	***Case 3: Continuous control monitoring***
Primary AI capability	Machine learning and anomaly detection	Natural language processing	Predictive analytics and automated alerts
Audit/control area	Journal-entry testing and fraud-risk assessment	Contract and disclosure review	Internal controls and transaction monitoring
Main benefit	Prioritisation of potentially high-risk transactions	Faster review of extensive unstructured documentation	Earlier identification of control exceptions
Contribution to audit quality	Broader review of transaction populations	Improved consistency and coverage of document analysis	More timely investigation of unusual patterns
Main implementation risk	False positives and limited model explainability	Contextual misunderstanding of textual information	Data integration, alert fatigue, and cybersecurity
Human oversight mechanism	Auditor validates flagged transactions	Auditor or legal/accounting specialist reviews clauses	Control owner and auditor assess alerts and corrective action
Governance requirement	Model documentation and audit trail	Transparency of extraction and classification criteria	Data governance, access controls, and escalation protocols

Source: Made by the authors based on research methodology

The comparative assessment suggests that AI creates value at different stages of the audit and control process. Machine learning appears particularly relevant for identifying unusual transactions within large datasets, NLP supports the examination of textual evidence, while continuous monitoring can improve the timeliness of control-related information. Across all three cases, however, the main conclusion is consistent: AI contributes to audit quality when it helps professionals focus their attention more

effectively, but it does not eliminate the need for professional judgement, adequate documentation, or clear responsibility.

4.2. Questionnaire Results

The output of the questionnaire presents a picture of professionals' perception of the prospects and limitations of AI-assisted auditing. The total number of 186 respondents involved in the study included the highest number of financial auditors, then accountants, and finally finance managers. The sample also consisted of professionals working in areas such as internal auditing, risk management, controls, consulting, and digital transformation. The majority of respondents had more than five years of professional experience, which means that the data present perceptions of people with significant practical knowledge of accounting/auditing/financial management/related procedures.

Table 3. Respondent profile

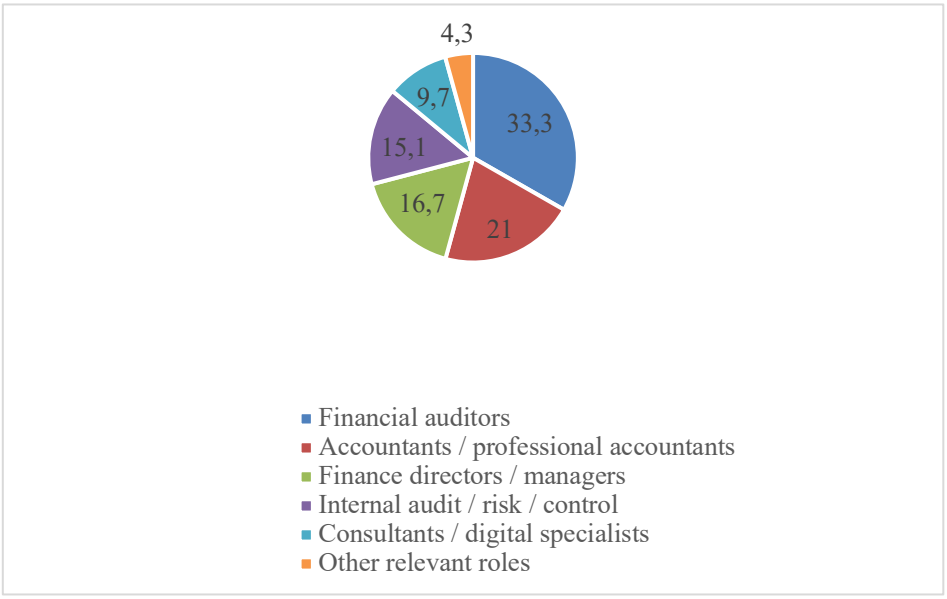
Variable	*Category*	*Frequency*	*Percentage*
Professional role	Financial auditor	62	33.3
	Accountant / professional accountant	39	21.0
	Finance director / finance manager	31	16.7
	Internal audit, risk, or control professional	28	15.1
	Consultant / digital transformation specialist	18	9.7
	Other relevant role	8	4.3
Sector	Private sector	112	60.2
	Public sector	47	25.3
	Both public and private sector	27	14.5
Professional experience	Under 5 years	24	12.9
	5–10 years	52	28.0
	11–15 years	46	24.7
	More than 15 years	64	34.4
Familiarity with AI	Very low or low	29	15.6
	Moderate	71	38.2
	High or very high	86	46.2
Current use of AI	No current use	37	19.9
	Exploratory or experimental use	61	32.8
	Limited operational use	53	28.5
	Regular or advanced use	35	18.8

Source: Made by the authors based on research methodology

From the results, it can be seen that although knowledge of AI was rather common, the use of AI at a high level was not that common among organizations. This can be seen by the fact that 18.8% of those interviewed had regular or advanced use of AI technology in their organization, compared to the 32.8% who felt that their organizations

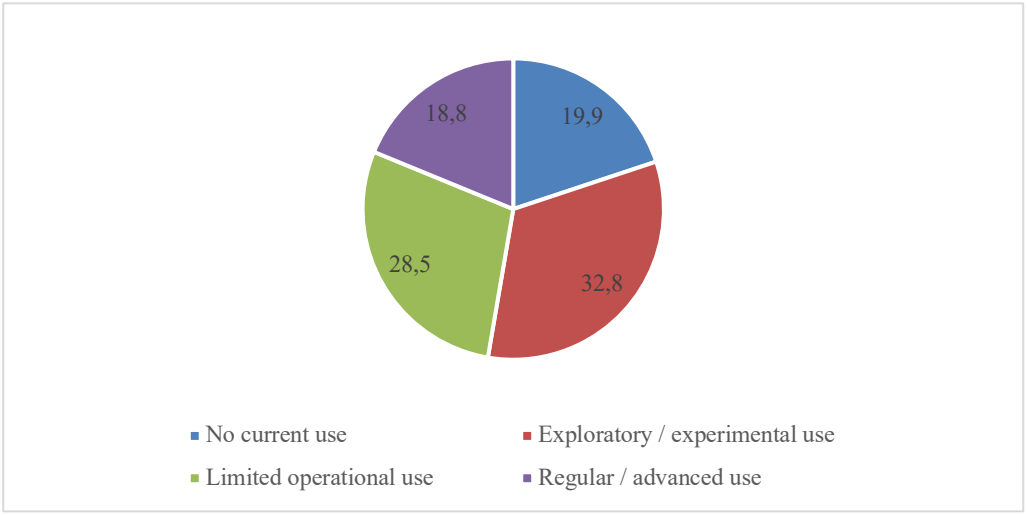
were still in a trial stage. This indicates that although the professional knowledge of AI is increasing faster than AI adoption.

Figure 1. Distribution of respondents by professional role (%)



Source: Made by the authors based on research methodology

Figure 2. Current organisational use of AI (%)



Source: Made by the authors based on research methodology

However, the results suggest an overall positive evaluation of the use of artificial intelligence as a technology which may improve the quality of audits, their efficiency, and the transparency of reporting. The most substantial level of consensus was reached concerning the ability of AI to increase the chances of detecting anomalies and suspicious

cases, then comes the belief in its ability to reduce the time spent on performing repetitive tasks. Also, there is an overwhelming level of consensus concerning the ability of AI to perform a comprehensive analysis of transactions.

Table 4. Perceived benefits of AI in auditing

Code	*Statement*	*Mean*	*Standard deviation*	*Agreement rate (%)*	*Rank*
BEN1	AI can improve the identification of unusual transactions and potential anomalies.	4.38	0.71	87.6	1
BEN2	AI can reduce the time required for repetitive audit procedures.	4.29	0.76	84.9	2
BEN3	AI can enable broader examination of transaction populations than traditional sampling methods.	4.21	0.80	81.7	3
BEN4	AI can support more timely audit procedures and continuous monitoring.	4.16	0.82	79.6	4
BEN5	AI can improve the transparency and traceability of corporate reporting processes.	4.02	0.86	74.7	5

Source: Made by the authors based on research methodology

The composite score for the perceived-benefits scale was 4.21, indicating a high level of overall agreement. The internal consistency of the five-item scale was good, with a Cronbach's alpha coefficient of 0.86. This value suggests that the items measured a coherent construct related to the expected contribution of AI to auditing and reporting processes.

Table 5. Reliability analysis of the questionnaire constructs

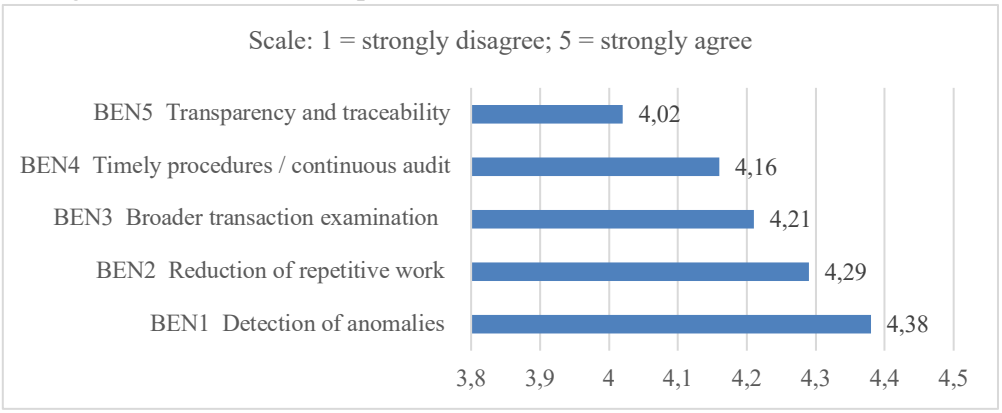
Construct	*Number of items*	*Cronbach's alpha*	*Interpretation*
Perceived AI benefits	5	0.86	Good internal consistency
Perceived risks and barriers	5	0.82	Good internal consistency
Human oversight and governance	5	0.89	Good internal consistency

Source: Made by the authors based on research methodology

The findings support the proposition that professionals perceive AI not primarily as a replacement for audit work, but as an analytical tool that can improve the capacity to

identify exceptions, process large data volumes, and focus audit effort on higher-risk areas. The results are particularly relevant for the transition towards continuous auditing, as respondents recognised the potential of AI to provide more timely information and to support ongoing monitoring of transactions and controls.

Figure 3. Mean scores for perceived benefits of AI



Source: Made by the authors based on research methodology

While the participants recognized the benefits that come with AI, they also highlighted various worries pertaining to the requirements for the proper use of AI. The highest average rating was obtained on the requirement that involved evaluating the outputs generated by AI through the professional judgement of experts. Other requirements highlighted were explainability, quality of data, cybersecurity, and appropriate governance.

Table 6. Perceived risks and barriers

Code	*Statement*	*Mean*	*Standard deviation*	*Agreement rate (%)*	*Rank*
RISK 1	Limited data quality and data availability may reduce the reliability of AI-supported audit procedures.	4.31	0.73	85.5	1
RISK 2	The lack of explainability of AI outputs may limit their use in audit engagements.	4.27	0.78	83.9	2
RISK 3	Cybersecurity and confidentiality concerns represent major barriers to AI adoption in auditing.	4.19	0.82	79.0	3
RISK 5	Insufficient digital skills may hinder the effective use of AI in auditing.	4.12	0.85	76.9	4
RISK 4	Implementation and integration costs may limit adoption, particularly in smaller organisations.	3.94	0.91	68.8	5

Source: Made by the authors based on research methodology

The results demonstrate that respondents did not perceive AI adoption as a purely technical matter. Instead, the ability to obtain reliable data, understand AI-generated outputs, protect confidential information, and develop relevant skills appeared to be central

to the practical value of AI. The composite score for the perceived-risks-and-barriers scale was 4.17, while Cronbach's alpha was 0.82, indicating good internal consistency.

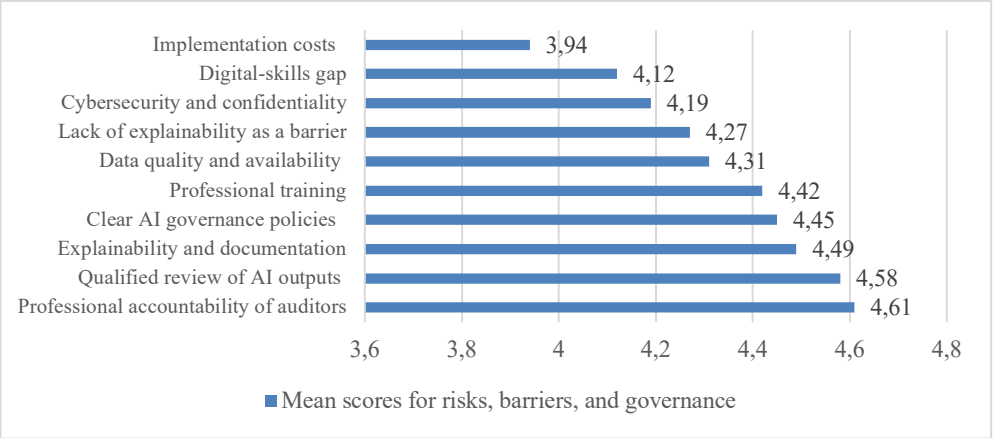
Table 7. Human oversight and governance conditions

Code	*Statement*	*Mean*	*Standard deviation*	*Agreement rate (%)*	*Rank*
GOV1	AI-generated alerts and recommendations should be reviewed by a qualified professional before audit decisions are made.	4.58	0.61	93.5	2
GOV2	Auditors should remain professionally accountable for conclusions reached with AI-supported tools.	4.61	0.58	94.6	1
GOV3	AI-supported audit procedures should be sufficiently explainable and documented.	4.49	0.65	90.9	3
GOV4	Organisations should establish clear policies for governance and monitoring of AI tools used in audit activities.	4.45	0.68	89.2	4
GOV5	Professional training in AI, data analytics, and digital ethics should become a priority.	4.42	0.70	88.7	5

Source: Made by the authors based on research methodology

The human-oversight-and-governance scale recorded the highest composite score, at 4.51, and the highest reliability coefficient, with Cronbach's alpha equal to 0.89. This result is important because it shows that the favourable attitude towards AI does not imply an acceptance of fully autonomous audit decision-making. On the contrary, the respondents strongly supported a human-in-the-loop approach in which AI assists the audit process, while qualified professionals remain responsible for reviewing evidence, interpreting results, and forming final conclusions.

Figure 4. Mean scores for risks, barriers, and governance



Source: Made by the authors based on research methodology

Spearman correlation analysis was used to explore whether familiarity with AI and current AI use were associated with respondents' perceptions of its benefits, risks, and governance requirements. The findings indicate a positive and statistically significant association between AI familiarity and perceived AI benefits. Respondents who reported a higher level of familiarity with AI were more likely to recognise its potential to improve anomaly detection, support broader transaction analysis, reduce repetitive work, and enable more timely audit procedures.

Table 8. Spearman correlations between AI exposure and perceptions

Variable pair	*Spearman's ρ*	*p-value*	*Interpretation*
AI familiarity – perceived AI benefits	0.46	<0.001	Moderate positive association
Current AI use – perceived AI benefits	0.41	<0.001	Moderate positive association
AI familiarity – perceived risks and barriers	0.24	0.001	Weak positive association
Current AI use – human oversight and governance	0.29	<0.001	Weak-to-moderate positive association
Professional experience – perceived risks and barriers	0.18	0.014	Weak positive association

Source: Made by the authors based on research methodology

The positive association between AI familiarity and perceived benefits should not be interpreted as proof that familiarity causes favourable perceptions. Nevertheless, it suggests that professionals who have greater exposure to AI may be better able to recognise both its practical opportunities and its limitations. The positive association between AI familiarity and perceived risks is also meaningful: more informed respondents did not appear to be uncritically optimistic. Instead, they were more likely to acknowledge the importance of data quality, explainability, cybersecurity, and appropriate governance.

A Kruskal–Wallis test was conducted to examine whether perceived AI benefits differed across the main professional categories. The results suggest that the differences between groups were statistically significant, $H(4) = 11.27$, $p = 0.024$. Finance directors and digital-transformation specialists reported slightly higher perceived-benefit scores than the other groups, whereas accountants reported the most cautious evaluations. However, all professional groups recorded composite scores above the neutral point of the scale, indicating broadly positive perceptions across the sample.

Table 9. Perceived AI benefits by professional role

Professional category	*Mean rank*	*Median composite benefit score*
Financial auditors	94.2	4.20
Accountants / professional accountants	78.6	4.00
Finance directors / managers	108.7	4.40
Internal audit, risk, or control professionals	95.5	4.20
Consultants / digital-transformation specialists	115.3	4.50

Source: Made by the authors based on research methodology

Such disparities in professional categories can be attributed to the unique responsibilities and exposure of each profession. The finance directors and experts in digital transformation are likely to have more direct involvement with decision-making concerning investments in data infrastructures and automation technology while accountants may be more concerned about the integrity and consistency of financial data. Financial auditors and controllers find themselves in a middle ground between having good expectations for analytics and strong concerns for validation and documentation.

4.3. Interview Findings

Themes that emerged from the thematic analysis of twelve semi-structured interviews included the following: (1) efficiency improvement and analytical support through the use of AI technology; (2) anomaly detection and monitoring; (3) data quality, security and confidentiality; (4) explainability and professionalism; and (5) skillset, governance and readiness.

Table 10. Interview themes

Theme	*Interpretation*	*Frequency*
AI as efficiency and analytical support	AI is viewed as useful for automating repetitive work and directing attention to exceptions	11 of 12 participants
Anomaly detection and continuous monitoring	AI can improve prioritisation and timeliness, but alerts require contextual review	10 of 12 participants
Data quality, security, and confidentiality	Poor data and confidential information are considered major constraints	9 of 12 participants

Explainability and professional accountability	Auditors must understand, challenge, and remain accountable for AI-assisted outputs	12 of 12 participants
Skills, governance, and organisational readiness	Training, governance policies, and infrastructure are needed for responsible adoption	11 of 12 participants

Source: Made by the authors based on research methodology

Theme 1 deals with the ability of AI to increase efficiency and improve focus of analysis. Generally, participants did not see AI as something that could replace professional work. Instead, participants viewed AI as a tool for decreasing repetitive processing of information, organization of large datasets, and enabling professionals to pay attention to transactions or documents that need more scrutiny. As demonstrated in the interviews, an auditor highlighted the following value in using AI: *The biggest benefit is not that the system makes decisions for us; it is that it makes it easier to reduce the time spent figuring out where the risk really lies.* (Participant P03, financial auditor).

Theme 2 focuses on the issue of anomaly detection and continuous monitoring. Participants saw the value of AI in being able to find out transactions that diverge from the expected pattern and allow for faster monitoring of controls. However, participants stressed at all times that alert does not mean fraud or misstatement. As it was noted by one of the participants: *Unusual transaction is a trigger for investigating the transaction, not evidence of fraud.* (Participant P08, internal-control professional).

Theme 3 relates to issues of data quality, cybersecurity, and confidentiality. Participants agreed that the effectiveness of AI is dependent on the quality of source data. Besides, participants mentioned that auditors deal with commercially sensitive and personal information. One of the participants noted the following: *Before talking about fancy algorithm we should ensure that the data are complete, proper, authorised and protected.* (Participant P05, finance manager). This result proves the hypothesis of the paper that introduction of AI technologies requires proper data management practices and information security procedures to be introduced.

Theme 4 of explainability and professional accountability appeared to be the most emphasized issue in the interviews. Participants agreed that AI-supported output should be sufficiently clear to enable the auditor to understand what triggered the alert and recommendation. As it was said by one of the audit professionals: *I can use tool for making decision only if I am able to explain the rationale behind the decision and my actions.* (Participant P11, senior auditor). It can be seen that this result is consistent with the findings of the survey that showed very high agreement in relation to human review and continuing professional responsibility.

Theme 5 is about skills, governance and organizational readiness. Participants noted that effective adoption of AI is not simply a matter of acquiring or developing technology. Professionals have to possess necessary skills to interpret data, identify limitations of AI, critically assess output of the tool and apply ethical and regulatory standards. It is how one of the participants expressed this necessity: *The future auditor should know not only financial logic of the transaction but also digital logic of the tool that analyses it.* (Participant P02, accounting and compliance specialist). The above mentioned statement implies that artificial intelligence and data analytics, information security and digital ethics should become the subject of educational programs and further professional training of the specialists.

5. Conclusions

This study examined the potential contribution of artificial intelligence to corporate auditing and, consequently, to the quality and transparency of corporate reporting. The analysis indicates that AI should not be understood merely as a tool for accelerating routine tasks. Its more significant contribution lies in extending the auditor's analytical capacity: processing larger volumes of information, identifying unusual transactions, supporting the review of unstructured documentation, and enabling more timely monitoring of risks and internal controls.

The documentary case studies illustrated that machine learning, anomaly-detection techniques, natural language processing, and continuous-monitoring tools may be applied at different stages of audit and control processes. These technologies can help professionals direct attention towards transactions, documents, and control exceptions that require deeper examination. Their value is therefore linked to improved prioritisation and broader analytical coverage, rather than to the replacement of audit procedures or the automatic generation of reliable audit conclusions.

The survey results showed a generally positive perception of AI among among the surveyed professionals. Respondents particularly recognised its potential to improve anomaly detection, reduce time spent on repetitive procedures, extend the examination of transaction populations, and support more timely audit activities. At the same time, the analysis revealed that familiarity with AI was associated not only with stronger recognition of its benefits, but also with greater awareness of the risks connected to data quality, explainability, cybersecurity, and implementation complexity.

The interview-based analysis reinforced the idea that AI-generated outputs must be treated as decision-support signals rather than as final conclusions. Professionals may use AI to identify where attention should be directed, but they must still evaluate the business context, reliability of evidence, materiality of the issue, and plausibility of management explanations. This finding confirms that professional scepticism, ethical reasoning, and informed judgement remain essential to the public-interest role of the auditor.

A central conclusion of the study is that the responsible adoption of AI requires a clear human-in-the-loop governance model. Auditors must retain responsibility for conclusions reached through AI-supported procedures, while organisations need transparent policies for model selection, data management, validation, documentation, monitoring, and escalation. This conclusion is consistent with the European approach to trustworthy AI, which emphasises human oversight, privacy and data governance, technical robustness, transparency, and accountability.

The regulatory and professional framework is therefore not an external constraint on technological innovation; it is a necessary condition for making AI useful and credible in audit practice. The IAASB's Technology Position similarly recognises that audit and assurance standards need to evolve alongside technological change, while preserving their effectiveness, relevance, and public-interest purpose. In practice, AI adoption should be accompanied by secure data infrastructure, reliable audit trails, appropriate cybersecurity measures, explainable outputs, and professionals who possess both accounting knowledge and digital competence.

The study supports the view that artificial intelligence can strengthen corporate auditing when it is used as an instrument of professional augmentation rather than professional substitution. The future of auditing is unlikely to be defined by a choice

between human expertise and algorithmic capability. Instead, it will depend on their responsible integration: AI can provide speed, scale, and pattern-recognition capacity, while auditors provide scepticism, contextual understanding, ethical responsibility, and accountable judgement.

Authors' Contributions:
The authors contributed equally to this work.

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ORIGINAL PAPER

Florin Şerban's Cinematic Perspective

Simber Atay[1)]

Abstract
Florin Şerban is a prominent contemporary film director and a leading figure of the Romanian New Wave Cinema. He has achieved international success with his films.
Throughout his career, Florin Şerban has moved from humanist observations of Romanian society to hermeneutic interpretations of love, then challenged classic theater with his postmodern thriller adaptation of Hamlet, creating one of the most original discourses in contemporary cinema.
If I Want to Whistle, I Whistle (2010), and Box (2015) are social-realist films. Love 1: Dog (2018) and Love 2: America (2020) are philosophical and poetic love stories. Meanwhile, Hamlet (2024) is an experimental horror film.
These films also trace the Freudian Oedipus Complex, the Foucauldian Oedipus Complex, and Deleuzian & Guattarian anti-Oedipus interpretations.
With his philosophical background and cinematographic style, Şerban represents the director-philosopher cinema.
Cinema and philosophy advance in tandem; however, certain directors create a distinct category of cinema through their unique rhetoric on existentialist research into meaning.
This study aims to characterize Florin Şerban's cinema, determine the meaning and significance of the Oedipus story for his films and cinema more broadly, and explain the features of the Director-Philosopher's Cinema using a descriptive method.

Key words: *Florin Şerban, If I Want to Whistle, I Whistle (2010), Love 1: Dog (2018), Love 2. America (2020), Chora, Oedipus, The Director- Philosopher's Cinema*

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Introduction

Florin Șerban (b. 1975) studied philosophy, hermeneutics, and cultural theory in Transylvania, and film directing at the Academy of Drama and Film in Bucharest, then continued his studies at Columbia University in New York, where he graduated in 2008. He is a Romanian New Wave Cinema director and represents the contemporary director-philosopher's cinema. His films have received numerous international nominations and won many awards.

This article examines five of his films—If I Want to Whistle, I Whistle (2010), Box (2015), Love 1: Dog (2018), Love 2: America (2020), and Hamlet (2024).

By the time this study is completed, Șerban's latest film, Nu e locul tau aici (You Don't Belong Here, 2026), will have been released and won the Golden Leopard for Best Film at the 2026 Locarno Film Festival. Therefore, unfortunately, it could not be included in the text.

Șerban's poetics presents an eclectic panorama incorporating elements of social realism, hermeneutics, and postmodern experimentalism. Consequently, a fertile ground for analysis emerges, encompassing Freudian psychoanalysis, Foucauldian analyses of power, the Deleuzian-Guattarian structures of Anti-Oedipus, and, ultimately, Bellour's Oedipian narrative of cinema.

The essay also discusses themes such as love, desire, power, the representation of social micro-power, social inadequacy, freedom, existential uncertainty, and the human-nature relationship, incorporating contemplative, intuitive, political, naturalist, and transgressive dimensions.

Thus, Șerban's Romanian stories become clear signifiers of the 21st-century Zeitgeist.

If I Want to Whistle, I Whistle (Eu când vreau să fluier, fluier, 2010)

Just before he is released from juvenile detention, Silviu learns from his younger brother that their mother has returned home. She has found a job in Italy and wants to take him with her. But her mother is a woman who creates trauma in her children's lives with her lifestyle. Meanwhile, Silviu also develops an interest in Ana, an intern at the prison. Then, Silviu struggles to stop his mother, risking losing his freedom again.

Despite his disadvantaged and socially marginalized position, Silviu wages a powerful internal struggle against all odds through his stubbornness and determination, ultimately achieving his goal of protecting his brother. In this context, the film's title is significant; it represents the protagonist's existential motto. If "If I Want to Whistle, I Whistle" is taken as a fundamental principle, then any endeavor stemming from it will succeed, whatever the cost.

It could be argued that this social realist film also contains a particular interpretation of the classical Oedipal complex; Foucault (1974) defines Oedipus as follows: So I answer you in Deleuzian terms—and here I am entirely Deleuzian—that this is absolutely not a fundamental structure of human existence, but a certain type of *contrainte,* a certain power relation that society, the family, political power, etc., establish over individuals".

In this context, although not in a special dramatic sense, the detention center institutionally represents patriarchal authority, political power, and eventual oppression; at this point, Silviu himself assumes a personalized Oedipal authority for a while to protect his brother from their mother. Thus, he copes with the entire system by staying within its interior.

Director: Florin Șerban; Script: Cătălin Mitulescu, Florin Șerban, Andreea Valean; Cinematography: Marius Panduru; Editing: Sorin Baican; Producer: Cătălin Mitulescu, Daniel Mitulescu; Cast: George Pistereanu (Silviu), Clara Voda (Mother), Marian Bratu (Brother), Ada Condeescu (Ana), Mihai Constantin (Penitentiary Director).

If I Want to Whistle, I Whiste won, Berlin International Film Festival 2010 Silver Berlin Bear Jury Grand Prix; 2010 Alfred Bauer Award; Cleveland International Film Festival 2011 Best Film Best Central & Eastern European Feature Film; Santa Barbara International Film Festival 2011 Jury Award Best Eastern Bloc; Zlín International Film Festival for Children and Youth 2010 Best European Debut Film European Debuts Competition; Transylvania International Film Festival 2010 Best Romanian Film Best Romanian Feature Film; Annonay International Festival of First Films 2011 Grand Jury Prize; Medias Central European Film Festival 7+1 2011 MECEFF Jury Award Best (https://www.imdb.com/it/name/nm2758521/awards/).

Box (Box, 2015)

Cristina is a theater artist in her thirties with a boring marriage. Alongside her stage work, she teaches dance to children. Rafael is a young boxer who works at a car wash. Both belong to minority groups. Cristina is Hungarian and Rafael is Romani. In fact, their lives are like two wings of a butterfly. Meanwhile, Rafael becomes obsessively in love with Cristina and occasionally follows her around the city.

On the other hand, Cristina's husband, the theatre director, box office manager, and organizer, each represents a form of micro-power. Yet, despite their ceaseless toil and struggle, Cristina and Rafael are both demoralized. Their status as a minority adds further layers of complexity to this repressive and unjust environment.

According to Deleuze & Guattari (2009): "Oedipus is like the labyrinth; you only get out by re-entering it -or by making someone else enter it. Oedipus as either problem or solution is the two ends of a ligature that cuts off all desiring-production" (p.79). When tracing this metaphorical expression in the film, the following variation could be proposed: Oedipus is like the labyrinth or the boxing ring. Then, finally, Cristina responds to Rafael's love. Their desire signifies not only sexual attraction or solidarity between two people, but it's also a meta-Oedipal silent challenge, despite the difficult conditions and limitations.

Director: Florin Șerban; Script: Florin Șerban; Cinematography: Marius Panduru; Editing: Eugen Kelemen; Producer: Florin Șerban; Cast: Rafael Florea (Rafael), Hilda Péter (Cristina)

The film Box won the FIPRESCI Prize at the 2015 50th Karlovy Vary International Film Festival (https://www.imdb.com/it/name/nm2758521/awards/).

Love 1: Dog (2018) (Dragoste 1: Câine, 2018)

Simion is a lonely middle-aged man who lives in an isolated mountain cabin in the middle of the forest with his dog. One day, while wandering in the forest, he finds a wounded young woman named Irina. Then he carries her to the cabin; he treats her injuries but forbids her from leaving the cabin. Bizarrely, he falls in love with her over time. They truly started living together. One day, Simion killed a man who was pursuing her. In doing so, he saved Irina's life and secured her freedom in the future. In the end, Irina leaves, and he is alone again.

Simion's desire for, and control over, Irina in the intimate setting of the mountain cabin reflects a pre-Oedipal schema of dependency. He acts as both a caring mother figure

and an authoritarian father figure. On the other hand, Simion both desires and tries to suppress that desire; from a Deleuzian &Guattarian perspective, the desiring-machine and Oedipus confront each other. "Desiring-machines establish the non-Oedipal life of the unconscious" (2017, p.558). "What defines desiring-machines is precisely their capacity to form an unlimited number of connections in every sense and in every direction" (2017, p.559). Deleuze & Guattari define "desiring-machines" by examining the works of avant-garde artists—such as Victor Brauner, Marcel Duchamp, Fernand Léger, and Pablo Picasso—that are based on machine forms. This formation indicates "*machinic repetition against the Oedipal design*" (p. 560). Nevertheless, the desiring machines need the Oedipus factor to function. However, the Oedipus factor categorizes desire and turns it into a pretext for controlling people and the social system. "*Oedipus is the entropy of the desiring machine*" (2017, p. 561). But the film's real protagonist is nature itself; Simion, Irina, a few others, and the dog are simply elements of nature, like trees, rocks, and animals. Amidst the forest's vastness, Simion becomes a desiring-machine, and desire is experienced as an intact intensity with Irina. This interpretation finds a symmetrical counterpart in the film's cinematography, reminiscent of Caspar David Friedrich's Romantic style, with tiny human figures immersed in nature or identified with it.

Director: Florin Șerban; Script: Florin Șerban; Cinematography: Marcin Koszalka; Editing: Florin Șerban; Production: Oana Iancu, Florentina Onea, Florin Șerban; Cast: Simion (Valeriu Andriutã), Vitalie Bantas (Gheorghe), Hritcu Florin (Mircea)

Love 1: Dog won the Sarajevo Film Festival 2018 C.I.C.A.E. Award Best Film; 2018 Cineuropa Award Best Film (https://www.imdb.com/it/name/nm2758521/awards/).

Love 2. America (Dragoste 2. America, 2020)

This movie follows two lovers, Anton and Beatrice, over the final twenty-four hours they spend in an old house deep in the forest. He leaves for America the next day, and she returns to her husband. Their love story has already turned into an impossible relationship.

The film begins with a quote from Saint Augustine: "Love first and do whatever you please. For the soul trained in love will do nothing wrong". The film then continues with images from Leonardo da Vinci's codices. The film consists of four sequences: Andante, Tango, Zohar, Leda. Throughout the film, reality, fantasy, and memory intertwine, blurring their boundaries through an Alain Resnais-style contemplative aesthetic.

Deleuze (1989) describes the Alain Resnais style: "Typically, the present begins to waver, seized by uncertainty, scattered amidst the comings and goings of the characters or already absorbed by the past" (p. 132).

Consequently, the love story between Anton and Beatrice is mapped out in philosophical terms.

Andante is the film's narrative rhythm. Tango is the film's passionate and intense narration. Zohar is the hermeneutic dimension of love; as a word, Zohar (זֹהַר) means splendor, and as a book, it "encompasses all the spiritual states that individuals will experience as their souls evolve" (n.a. n.d.). It's "a pseudepigraphic work which pretends to be a revelation from God communicated through R. Simeon ben Yoḥai to the latter's select disciples. Under the form of a commentary on the Pentateuch, written partly in Aramaic and partly in Hebrew, it contains a complete cabalistic theosophy, treating of the nature of God, the cosmogony and cosmology of the universe, the soul, sin, redemption,

good, evil, etc. It first appeared in Spain in the thirteenth century" (Jacobs & Broydé). In an Eleusinian Approach framework, Leda is a mythological figure who illustrates the continuously changing, transformative roles of man and woman in a romantic relationship.

In this regard, one might define the act of interpreting and labeling a contemporary phenomenon across any field by drawing on classical mythology, art, or literature as the "Eleusinian Approach". This approach traces its origins to the Eleusinian Mysteries, celebrated in the ancient Greek world; the three phases associated with this cult represent fundamental components of our civilization: deiknymenon (things shown), dromenon (things done), and legomenon (things said). While he may not have used this specific term, Jan Assmann (1995, p. 131) points to the comprehensive vision this framework encompasses.

The film's title includes "America", and the America associated with freedom and new beginnings, as cliché, is absent in the film, like Carlos Reygadas' Japón (2002);

The film is set in Mexico, yet its title is simply Japón. This is a kind of paradoxical "Ceci n'est pas une pipe" phenomenon. The phrase "Ceci n'est pas une pipe" appears as a calligraphic compositional element in René Magritte's painting La trahison des images (The Treachery of Images) (1929). It depicts a pipe, and the inscription "Ceci n'est pas une pipe /This Is Not a Pipe" appears beneath the image within the painting itself. According to Foucault (1983): "On the one hand, overhead, the polished, silent, visible shape, on whose proud and disdainful evidence the text is allowed to say whatever it pleases. On the other hand, below, the text, displayed according to its intrinsic law, affirms its own autonomy regarding what it names" (p.25). Here, the calligraphic pipe displaces the visualized pipe, creating an atmosphere of ostranenie (defamiliarization). In Reygadas's case, the film's title bears no relation to the film itself. Similarly, in Șerban's film, America remains merely a matter of the title; there is no common denominator like the pipe. Nevertheless, the discrepancy between the film and its title intensifies the analytical attention it draws.

In the end, Anton still wanders around the train station with his old-fashioned suitcase. The suitcase is a signifier, expanding and anachronizing the film's timeline. It's not just a postmodernist leap; rather, it's modernism absorbed into anachronism.

Within the film, the story largely takes place in that old house filled with books and paintings. As a result, Anton and Beatrice's love story extends into artistic and intellectual territory. One particularly noteworthy drawing on the house's wall is an important clue. It is Leonardo da Vinci's sketch, "The Fetus in the Womb" (c. 1511). The film's credits also include this and related Da Vinci sketches. Furthermore, Beatrice and Anton also look through Leonardo's album while walking together. The mother's womb symbolizes the Platonic concept of Chora (Timaios, 52 a-b). Chora is a place and an endless source of becoming. It is a third kind of being, besides ideas and phenomena. It is between the abstract and the concrete, the visible and the invisible. It is formless yet receptive; It is anachronistic yet intuitively represents Aion. In short, Chora is a Platonic cosmological design (Plato (Eflâtun), 1943, 52 a-b; p.60). Love 2. America is a sublime description of the Chora, realized in a multilayered, spherical environment composed of desires, passions, immense nature, a shared home once upon a time, Beatrice's existence, books, and Da Vinci imagery.

Director: Florin Șerban; Script: Florin Șerban; Cinematography: Oleg Mutu; Editing: Florin Șerban; Production: Florin Șerban, Oana Iancu, Bogdan George Apetri; Cast: Igor Babiac (Anton), Emőke Pál (Beatrice), Constantin Dogioiu (David).

Hamlet (2024)

A theater director calls five actresses to an audition room to cast a Hamlet production as Ofelia, Polonius, Gertrude, Claudius, and Laertes. Still, they become trapped there, and acting becomes a deadly struggle. It is a Script so anti-feminist that it creates an irony: one man is pitted against five women, forcing them to play a game of life and death.

This film is an experimental, horror-genre adaptation of Shakespeare's Hamlet. Moreover, it's a postmodern pastiche. The director, with a totemic Hamlet mask, begins to threaten them. Moreover, the Hamlet-Totem frightens the actresses with these misogynistic tone words: "Your whole life has been a show, a provincial one. Leaving this place is no longer an option".

According to Freud (2010): "According to the view which was originated by Goethe and is still the prevailing one today, Hamlet represents the type of man whose power of direct action is paralyzed by an excessive development of his intellect" (p. 282).

Consequently, these critical words of Hamlet-Totem become a statement that restricts victims' freedom. But what is tragicomic is his narcissistic self-confidence and his failure to realize that he, too, belongs to or is condemned to the same place as the others.

Șerban's Hamlet-Totem is a transgressive, almost ludicrous figure, and in this adaptation, Hamlet serves merely as context. The primitive totem mask establishes a menacing authority behind which Hamlet conceals himself. It is an intellectual trap. Hamlet-Totem uses Hamlet.

As is known, Hamlet's story displays a panorama of the classical Freudian Oedipus complex. He is jealous of his mother; he desires her. According to Freud (2010): "Shakespeare's Hamlet has its roots in the same soil as Oedipus Rex"; "In Oedipus, the child's wishful phantasy that underlies it is brought into the open and realized as it would be in a dream. In Hamlet it remains repressed; and—just as in the case of a neurosis—we only learn of its existence from its inhibiting consequences" (p.282).

Shakespeare has created a realm of challenge for those who stage, adapt, and interpret his works. In every era, in light of prevailing paradigms, the Zeitgeist and Shakespeare enrich and diversify one another, as Șerban's adaptation shows. Moreover, Hamlet's restlessness remains a compelling subject.

Director: Florin Șerban; Script: Florin Șerban; Cinematography: Andrei Butică; Editing: Florin Șerban; Production: Florin Șerban; Cast: Igor Babiac (Hamlet), Roberta Antonie (Isabela/Ophelia), Andreea Gramosteanu (Adriana/Polonius), Sabrina Iaschevici (Tania/Gertrude), Cristina Lupu (First girl), Cosmina Stratan (Cosmina/Laertes), Irina Tufescu (Irina/Claudius).

Oedipus Story, **Oedipus Complex and Its Cinematographic Context**

> "Je suis Œdipe. Quarante ans d'âge, vingt ans de règne. Par la force
> de mes poignets, j'atteins au sommet du bonheur. Enfant perdu,
> trouvé, sans état civil, sans papiers, je suis surtout heureux de ne
> devoir rien qu'à moi-même". ACTE PREMIER 1
>
> (André Gide, Œdipe, 1931)

The story of Oedipus is recounted in the tragedies by Sophocles (496 BC, Colonus – 406 BC, Athens) titled Antigone (c. 442–441 BC), Oedipus Rex (c. 429–425 BC), and Oedipus at Colonus (c. 406–405 BC).

The story of Oedipus, based on these works, is briefly as follows:

Oedipus is the son of Laius, King of Thebes, and his wife Jocasta. However, according to a prophecy, the child to be born would one day kill his father. Consequently, his parents bound the baby's feet and gave him to a shepherd to be left to die; yet, the shepherd could not bring himself to harm the infant and instead handed him over to King Polybus and Queen Merope of Corinth. They raise him as their own child. As he grows up, Oedipus hears this prophecy and flees Corinth to avoid harming Polybus and Merope, whom he believes are his real parents. On the way, during a quarrel, he kills Laius—who is, in fact, his biological father. Later, he arrives in Thebes. He saves the city by solving the Sphinx's riddle. The riddle is: What creature walks on four legs in the morning, two legs at noon, and three legs in the evening? The answer is: a human being. For a human crawls on all fours as an infant, walks on two legs as an adult, and walks on three legs—using a cane—in old age. Because of this heroic deed, the Thebans proclaim Oedipus king and marry him to Jocasta, who is actually his mother. They have four children together: Antigone, Ismene, Eteocles, and Polynices. After years of successful, stable rule, a terrible plague breaks out in Thebes. Another prophecy reveals how the plague will end: the murderer of Laius must be found and banished from the city. Oedipus is determined to do whatever it takes to save Thebes, yet he remains unaware of the truth. Ultimately, the seer Tiresias reveals the reality, and mother Jocasta commits suicide. Oedipus blinds himself with the pins from her robe and, accompanied by his loyal daughter Antigone, arrives in Colonus near Athens after years of exile. There, King Theseus receives him with respect and compassion. Then one day, Oedipus vanishes without a trace. (Sophocles, 2026; Sophocles,2023)

The story of Oedipus endures as a source of inspiration in art, science, and philosophy; like Prometheus, Demeter, or Electra, he offers a lens for defining, analyzing, and narrating our existence through his story and personality.

The same holds for Freudian psychoanalysis. In this context, "The Interpretation of Dreams was finished in all essentials at the beginning of 1896. Nevertheless, we can now add some qualifications. Thus, the existence of the Oedipus complex was only established during the summer and autumn of 1897 (Letters 64 to 71) and "his interest began to be centered at that time on his self-analysis, which was to lead during the summer to his discovery of the Oedipus complex" (Strachey, 2010, p. xviii).

Thus, Freud creates a criterion for criticism and analysis that remains constantly relevant and encompasses an entire life; accordingly (2010): "It is the fate of all of us, perhaps, to direct our first sexual impulse towards our mother and our first hatred and our first murderous wish against our father" (p.280).

On the other hand, as Freud (2010) emphasized, the plot of Oedipus and the process of psychoanalysis are similar processes: "The action of the play consists in nothing other than the process of revealing, with cunning delays and ever-mounting excitement—a process that can be likened to the work of a psycho-analysis—that Oedipus himself is the murderer of Laïus, but further that he is the son of the murdered man and of Jocasta" (Freud, 2010, p.279).

However, since its inception, the classical psychoanalytic perspective centered on Oedipus has evolved from merely offering a solution to becoming an instrument of political and social constraint. In this context, Deleuze & Guattari revolutionized the field

with their 1972 book Anti-Oedipus, and Foucault did the same with his 1973 lectures titled La Vérité et les formes juridiques. In other words, they liberated Oedipus.

Drawing on Deleuze and Guattari's book Capitalisme et Schizophrénie, I: L'Anti-Oedipe (Paris, Éd. de Minuit, 1972), Foucault (1974) makes the following observation: "Oedipus, then, would not be a truth of nature, but an instrument of limitation and constraint that psychoanalysts, since Freud, have used to contain desire and fit it into a family structure defined by our society at a specific moment in time… The tragedy of Oedipus is therefore the story of a search for the truth; it is a truth-seeking process that strictly adheres to the Greek judicial practices of the time".

In this respect, Oedipus is examined not only from a psychoanalytic perspective but also as a figure of power.

In this search, answering one question reveals half the truth, yet another question must be answered for the remaining half. As for the killer's name, the play turns to prophecy, though here, too, a twin structure of opposites exists: Apollo represents light, yet his spokesman, Tiresias, is blind. Yet the seer Tiresias tells Oedipus he is the murderer. The truth has come to light, yet there is no witness to the killing. Oedipus remembers having killed someone on the road to Thebes, but that is all. The investigation stalls once again, for this is a double murder. Oedipus killed King Laius and, at the same time, his own father, yet he still believes Polybus, the King of Corinth, is his father. At this juncture, a slave arriving from Corinth to announce the King's death reveals to him that Polybus was not his real father. Meanwhile, the shepherd, the slave from Mount Cithaeron who had rescued the infant Oedipus and entrusted him to Polybus in the past, fills in the final missing piece of the story (Foucault, 2020, pp. 180–181)

Truth is constructed slowly, step by step, piece by piece through symmetries, equivalent contrasts, causes and effects, and the events of the past and their impacts on the present.

Foucault (1974) interprets the subject he examined in detail as summarized above in the following way: "This form, truly impressive in Sophocles' Oedipus, is not merely rhetorical. It is at once religious and political. It consists of the famous technique of *the symbolon*, the Greek symbol. An instrument of power, or of exercising power, that lets someone holding a secret or authority break an object, such as a ceramic piece, into two parts, keep one, and entrust the other to a person responsible for delivering a message or attesting to its authenticity. By fitting these two halves together, one can recognize the message's authenticity, that is, the continuity of the power being exercised. Power manifests itself, completes its cycle, and maintains its unity through this interplay of small fragments separated from one another of a single whole, a unique object whose overall configuration constitutes the manifest form of power".

On the other hand, the art of cinema and cinematographic narration should also be added to the list of symbolon mentioned here. Consequently, while the Freudian Oedipus complex serves as content within films, the Foucauldian Oedipal symbolon is the formal equivalent of cinematographic narration. Investigating Oedipus's truth in Sophocles' tragedy lays the foundation for narrative realization and performance in general.

In 1979, film theorist and critic Raymond Bellour defined the structure of cinematographic narrative in his book L'Analyse du film using the narrative logic of Sophocles' Oedipus story. Francesco Cassetti then updates Bellour's perspective by analyzing examples from Hitchcock's cinema in his book Teorie del Cinema (1993). Accordingly, even before considering drive dynamics in general, the structure underlying

classical narrative cinema leads us back to the central crux: the emergence of desire and its submission to the law, Oedipus. "One must understand the destiny of Oedipus and castration down to the minutest textual operation as a continuous vibration" (Bellour, 1979, p. 245). Indeed, the Oedipus complex is intimately familiar with repetition based on difference, using it as a means of resolution to exorcise transgression (attraction to the mother), effect a substitution (another woman in place of 'her'), mask a fear (of castration), and enforce a return to order (familial and social). Diversity and similarity, rupture and recomposition are the hallmarks upon which Oedipus is founded. (Casetti, 1993, p.184).

Therefore, every film, every cinematographic narrative, is in fact an Oedipal performance.

"The film is subject; it submits to the story, just as the subject submits to the Oedipus complex. It thus narrates what the body of the film never ceases to mime: the transition from one state of equilibrium to another, from a first term to a second that repeats and resolves it" (Bellour 1979:244; Casetti 1993: 185).

Freud, Deleuze & Guattari, and Foucault coexist within the realm of psychoanalysis, yet one or the other comes to the fore depending on prevailing cultural paradigms; consequently, this dynamic naturally emerged when approaching Florin Șerban's cinema from an Oedipal perspective.

At this point, one might ask a playful question: Could the Lumière Brothers have invented cinema without Sophocles?

As Casetti highlights (1993): "In short, there is a correspondence between the kinship system portrayed, characterized by difference and mirroring, and the game upon which the film rests, a game itself woven from mirroring and difference. Once again, we find an intimate solidarity between the various levels on which cinema operates: just as there was previously a bond between the film's body and the narrative exercise, there is now one between the film's body and the events being narrated—an intimate solidarity under the sign of Oedipus" (p.186).

The director-philosopher's cinema

> "Nous avons besoin maintenant du présent et du témoignage du passé:
> le témoignage présent de ce qui est réellement arrivé".
>
> (Michel Foucault 1973)

The director-philosopher's cinema is a distinct genre proposal.

Florin Şerban, especially with his films Love 1: Dog (2018) (Dragoste 1: Câine, 2018) and Love 2. America (Dragoste 2: America, 2020) belongs to a class of contemporary director-philosophers such as Terrence Malick, Béla Tarr, Carlos Reygadas, Lav Diaz, Apichatpong Weerasethakul, and Ryūsuke Hamaguchi.

Directors such as Carl Theodor Dreyer, Robert Bresson, Ingmar Bergman, Michelangelo Antonioni, Alain Resnais, Jean-Luc Godard, and Andrei Tarkovsky are historical precursors of "director-philosopher's cinema".

Furthermore, certain directors representing "director-philosopher cinema" also fall into the category of Slow Cinema. However, the formalist characteristics of this cinema as described in the quote below do not fully encompass "director-philosopher cinema".

However, according to de Luca and Barradas (2015): "One of the first to coin the expression 'cinema of slowness' was the French film critic Michel Ciment, in 2003, citing, as exemplary of this trend, directors such as Béla Tarr (Hungary), Tsai Ming-liang (Taiwan) and Abbas Kiarostami (Iran) (Ciment, 2003). In 2008, taking up Ciment's expression, Matthew Flanagan would expand its theoretical application in his influential article 'Towards an Aesthetic of Slow in Contemporary Cinema', which he described as based on 'the employment of (often extremely) long takes, de-centered and understated modes of storytelling, and a pronounced emphasis on quietude and the everyday" (2008, p.1).

On the other hand, generally every film has a philosophy. Every film director eventually develops a philosophy. But according to Deleuze (1984): "It seemed to us that the great auteurs of cinema could be compared not only to painters, architects, and musicians, but also to thinkers. They think in terms of movement-images and time-images, rather than concepts" (p. 11).

Therefore, defining "director-philosopher's cinema" as a distinct genre is difficult. Moreover, this is not a criterion for criticism. Many significant directors in cinema history never held the title of theorist, yet this poses no problem. The only issue is whether a cinematographic poetics belongs to this genre, as with any other genre. In this context, Deleuze (1989) again distinguishes between cinema and philosophy: "Cinema itself is a new practice of images and signs, and philosophy, as a conceptual practice, must develop a theory of it" (p. 308). However, representatives of the director-philosopher's cinema have rendered this distinction transparent. They structure the labyrinths of existence by immersing themselves in nature; the tragedies of the historical past and political adversities emerge within the ordinary flow of daily life—appearing only to vanish—yet they remain always present. Ordinary people represent the reality of life—with all its good and bad—in a non-dramatic manner, simply continuing on their way; it is like a silent moral lesson. Everything can be perceived simultaneously: physical and metaphysical dimensions, reality and metaphor, the real and the imaginary; at times, this world and a science-fictional universe. Moreover, all of this unfolds generally in a Bakhtinian dialogic form. Ultimately, this is a meta-cinema initiative.

The characteristics of the director-philosopher's cinema are as follows:

- It is a becoming cinema.
- It is an intuitive cinema
- It is a contemplative cinema.
- It is sometimes an anachronistic cinema.
- It is a naturalist cinema
- It is sometimes a transgressive cinema
- It is a political cinema
- It is an observational cinema
- It is sometimes a silent cinema in the sense of establishing an almost telepathic relationship between the director and the audience.
- Each time, cinematographic spectacle becomes an Erfahrung.
- Each time, cinematographic spectacle is an Erlebnis of the "I watched a film and my life changed" variety.
- It is a cinematographic performance to research the Janus design of life as existential meaning or existential meaninglessness.

Conclusion

By designing narrative and philosophical symmetries in his films, Florin Şerban explores desire, power, challenge, freedom, and existential struggle within love, institutional authority, minority issues, social constraints, human relationships, and the relationship between humans and nature.

Oedipus's theories are clearly identifiable in his films through Freudian, Foucauldian, Deleuzean & Guattarian, and Bellourian lenses.

Florin Şerban exemplifies the director-philosopher's cinema through contemplative visuality, expressive silence, an individualist social-realist manner, sophisticated transgression, identification with nature, experimental challenge, a de-dramatic, cool vision, and an original Oedipian style.



Florin Şerban Portrait After Caspar David Friedrich and Leonardo Da Vinci 2026 © Simber Atay
(This image is co-generated by Simber Atay and Nano Banana Pro in a mobile phone environment)

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ORIGINAL PAPER

FinTech and the Integration of Financial Markets and Institutions: Mapping Research Frontiers and Impact Pathways

Andrei Cristian Spulbar[1)]

Abstract
This study examines how academic research links FinTech to the integration of financial markets and institutions. It aims to map the field's intellectual structure, thematic evolution and collaboration patterns, and to distinguish the mechanisms associated with integration. A query-pair retrieval protocol in Web of Science yielded a screened sample of 764 articles and reviews published between 2013 and 2026. The analysis combines performance indicators, local citations, a keyword co-occurrence network normalised by association strength, Callon's centrality–density measures and Kleinberg burst detection. The results indicate rapid recent growth (44.8% compound annual growth over 2017–2025; 91% of documents published after 2021), concentrated author affiliations (China appears in 44% of documents) and a high share of single-document contributors (Lotka exponent ≈ 4.6). Four thematic clusters are identified: market connectedness and systemic risk; payment infrastructure, interoperability and regulation; digital finance and spatial real-economy spillovers; and SME financing frictions. The map connects integration-related research with spillover, connectedness and interoperability concepts, while recent keyword bursts highlight green finance and digital financial inclusion. The paper proposes three interpretative pathways—friction reduction, infrastructural interoperability, and risk sharing versus contagion—and a research agenda centred on comparable integration measures and their application to the European Union and Central and Eastern Europe. These conclusions concern the selected corpus: the retrieval limits, source screening and partial coverage of 2026 constrain generalisation to the wider literature.
Keywords: *FinTech; financial integration; market connectedness; interoperability; open banking; bibliometric analysis*

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1. Introduction

Financial integration is a central objective of European economic governance, from the Single Market to the Banking Union and the Capital Markets Union. Integration requires equal access and common rules, with economically identical assets and services priced identically regardless of location (Baele, Ferrando, Hördahl, Krylova & Monnet, 2004). Digital payments, application programming interfaces (APIs), platform-based lending, distributed ledgers and central bank digital currencies can change the costs of moving information and value across boundaries. The question is therefore how technology removes, reshapes or creates financial frictions.

The FinTech literature has grown at a pace that makes it difficult to see the whole. Early conceptual contributions described the forces of innovation, disruption and transformation in financial services (Gomber, Kauffman, Parker & Weber, 2018) and the implications for banking (Thakor, 2020; Vives, 2019). In parallel, empirical work has examined risk spillovers between FinTech firms and incumbent institutions (Li, Li, Zhu, Yao & Casu, 2020), the effects of mobile money on risk sharing (Riley, 2018) and the potential of FinTech to support the European Capital Markets Union (Demertzis, Merler & Wolff, 2018). These strands use the word "integration" in different senses: price convergence and co-movement in market studies, interoperability and access in payments research, and territorial diffusion in regional economics.

The study addresses four questions: (RQ1) how large, recent and geographically distributed is the selected literature; (RQ2) which documents form its intellectual base; (RQ3) which thematic communities structure it and how central and developed are they; and (RQ4) which topics are emerging and which measurement priorities follow? It reports a structured retrieval and screening protocol using Web of Science, tests cluster stability across algorithms and combines co-word analysis with burst detection. The resulting map informs a framework of three integration pathways and a measurement-oriented research agenda for the European Union and Central and Eastern Europe.

2. Conceptual background: three meanings of FinTech-enabled integration

The integration literature distinguishes price-based measures (yield and interest-rate dispersion, return co-movement), quantity-based measures (cross-border holdings and flows) and institution-based measures (common rules, access to infrastructures) (Baele et al., 2004). Each can be linked to a distinct FinTech mechanism.

The first mechanism is *friction reduction*. Digital channels lower search, verification and transaction costs and reduce information asymmetries through alternative data and automated underwriting (Fuster, Plosser, Schnabl & Vickery, 2019; Philippon, 2016). Lower frictions should, in principle, compress price differences and expand cross-border participation, which corresponds to price- and quantity-based integration. The second mechanism is *infrastructural interoperability*. Open banking mandates, standardised APIs and interoperable fast-payment systems connect previously closed networks, so that the integration of institutions occurs through shared technical layers rather than through ownership or branch networks. Evidence from India's Unified Payments Interface suggests that interoperability increases the adoption of digital payments by widening users' choice of applications (Copestake, Kirti & Martinez Peria, 2025), while competition authorities emphasise the role of data-sharing frameworks in opening markets to new entrants (OECD, 2024). The third mechanism concerns *risk transmission*. Greater connectedness can improve risk sharing, but it can also accelerate contagion. Spillover measures (Diebold & Yilmaz, 2012) characterise connectedness

involving FinTech, traditional financial institutions and other asset classes, including during periods of stress (Le, Yarovaya & Nasir, 2021; Li et al., 2020).

These mechanisms provide complementary perspectives on integration. A bibliometric map can describe their thematic connections and relative visibility, but cannot establish causal effects or rule out relevant evidence outside the sample.

3. Data and methodology

3.1. Retrieval protocol and screening

The corpus was retrieved from Web of Science and the search was designed as a grid of 96 query pairs, of which 94 were executed, each combining one FinTech descriptor with one integration descriptor in titles and abstracts (Table 1). The union of all pairs was deduplicated by record identifier. Two filters were then applied. First, 441 records retrieved exclusively through the polysemous term "convergence" (treated as a source of technological-convergence matches in the screening protocol) were removed. Second, the remaining 2,320 records were restricted to those published in sources classified as core by the Centre for Science and Technology Studies (CWTS, Leiden University), an additional source-selection criterion distinct from the Web of Science Core Collection. The final corpus contains 764 documents (749 articles and 15 reviews; 763 in English).

Table 1. Retrieval and screening protocol

Step	Specification
Database	Web of Science (API)
Search field	Titles and abstracts; publication years 2008–2026; document types: article, review
FinTech descriptors (8)	fintech; "financial technology"; "financial technologies"; "digital finance"; "open banking"; "digital payments"; "platform finance"; "mobile money"
Integration descriptors (12)	"financial integration"; "market integration"; "banking integration"; "financial market integration"; "capital mobility"; "cross-border payments"; cross-border; interoperability; interconnectedness; spillover; harmonization; convergence
Query design	96 pairs (FinTech AND integration descriptor); top 200 records by relevance per pair; 94 pairs executed
Records retrieved (union)	2,761 unique works
Exclusion 1	Records matched only through "convergence" (polysemy): −441 → 2,320
Exclusion 2	Sources not classified as CWTS core: −1,556 → 764
Final corpus	764 documents (749 articles, 15 reviews), 2013–2026

Source: Author's design.

3.2. Analytical design

The analysis follows the science-mapping workflow formalised by Aria and Cuccurullo (2017), implemented in Python to allow the additional robustness tests

described below. Performance analysis covers annual production, sources, citations, authorship and country collaboration, distinguishing single-country (SCP) from multiple-country publications (MCP) by the first author's country. Author productivity is assessed against Lotka's (1926) inverse power law, in which the number of authors with n publications is proportional to $\frac{1}{n^{\alpha}}$. The intellectual base is identified through local citations, that is, citations received from other documents in the corpus.

The conceptual structure is derived from the 60 most frequent keywords in the bibliometric dataset (3,199 distinct keywords; 9.9 per document on average). Co-occurrences were normalised by association strength, $AS_{ij} = \frac{c_{ij}N}{c_i c_j}$, where $c$ij is the number of documents in which keywords i and j co-occur, ci and cj are their frequencies and N is the number of documents; this measure corrects for the size effect of frequent terms (van Eck & Waltman, 2009). Communities were detected with the Louvain modularity algorithm (Blondel, Guillaume, Lambiotte & Lefebvre, 2008). Following the triangulation strategy announced in the research design, the partition was compared with twenty alternative random seeds, with greedy modularity optimisation, with label propagation and with a Louvain run on raw counts, using the adjusted Rand index (ARI) (Hubert & Arabie, 1985). Each cluster was positioned using Callon's centrality (strength of external links) and density (strength of internal links), computed from the equivalence index $e_{ij} = \frac{{c_{ij}}^2}{c_i c_j}$ (Callon, Courtial & Laville, 1991). Finally, emerging topics were identified with Kleinberg's (2003) two-state burst detection algorithm applied to annual keyword frequencies relative to annual output (scaling parameter $s = 2$, transition cost $\gamma = 1$).

4. Results

4.1. Growth, sources and production structure

Table 2 summarises the corpus. Publication output in the sample is recent and expanding rapidly. Only 67 documents were published between 2013 and 2021, whereas 697 documents (91.2%) appeared from 2022 onwards (Figure 1). Annual output rose from 10 documents in 2017 to 193 in 2025, a compound annual growth rate of 44.8%, and the 217 documents already indexed for 2026 exceed the full 2025 total. The mean of 20.1 citations per document is driven by a small number of highly cited works, while 30% of the documents have not yet been cited, which is consistent with the recency of the corpus.

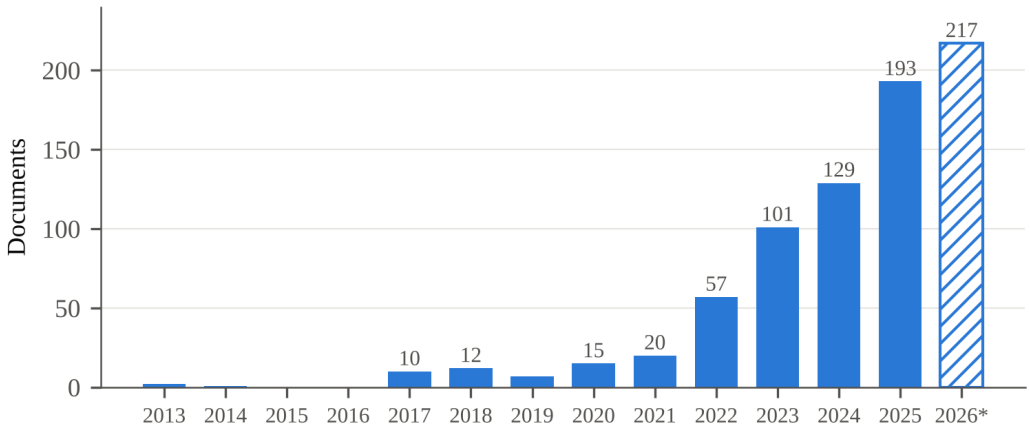
Table 2. Main characteristics of the corpus

Indicator	Value
Timespan	2013–2026
Documents / sources	764 / 377
Compound annual growth rate, 2017–2025	44.8%
Share of documents published 2022–2026	91.2%
Total citations / mean citations per document	15,329 / 20.1
Uncited documents	229 (30.0%)
Mean references per document	40.0
Distinct keywords / mean per document	3,199 / 9.9

Indicator	Value
Authors / mean authors per document	1,828 / 2.86
Single-authored documents	173 (22.6%)
Authors with a single document	1,692 (92.6%)
Lotka exponent (α)	4.61
Countries / country collaboration pairs	93 / 293

Source: Author's calculations.

Figure 1. Annual scientific production, 2013–2026



Note: *2026 data cover 1 January–31 October (hatched bar). Source: Author's calculations.

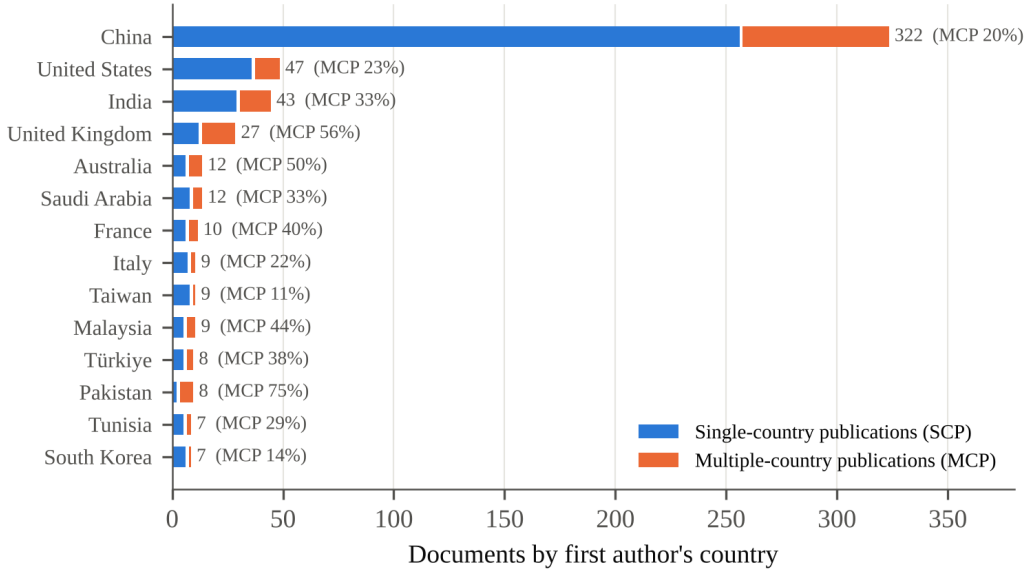
Production is dispersed across 377 sources. *Sustainability* (32 documents), *Finance Research Letters* (19), *Resources Policy* (14), *Research in International Business and Finance* (13), *International Review of Economics & Finance* (13) and *International Review of Financial Analysis* (12) are the most productive outlets. The presence of environmental and resource-economics journals among the leaders already signals that a large part of the literature links digital finance to real-economy and environmental outcomes rather than to financial integration in the narrow sense.

Authorship is concentrated among single-document contributors. Of 1,828 authors, 1,692 (92.6%) contributed a single document, and no author contributed more than five. The estimated Lotka exponent ($\alpha \approx 4.6$) is above the classical value of 2, consistent with the steep decline in author counts as productivity increases. This pattern describes participation in the selected corpus; it does not establish that these authors are occasional researchers or that the wider field lacks established specialists. The average document has 2.86 authors and 22.6% are single-authored.

The geographical distribution is strongly concentrated. The following counts include documents with at least one affiliated author from each country; Figure 2 instead attributes each document to the first author's country. Authors affiliated with Chinese institutions appear in 334 documents (43.7% of the corpus), followed by the United States (81), the United Kingdom (57) and India (56). Among the reported European Union affiliations, France appears in 24 documents, Italy in 12, Spain in 9 and Germany in 7.

These affiliation counts describe research participation, not the countries examined by the studies. International collaboration is limited: only one fifth of the documents with a Chinese first author involve foreign co-authors, compared with 56% for the United Kingdom. The strongest bilateral links connect China with the United States (15 joint documents), the United Kingdom (13) and Malaysia (9).

Figure 2. Most productive countries and international collaboration



Note: Documents attributed to the first author's country; MCP = share of documents with co-authors from other countries. Source: Author's calculations.

4.2. Intellectual base

Table 3 lists the most locally cited documents. Gomber et al. (2018) is the dominant reference, cited by 50 documents in the corpus, and acts as the field's conceptual anchor. The next four positions concern connectedness and spillovers involving FinTech, traditional financial institutions, other asset classes and investor attention (Li et al., 2020; Le, Yarovaya & Nasir, 2021; Chen, Chiu & Chung, 2022; Adekoya, Oliyide, Saleem & Adeoye, 2022). A second group comprises policy-oriented contributions on the Capital Markets Union (Demertzis, Merler & Wolff, 2018) and on sustainability and inclusion (Arner, Buckley, Zetzsche & Veidt, 2020), while a third group consists of Chinese regional studies on digital finance, carbon efficiency and industrial upgrading (Ren, Zeng & Gozgor, 2023; Zhang & Liu, 2022). These influential documents illustrate several strands also visible in the keyword network.

Table 3. Most locally cited documents in the corpus

Document	Source	Local citations	Global citations
Gomber et al. (2018)	Journal of Management Information Systems	50	2,135

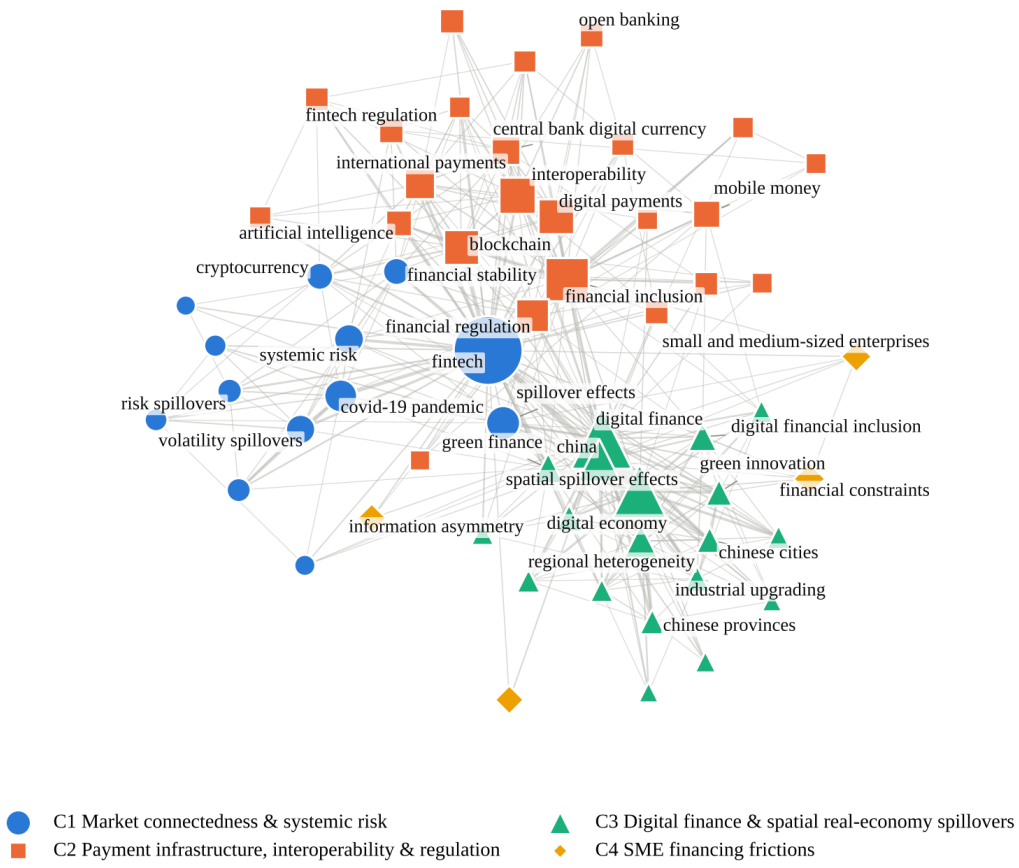
Document	Source	Local citations	Global citations
Li et al. (2020)	International Review of Financial Analysis	37	222
Le, Yarovaya & Nasir (2021)	Research in International Business and Finance	21	123
Chen, Chiu & Chung (2022)	Finance Research Letters	19	62
Adekoya et al. (2022)	Technology in Society	17	57
Demertzis, Merler & Wolff (2018)	Journal of Financial Regulation	17	341
Zhang & Liu (2022)	Science of the Total Environment	17	435
Ren, Zeng & Gozgor (2023)	Journal of Environmental Management	14	333
Arner et al. (2020)	European Business Organization Law Review	13	748
Abakah, Tiwari, Lee & Ntow-Gyamfi (2023)	International Review of Finance	13	108

Source: Author's calculations.

4.3. Conceptual structure: four thematic communities

The co-occurrence network of the 60 keywords contains 525 links with at least two co-occurrences (density 0.30). The Louvain partition has a modularity of 0.41 and shows strong agreement across random initialisations: across twenty random seeds the mean ARI is 0.91, and agreement with greedy modularity optimisation is high (ARI = 0.81). Agreement is lower with label propagation (0.58) and with clustering on raw counts (0.52). The four-community interpretation is more consistent across random seeds than across algorithms or weighting choices (Figure 3; Table 4).

Figure 3. Keyword co-occurrence network and thematic communities



Note: Node size is proportional to keyword frequency; links with at least three co-occurrences are drawn; colours and marker shapes identify Louvain communities. Source: Author's calculations.

Table 4. Thematic communities of the keyword co-occurrence network

Cluster (size)	Leading keywords	Mean year	Cit./ occ.	Centr.	Dens.
C1 (13)	fintech; spillover effects; COVID-19 pandemic; systemic risk; volatility spillovers; cryptocurrency; financial stability; risk spillovers	2023.9	26.4	15.95	13.24
C2 (24)	financial inclusion; interoperability; digital payments; blockchain; financial regulation; international payments; CBDC; mobile money; open banking	2024.0	25.0	16.52	10.81

Cluster (size)	Leading keywords	Mean year	Cit./ occ.	Centr.	Dens.
C3 (19)	digital finance; spatial spillover effects; China; regional heterogeneity; green finance; digital financial inclusion; green innovation	2024.4	19.1	11.41	23.34
C4 (4)	financial constraints; SMEs; information asymmetry; Chinese listed companies	2024.6	11.6	4.16	2.55

Note: Cluster size is the number of keywords; cluster names are defined below. Mean year is the frequency-weighted mean publication year; Cit./occ. = citations per keyword occurrence; Centr. and Dens. = Callon centrality and density (equivalence index). Louvain modularity Q = 0.41; mean ARI across 20 seeds = 0.91. Source: Author's calculations.

Cluster 1, *market connectedness and systemic risk*, groups keywords such as spillover effects, volatility and risk spillovers, systemic risk, financial stability, cryptocurrency, bitcoin, portfolio diversification and the COVID-19 and Russia–Ukraine shocks. Its centrality is second only to Cluster 2 and its density second only to Cluster 3; it has the highest citation impact (26.4 citations per keyword occurrence). Co-movement and the direction of shock transmission provide a price-based perspective on linkages between FinTech assets and traditional finance.

Cluster 2, *payment infrastructure, interoperability and regulation*, is the largest community (24 keywords) and has the highest centrality but only moderate density. It brings together financial inclusion, interoperability, digital and international payments, central bank digital currency, open banking, mobile money, blockchain, artificial intelligence and several regulatory terms. Its density is lower than that of Clusters 1 and 3, and its keywords span heterogeneous technologies and institutional questions.

Cluster 3, *digital finance and spatial real-economy spillovers*, has the highest density and the lowest centrality among the large clusters. Its vocabulary is consistent with regional research on digital finance, green innovation, industrial upgrading and carbon efficiency, illustrated by Chinese studies such as Ren, Zeng and Gozgor (2023) and Zhang and Liu (2022). The word "spillover" in this cluster refers to geographical diffusion rather than to financial contagion. This semantic distinction helps interpret why "spatial spillover effects" (145 documents) and "spillover effects" (54 documents) belong to different communities, and it warns against keyword-based reviews that treat both as evidence of financial integration.

Cluster 4, *SME financing frictions*, is a small and recent community (financial constraints, information asymmetry, small and medium-sized enterprises, Chinese listed companies) with low centrality and density. Its mean publication year (2024.6) suggests an emerging rather than a declining theme. It corresponds most directly to the friction-reduction mechanism, yet remains weakly connected to the integration debate.

The strongest inter-cluster connection joins Cluster 1 and Cluster 2 (494 co-occurrences), indicating that research on market connectedness is closely associated with payments, regulation and digital currencies. Cluster 3 is the most self-contained community: only 39% of its co-occurrence links point outside the cluster, compared with 69% for Cluster 1 and 57% for Cluster 2, while Cluster 4 is linked mainly to Cluster 3 (84 co-occurrences). The field is thus organised around a financial core (Clusters 1 and 2) and

a relatively separate regional-development periphery (Clusters 3 and 4); these links indicate shared vocabulary, rather than necessarily shared methods or research questions.

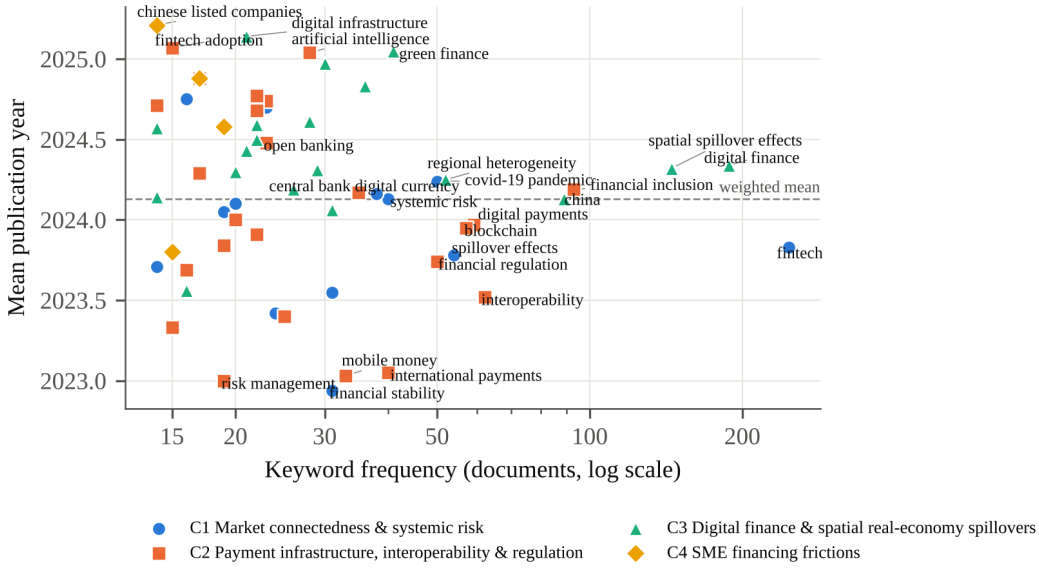
Betweenness centrality indicates the bridging role of a few general terms: "fintech" (0.22), "digital finance" (0.11), "financial inclusion" (0.06) and "financial regulation" (0.03) connect communities that otherwise share few keywords. Notably, the keyword "financial integration" does not reach the top 60: even in the set of 2,320 records before the CWTS core-source screen it is assigned to only 37 documents (1.6%), while supplementary title-and-abstract search counts are 107 for "financial integration", 660 for "cross-border", 602 for "interoperability" and 459 for "spillover". These retrieval counts should not be interpreted as shares of the final 764-document corpus or as mutually exclusive categories. The absence of "financial integration" from the top 60 keywords indicates limited visibility of that exact label, rather than an absence of research on integration.

4.4. Thematic evolution and emerging topics

Figure 4 positions each keyword by frequency and average publication year, and Figure 5 shows the share of documents mentioning the main keywords in four periods. Three dynamics stand out. First, the distribution of selected keywords has shifted from payment and stability concerns towards regional development. Between 2013–2021 and 2026, the share of documents mentioning financial stability fell from 11.9% to 2.3%, interoperability from 14.9% to 6.9% and international payments from 14.9% to 4.1%, whereas digital finance rose from 6.0% to 23.0% (with a peak of 31.0% in 2022–2023) and spatial spillover effects from 3.0% to 15.7%. Second, some keyword labels have gained visibility: the exact keyword "artificial intelligence" is not recorded before 2024 in Figure 5 but appears in 6.2% of the 2024–2025 documents, and green finance grew from zero to about 7%. Third, central bank digital currency accounts for around 3–6% of documents per period in Figure 5; the reported range for open banking is 1–4%, although that keyword is not displayed in the figure. Changes in exact labels should not be equated

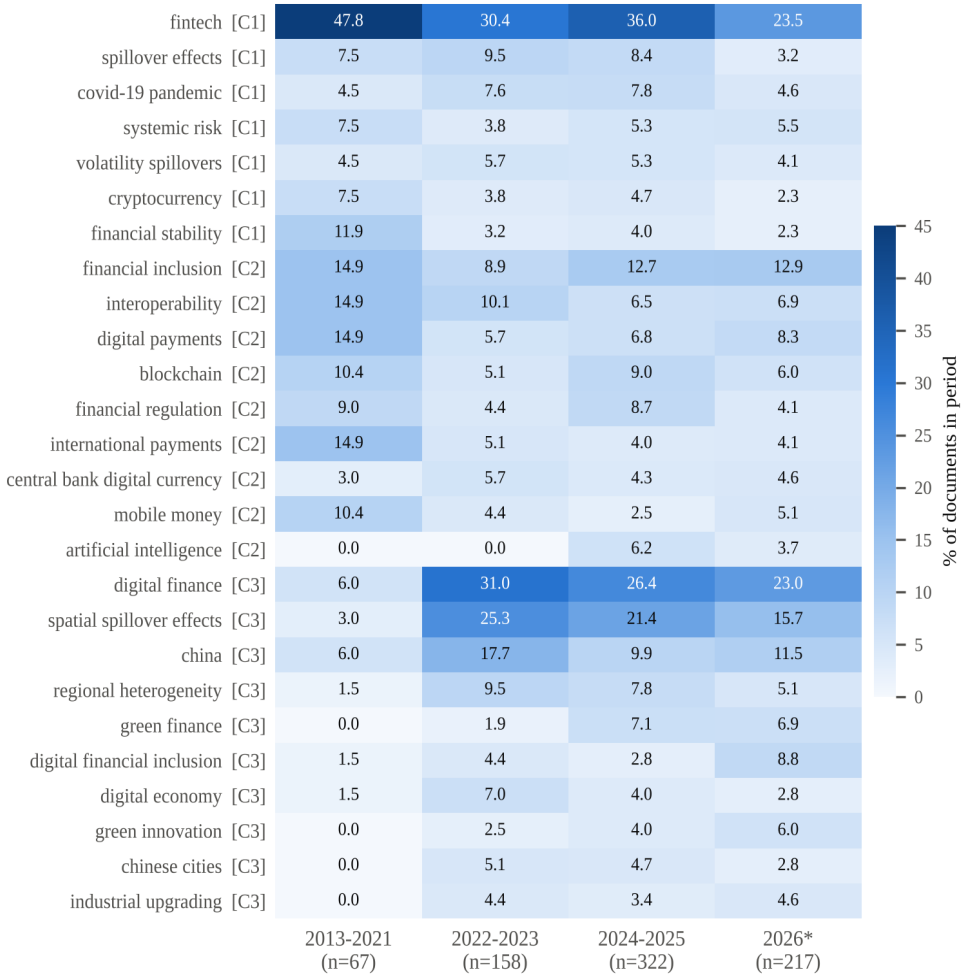
with the first appearance or disappearance of a research topic, and the 2026 period remains incomplete.

Figure 4. Thematic maturity map: keyword frequency and mean publication year



Note: The dashed line marks the frequency-weighted mean publication year of the 60 keywords. Source: Author's calculations.

Figure 5. Thematic evolution: share of documents mentioning each keyword, by period



Note: Values are percentages of documents published in each period; bracketed labels give the community. *2026 to 31 October. Source: Author's calculations.

Burst detection supports this reading (Table 5). The earliest bursts concern mobile money (2013–2020), international payments (2017–2020), financial stability (2017–2020), interoperability (2018–2020) and digital payments (2020), that is, the institutional and payment dimensions of integration. The most recent bursts concern green bonds (2025) and digital financial inclusion (2026). The detected bursts indicate increased attention to developmental and environmental vocabulary within this sample; they do not establish that cross-border connectivity has ceased to be an active research topic.

Table 5. Keyword bursts (Kleinberg algorithm)

Keyword	Burst period	Burst strength
international payments	2017–2020	5.00
green bonds	2025	3.69
digital payments	2020	3.37
financial stability	2017–2020	3.25
interoperability	2018–2020	3.14
digital financial inclusion	2026	3.13
mobile money	2013–2020	3.00

Note: Two-state automaton, $s = 2$, $\gamma = 1$; strength is the log-likelihood gain of the burst state. Source: Author's calculations.

5. Discussion: impact pathways and research agenda

The mapping allows the three conceptual mechanisms to be translated into three impact pathways, each associated with a dominant community, potential measures and a proposed measurement priority (Table 6).

Table 6. Impact pathways of FinTech-enabled integration and measurement priorities

Pathway	Main community	Typical measures	Measurement priority
Friction reduction (price- and quantity-based integration)	C4 (and parts of C2)	Price dispersion, pass-through, cross-border credit and investment flows	Test whether reduced frictions narrow cross-border price differences
Infrastructural interoperability (institution-based integration)	C2	Open-banking API usage, instant-payment reach, CBDC design	Link infrastructure access and usage to cross-border participation
Risk sharing versus contagion (market integration)	C1	Spillover and connectedness indices, tail dependence	Distinguish risk-sharing benefits from contagion and fragility

Source: Author's synthesis.

The friction-reduction pathway links FinTech to price- and quantity-based integration through lower transaction and information costs. Relevant measures include price dispersion, interest-rate pass-through and cross-border credit and investment flows, while the corresponding cluster is the smallest and most recent in the map. Research on financing constraints can inform this pathway, but improved access to credit is not equivalent to financial integration. A direct test would examine whether lower frictions narrow price differences or expand participation across institutional, regional or national boundaries, with appropriate controls for changes in borrower risk and market conditions.

The infrastructural-interoperability pathway links FinTech to institutional integration through open banking, interoperable instant payments and digital currencies.

Its community has the highest centrality in the network. The study of India's Unified Payments Interface by Copestake, Kirti and Martinez Peria (2025) illustrates how interoperability can be examined empirically through payment adoption and user choice. A European research agenda could similarly connect technical access and actual usage to cross-border participation, drawing on the broader integration questions discussed by Demertzis, Merler and Wolff (2018). Differences in the timing of infrastructure adoption may provide useful comparisons, but their value for causal analysis depends on the institutional setting, selection into adoption and the availability of comparable data.

The risk-sharing versus contagion pathway links FinTech to market integration through connectedness. Cluster 1 has the highest citations per keyword occurrence and the second-highest density in the map. The cited studies examine financial linkages using market-based measures, including spillovers involving traditional institutions and other asset classes (Li et al., 2020; Le, Yarovaya & Nasir, 2021; Chen, Chiu & Chung, 2022). Such measures do not by themselves identify welfare implications: higher connectedness may accompany improved risk sharing or greater fragility. Distinguishing these possibilities requires linking connectedness estimates to outcomes such as resilience to shocks, funding continuity or the concentration of exposures.

Central and Eastern European member states offer a useful setting for investigating how digital channels interact with established cross-border financial relationships. Relevant questions concern access to payment and investment infrastructures, the allocation of credit and dependence on financial or technological intermediaries. Digital access could broaden participation, but it could also create concentrated reliance on particular platforms or infrastructure providers. These are competing hypotheses rather than effects demonstrated by the bibliometric map. A targeted assessment of study settings is needed to establish the coverage and adequacy of regional evidence.

Four priorities follow for future research. First, measurement: use comparable price-, quantity- and infrastructure-based indicators, reporting their components separately before combining them into an index. This would help distinguish integration outcomes from general digital adoption. Second, geography: assess European Union and Central and Eastern European applications through a targeted review of study settings, rather than inferring gaps from author affiliations. Third, identification: regulatory and infrastructure changes may support quasi-experimental designs, including difference-in-differences, where parallel-trends and other identification assumptions are credible. Such designs require attention to anticipation, concurrent reforms and spillovers between treated and comparison groups. Fourth, conceptual precision: distinguish financial spillovers from spatial spillovers, since similar vocabulary can describe different mechanisms and outcomes.

6. Conclusions

This paper mapped 764 articles and reviews on FinTech and the integration of financial markets and institutions using Web of Science data. The selected corpus shows rapid recent growth, concentrated author affiliations and a high proportion of single-document contributors. Four thematic communities correspond imperfectly to three integration mechanisms: friction reduction, infrastructural interoperability and risk transmission. The keyword structure connects integration-related questions with connectedness, spillovers and interoperability, while recent bursts highlight developmental and environmental topics. These patterns motivate closer attention to how

integration is defined and measured; they do not independently establish the prevalence of particular empirical methods or the absence of European evidence. For policymakers and researchers, the proposed framework identifies complementary outcomes to examine through comparable data on digital payments, open-banking usage and cross-border financial activity.

The study has limitations. The query-pair design retained the 200 most relevant records for each pair, and two of the 96 pairs could not be executed because of API rate limits. The corpus is therefore a relevance-selected sample rather than an exhaustive population. Excluding convergence-only matches may also omit relevant price-convergence research. The additional CWTS core-source screen restricts source coverage and should not be interpreted as a guarantee of individual article quality. These choices may affect growth, geography, citation patterns and thematic structure. Keyword labels and clustering choices influence the map, while citation indicators reflect unequal time available to accumulate citations. Author affiliations do not identify study locations, and the 2026 data are partial. The findings should consequently be read as an exploratory synthesis within these boundaries.

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ORIGINAL PAPER

The importance of teachers for the educational system

Andreea Mihaela Stoian[1)]

Abstract

The worldwide educational system has been changing and reshaping its structure continuously. In nowadays, education as a stand-alone word can have multiple definitions – but, if we refer to the system, then education comprises: modern buildings, trained teachers, teaching methods, receivers (those who are enrolled in different levels of education) and unlimited access to the latest technology. All of these represent the result of thousands of years in which societies evolved and decided to organise their first schools and to acknowledge the fact that the only way to transfer information to future generations is through education.

History shows that ancient civilisations set the basis of education. Archaeologists discovered that it was – almost 3000 years B.C. - on the territories of ancient *Mesopotamia* where education and forms of schools appeared for the first time. Back then, teachers were called *scribes* and they taught reading and writing mainly to the male children from wealthy families. Later, other proofs of education appeared: old documents like *papyrus scrolls* and paintings showing pupils learning how to read and write were found in Egypt and Greece. In time, schools started to diversify their subjects and children were taught: arithmetic, philosophy, how to write official documents, music, poetry and physical training. Moving on, chronologically, it was only in the 20th century when education expanded - reaching mass access, improved its teaching methods and introduced new disciplines. Teachers became the central part of this system along with the pupils and students who attended classes/ courses.

This article will explore the importance of teachers for the educational system by emphasizing their role in nowadays society. Although we are living in a period in which we are dominated by algorithm, teachers and the educational system prove the fact that they can adapt and integrate these innovations in their classrooms.

Key words: *educational system, teachers, new technologies. evolution, challenges*

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The evolution of teachers – different stages before technology

In Antiquity, teachers were regarded as sage and philosophical people. Those who passed down traditions or moral codes were the elders and the leaders of the group/ tribe. In ancient Greece, Rome and China, philosophers taught small groups of people. It was then when Confucius, Plato and Socrates appeared. They were dedicated teachers and their theories survived because students wrote down their presentations.

After the fall of the Roman Empire, certain western countries gathered their knowledge and teaching processes around religious institutions. These institutions served as schools were monks and priests taught groups of pupils. Their courses offered information on Latin, Theology and Rhetoric.

During the 11th century, the first universities appeared in Europe. The University of Bologna – the oldest university from the European continent had teachers who presented academic lectures in front of students. The first courses at this higher-education institution were related to the Roman law. In fact, the University of Bologna was set up in 1088 and it was the first European higher education institution where students took notes, had access to lectures and one thing that made it unique was the fact that it was ran by students. "*At first only a school of law, Bologna successively incorporated the other branches of learning. In 1316, a school of arts and medicine was formed; and in the latter half of the same century a school of theology was founded….”* (Mullinger, 1873:73)

The University of Bologna followed by the University of Cambridge and the University of Paris (Sorbonne) have opened new doors for education and learning because they offered spacious institutions with amphitheatres and lecture halls.

Nevertheless, it was in the 15th century when education registered a massive expansion due to the appearance of the printing process. The printing technology led to the publishment of many books that began to be spread worldwide. Printing books at a big scale offered access to information and knowledge to the general public. European societies went from hand-copied manuscripts to massive communication through written texts that were printed in large series and send out to the wide audience. Printed books led to the rise in literacy and to easier access to foreign languages rather than to just one standardized language which at that time was Latin.

Even though in those times printed books were not instantly affordable, they became the tools that encouraged reading within different social classes. Moreover, printed books helped education include science, history, geography and literature among its subjects of study. Printing did another thing – it helped teachers shift from dictating long lessons to discussions and debates based on the printed versions of books and texts. Once students had access to books, they could focus on reading and understanding the information rather than spending long hours to write after dictation. Countries witnessed an increase in the interest for knowledge and printed books opened the path for the establishment of public education. The centuries that followed 16th, 17th and 18th century gave education the necessary infrastructure to reach a broader public and to improve literacy.

At the end of the 18th century until the beginning of the 20th century, education was well-established in all European countries. The general public had access to schools and to printed materials fact which gave people access to information and knowledge. In the 19th century, teaching became an official profession.

The 19th century was the catalyst for education. The development of technology and industry helped people realize that literacy was an advantage for the workforce that

had to follow instructions, read and write documents, schedule the work hours and create different products demanded by societies.

The 19th century was represented by the Industrial Revolution. Rural farming was gradually replaced by urban factories. People moved to cities and governments had to adapt education and schools in order to answer to the demands of the industry.

In the 20th century, education continued its development. Until the widespread of the internet, teaching and learning had four major components: the teacher, the student, the school/ high school/ university and the library. The teacher was the guide, the tutor, the one who helped the student understand the new terminology. The student took notes and went to the library for additional information. Those were the times when: "*A simple chalkboard sketch can replace a slide. A classroom discussion can replace a video. Asking students to explain concepts in their own words can replace digital assessments*." (Fajle, 2026:12)

Education in the 20th century

In the 20th century, education became an important pillar for each society. In Europe, especially after the 2nd World War there was a boom in establishing new schools, high schools and universities. Most of the European countries started gradually to raise the mandatory school-leaving age to 15 and later to 16 years old. Due to the need of reconstruction after two World Wars, countries like Germany, UK and France brought diversity to the types of degrees that they offered to students. Many *baby boomers* (children born between 1946 and 1964) wanted to continue their studies looking for different specializations offered in higher education. Therefore, they enrolled in universities increasing the educational figures. This meant that Europe went from less than 5% of young adults who joined a university to a system that encouraged the general public to join a higher education institution.

The shift of the education from basic toward highly specialized knowledge and to advanced curricula, pushed teachers to look for training that would help them master modern scientific and pedagogical practices. That meant that teachers had to learn pedagogy – an essential subject – that would help them create a good management for each class/ course. Teachers received training that focused on different teaching methods which had to align to each child/ student's age, interest and other external factors that could influence his/ her educational achievements.

The 20th century encouraged education to focus on developing critical thinking rather than rote memorization. In time, the educational system adapted its teaching methods because they had to fit to the changes that were coming from the industry, economy and the world of business. Lifelong learning, technological fluency and the ability to offer support to students – all these became mandatory for teachers. They had to attend seminars, enroll in workshops and obtain special degrees that offered them further certification for the domain in which they taught.

According to Vincent Carpentier in his study *Higher Education in Modern Europe,* the interest for higher education registered a significant increase in the 20th century: "*A process of growing mass participation in higher education, mainly led by public institutions, took place in Europe after 1945. It was clearly the result of long-term transformations in society and the economy, combined with profound changes triggered by two global wars and the Great Depression in the first half of the twentieth century*" (Carpentier,Rury&Tamura, 2019:267)

While education spread to the general public, technology registered an historical moment in 1969 when scientists sent the first electronic message via a virtual network. This was the beginning of the internet – the network that connects people online. In time, this network reached institutions, including schools and universities in waves and in the 90s internet connection started to be popular worldwide. At the beginning, computers weren't so performant and they were used mainly for typing documents or trying new software. Teachers embraced this new network as it promised to be very helpful and also because they: "… *are often searching for new methods or approaches to implement in order to manage a classroom problem, to develop their teaching or simply to break the routine*" (Scorțan, 2024: 144)

In the 2000s, the internet and its devices were implemented in schools and universities. For a period of ten years this new technology made a lot of changes and slowly, printed materials, books or reports were replaced by their online versions. Teachers could access easier online libraries or use their personal computers for school/ university paperwork. Due to the internet, the tasks of teachers gained other values because they were entering a classroom not only to teach but also to guide and mentor their students in their journey of discovering the online world that could and can be used in their education.

The 21st century – Digitalization and the challenges for teachers

As we entered the 21st century, education transformed and improved its methods because it kept pace with technology. Teachers and educational institutions evolved alongside the new tech developments. The transition from printing to online versions of books, dictionaries, classes was facilitated by: "*The evolution of technology, worldwide access to the internet (the largest and fastest way of communication) and the appearance of social media are important changes that have been adopted by the majority of the educational institutions" (*Stoian, 2019:125)

Technology came as a helpful tool for teachers as it saved them time and offered instant information. Teachers could shape the online information and customize it for their pupils/ students. The intelligent board, the laptop, the tablet and even the desktop computer were virtual libraries and keepers of important school/ university documents. Integrating these devices in the educational process helps teachers as well as students because they: "… need to be prepared to succeed in the academic or business world after they finish school since social media skills and digital literacy are extremely appreciated…" (Bărbuceanu, 2020:141)

The fact that technology was introduced gradually, gave time to the educational system to prepare and to purchase all the peripherals needed for a modern class. Teachers received specialized training and courses, being encouraged to use this huge virtual network. All these digital tools gave immense opportunities and reshaped the entire architecture of a class / course. Apart from the physical devices, teachers and students could log in on different platforms. Google Classroom or Microsoft Teams are virtual places where the teacher connects with his/ her class, shares classroom materials, loads books, starts online meetings, sends instant messages and the list can continue. Moreover, on these platforms students can turn-in their assignments, drop comments or ask for further explanations. They are an extension of the physical class/ course and they are meant to encourage a continuous process of teaching and learning.

The 21st century is a challenging time in which everyone needs to adapt and it is: "*Undoubtedly, technique and psychology as well as information content remain relevant,*

however, as educators and formulators of information, we must strive towards remaining close to that which is contemporary" (Lăpădat&Lăpădat, 2020: 139) The need for adaptation gives the educational system a versatile part that places the teacher in the center because he/ she has to form the student so that he/ she can find, evaluate, select and synthesize the information that is coming from websites, links, tutorials, etc. After graduation, for example, from high school and university, the student has to be ready to use the accumulated knowledge and also to know how to navigate online in order to get the most accurate information for a future workplace or business. The teacher is the guide, the mentor and the companion who teaches not only his subject but also encourages the student to learn how to select the best option from the *world wide web*.

It is true that until technology, the teacher and physical libraries were the only sources of information; with the advent of the internet, online search engines brought a lot of alternative sources that are used for educational purposes. Still, teachers through their specialized degrees are the key link between students and the world of the internet. Leaving a student alone in front of a computer with internet connection gives him no chances or very few chances to learn on his own. The internet and the algorithm only display information without teaching. Therefore, the role of teachers is essential in the educational path of students because it offers specialized guidance. Even though: "It *is obvious that we must not neglect students 'dependence on technology, which makes them impatient and rebellious, and develops their ability to operate with several things simultaneously (multitasking)"* (Chirițescu&Păunescu, 2024: 236); we have to take in consideration that the educational system comes to support and to mentor.

A.I. tools such as Chat GPT or Google Gemini - support for education

To continue the list of innovations from the 21st century, I have to mention the virtual assistants that were launched four years ago – more precisely in 2022. This new software innovation opened the door for other approaches and revolutionized all domains including the educational system. *A.I., ChatGPT or Google Gemini* (to mention just a few) are virtual assistants, libraries, dictionaries – practically they can answer questions from every domain of activity. They are designed to work with humans and to give them the necessary information within seconds. They are practical and can be accessed from the mobile phone as well as from the computer or laptop. They are meant to help us in urgent situations or in everyday life every time we need to find a solution, an answer or just to double-check what we already know. Nonetheless, we have to know that the information that we get from these virtual assistants has to be verified because these *chatbots* are not flawless. For the educational system these virtual assistants offer additional support and resources therefore they are incredibly healthy for education. Teachers and learners have started to integrate and to work with them for different educational purposes. As an English teacher and researcher, I have to say that these internet tools: "… *will help the English teacher stay active and connected to the changes and updates that occur in the English vocabulary. No matter if we speak about new English teachers or about experienced ones, professional development should be encouraged for both categories." (*Stoian, 2019: 1716)

Professional development is essential for teachers and can be enabled with the help of these new virtual *chatbots* – software that offer assistance through text and voice interaction. For students, A.I. and the other internet tools mentioned above can function as a private tutor who comes to offer additional explanation in different situations. Learning to work and to integrate all these technological breakthroughs in the classroom

will satisfy students' curiosity and will keep them active and interested during teaching hours.

"Faced with the vast and varied complexity of a changing and constantly evolving school, it is necessary to leverage some fundamental characteristics of teaching to increase levels of inclusion in the classroom and improve the learning conditions for all students." (Scorțan, 2025:112) Thus, education and teachers have the role of balancing traditional teaching methods with the innovative support that is offered by these virtual assistants. In classrooms there has to be an equal use of methods in order to keep all the students involved and interested, practically the teaching hours need to offer a blend between tradition and innovation.

In conclusion, as the world evolved, education evolved as well. From Antiquity until nowadays a lot of changes influenced teachers, students and education in general.

The 21st century has offered us many surprises – the internet, tech-devices, different software and virtual assistants (*chatbots*). As this century started in 2001 and we are in 2026, we can expect other innovations and discoveries until 2100 when it will end. As for teachers, their role is essential for education and that is why they have to continue to adapt their teaching methods and to work on their professional development. Educating intelligence is necessary if the world wants to keep its evolution. In order to evolve we need to innovate and true innovation requires educated people.

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ORIGINAL PAPER

Organizational Support for Mental Health: Effects on Employee Wellbeing and Performance

Otilia Maria Trașcă[1)]

Abstract
Nowadays, the mental health of employees has emerged as a vital theme in organizational and management research literature. In this context, rapid changes in the nature of work, increased work demands, and work pressure have led to increased levels of stress, burnout, and psychological distress among employees in the workplace. In this context, there is a growing recognition of the importance of mental health support in the workplace among organizations. The main purpose of this article is to examine the role of organizational support for mental health and its effects on employees' mental health and work performance outcomes. In this context, the article analyses existing research on this topic from the fields of organizational psychology, human resource management, and work and organizational health psychology. The literature suggests that organizational support for mental health can have a major impact on the overall well-being of employees by reducing stress, emotional exhaustion, and burnout. At the same time, access to mental health support and organizational support can have a major impact on increasing the overall levels of work engagement, job satisfaction, and productivity. The literature also suggests the importance of perceived organizational support, as employees who perceive organizational support for their well-being are more likely to have a positive psychological outcome and increase their overall performance. Overall, the literature suggests that investing in mental health support for employees is not just the ethical and social responsibility of the organization, it also has the potential to improve organizational effectiveness and the well-being of employees. The article also concludes with the implications for the organization that would like to develop a comprehensive support strategy for the mental health of employees and the future research directions for this area.

Keywords
Workplace mental health, Organizational support, Employee wellbeing, Job performance, Mental health support

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1. Introduction

In recent decades, the mental health of employees has become one of the central themes of organizational and management research. The nature of work has changed considerably as a result of digitalisation, economic uncertainty, organizational restructuring and the intensification of work. Employees are increasingly required to work faster, adapt to frequent changes and manage higher workloads, often with limited control over how their work is organised. These changes have been accompanied by rising levels of stress, emotional exhaustion and burnout. The World Health Organization recognised burnout as an occupational phenomenon in the 11th revision of the International Classification of Diseases, describing it as a syndrome resulting from chronic workplace stress that has not been successfully managed (WHO, 2019).

The scale of the problem is significant both for individuals and for organizations. According to the World Health Organization, an estimated 12 billion working days are lost every year to depression and anxiety, at a cost of nearly one trillion US dollars in lost productivity (WHO, 2022). These costs are not limited to absences from work. A considerable part of them arises from presenteeism, a situation in which employees continue to work while experiencing mental health problems, but with reduced functioning and productivity (De Oliveira, Saka, Bone & Jacobs, 2023). Mental health at work is therefore not only a matter of individual well-being, but also an economic and organizational issue.

At the same time, the workplace plays a dual role in relation to mental health. On the one hand, poor working conditions, excessive demands, lack of support and job insecurity can contribute to the development of psychological problems. On the other hand, the workplace can also be an important source of protection, as it provides structure, social relationships, a sense of purpose and access to resources (Kelloway, Dimoff & Gilbert, 2023). This dual role explains the growing interest in the ways in which organizations can actively support the mental health of their employees. In 2022, the World Health Organization published its first global guidelines on mental health at work, recommending organizational interventions, training for managers and workers, and individual interventions aimed at preventing mental health problems and supporting employees who experience them (WHO, 2022).

Organizational support for mental health can take many forms, from formal policies and programmes to the everyday behaviour of supervisors and the overall climate of the organization. A key concept in this field is perceived organizational support, which refers to employees' beliefs about the extent to which their organization values their contributions and cares about their well-being (Eisenberger, Huntington, Hutchison & Sowa, 1986). Research suggests that the effects of support depend not only on the existence of programmes and resources, but also on whether employees perceive that their organization genuinely cares about them.

Against this background, the aim of this article is to examine the role of organizational support for mental health and its effects on employee well-being and work performance. More specifically, the article seeks to answer three questions: (1) what forms can organizational support for mental health take; (2) how does this support influence employee well-being, particularly stress, emotional exhaustion and burnout; and (3) how does it relate to work engagement, job satisfaction and productivity. To address these questions, the article draws on research from organizational psychology, human resource management and occupational health psychology, as well as on established theoretical

frameworks such as organizational support theory, the job demands-resources model and the conservation of resources theory.

2. Conceptual and theoretical background

2.1. Mental health at work

Mental health is not merely the absence of mental illness. The World Health Organization defines it as a state of well-being in which individuals realise their own abilities, can cope with the normal stresses of life, can work productively and are able to make a contribution to their community (WHO, 2004). This definition is particularly relevant for the workplace, as it links mental health directly to the ability to work and to function effectively in a social context. Keyes (2002) further argued that mental health and mental illness are related but distinct dimensions. In his mental health continuum model, individuals can range from "languishing", a state of low emotional, psychological and social well-being, to "flourishing", a state of high well-being, regardless of whether they have a diagnosed mental disorder. From this perspective, supporting mental health at work involves not only preventing and treating psychological problems, but also promoting positive states such as satisfaction, engagement and a sense of meaning.

In organizational research, mental health at work is usually examined through a set of related outcomes. These include work-related stress, emotional exhaustion, burnout, common mental disorders such as anxiety and depression, as well as positive indicators of well-being. Burnout has received particular attention, as it is closely connected to working conditions. Maslach, Schaufeli and Leiter (2001) described burnout as a prolonged response to chronic interpersonal and emotional stressors at work, defined by three dimensions: exhaustion, cynicism and a reduced sense of professional efficacy. Because burnout develops in response to the work environment, it is especially sensitive to the presence or absence of organizational support.

2.2. Perceived organizational support

The concept that best captures the relationship between employees and the support they receive from their organization is perceived organizational support. According to organizational support theory, employees develop general beliefs about the extent to which their organization values their contributions and cares about their well-being (Eisenberger et al., 1986). These beliefs are formed through everyday experiences, such as how fairly employees are treated, how their supervisors behave and what resources and rewards they receive. Employees tend to personify the organization, interpreting the actions of its representatives as signs of the organization's intentions towards them.

Organizational support theory is grounded in social exchange theory (Blau, 1964) and in the norm of reciprocity, according to which people feel obliged to return the favourable treatment they receive (Gouldner, 1960). When employees perceive that their organization cares about them, they feel obliged to care about the organization's objectives and to help it reach them. This mechanism explains why support for well-being can also have consequences for performance. In a meta-analysis of more than 70 studies, Rhoades and Eisenberger (2002) found that perceived organizational support was associated with higher job satisfaction, affective commitment, positive mood and performance, as well as with lower strain and withdrawal behaviours. A later meta-analysis by Kurtessis, Eisenberger, Ford, Buffardi, Stewart and Adis (2017) confirmed these findings and showed that perceived organizational support is related to both employee well-being and organizational outcomes.

Supervisors play a central role in this process. As agents of the organization, they are responsible for evaluating and directing employees, and their behaviour is often interpreted as an indicator of the organization's support. Eisenberger, Stinglhamber, Vandenberghe, Sucharski and Rhoades (2002) showed that perceived supervisor support contributes to perceived organizational support. For mental health, this suggests that the attitudes and actions of supervisors are at least as important as formal policies.

2.3. Support as a job resource

A second set of theories explains how organizational support protects employee mental health. The job demands-resources model (Demerouti, Bakker, Nachreiner & Schaufeli, 2001; Bakker & Demerouti, 2017) distinguishes between job demands, such as workload, time pressure and emotional demands, and job resources, such as social support, autonomy and feedback. Job demands require sustained effort and, when they are high and persistent, lead to exhaustion and health problems. Job resources, on the other hand, help employees achieve their goals, reduce the negative impact of demands and stimulate motivation and engagement. Organizational support is one of the most important job resources, as it can both buffer the effects of high demands and directly promote well-being. A similar idea was formulated earlier in the demand-control-support model, which showed that social support at work can reduce the negative health effects of high demands and low control (Johnson & Hall, 1988).

The conservation of resources theory (Hobfoll, 1989) offers a complementary explanation. It states that people strive to obtain, retain and protect the resources they value, and that stress occurs when these resources are threatened or lost. In the organizational context, support from the organization, supervisors and colleagues represents a valuable resource that helps employees cope with demands and prevents the loss of other resources, such as energy and emotional stability (Hobfoll, Halbesleben, Neveu & Westman, 2018). Employees who have access to more resources are also better able to invest them and obtain new ones, which creates positive spirals of well-being and performance. Taken together, these theories suggest that organizational support for mental health can influence both employee well-being and performance, and they provide the basis for the analysis in the following sections.

3. Forms of organizational support for mental health

Organizational support for mental health is not a single programme or practice, but a combination of policies, resources and behaviours that operate at different levels of the organization. Some forms of support aim to prevent mental health problems by improving working conditions, while others focus on helping employees who are already experiencing difficulties. This section discusses the main forms of support identified in research: organizational-level interventions, the role of managers, access to psychological support services and the psychosocial safety climate of the organization.

3.1. Organizational-level interventions and integrated approaches

One of the most influential frameworks in this field is the integrated approach proposed by LaMontagne, Martin, Page, Reavley, Noblet, Milner, Keegel and Smith (2014). According to the authors, an effective workplace mental health strategy should combine three complementary directions. It should protect mental health by reducing work-related risk factors. It should promote mental health by developing the positive aspects of work and the strengths of employees. And it should respond to mental health problems among employees, regardless of their cause. This approach emphasises that

individual interventions, such as stress management courses, are not sufficient if the working conditions that generate stress remain unchanged.

The importance of addressing the work environment itself is also reflected in the recommendations of the World Health Organization (2022). It advises organizations to implement interventions that reduce psychosocial risks, for example by adjusting workloads, offering flexible working arrangements and involving employees in decisions about how their work is organised. Wu, Roemer, Kent, Ballard and Goetzel (2021) examined organizational best practices for supporting mental health and highlighted that effective approaches combine formal policies, accessible programmes, a supportive culture and the visible commitment of leadership. However, evidence on the effectiveness of organizational-level interventions is still developing. In a systematic review of interventions in the construction sector, Greiner, Leduc, O'Brien, Cresswell-Smith, Rugulies, Wahlbeck, Abdulla, Amann, Pashoja, Coppens, Corcoran, Maxwell, Ross, De Winter, Arensman and Aust (2022) found that the available studies were limited and heterogeneous, and they called for better designed evaluations of interventions that target the organization of work.

3.2. The role of managers and supervisors

Managers and supervisors are often the first point of contact for employees experiencing mental health difficulties. They influence the workload, autonomy and working climate of their teams, and they are frequently the ones who notice changes in employees' behaviour or performance. For this reason, training managers to recognise and respond to mental health problems has become one of the most widespread forms of organizational support. Dimoff, Kelloway and Burnstein (2016) developed and evaluated a mental health awareness training programme for workplace leaders and found that it improved leaders' knowledge of mental health, their confidence in addressing the topic and their intentions to support employees.

A systematic review and meta-analysis by Gayed, Milligan-Saville, Nicholas, Bryan, LaMontagne, Milner, Madan, Calvo, Christensen, Mykletun, Glozier and Harvey (2018) confirmed that training workplace managers improves their knowledge of mental health, reduces stigmatising attitudes and increases their self-reported behaviours aimed at supporting employees. The authors noted, however, that more evidence was needed regarding the direct effects of such training on employee outcomes. Some evidence on these effects comes from a cluster randomised controlled trial conducted by Milligan-Saville, Tan, Gayed, Barnes, Madan, Dobson, Bryant, Christensen, Mykletun and Harvey (2017) among fire and rescue services. The study found that a short mental health training programme for managers was followed by a significant reduction in work-related sick leave among their employees, with a considerable return on investment for the organization.

3.3. Access to psychological support services

A third form of organizational support consists of providing employees with access to psychological services and individual interventions. These include employee assistance programmes, counselling services, stress management programmes and support for returning to work after a period of mental ill health. Joyce, Modini, Christensen, Mykletun, Bryant, Mitchell and Harvey (2016) conducted a meta-review of workplace interventions for common mental disorders. They found evidence supporting interventions based on cognitive behavioural therapy, as well as programmes that increase employee control over their work and return-to-work programmes that combine

psychological support with workplace adjustments. Tan, Wang, Modini, Joyce, Mykletun, Christensen and Harvey (2014) also showed that universally delivered workplace mental health interventions can have a small but positive effect in reducing depressive symptoms among employees.

The effectiveness of these services, however, depends on whether employees actually use them. Stigma, fear of negative consequences for their careers and a lack of trust in the confidentiality of services may prevent employees from seeking help. Access to services must therefore be accompanied by an organizational culture in which discussing mental health is accepted and does not lead to discrimination.

3.4. Psychosocial safety climate

The concept of psychosocial safety climate brings together the different forms of support discussed above. Dollard and Bakker (2010) defined it as the shared perceptions of employees regarding the policies, practices and procedures that protect their psychological health and safety. Psychosocial safety climate reflects the extent to which senior management is committed to employee mental health, gives it priority in relation to productivity goals, communicates about it and involves employees in addressing psychosocial risks. In their study, Dollard and Bakker (2010) found that psychosocial safety climate operates as a precursor of working conditions. It was associated with lower job demands, which in turn reduced psychological distress, and with more job resources, which in turn increased employee engagement. The concept shows that organizational support for mental health is most effective when it becomes part of the organization's priorities and everyday functioning, rather than an isolated initiative.

4. Effects of organizational support on employee wellbeing

Research on organizational support and mental health has consistently shown that employees who feel supported by their organization report better well-being. These effects concern both the reduction of negative states, such as stress, emotional exhaustion and burnout, and the development of positive states, such as psychological well-being and satisfaction. This section discusses these effects and the mechanisms that explain them.

4.1. Stress and emotional exhaustion

One of the most important effects of organizational support is the reduction of work-related stress. In an early meta-analysis on the role of social support in the stress process, Viswesvaran, Sanchez and Fisher (1999) found that support at work operates in three ways. It is directly associated with lower strain, it reduces the stressors that employees perceive and it moderates the relationship between stressors and strain. In other words, supported employees not only feel less strained, but also perceive their working conditions as less threatening and cope better with the demands they face.

The findings of studies on perceived organizational support point in the same direction. Rhoades and Eisenberger (2002) found that perceived organizational support was associated with lower levels of strain, including fatigue, anxiety and burnout. Kurtessis et al. (2017) confirmed in their meta-analysis that perceived organizational support is negatively related to strain and positively related to subjective well-being. Organizational support theory explains these effects through the socioemotional needs of employees. When employees believe that their organization cares about them, their needs for esteem, approval and affiliation are satisfied, and they know that help will be available when they face difficult situations. This expectation of help reduces the uncertainty and threat associated with stressful situations at work.

The work environment created by the organization also matters. Dollard and Bakker (2010) found that psychosocial safety climate was associated with lower psychological distress and emotional exhaustion, mainly because organizations with a strong climate of this type also had lower job demands. This finding shows that organizational support for mental health protects employees not only by helping them cope with stress, but also by reducing the sources of stress themselves.

4.2. Burnout

Organizational support is also an important protective factor against burnout. According to the conservation of resources theory, burnout develops when employees experience a continuous loss of resources without the possibility of replenishing them (Hobfoll, 1989). In a meta-analysis testing this theory, Halbesleben (2006) found that social support was negatively associated with all dimensions of burnout. Support from work-related sources, such as supervisors, colleagues and the organization, was more strongly related to exhaustion than support from outside work. This finding suggests that organizations are particularly well placed to prevent the exhaustion that lies at the core of burnout.

Organizational support can also reduce the impact of high job demands. Bakker, Demerouti and Euwema (2005) showed that job resources, including social support and a good relationship with the supervisor, buffer the effect of job demands on burnout. Employees who faced high demands but had access to sufficient resources did not report higher levels of exhaustion and cynicism. This is consistent with the job demands-resources model (Bakker & Demerouti, 2017), according to which resources can protect employees even in demanding working conditions. The role of leaders is also highlighted by Kuoppala, Lamminpää, Liira and Vainio (2008), whose systematic review and meta-analysis found that good leadership was associated with higher job well-being and with lower sickness absence among employees.

4.3. Positive well-being and psychological health

Beyond reducing negative outcomes, organizational support can also contribute to positive well-being. Kelloway et al. (2023) noted that the workplace can be not only a source of risk for mental health, but also a context that promotes psychological health through meaningful work, positive relationships and supportive leadership. In line with the mental health continuum model (Keyes, 2002), employees who receive support are more likely to move towards a state of flourishing, characterised by positive emotions, a sense of purpose and good social functioning.

Recent studies provide support for this perspective. In a study conducted among 572 secondary school teachers in China, Wang (2024) examined the effects of workload, organizational support and work engagement on psychological well-being. The study found that workload was negatively associated with organizational support, work engagement and well-being, while organizational support and work engagement were positively associated with well-being. Work engagement also mediated the relationship between organizational support and psychological well-being. These findings suggest that organizational support can counterbalance, at least partially, the negative effects of high demands and can create the conditions in which employees remain engaged and psychologically healthy.

Taken together, the research discussed in this section shows that organizational support influences employee well-being through several complementary mechanisms. It reduces the sources of stress, helps employees cope with the demands they face, protects

them against the loss of resources that leads to burnout and promotes positive psychological states. These effects on well-being represent the foundation for the effects of organizational support on engagement and performance, which are discussed in the next section.

5. Effects of organizational support on work engagement and performance

The effects of organizational support for mental health are not limited to employee well-being. Research shows that support is also associated with work engagement, job satisfaction and performance. These outcomes are relevant for organizations, as they show that investing in mental health can contribute to organizational effectiveness. This section discusses these effects in turn.

5.1. Work engagement and job satisfaction

Work engagement is a positive, fulfilling work-related state characterised by vigour, dedication and absorption. According to the job demands-resources model, job resources are the main drivers of engagement. Schaufeli and Bakker (2004) showed that job resources, including social support and supervisory coaching, predicted work engagement, which in turn was associated with lower turnover intentions. Organizational support can therefore stimulate a motivational process that is distinct from, but complementary to, the protective effects on health discussed in the previous section. Saks (2006) also found that perceived organizational support was a significant predictor of both job engagement and organizational engagement. Employees who feel valued and cared for by their organization tend to respond by investing more of themselves in their work.

Engagement is in turn associated with other positive work attitudes. In a study comparing supervisors and line-level employees in the hospitality industry, Lu, Lu, Gursoy and Neale (2016) found that work engagement was positively related to job satisfaction and negatively related to turnover intentions. Rhoades and Eisenberger (2002) had likewise reported that perceived organizational support was associated with higher job satisfaction and affective commitment. These results suggest that employees who feel supported are more likely to be satisfied with their jobs and to remain in the organization, which reduces the costs associated with staff turnover.

5.2. Performance, absenteeism and presenteeism

The link between mental health and performance has been examined in a large number of studies. Ford, Cerasoli, Higgins and Decesare (2011) conducted a meta-analysis on the relationship between health and work performance and found that psychological well-being was among the strongest health-related predictors of performance. Engaged employees also tend to perform better. Christian, Garza and Slaughter (2011) found in a meta-analysis that work engagement was associated with both task performance and contextual performance, which includes helping colleagues and contributing to a positive working environment. Through its effects on well-being and engagement, organizational support can thus contribute indirectly to higher performance. Rhoades and Eisenberger (2002) and Kurtessis et al. (2017) also found direct associations between perceived organizational support and performance, as well as lower withdrawal behaviours.

Mental health problems affect productivity mainly through absenteeism and presenteeism. In a critical review of the literature, De Oliveira et al. (2023) showed that mental health problems are associated with both forms of productivity loss. They emphasised that presenteeism, where employees are present at work but function at a

reduced level, can be as costly as absenteeism or even more so. Organizational support can reduce both. The trial conducted by Milligan-Saville et al. (2017), discussed in the third section, showed that training managers to support employees was followed by a reduction in work-related sick leave. Support can also encourage employees to seek help earlier, before their difficulties affect their work in a significant way.

5.3. The economic case for supporting mental health

These findings support an economic argument for investing in employee mental health. At the global level, Chisholm, Sweeny, Sheehan, Rasmussen, Smit, Cuijpers and Saxena (2016) estimated that scaling up treatment for depression and anxiety would produce returns that substantially exceed its costs, through improvements in health and productivity. Their analysis is often cited for the estimate that every US dollar invested in treatment returns about four dollars. From the perspective of organizations, this suggests that supporting mental health is not only an expense. It is an investment that can reduce the costs associated with absences, reduced productivity and staff turnover. At the same time, the economic argument should not be the only reason for organizations to act. As Kelloway et al. (2023) underline, the protection of employee mental health is also a matter of responsibility towards the people who make up the organization.

6. Discussion and implications for organizations

Taken together, the studies discussed in this article show that organizational support for mental health has a dual effect. On the one hand, it protects employees by reducing stress, emotional exhaustion and burnout. On the other hand, it stimulates engagement, satisfaction and performance. These two effects correspond to the two processes described by the job demands-resources model: a health-impairment process, which organizational support can limit, and a motivational process, which it can strengthen (Bakker & Demerouti, 2017). For this reason, investing in employee mental health can benefit both employees and organizations.

A first implication concerns the need for an integrated approach. The research suggests that isolated initiatives, such as a single stress management workshop or the mere existence of a counselling service, are unlikely to produce lasting effects. A comprehensive strategy should combine the three directions described by LaMontagne et al. (2014): protecting employees by reducing psychosocial risks, promoting the positive aspects of work and responding to mental health problems when they occur. In practice, this means adjusting workloads and the organization of work, developing employee resources and offering accessible support services, including programmes that facilitate the return to work.

A second implication concerns the role of managers. Since perceived organizational support is largely formed through relationships with supervisors (Eisenberger et al., 2002), managers should be trained to recognise signs of psychological difficulty, to discuss mental health without stigma and to direct employees towards appropriate resources (Dimoff et al., 2016; Gayed et al., 2018). Training is particularly valuable because it is relatively inexpensive and can have measurable effects on sickness absence (Milligan-Saville et al., 2017).

A third implication concerns the credibility of support. Organizational support theory suggests that employees evaluate not only what the organization offers, but also the intentions behind it (Rhoades & Eisenberger, 2002). Programmes that are introduced while workloads remain excessive, or that are perceived as formal obligations without real commitment, may fail to improve perceived support. The concept of psychosocial safety

climate (Dollard & Bakker, 2010) shows that the commitment of senior management and the priority given to mental health in relation to productivity goals are essential for support to be credible. Organizations should also evaluate their interventions regularly, as evidence on the effectiveness of many workplace programmes is still limited (Greiner et al., 2022).

Finally, organizational support for mental health is also a legal and institutional matter. At the European level, Framework Directive 89/391/EEC requires employers to ensure the safety and health of workers in every aspect related to work, which includes psychosocial risks (Council of the European Communities, 1989). In 2004, the European social partners also concluded a framework agreement on work-related stress, which provides guidance for identifying and preventing stress at work (ETUC, UNICE/UEAPME & CEEP, 2004). In Romania, Law no. 319/2006 on safety and health at work transposes the Framework Directive and requires employers to assess risks and take the necessary measures to protect workers' safety and health. In addition, the international standard ISO 45003:2021 offers organizations practical guidance for managing psychosocial risks (International Organization for Standardization, 2021). These frameworks establish a minimum level of protection. However, the findings discussed in this article suggest that genuine support for mental health requires more than legal compliance. It depends on the everyday practices, relationships and priorities of the organization.

7. Conclusions

This article examined the role of organizational support for mental health and its effects on employee well-being and work performance. The analysis shows that organizational support can take many forms. These include organizational-level interventions that reduce psychosocial risks, the training and involvement of managers, access to psychological support services and a psychosocial safety climate in which employee mental health is a genuine organizational priority. The research discussed indicates that employees who perceive that their organization values them and cares about their well-being experience lower levels of stress, emotional exhaustion and burnout, as well as higher psychological well-being. At the same time, organizational support is associated with higher work engagement, job satisfaction and performance, and with lower absenteeism, presenteeism and turnover intentions.

The main conclusion is that supporting employee mental health is both a responsibility and an investment for organizations. Its effectiveness depends less on individual programmes than on an integrated strategy that combines prevention, promotion and response, is supported by managers and is perceived by employees as credible.

The analysis has certain limitations. Many of the studies discussed are cross-sectional and were conducted in Western countries, which limits causal conclusions and the generalisation of their findings to other contexts. In addition, evidence on the effectiveness of organizational-level interventions is still developing. Future research could examine organizational support for mental health in Central and Eastern European organizations, including Romania. It could also analyse which combinations of interventions are most effective in different sectors and evaluate their long-term effects on both employees and organizations.

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ORIGINAL PAPER

Romania the Cairo negotiations in SOE documents from Spring and Summer 1944

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Abstract:
From the summer of 1943 until the following spring, on the Eastern Front, the German armies were constantly pushed back towards the borders of Romania. The futile grinding of Romanian troops made more politicians in Romania think about actions to take the country out of the war. The key figure was Iuliu Maniu, the leader of the democratic opposition. At the end of 1943, the Western Allies had accepted Maniu's proposal to send a representative for negotiations. He had proposed prince Barbu Ştirbei, who, in February 1944, was sent to Cairo, where the headquarters of the Allied Command for the Middle East was located. He was to be followed, in May, by the diplomat Constantin Vişoianu. The prince's departure was made with the approval of Ion Antonescu, with whom he had discussed the matter before the trip. This article seeks to shed light on some of the lesser-known aspects of Vișoianu's trip to Cairo, as well as the discussions he held with SOE representatives in Cairo.

Keywords: *SOE, Iuliu Maniu, Barbu Ştirbei, Constantin Vişoianu, Mihai Antonescu, Auschnitt, Tozan, Gardyne de Chastelain, Cairo, negotiations*

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Mihai Antonescu asked Alexandru Cretzianu, ex-general secretary of the Foreign Affairs Ministry, who had connections with Maniu, to accept the post of Ambassador in Ankara, to probe the Anglo-American ambassadors in Turkey with an offer of truce. Before accepting, Cretzianu asked Gafencu to get from the British government reassurances that the acceptance of this position would not be seen as a proof of collaborationism. SOE in Switzerland, who had Gafencu in contact, sent the request to London. After analyzing the situation Foreign Office gave the insurance requested by Cretzianu.

Cretzianu contacted Maniu who told him: "we urgently need a trustworthy connection with the allies and probably you will have greater changes of communication in Romania, if you accept an official position."[3] Maniu asked him to inform the allies that everything is ready for disembarkation in the Balkans and that the public opinion in Romania restlessly waits for the event. Before his departure Cretzianu contacted Grigore Niculescu-Buzești to whom he requested a secret code because some telegrams could have an unofficial and unorthodox character and could not be seen by any other then Maniu. Buzești accepted under the condition that was to be allowed to show them to the king. In SOE's opinion "in this manner the King became a direct part of the conspiracy." Grigore Niculescu-Buzești gave Cretzianu a secret code, one different than the one used by the Foreign Affairs Ministry which was to be used only in the messages sent to Maniu. Cretzianu quickly settled contacts with the British representatives in Turkey and became informed about the collaboration possibilities with the allies. The British government answered that nay contact of Romania with the allies must take the form of an offer of an unconditioned truce. "No other solution appeals to us"[4] stated the message from the British government.

On October 17, 1943, Allen Dulles, OSS' resident in Switzerland answering an exploratory attempt of the Anglo-Americans coming from Romanian opposition told Gafencu that "Romania's position is the subject of the United States government" in the "consultations" with the governments of the key allies.[5] Well informed after the contacts with the allies, the ex-Foreign Affairs Romanian minister, warned the minister of Romania in Berne, Vespasian Pella, that it was "useless and dangerous to play directly the English card against the Russian one." He was to confront with some narrow-minded Romanian political figures. Thus, on December 15, 1943, Grigore Gafencu wrote in his diary: "I have asked Maniu to reveal to me his policy towards Russia: I have not received an answer. (…) We must know what we want (…) We cannot save ourselves unless we look reality in the face: we must make up our minds to discuss with the Russians."

On October 19, 1943, Masterson reported two meetings with Cătălin Vlădescu-Olt with whom he discussed the possibility of a coup d'état in Romania, because of the information he had supplied to the British. Vlădescu enjoyed the highest consideration

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[3] Alexandru Cretzianu, *Ocazia pierdută*. Ediția a doua. Prefață de V.Fl. Dobrinescu. Postfață de Sherman David Spector, Institutul European (Colecția *Istorie și diplomație* 14), Iași, 1998, p. 110. [Original Edition – The Lost Opportunity (Cape, Londra: 1957).]

[4] Reuben H. Markham, *Romania sub jugul sovietic*. În românește de George Achim, Fundația Academia Civică ([Colecția] *Biblioteca Sighet* 2), București 1996, p. 89. [Original Edition – *Rumania under the Soviet Yoke* (Boston, 1949: 608 pp.).]

[5] A. Simion, *Preliminarii politico-diplomatice ale insurecției române din august 1944* [Political and Diplomatic Preliminaries to the Romanian Insurrection of August 1944], Editura Dacia, Cluj-Napoca, 1979, p. 343.

from the British and the information furnished by him was considered to have a high rank of credibility. Also, Colonel Black's scheme was considered by Masterson as being very credible.

General Sănătescu had been placed at the Palace at the insistences of the group, and his rank was higher the normal for the function he had. To accelerate the negotiations the *Autonomous* mission was sent to Romania, formed by Gardyne de Chastelain, Ivor Porter, and Silviu Metzianu.

From a letter, addressed on May 9, 1944, by Colonel Talbot Rice from SOE to Howard, from Foreign Office, results that although initially this mission was to be a sabotage operation, finally as a result of the way the events played it turned into a mission of sending recommendations to Maniu[6]. The reason for which Chastelain claimed that he asked for this mission was that two years of trying to convince Maniu to take act have passed, and he got nothing. It became clear to Chastelain that the tactic of postponing which characterized Maniu's last twenty years of his political carrier, was to lose for the effort of war ally that pro-British sympathies of the Romanian people.

This mission failed, due to an air navigation error, being captured after a few hours after parachute. The three have been incarcerated in a three-room apartment from the headquarters of the General Inspectorate of the Gendarmerie, were they got a special treatment being attributed a salary equivalent to the grades from the Romanian army and they were given proper food and medical care. With Mihai Antonescu's approval they were arranged by Eugen Cristescu with a credible story which was to be told to the Germans in case of their taking part in the enquiry. Today, it is known that the British used the contacts with the opposition and with the Romanian government to confuse the German army. The operation was given the code name "Bodyguard" and managed to determine the Germans to maintain the troops in the Balkans to allow the allies to debark in Normandy.[7]

Maniu tried several times to contact Chastelain without any luck. In March 1944 Maniu had to send his emissary to Cairo, prince Stirbei without Chastelain's instructions. As it is known the arrival of Știrbei was compromised by the main British news agency "Reuters", in March 1944. This was not due to a slip but was a deliberate action which fitted in the "Bodyguard" plan, established by the allies to misinform the Germans.[8] The Germans asked once again the arrest of Maniu. According to a British document, Antonescu refused preferring to sacrifice himself with Maniu's memoirs then to sacrifice him. We will not take on the problem of the talks in Cairo which were treated in other works. We remind the fact that Știrbei had several meetings with Colonel Ted Masterson. During the meeting on March 16, 1944, the prince told the British Officer that: "after his opinion a solution could be easily found if it was discussed directly with Marshal

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[6] Ion Ardeleanu, Vasile Arimia, Mircea Mușat (eds.), *23 August 1944. Documente: 1944* [August 23, 1944. Documents: 1944] (Centrul de Studii și Cercetări de Istorie și Teorie Militară. Direcția Generală a Arhivelor Statului), Editura Științifică și Enciclopedică, București, 1984, vol. II.

[7] Cristian Troncotă, *Eugen Cristescu, asul serviciilor secrete românești*. Memorii, mărturii, documente 1916-1944 [Eugen Cristescu, The Ace of the Romanian Secret Services. Memoirs, Testimonies, Documents 1916–1944], Editura Roza Vânturilor (Colecția *Fața nevăzută a istoriei*), București, 1994, p. 98.

[8] Eugen Preda, *„Săritura de pisică"* ["The Cat's Leap"], Editura Militară, București, 1976, p. 198.

Antonescu, rather than Maniu, given the fact that the first being in control of all of the army and administration, could meet his assumed obligations, doubting at the same time of Maniu's possibilities of doing the exact same thing."

On February 24,1944, Maniu wrote to Masterson a letter in which he recommended Constantin Visoianu who was leaving for Cairo with the mission to "inform and discuss the whole action of Romania in the shortest time." Maniu presented him as "our trustworthy man, a democrat and a convinced nationalist, a fine connoisseur of all the problems related with the South-Eastern Europe and of the whole international action of the past couple of decades." Maniu asked Masterson to help Vișoianu in his mission, underlining that "it is o great interest for me and our cause that he arrives in London."

On April 2, 1944, Chastelain was allowed to meet with Maniu in Andronache forest, near Bucharest. Here the British Officer tried to convince the PNȚ leader to act and put him in theme with the aim of his mission which according to Porter was "to inform Iuliu Maniu, the leader of the Romanian opposition, that Romania had become a spring issue of the Soviets and that the only remaining way was the unconditional capitulation in front of the Red Army." Maniu's answer was evasive and unconvincing for Chastelain. In a report dated November 18, 1944, Chastelain said that alongside Maniu's proverbial indecision, another of the causes of postponing the action was the start of the ally bombings of Bucharest which hardened the conditions of the development of the action. Also, in this report the British Officer states that everything coming from Maniu's circles was known by the Marshal in a few hours. Thus, in one of the meetings he had with Cristescu, he showed to him the materials regarding the coup d'état developed by Maniu's men. The SSI leader told him that he is aware of the way the British and ally services gather their information from Romania. He stated that he allowed them to carry on easing the work of the opposition. Cristescu listed some means of transmitting the information, but Chastelain ignored him although he knew they were correct.

Reginald W/T Traffic

Masterson found that Vișoianu (*nick-name Ianos*) was extraordinary ignorant about how Țurcanu (*nick-name Reginald*) worked, his contacts, etc. Masterson told Vișoianu that Țurcanu that he had complained that he had no help from Maniu (*nick-name Alecu*) or his men. Vișoianu stated that due to the danger in which taxis found himself on two occasions Maniu's people had found him a safe dwelling. Masterson is hardly inclined to believe this as in point of fact. Janos spoke most unconvingsilly on this subject. They found Turcanu a very difficult men and a man of moods. He leaves town and disappears for days on end is what Janos told SOE. Masterson ask Visoianu if Antonescu's regime knew about 's w/t link. Janos said they did. Maniu did in fact show Ion Antonescu (*nick-name Mitică*), a number of the signal received especially at the time when it looked as if Antonescu himself could be won to the Allied cause. As far as Janos as aware the person changed by Maniu with looking after Reginald was MIMI. Vișoianu was told before his departure from Romania that MIMI had found a suitable landing ground and that a signal had been send to CAIRO to that effect.

This property belongs to General Vârtejan a friend of Max Auschnitt. This property is near Constanta. General Vârtejan had told Janos at the time of his departure if he was contemplating leaving by plan the machine could take off from this property. Vârtejan was on the active list when Ion Antonescu first came to power but was later placed on the retired list.

From signal received from MIMI this is in fact the case, but the Mimi is finding Tzurcanu a difficult man to handle. Vișoianu further stated that Alecu's people had told Reginald One-Two or three occasion to keep off the air because of warnings had received from general Diaconescu (assistant to Christescu) that the Germans were on Reginald tracks.

On several occasions Masterson asked Vișoianu, why despite repeated requests, none of those around Maniu have ever done anything, what soever about finding suitable dropping grounds for the parties we had wished to infilter.

Masterson questions on these subjects have remained always unanswered in the same way as all the questions he put to Vișoianu regarding SOE failure to comprehend Alecu's (and his parties') inability to find a suitable and devoted W/T operator which would have enable them to have permanent contact with SOE.

Vișoianu arival in Istanbul

Masterson asked Vișoianu why he had not caried out the orders he had sent to Alecu regarding the method by which he was contact SOE people in Turkey, and secondly, whether at first contact with the latter he had referred to the name Dupont as stated in one DH5 letter.

Vișoianu denied that Maniu has told him to ring D/H5 s telephone number after his arrival in Istanbul and that he was to give the name Dupont. He stated that he knew this arrangement had been made at the time he was to have come out by plane, but he thought that in the meantime GANE had made other arrangements. I pointed out how ridiculous his remarks were as it would have been quite out of the question for him to have used D/H5 phone number as by that method of infiltration he would not see Istanbul.

He did not recollect whether referred the name *Dupont* (Masterson) believe that Janos did, in fact, have instructions call up D/H,5 upon his arrival, but that he neglected this as a result of unexpected meeting with Romanian press attaché Solacolu.

On 19th May 1944, an SOE telegram sent from Cairo to Istanbul contained the following instructions:

A To avoid confusions all arrangements for Vișoianu exfiltration's from Turkey must be to you and we request that you issue that your necessary instructions to Smyrna and repeating theme to SOE.

B We would again point out that maintenance of the secrecy is essential that SOE want Vișoianu in Cairo as soon as possible.

C We repeat that we don't consider TAXIARCHIS suitable for these operations.

D We again point out that Navy is willing to help and agrees to send M.T.B. (MOTOR TORPEDO BOAT) in order that transshipment may be affected at sea at dusk off EGRILLAR.

E In order that an MTB may be available on night of 25th May we must have confirmation by 20th May. Vișoianu must be in CATINIA when she leaves for IKARIA on 25th May.

F Recognition signal from CATINIA to MTB will be one green and one red flash,

G Will be one pinpoint for transshipment as soon as we receive your confirmation as of date of confirmation.[9]

[9] PRO KEW GARDENS, HS5/ 838, SOE. *Telegram* from Cairo to Istanbul, 19th May 1944.

On 27th May 1944 an SOE telegram[10] contained the following questions:

A. Has Vișoianu any news about Chastelain and doors he thinks he will be able to escape assuming plan brought by Janos;

B. If you see no objections from security angle ask Vișoianu if he knows anything about Tozan (*nick-name Tozan* and his activities). Has Tozan contacts with Ion Antonescu, Mihai Antonescu, and Maniu?

C If the answer at para-A is negative and in vieux of your para-B would you still consider sending A/H 89 or would you rely more on PANTS. A/H89 might be used for other purposes in connection with JANOS visit, therefore should not be compromised in any D/H 13 projects,

Tom Masterson (*nick name D/HY*) considers PANTS to be better versed in such affairs. Certainly, PANTS larger projects of assisting to get Romania out of war is out of question and is not one in which we could not assign a role to him. To enable PANTS (*nick-name Tozan*) to carry out exfiltration of D/H13 and party, presume further sum of about 6,500. Pounding sterling referred to in Istanbul. S 1036/628 is necessary. We cannot however put forward proposal until answer to above received question especially to the para-B. Vișoianu himself met Tozan two or three occasion the last time at the luncheon given at Mr. Tabacovici's house.

Vișoianu was not impressed and in fact considered Tozan as rather a suspicious character. Visoianu agreed that Tozan had connections with Maniu and Mihai Popovici one of the vice-presidents of the National Peasant Party. He was also a close friend of Atta Costantinescu. The latter was also minister of the public works, verry pro-German. On one occasion Vișoianu remembers that Tozan denied the veracity of certain information sent to Maniu by Gane in connection with the changes in the Turkish General Staff. Tozan was against Inönü regime in Turkey. Vișoianu did not know if Tozan had contacts with Ion and Mihai Antonescu, but he was so friendly with Atta Constantinescu he no doubt can get Mihai Antonescu through this channel.

On 25th May 1944, at meeting between Stirbei, Vișoianu and delegates at which D/H 311 was present VODA as spokesmen stated as a result of an increased number of German troops in Romania and the location of the Romanian Army including Bitter's Corps on the Russian corps, a coup d'etat in the interior of the country was not possible.

He therefore stated that Maniu proposed and Alfred that a coup d'état and a volte face should be caried out at the front.

The Russian delegate insisted that to carry out this plan Alecu should sent a military envoy to the Russian to fix details of the operation. A message for Maniu was prepared by Voda, in agreement with Novikov asking Maniu to send an emissary and asking him at the same time to indicate the place the emissary would wish to cross the lines so that Russians could make reception arrangements. This message was sent via CANE and repeated via Reginald if he comes up again:

Stirbei stated that Maniu agreed to the armistice terms but had certain armistice to make and certain explanations.

Novikov stated that such discussions must be postponed until after the military emissary had come out and the final plan of action established. The lack of communication with Maniu was stressed by Știrbei and NOVIKOV was asked by LORD MOYNE if the Russian could help in this matter.

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[10] PRO KEW GARDENS, HS5/ 838, SOE. *Telegram* from Force 133 to Cairo, 27th May 1944.

News about SOE collaborators

a) GICA

Although GICA is not often to be seen in Alecu's house, Maniu is of the opinion that he is very well informed about what is going on. Maniu could not give SOE any news.

b) DAN

To SOE great disappointment JANOS told Masterson that DAN no longer took a great interest in Maniu's work and in fact appear to have a little interest In Romania's plight. He was anxious to leave the country and with this aim in view he had arranged matters with NAE. He was expected to lease shortly after Visoianu. His destination was Sweden.

c) Mihail Ralea (*nick-nameA/H88*)

Mihail Ralea was in Bucharest at the time of Vișoianu departure. It was uncertain if he returned Sofia.

d) A/H 185

A/H185 did not know this man. Regarding Vania. He could give no details. He knows him considered as intelligent man, but did not he was in any way active at the present time.

e) BITTER

BITTER and the army corps under his command had been until recently, in the interior of the country.

Now he and his troops had been moved to the front.

Just prior Janos 'departure, General Sănătescu, military chief of the King, palace and latterly Marshall of the palace had been sent to the front with a view to discuss the position to the BITTER and to examine the possibilities of a volte-face at the front.

Since Janos arrived in the M.E., we have heard that Sănătescu returned with negative report.

DINU

Masterson asked Ianos if he knew anything about Dinu. He wanted to check up if this men in view of the fact he had brought into SOE scheme by Țurcanu and not by Maniu's men. VIȘOIANU knew about Dinu as Vișoianu himself was the person who accompany DINU last February when the latter was planning to fly out of Romania, the story about this Vișoianu told was the following:

Sometime about February 15 Maniu mentioned to Vișoianu that he should leave the country immediately and that he hoped a plane could be made available for this purpose. A day or two after that Ionescu (probably FARO) JOCKEY's secretary came to Vișoianu and told him that the plane was available and that the date of departure would be notified later, On the 24th Ionescu advised Vișoianu that the departure had been fixed Sunday 27th February.

The plane was to start from Buzau and Janos was to proceed to Buzau on the night of the 26th. He was told that apart from the pilot there would be two of the passengers – one the pilot's wife who was disguised as a man and would be in uniform, and the second Țurcanu himself.

In connection with Reginald, Ionescu had told Vișoianu that Maniu expected another operator from the Dobrudja to replace Reginald. He did not know anything further

about the new operator. Vișoianu bought the new railway ticket for Focsani and made all the preparations for leaving Bucharest at 4 o'clock.

The negotiations led by Cretzianu and Știrbei, to which Vișoianu joined later, were known and approved by the Marshal. To misinform the Germans and protect the secret of the negotiations, at the beginning of 1944, Borcescu created in SSI, the Inter-Mar group, formed from 8 to 10 officers who had to signal all the visits made by the Germans at the SSI offices. The Germans were sent some information with a different interpretation then the real one[11]. SOE state that according to a document signed by Major Boxshall, Vișoianu's role was the send to the allies from Maniu the latest information regarding the internal situation in Romania and to accelerate the negotiations. Also, Maniu hoped that Vișoianu's presence was seen in the ally circles of Cairo as a sign of his good intentions. Chastelain told Attlee that General Tobescu confessed, on August 22, 1944, that Antonescu rejected the truce propositions of the allies because he was advised by Gafencu who explained to him that if he resisted, he will get better conditions. Chastelain alluded to the Polish influence because Dianu, Pangal, Gafencu, and Franasovici were known as having close links with the Polish and used Polish links of communication. Chastelain considered that a secondary influence in Antonescu's decision of rejecting the terms of the truce was the information provided by the Romanian information service that the Americans secretly procured important quantities of Romanian oil shares.

Kremlin was very unsatisfied with the tone used by Chastelain (who did not know that his telegrams were shown by the SOE to the Soviets) in his telegram from April 19, 1944, through which he informed his superiors in Cairo on the motives of Antonescu's government on rejecting the conditions of the truce. The effects of this incident have been considerable. Many of the SOE operations in the Balkans were suspended.

The British government informed on April 22 the Soviet government, specifying that it had instructed the British minister in Berne to communicate that a contact link had been established with Maniu and Antonescu and that opening a new contact link was not wanted.

On June 1, Lord Moyne, Novikov and MacVeagh met and agreed to hand a declaration to the Romanian emissaries through which they declared that the prolonging of the negotiations had no goal and that the negotiations were considered stopped. If Maniu wanted to take advantage of the conditions offered by the truce he had to send an officer on the front to contact the Red Army. On June 10, Maniu telegraphed to the allies that he agreed to their conditions.[12] Regarding the means of applying the truce, the tzaranist leader informed that these were to be settled with the responsible factors and will be communicated to the allies. Maniu finished his telegram in an optimistic note: *"keeping in mind the fact that the conditions of the truce have been accepted, we are convinced that we will get an ease of these conditions when they will be applied, as the Allies have said in numerous times"* . Ambassador MacVeagh had a different opinion: *"the allies' representatives do not know what to understand from the last proposition from above, because they have not promised an ease of the conditions of the truce, but on the contrary*

[11] Cristian Troncotă, Traian Borcescu, *Riscul jocului dublu* [The Risk of a Double Game], in „Magazin istoric", no. 7, July 1993, p. 31.

[12] Paul D. Quilan, *Ciocnire deasupra României. Politica Anglo-Americană faţă de România, 1938-1947*. Traducere: Gheorghe Onișoru, Centrul de Studii Româneşti, Fundaţia Culturală Română, Iaşi, 1995, p. 94. [Original Editions – *Clash over Romania: British and American Policies Toward Romania* (Los Angeles: 1977).]

they underlined numerous of times that these could be changed worse if Romania will not accept the sooner."

On 3rd June 1944 in the document SOE work in Romania Masterson wrote that He had some meetings with Janos since his arrival in Cairo on 24th May. He gave some information about political situation. The following notes deal with the subjects covered during their talks:

D/H13 and Autonomous Party

Janos information on this matter was verry scanty. Knowing how interested we should be in any reliable information he could be given SOE about D/H 13 it is surprising that Alecu did not make a point to find out as much as possible about party such news to send SOE through Vișoianu. Masterson can only surmise that the surmise Autonomous Party are very well guarded.

It was interesting to note that Janos made the statement that Alecu had not seen D/H13 despite his repeated attempts to do so. This is strange because it is a contradiction in statements contained in one of DH 13's own messages

There are two possibilities. Firstly, that Maniu did in fact see D\H13 and had orders from Ion or Mihai Antonescu to keep the matter absolutely to itself and for this reason he had not confided in Vișoianu and secondly, D/H 13s message was written under duress and in fact D/H13 didn't see Maniu.

As far as Vișoianu knows Chastelain still held in Bucharest in the house adjoining the Gendarmerie Palace and usually inhabited by officer of i/g of Gendarmes. Both Voda and Janos that every attempt should be made to arrange to escape the party. Janos considers that any attempts to have the party moved from Bucharest (on account of the bombing) into one of the nearby villages. Escape should be easier than from their present location. Masterson` discussed the question of the arranging of the escape of the Autonomous party during the period of confusion which was bound to exist at the time of the proposed Alecu's proposed coup d'etat. Vișoianu agreed that as the coup was to take place as the front setting the Autonomous party free would present very considerable difficulties Maniu would probably be able only hold Bucharest for a short time.

Both Voda and Janos thought that Alecu should be asked at this stage to nominate somebody for the task of getting the Autonomous party free at the right time. They thought that the best person for this is the general Barbu who was 2nd person i/g of the Corps of the Gendarmes and who was removed from this post by Ion Antonescu. He has since then been collaborator of Alecu's and has probably assigned an important role in connection with winning over of the Gendarmerie at the time of the coup. In the last time Maniu appears to have reverted the idea of a coup in Bucharest. This should make this escape operation easier. Mention should also be made of the intervention by Gane who in a personal message to Mihai Antonescu asked the latter.

MATEI GHICA a friend of D/H 13 and D/H311 is also going out. He was the pilot who was going tring out Janos. The operation of exfiltration of Vișoianu by plane failed. Matei Ghica was moved to Ianca aerodrome.

JOCKEY (*nick-name Rica Georgescu*)

With the regard of the Vișoianu stated that he had been moved from Malmaison following upon certain requests which had been made to Mihai Antonescu to send the Rica Georgescu out of BUCHAREST on account of the Allied bombing. CHISTESCU must have received order in this sense from Mihai Antonescu (*nick-name NAE*) as the jockey was recently moved into a house in a village near to BUCHAREST. In this case

Janos was rather vague regarding the information he could give to SOE to the Rica Georgescu contacted and whom he can see. FARO is apparently, secretary and visit him regularly. So does his wife. Janos could say very litle.

A/H25

Regarding A/H25 and his collaborator Soreanu (the jewish journalist), Janos had quite a lot to say. It was Janos itself who took A/H25 to see Alecu after A/H 25's first visit to Istanbul where he had had discussion with Chastelain. At that time Janos considered A/H25 as an honorable man but he has subsequently become convinced that both he and more and especially SOREANU are doble agents. Through Eugen Christescu the head of (the Romanian Secret Service) Soreanu had pass all the information he got from MANIU circles to Mihai Antonescu. To convince himself of this Janos purposely told Soreanu a lie and was able to check that within a matter of days the story had reached NAE. Furthermore, as the story concerned Alfred, Janos was also able to confirm also that Mihai Antonescu also spoke to Alfred about this matter.

Janos referred to A/H25's arrest last year and stated that this was definitely a put-up job just before this arrest Mitica just returned from a visit to HITLER and during a meeting with a Alecu's collaborators ravel at this interviewer stated he had had a great deal of trouble during his visit to GERMANY, because Hitler had accused him that closing an eye to Alecu's contacts with the British. During his rage he stated that he knew that A/H25 was ALEC contact with the British. A/H25 subsequently arranged for his own arrest with his friend Christescu. Nothing of a compromising nature was found during house search which was instituted and AH25 was soon released.

In this period Christescu called about ten people to his office and gave them a warning that they must stop all forms of activity in the favor of the Allies. Christescu then turned to four of the ten among whom was Sorean saying that he gave them a last warning and that at the first sign of agitation they would be interned. The next day Soreanu was around Maniu house as usual. Janos asked if we considered such a thing possible unless Soreanu was, in fact, an agent of police. As he is a Jew Soreanu would have been locked up long ago had he was not Cristescu's agent.

Janos warned Maniu about all this and had asked him to be very carefully what he told Soreanu. Asked by Masterson why Maniu had to see Soreanu at all. Janos stated that Alecu was indebted to Soreanu for establishing the contact between himself and de Weck, the Swiss minister in Bucharest. And that it was through this channel that Maniu arranged the sending the messages to his Romanian political friends in Western Europe.

On June 20, 1944, in Cairo, on El Gekira Street number 10, took place a meeting with: Steel, the political counselor of the Foreign Office, the American counselor Smante, the Soviet counselor Solod, Lieutenant Colonel Masterson, prince Stirbei, C. Vișoianu and the Romanian businessman Max Auschnitt, latter recently came from Romania. Auschnitt was questioned about Maniu's plans to overthrow Marshal Ion Antonescu. He answered that, lately, he visited Maniu quite often, the last visit being made on the evening of June 16, 1944. Auschnitt showed that the politic opposition forces, especially the communists, need funds, and he gave them the money: about 15 million lei. Many people had heard about the financial help he offered the communists and now his life was in danger. Maniu himself advised him to leave the country. He managed to escape at the board of a military plane, after Maniu warned the British that a plane carrying a friend of his will leave the country, via Turkey.

Auschnitt gave precious information to the British regarding targets of the ally bombings in Romania and valuable information from the politic and economic domain.

The Romanian businessman proposed that General Vârtejan be sent as the link officer to coordinate with the allies the coup d'état. Maniu did not accept because he was not ready with the plans. The tzaranist leader also told Auschnitt to organize a resistance in the Apuseni Mountains; there was also a reception area there. Maniu insisted also on two other problems. The communication problem showed that the device he had was out of order for three weeks. Therefore, another device was necessary with an operator. The second issue was the German propaganda which spread rumors about the deportations in occupied Moldavia, especially in Botoşani and Dorohoi. The news had been believed by the population. Auschnitt suggested that the mayors of the localities should deny the rumors, but not on radio in Moscow but on BBC. He also talked about an audience with Doctor Filderman with the King in which he asked the Sovereign to keep him posted with the preparations for the coup d'état so that the Jews could take their own security measures. Filderman reminded Auschnitt that they found the King in a good mood and that he looked stronger than he did in the past. He was visited by some high rank Officers in the days after the second front was opened and these Officers assured the king of their loyalty in any kind of action he intended to undertake. Asked if Maniu had decided the time and place of the coup d'état, Auschnitt answered that it had to be coordinated with a Soviet offensive. Solod asked Auschnitt how Maniu intended to coordinate the coup d'état with the Soviet offensive. The answer was received through a contact officer.

In the Romanian industrialist opinion, the departure from Romania was an easy problem because it was impossible to survey all the departure points. He had left the country during daytime from a military airport. Auschnitt answered that Luca, the manager of his company in Galati reported that important German troops and equipment's had passed through the city onto the front. Marshal Antonescu said to a friend of his that on the front were in that moment 50 divisions: 30 German and 20 Romanian. General Vârtejan, a friend of Auschnitt's who had just returned from Bacau before his escape from Romania, informed him that the German troops were poorly equipped mostly regarding the clothes. According to Vârtejan, there were 150.000 German soldiers on the front and a corresponding number in reserve. The movement of the German troops in Romania was done without the knowing of the Romanian Commandment. There were no Romanian commandments on the front and neither were two Romanian divisions on the front fighting next to each other; they were all interspersed with the Germans. The Romanian recruits seen in different villages were not armed. Although from routine Auschnitt's activity was under surveillance, his pro-British feelings have never been questioned by the SOE. Nevertheless, the transcript of the meeting in El Gekira proves the fact that Auschnitt was not completely honest, tending to exaggerate his activity.

So, he stated that that he helped a lot at the organization of the Patriotic Block formed from the tour opposition parties and that the creation agreement of BND was signed ten days ago, i.e. on June 10, 1944, and that the parties delegated four members to form the work committee of the Patriotic Front. This is false; the creation agreement was signed on June 20, in the same day as Auschnitt's leave for Cairo to take part in the meeting on El Gekira Street with the representatives of the allies. Likewise, he stated that he organizes several 15-20.000 workers from the plants in Resita regarding the resistance after the coup d'état and that important stacks of arms and grenades were made, and that they were available in plants. The number was undoubtedly exaggerated. The total of the workers of the plants in Resita was smaller, and it would have been necessary to organize such many people – the equivalent of an infantry division – a major state formed of men who should have had military training.

On June 23, 1944, in an SSI note was shown that Maniu appreciated that the German front was expected to crash and Antonescu to retire from power. *"Maniu, was showed in that document, often contacts his informers and his military experts, who give him documents permanently."*[13] This febrile activity is explained by the fact that on June 20 the tzaranist leader sent to Ankara a message which contained detailed plans of the coup d'état which was to lead Romania in the camp of the United Nations. For this action to work Maniu requested to the USSR to undertake a vigorous offensive of the Romanian front and to the Anglo-Americans to send three air born brigades, in some vital points around Bucharest. The message was resolved in Cairo, to the Allies on June 29, 1944, by Știrbei and Vișoianu.

On July 14, 1944, the radio telegrapher Tzurcanu was captured. Thus, the last radio links which served Maniu directly with Cairo was cut. An inquiry started by the British after the War highlighted serious deficiencies of security. Regarding Tzurcanu's capture, Cristescu's declarations proved that not only Tzurcanu was guilty of disobeying the security rules but also some members of Maniu's network who have not respected some elementary rules of conspiracy. An example in this matter was Reginald being brought into Știrbei's house, objective which was under the observation of the Romanian and German information services. The high radio traffic (Cristescu speaks of approximately 600 messages. and keeping the hour of the transmission were other mistakes that could have brought the downfall of the entire SOE network in Romania including Maniu if it wasn't for Cristescu. Besides a British document showed that the purpose of Reginald's mission had become known to almost 40 persons and stated that without the protection and guidance of Eugen Cristescu the network would have easily been captured by the Germans. Another radio-emission device was sent to the country with Cretzianu's help. For safety measures its location was settled in Snagov and not in the capital. Also, Masterson managed to deliver two devices, one to Alexandru Ștefănescu and the other to Niculescu Buzești.

When Tozan escaped from the arrest in Budapest, he was in Bucharest since December 1, 1943. He resumed his contact with Maniu with the purpose of assisting the allied cause. Later, he realized that the Opposition was impotent, so he contacted Mihai Antonescu. The latter regarding him as a British agent and knowing him to be a Turks of standing charged him with a peace feeler HS5/827 SOE report dated 7th August 1944. He left Romania in a boat put at his disposal by the Romanian Government, and under the command of a Romanian Naval Officer. On July 25, 1944, Tozan arrived in Istanbul where he immediately contacted Lieutenant Colonel Harris-Burland. During their meeting, he declared himself disappointed by Maniu's lack of action. Tozan said that Maniu's party was not likely to take any action to overthrow the existing Regime in Romania. They were content to have numerous meetings and discussions and apparently think that the coup d'etat in Romania can be carried out by political means only and without bloodsheds.

Maniu stated on several occasions that his coup d'etat was to take place on a certain day, or at a certain hour, but on each occasion an excuse has been found for not acting. Alecu's activities are closely watched and he was followed everywhere. The impression gained from what Tozan said was that Maniu and his party were insecure, and one member pf the Party who reported to Maniu about Mihai Antonescu's activities pose

[13] Nicolae Ciachir, *Marile Puteri și Romania 1856-1947* [The Great Powers and Romania 1856–1947], Editura Albatros (Seria *Historia*), București, 1996, p. 311.

the same thing for Mihai Antonescu. Generally, Allecu's movement was well known and was not considered dangerous HS5/825, SOE report dated 29th Jully 1944. Tozan stated that he had with him a plan from Mihai Antonescu to get the Germans out of Romania, which bore the agreement of Marshal Antonescu. The Marshal wanted to send a qualified officer to discuss the details of the plan with the allies. Tozan gave his word to Mihai Antonescu that he will come back to Romania after he shows the plan. He did not trust Cretzianu or Barbu Știrbei. He brought with him letter from colonel Chastelain to Masterson, and from Ivor Porter. Tozan asked to be sent to London with Violeta Stârcea as his private secretary. Tozan's propositions have not been acted because the British officers in Istanbul regarded them as a new attempt of Mihai Antonescu to secure immunity after the War from the Allies part. In Istanbul Tozan contacted Constantin Giurescu, Mihai Antonescu's personal representative, and cooperated with him. HS5/827 SOE report dated 7th August 1944.

After Tzurcanu's fall, Maniu depended on Niculescu-Buzești to secure the links with the outside. He decided that General Aldea passed the front line and consulted with the Soviets technical aspects of the truce. It was suggested that he should be accompanied by Colonel Chastelain, but the British wanted to get him out of Romania because they were afraid that the Romanians would not last the German pressure and they will give him to the Gestapo. Mihai Antonescu sent information through Cretzianu that Chastelain was safe and that he will resist the German pressure. The Romanians had strong reasons not the give the British officer who could disclose information to the Germans, which could compromise them, for example the Marshal's correspondence with the British General Wilson and especially with Maniu.

On August 20, when the Soviet pressure on the front increased, Maniu sent a message to Cairo which informed him that he decided to act without waiting for an answer from the allies. Mihai Antonescu also asked Turkey to act as an intermediary/mediator between Romania and the allies to finish the truce, having in this case the King's consent, the Marshal and of every member of the opposition. He wanted to know which of the three alternatives was favorable to the Anglo-Americans: sending a Romanian representative to Moscow to finish the truce; simultaneously being in connection/contact with the British, Americans and the Soviets to settle the conditions of a truce; or discussing the conditions of the truce with the Allies in Cairo[14]. He did not have the chance to finalize the action. On the afternoon of August 23, the Marshal and his main collaborators were arrested.[15]

Conclusions

In the second half of 1943, the defeats suffered on the Eastern Front prompted both the Antonescu government and the opposition to step up discussions with the Allies in search for a solution to bring the country out of the war. With the government's consent, two emissaries were sent: Barbu Știrbei and Constantin Vișoianu. This article analyses the SOE operation to extract Vișoianu from Istanbul and the discussions they held with SOE

[14] Florin Constantiniu, *Însemnările unui agent britanic din ajunul insurecţiei române din August 1994* [Notes of a British Agent on the Eve of the Romanian Insurrection of August 1944], in „Revista de istorie", 35, no. 5-6, 1982, p. 737.

[15] Christopher Andrew, Oleg Gordievschi, *KGB. Istoria secretă a operațiunilor sale externe de la Lenin la Gorbaciov*. Traducere din limba engleză de Doina Mihalcea-Știucă, Editura All, București, 1994, p. 229. [Original Edition – KGB: The Inside Story of Its Foreign Operations from Lenin to Gorbachev (London: 1990).]

representatives in Cairo. Documents relating to this operation indicate that the SOE appeared interested in the situation of the *Autonomus* team and the possibility of exfiltrating this team, which had been arrested by the Romanian authorities. Furthermore, the SOE were interested in the activities of their agents, which were verified through Barbu Stirbei, Vișoianu and, subsequently, Max Auschnitt. The British officers appeared less interested in Maniu's role in organizing the coup. The British document analyzing the activity of SOE in Romania concludes that if the connections with the opposition would not have been settled since 1939 it is doubtable that the coup d'état in August 23, 1944, would not have been prepared and executed successfully. Thus, SOE attributed itself merits for the success of the coup d'état on August 23, 1944, in Romania. In our opinion these merits are not wholly justified and an argument regarding this is given by the British document which talk about the fact that SOE gave a small importance to Colonel Black's Scheme presented by Vlădescu-Olt, about which the British officers themselves admit was the basis of the coup d'état in August 1944.

Authors' Contributions:

The authors contributed equally to this work.

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ORIGINAL PAPER

Government AI Readiness in Europe: Economic Development, Digital Government and Administrative Accountability

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Abstract:
The use of artificial intelligence (AI) in public administration depends not only on resources and technology but also on how authority and responsibility are organised within government. This article examines how economic development, human development, government effectiveness and digital government maturity relate to the Government AI Readiness Index 2025 across 38 European countries, and complements this analysis with a documentary comparison of Estonia, Romania and Albania. The quantitative analysis combines Pearson and Spearman correlations with ordinary least squares models using HC3 robust standard errors, followed by influence diagnostics, subsample estimates and a re-estimation on a readiness score that excludes the index components drawn from the same United Nations and World Bank sources as the explanatory variables. All four indicators are positively associated with AI readiness. The E-Government Development Index shows the highest correlation ($r = 0.81$) and, together with log GDP per capita, accounts for 70% of the cross-country variation; this association persists when the overlapping components are removed ($R^2 = 0.69$). Government effectiveness is associated with readiness after controlling for income ($\beta = 0.39$, $p = 0.01$), but not once digital government is also included ($p = 0.82$). The explained variance falls to 0.46 when the five Western Balkan states are excluded and to 0.43 within the EU-27, so part of the pattern reflects the contrast between the Western Balkans and the rest of the sample. The case comparison shows that national strategies, coordination bodies and citizen-facing AI services do not by themselves establish who may authorise, override or answer for AI-supported administrative decisions. Readiness indices therefore capture enabling conditions rather than accountable AI governance. Governments should pair investment in digital government with an explicit allocation of decision rights, meaningful human oversight and identifiable administrative accountability.

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1. Introduction

Artificial intelligence (AI) offers public administrations opportunities to automate routine tasks, improve access to services and support complex decision processes. Yet its introduction also raises questions about data quality, organisational competence, transparency and the accountability of public officials. Research accordingly treats AI in government as an institutional transformation rather than a purely technological investment (Wirtz, Weyerer and Geyer, 2019; Zuiderwijk, Chen and Salem, 2021).

European governments differ considerably in the resources available for AI and in the maturity of their administrative systems. Prosperity can facilitate investment but does not guarantee effective deployment; digital capabilities and institutional arrangements may matter as much (Mergel, Edelmann and Haug, 2019; Janssen et al., 2020). Recent comparative work questions GDP-based explanations of AI readiness (Pearl et al., 2026; Amaral, Naranjo-Zolotov and Bação, 2026), links AI readiness to income, and income to internet use, across the European Union (Burlacu et al., 2025), and finds that gains in AI readiness accompany e-government development over time (Spivakovskyy et al., 2026).

This matters for ministries, municipalities and public agencies. Readiness rankings can guide policy attention, but they do not show whether procurement decisions are documented, whether a civil servant may override an algorithmic recommendation or whether an affected citizen can obtain meaningful review. An advanced digital government may deploy AI quickly without having assigned responsibility for consequential outputs, while a less resourced one may adopt narrower applications with stronger safeguards. Enabling national conditions must therefore be distinguished from the quality of governance at the point of administrative use, which national indices cannot capture.

A further difficulty is methodological. The 2025 Oxford Insights index, which broadened its question from implementing AI in public services to how far a government can harness AI for public benefit, includes the UN Online Services Index and the World Bank's Government Effectiveness score among its 69 indicators (Oxford Insights, 2026). Correlations between readiness and these measures may therefore partly reflect shared inputs, a possibility that should be tested rather than assumed away.

This article asks how economic development, human development, government effectiveness and digital government maturity relate to government AI readiness across 38 European countries, and what these indicators leave unanswered about the administrative use of AI. It makes three contributions: a harmonised cross-sectional analysis based on the 2025 index; a test of whether the association between digital government and readiness persists once components sharing sources with the explanatory variables are removed; and a documentary comparison of Estonia, Romania and Albania focused on decision rights, human oversight and administrative accountability, with reference to the EU AI Act (Regulation (EU) 2024/1689). The following sections review the literature, describe the data and models, report the results, compare the three cases and discuss policy implications.

2. Theoretical Framework and Hypotheses

Wirtz, Weyerer and Geyer (2019) discuss opportunities and barriers across public-sector functions, while Sun and Medaglia (2019) show that challenges differ by stakeholder and organisational context. Zuiderwijk, Chen and Salem (2021) call for empirical work connecting technological adoption to governance, public values and institutional change, and an OECD (2025a) review documents the promise of AI in core government functions alongside persistent constraints involving skills, legacy systems, data and coordination. Several distinctions matter when interpreting these studies. Automated assistance with information retrieval differs from applications supporting eligibility, risk assessment or enforcement, which place greater demands on evidence, transparency and review. A system's technical accuracy does not settle whether its deployment is administratively appropriate: public managers must decide when automation is justified, which decisions are reserved to qualified officials and how performance will be monitored after implementation. Cross-country readiness indicators identify broad patterns, but they reveal little about how these responsibilities are carried out in practice.

Digital transformation is particularly relevant because AI applications depend on interoperability, reliable data, electronic services and administrative experience with new technologies. Mergel, Edelmann and Haug (2019) describe digital transformation as organisational change rather than service digitisation, Janssen et al. (2020) emphasise data governance for trustworthy AI, and van Noordt and Misuraca (2022) document diverse AI uses across the European public sector. E-government maturity is nevertheless not synonymous with AI capability: digital service availability may develop faster than the governance arrangements required for automated processes. The usual measure, the UN E-Government Development Index (EGDI), also averages online services with telecommunications infrastructure and human capital, so it captures broader digital development rather than administrative digitalisation alone (United Nations, 2024). The relationship may also run in both directions, since within-country gains in AI readiness accompany improvements in e-government development (Spivakovskyy et al., 2026).

Economic and human development provide resources and skills, while government effectiveness may facilitate policy implementation and the coordination of technological investment. Comparative studies find that governance and digital capacity are associated with readiness and that European national profiles are heterogeneous (Pearl et al., 2026; Amaral, Naranjo-Zolotov and Bação, 2026). These conditions are themselves interrelated, and the indicators used to capture them measure different things: HDI combines health, education and income outcomes; Government Effectiveness aggregates perception-based sources on public-service quality and policy implementation (World Bank, 2026b); EGDI measures e-government development; and the Oxford Insights index assesses a government's wider capacity to harness AI. A strong correlation between them may reflect genuine co-development, shared national conditions or common inputs to the composite measures. This study therefore treats them as comparative proxies rather than observations of administrative routines, and also examines whether government effectiveness and digital government maturity retain separate associations with readiness when considered together.

The literature on algorithmic accountability adds a dimension that composite readiness measures cannot capture. Busuioc (2021) highlights the difficulty of scrutinising automated public decisions, Green (2022) questions whether nominal human supervision provides meaningful control, and Nzobonimpa and Savard (2023) distinguish readiness

from responsible AI governance. Formal authority, staff competence, the ability to contest outcomes and clearly assigned responsibility remain central public-management questions. Regulation (EU) 2024/1689 translates several of them into obligations for high-risk systems: human oversight (Article 14), the assignment of oversight by deployers to competent and authorised persons (Article 26), fundamental-rights impact assessments by public bodies (Article 27) and a right to explanation for affected persons (Article 86). Compliance with these requirements should not, however, be confused with demonstrated administrative performance (European Parliament and Council, 2024).

Four hypotheses follow:

H1: Higher socio-economic development is positively associated with government AI readiness.

H2: Government effectiveness is positively associated with government AI readiness after accounting for economic development.

H3: Digital government maturity is positively associated with government AI readiness after accounting for economic development.

H4: The association between digital government maturity and government AI readiness persists when the index components that share sources with the explanatory variables are excluded.

The hypotheses concern statistical associations. The three country cases are used to interpret, not to test, how decision rights, human oversight and accountability are organised behind these national differences.

3. Data and Methodology

The study combines a cross-sectional analysis of 38 European countries with a documentary comparison of three national cases. The sample comprises the 27 EU Member States, the EFTA states and the United Kingdom, and the candidate countries whose accession process was active in 2025: Albania, Bosnia and Herzegovina, Moldova, Montenegro, North Macedonia, Serbia and Ukraine. Liechtenstein is excluded because 2025 GDP data are unavailable, and Georgia and Türkiye because the European Commission (2025b) considered their accession processes to be at a standstill. The sample therefore covers the EU together with its closest European partners and active accession candidates. Because it is purposive rather than random, significance tests are read as diagnostics of the observed relationships rather than as grounds for generalisation. A robustness check adds the seven further states of the wider European region with complete data (Andorra, Armenia, Azerbaijan, Belarus, Georgia, Russia and Türkiye).

The dependent variable is the Government AI Readiness Index 2025 (Oxford Insights, 2025), scored from 0 to 100. The 2025 edition aggregates 69 indicators into 14 dimensions and six weighted pillars and assesses how far a government can harness AI for public benefit, including as buyer, enabler and regulator of AI across the economy, rather than public-sector deployment alone (Oxford Insights, 2026). The explanatory variables are GDP per capita at purchasing power parity in constant 2021 international dollars for 2025 (World Bank, 2026a), entered in logarithms to reduce positive skew; the Human Development Index for 2023 (UNDP, 2025); the 2025 Government Effectiveness score on a 0-100 scale, which aggregates perception-based sources (World Bank, 2026b); and the E-Government Development Index (EGDI) for 2024, which averages online services, telecommunications infrastructure and human capital on a 0-1 scale (United Nations, 2024). The five datasets were merged by ISO3 code after harmonising country names, with no missing values. Because reference years differ, the data form a

comparative snapshot rather than a time series.

Pearson and Spearman correlations describe the bivariate patterns, and Williams' test compares dependent correlations (Steiger, 1980). Ordinary least squares models then take the general form:

$$AI_Readiness_i = \alpha + \beta_1 \ln(GDP_PPP_i) + \gamma' Z_i + \varepsilon_i$$

Four OLS regression specifications are estimated, following the general equation above. Model 1 serves as the baseline specification, with Z_i empty, and includes only the logarithm of GDP per capita (PPP) as an explanatory variable, capturing the association between economic development and Government AI Readiness. Model 2 extends the baseline specification by including the E-Government Development Index (EGDI) in Z_i, assessing whether digital government maturity is associated with AI readiness after controlling for economic development. Model 3 replaces EGDI with Government Effectiveness, examining whether institutional effectiveness is associated with AI readiness independently of economic development. Finally, Model 4 includes both EGDI and Government Effectiveness in Z_i, testing whether these indicators retain separate associations with AI readiness when considered simultaneously. The Human Development Index (HDI) is included in the correlation analysis to assess the relationship between human development and AI readiness, but is excluded from the multivariate regressions. This decision reflects both conceptual overlap with the other development indicators and its strong correlations ($r = 0.89$) with log GDP per capita and Government Effectiveness, which could complicate the interpretation of individual regression coefficients due to multicollinearity. All four models are estimated using ordinary least squares (OLS) with HC3 heteroscedasticity-consistent standard errors. The corresponding p-values are calculated using the t distribution with n-k degrees of freedom, providing a more conservative approach to statistical inference in a relatively small sample. Model performance is compared using R^2, adjusted R^2, the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). Higher R^2 and adjusted R^2 values indicate greater explanatory power, while lower AIC and BIC values indicate a more favourable balance between model fit and complexity. The estimated coefficients and model comparison statistics are reported in Table 3.

To test H4, the models are re-estimated on a purged readiness score. Two Oxford Insights dimensions contain indicators drawn from the same sources as the explanatory variables: e-Government delivery (weight 7.5%), which includes the UN Online Services Index, and Societal transition (5%), which includes the World Bank Government Effectiveness indicator (Oxford Insights, 2026). The published weights reproduce the total scores to within 0.01 points. Because the index dataset reports scores at dimension level, both dimensions are removed in full and the remainder is rescaled to 0–100:

$$AI^*_i = (AI_i - 0.075 \cdot EGD_i - 0.05 \cdot ST_i) / 0.875$$

This is conservative, since it also removes the other indicators of these dimensions.

Diagnostics include variance inflation factors, residual plots, the Breusch–Pagan and Shapiro–Wilk tests, Cook's distance and leverage. Robustness checks re-estimate the models after excluding each country in turn, the most influential observations (Iceland, Ukraine, Bosnia and Herzegovina, Ireland and Luxembourg), the five Western Balkan states and all non-EU states, and on the extended sample of 45 countries; Model 2 is also estimated with the Online Services Index in place of EGDI. The analysis was carried out in Python (pandas, NumPy, SciPy and statsmodels).

The documentary comparison covers Estonia, Romania and Albania. Estonia and Romania have similar GDP per capita but readiness scores 12.8 points apart, while

Albania has a higher EGDI than Romania but lower readiness; the three also occupy different positions relative to the predictions of Model 2. Sources comprise national strategies, legal acts, official communications and assessments by the OECD and the European Commission. They are examined along four dimensions (strategic and institutional coordination, administrative capacity, decision rights and human oversight, and transparency and accountability), distinguishing implemented arrangements from announced goals and draft instruments.

The design identifies associations, not causal effects, and national indicators cannot observe decision rights or oversight within individual organisations; these limits are discussed in the conclusions.

4. Empirical Results

Table 1 summarises the five indicators. Government AI readiness ranges from 35.67 to 80.81 points (mean 62.74, standard deviation 11.22), so national preparedness differs substantially even within a comparatively developed European sample. GDP per capita is positively skewed (skewness 1.33, reduced to -0.23 after log transformation), which supports its use in logarithmic form.

Table 1. Descriptive Statistics of the Main Research Variables

Variable	N	Mean	Median	Std. Dev.	Minimum	Maximum
Government AI Readiness (2025)	38	62.739	64.420	11.217	35.670	80.810
GDP per capita, PPP (2025)	38	52,823	49,192	25,578	16,155	131,338
Human Development Index (2023)	38	0.901	0.914	0.054	0.779	0.972
Government Effectiveness (2025)	38	72.571	74.100	13.961	40.147	92.814
E-Government Development Index (2024)	38	0.865	0.875	0.078	0.633	0.985

Source: Authors' calculations based on Oxford Insights (2025), World Bank (2026a, 2026b), UNDP (2025) and United Nations (2024).

All four indicators are positively correlated with AI readiness (Table 2). EGDI shows the strongest linear association ($r = 0.81$), followed by HDI (0.73), Government Effectiveness (0.69) and log GDP per capita (0.66); rank correlations are similar ($\rho = 0.70$-0.73). The confidence intervals overlap, however, and the correlation for EGDI is not significantly larger than those for HDI (Williams' $t = 1.09$, $p = 0.28$) or Government Effectiveness ($t = 1.57$, $p = 0.13$). The explanatory indicators are also closely interrelated: HDI correlates at 0.89 with both Government Effectiveness and log GDP, Government Effectiveness at 0.87 with log GDP, and EGDI at 0.70 with Government Effectiveness.

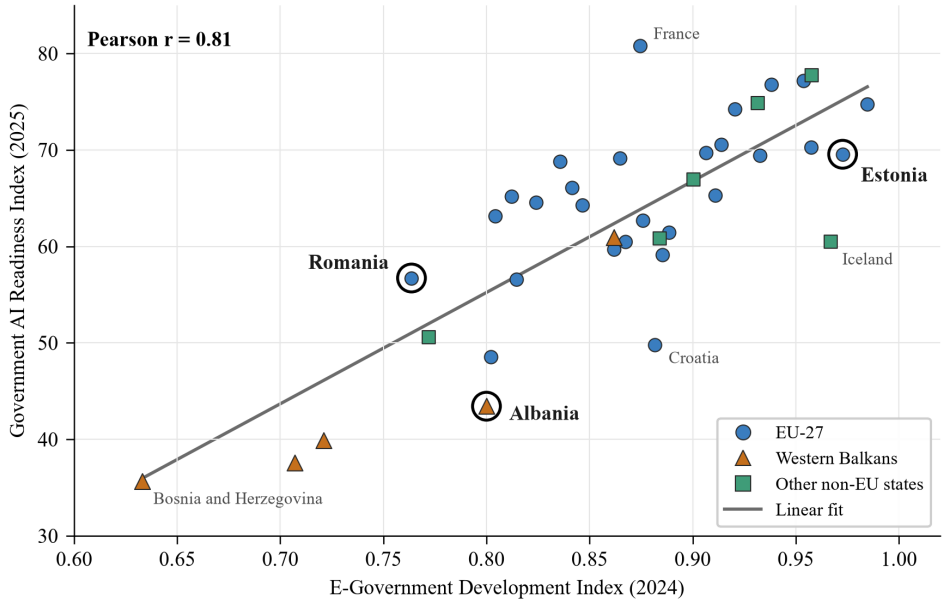
Table 2. Correlations Between Government AI Readiness and Selected Indicators

Explanatory variable	Pearson's r	95% CI for r	Spearman's ρ
GDP per capita, PPP (2025)	0.547	0.275 – 0.738	0.697
Log GDP per capita, PPP (2025)	0.656	0.425 – 0.806	0.697
Human Development Index (2023)	0.728	0.533 – 0.850	0.719
Government Effectiveness (2025)	0.688	0.473 – 0.826	0.718
E-Government Development Index (2024)	0.806	0.656 – 0.895	0.728

Notes: N = 38. All coefficients are significant at p < 0.001. Confidence intervals are based on Fisher's z transformation. Spearman's ρ is identical for GDP and log GDP because the transformation preserves ranks.
Source: Authors' calculations based on the harmonised European dataset.

Figure 1 shows the relationship with EGDI and the position of the Western Balkan states at the lower end of both scales.

Figure 1. E-Government Development and Government AI Readiness in 38 European Countries



Note: The line shows the bivariate OLS fit. Labelled cases are the three countries compared in Section 5 and observations discussed in the text.
Source: Authors' calculations based on Oxford Insights (2025) and United Nations (2024).

Table 3 reports the four regression models. Log GDP per capita alone accounts for 43% of the variation in readiness (Model 1). Adding EGDI raises R^2 to 0.70 and yields the lowest AIC and BIC among the four specifications (Model 2).

Table 3. OLS Regression Results: Government AI Readiness

Variable / Statistic	Model 1	Model 2	Model 3	Model 4
Constant	−102.798*	−87.903***	−25.416	−93.782*
	(44.086)	(18.506)	(45.659)	(37.183)
Log GDP per capita, PPP	15.375***	6.604**	5.576	7.226
	(4.060)	(1.978)	(4.670)	(3.653)
EGDI	—	91.943***	—	93.586***
		(13.753)		(17.472)
Government Effectiveness	—	—	0.387*	−0.031
			(0.143)	(0.138)
Observations	38	38	38	38
R^2	0.4300	0.7027	0.4878	0.7030
Adjusted R^2	0.4141	0.6857	0.4586	0.6768
AIC	273.193	250.454	271.126	252.419
BIC	276.468	255.367	276.038	258.969

*Notes: Dependent variable: Government AI Readiness Index (2025). HC3 heteroscedasticity-consistent standard errors in parentheses; p-values from the t distribution with n-k degrees of freedom. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.*
Source: Authors' calculations based on the harmonised European dataset.

Both predictors remain significant: at a given income level, an EGDI higher by 0.1 is associated with a readiness score about 9.2 points higher. In Model 3, Government Effectiveness is positively associated with readiness ($\beta = 0.39$, $p = 0.010$), while log GDP loses significance; fit improves only modestly over Model 1 ($R^2 = 0.49$). These results support H1–H3. When both indicators are entered together (Model 4), EGDI keeps a similar coefficient (93.6, $p < 0.001$), whereas the coefficient of Government Effectiveness falls to −0.03 ($p = 0.82$) and R^2 is unchanged (0.703). Government Effectiveness therefore adds no information about readiness beyond income and EGDI in this sample.

Table 4 assesses the stability of these results. When the two Oxford Insights dimensions that share sources with the explanatory variables are removed, the Model 2 estimates are virtually unchanged (EGDI $\beta = 99.5$, $R^2 = 0.69$), supporting H4; Government Effectiveness also remains significant in Model 3 and insignificant in Model 4. Replacing EGDI with the Online Services Index gives a similar fit ($R^2 = 0.68$). In Model 2, EGDI remains significant in every subsample and in all 38 leave-one-out estimations (coefficient range 87.1–98.7), but the share of variance explained depends on sample composition: it falls to 0.46 without the Western Balkans and to 0.43 within the EU-27, where log GDP is no longer significant. Part of the overall pattern therefore reflects the contrast between the Western Balkan states and the rest of the sample. Within the EU-27, Model 4 cannot separate Government Effectiveness from EGDI ($p = 0.051$ and $p = 0.146$). The Government Effectiveness coefficient in Model 3 weakens to the margin of significance when Ireland and Luxembourg, the two income outliers, are excluded ($p = 0.051$), but

remains significant in every leave-one-out estimation.

Table 4. Robustness of the Regression Results

Specification	N	Model 2			Model 3	Model 4	
		Log GDP	EGDI	R^2	GE	GE	EGDI
Full sample	38	6.60**	91.94***	0.703	0.387*	−0.031	93.59***
Purged readiness score (H4)	38	7.12**	99.46***	0.687	0.380*	−0.084	103.95***
Online Services Index instead of EGDI	38	10.75***	52.24***[a]	0.679	0.387*	0.105	49.72***[a]
Excluding Iceland	37	6.60**	98.74***	0.748	0.399**	−0.046	101.21***
Excluding Ireland and Luxembourg	36	8.42*	86.15***	0.706	0.294	−0.070	89.56***
Excluding high-leverage cases	34	10.85**	76.19***	0.660	0.290	−0.009	76.75**
Excluding Western Balkans	33	5.46**	69.42***	0.464	0.407**	0.164	57.56*
EU-27 only	27	6.47	71.57***	0.432	0.518***	0.304	42.03
Extended sample	45	7.70**	99.76***	0.713	0.378*	0.122	94.51***
Leave-one-out range[b]	37	5.77 to 7.56	87.1 to 98.7	—	0.318 to 0.446	−0.088 to 0.023	86.9 to 101.2

*Notes: OLS coefficients with HC3 standard errors; p-values from the t distribution. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$. The purged readiness score excludes the e-Government delivery and Societal transition dimensions (Section 3). High-leverage cases: Bosnia and Herzegovina, Ireland, Luxembourg and Ukraine. Western Balkans: Albania, Bosnia and Herzegovina, Montenegro, North Macedonia and Serbia. The extended sample adds Andorra, Armenia, Azerbaijan, Belarus, Georgia, Russia and Türkiye. [a] Coefficient of the Online Services Index. [b] Range across 38 estimations, each omitting one country; all estimates are significant at $p < 0.05$ except Government Effectiveness in Model 4 ($p \geq 0.54$ in every estimation).*
Source: Authors' calculations based on the harmonised European dataset and, for the extended sample, the same sources.

Diagnostics do not indicate heteroscedasticity in Model 2 (Breusch–Pagan LM = 0.05, p = 0.98), and its residuals are consistent with normality (Shapiro–Wilk p = 0.43). Variance inflation factors are low in Model 2 (1.51) and moderate in Model 4 (at most 5.28). Iceland has the largest Cook's distance in Model 2 (0.14, above the 4/n threshold of 0.105), while Bosnia and Herzegovina, Ukraine, Luxembourg and Ireland have high leverage; excluding them does not change the direction or significance of the Model 2 coefficients (Table 4).

Relative to the predictions of Model 2, Romania scores 4.3 points above its expected value, Estonia 2.2 points below and Albania 8.5 points below. Section 5 examines the institutional arrangements behind these positions.

5. Comparative Institutional Analysis: Estonia, Romania and Albania

This section examines what the national indicators leave unanswered in the three cases selected in Section 3. Table 5 places them within the statistical results, using the Model 2 predictions and the Oxford Insights pillar scores, and Table 6 summarises the documentary evidence along the four analytical dimensions. The comparison distinguishes arrangements in force from strategies, announcements and draft instruments.

It is illustrative: it cannot establish why the countries differ, but it shows which administrative questions the scores do not answer.

Table 5. Quantitative Profile of the Three Cases

Indicator	Estonia	Romania	Albania
GDP per capita, PPP (2025)	41,604	40,846	22,724
Government Effectiveness (2025)	83.04	59.94	61.98
EGDI (2024)	0.973	0.764	0.800
Government AI Readiness (2025)	69.56	56.73	43.44
Predicted readiness, Model 2	71.78	52.43	51.90
Residual, Model 2	−2.22	+4.30	−8.46
Oxford Insights pillars and dimensions (score and rank)			
Policy Capacity (10%)	96.0 (3)	84.0 (13)	23.0 (36)
AI Infrastructure (25%)	54.3 (26)	55.2 (24)	51.2 (34)
Governance (15%)	90.0 (9)	71.7 (30)	51.7 (36)
Public Sector Adoption (15%)	99.6 (1)	55.7 (35)	69.0 (29)
Government digital policy (7.5%)	99.4 (1)	28.4 (35)	51.0 (29)
e-Government delivery (7.5%)	99.9 (2)	82.9 (33)	86.9 (24)
Development and Diffusion (25%)	46.0 (19)	38.1 (28)	24.4 (36)
Resilience (10%)	64.4 (17)	59.0 (26)	41.6 (36)

Notes: Ranks among the 38 sample countries in parentheses (1 = highest). Percentages give the weight of each pillar or dimension in the overall index. Predicted values and residuals are from Model 2 (Table 3).
Source: Authors' calculations based on Oxford Insights (2025), World Bank (2026a, 2026b) and United Nations (2024).

The three countries occupy different positions relative to Model 2. Estonia's readiness score is close to the value predicted from its income and EGDI (2.2 points below). It ranks first in the sample on Public Sector Adoption but 26th on AI Infrastructure and 19th on Development and Diffusion, the pillars that capture computing capacity and the wider AI economy. Romania scores 4.3 points above its prediction, a position consistent with its comparatively strong Policy Capacity (13th), whereas it ranks 35th on Public Sector Adoption and scores 28.4 out of 100 on government digital policy. Albania lies 8.5 points below its prediction: its e-government delivery score exceeds Romania's, but it ranks 36th on Policy Capacity, Governance and Development and Diffusion. For Romania and Albania, the distance between digital service provision and overall readiness therefore lies in policy and governance components rather than in online services.

Estonia's AI agenda builds on an established digital administration. The Kratt Strategy of 2019 and the White Paper on Data and Artificial Intelligence 2024–2030 link AI to interoperable digital services, with central coordination and implementation by individual public authorities (OECD, 2026a). Bürokratt, an AI-supported virtual assistant for access to public services, illustrates this model: when automated assistance is insufficient, users are directed to human customer-service staff (Estonian Information System Authority, n.d.). Such escalation preserves human contact in citizen-facing

services, but it is not evidence that consequential administrative decisions are subject to effective oversight. Like most Member States, Estonia had not adopted a national law implementing the AI Act by spring 2026 (Cullen International, 2026), and the obligations for stand-alone high-risk systems apply only from 2 December 2027 (European Parliament and Council, 2026). Estonia's governance challenge is therefore to keep oversight consistent as AI adoption spreads across many authorities.

Romania adopted its National Artificial Intelligence Strategy 2024–2027 by Government Decision No. 832/2024 (Government of Romania, 2024). Implementation is coordinated by an interministerial commission of representatives of 34 central public institutions, which monitors the action plan while each institution implements the measures in its own field (OECD.AI, 2026). Leadership of the commission is passing from the former Ministry of Research, Innovation and Digitalisation to the newly established Ministry of Economy, Digitalisation, Entrepreneurship and Tourism (OECD, 2025b). This architecture assigns policy responsibilities but not operational accountability for individual systems. Supervision under the AI Act shows a similar gap. A government memorandum of 12 March 2026 designated ANCOM as market surveillance authority and single point of contact, the Authority for the Digitalisation of Romania as notifying authority, and sectoral authorities for financial, biometric, migration and justice-related systems (Government of Romania, 2026). Because a memorandum confers no enforcement powers, ANCOM stated in July 2026 that breaches could be sanctioned only after a national implementing law, then still in preparation, entered into force (ANCOM, 2026). Romania's position above the model prediction thus rests on strategic commitments, while the arrangements that would turn them into supervised administrative practice remain incomplete.

Albania has expanded e-Albania services through a centralised model in which the National Agency for Information Society (AKSHI), under the Prime Minister's Office, coordinates government information systems (European Commission, 2025a; OECD, 2026b). A draft National AI Strategy 2025–2030 and a draft Law on Artificial Intelligence modelled on the EU AI Act were opened for public consultation in August 2025 and May 2026, but neither had been adopted by August 2026 (National Agency for Information Society, 2025, 2026; Balkan Insight, 2026). Diella, the e-Albania virtual assistant, was presented in September 2025 as a Minister of State for Artificial Intelligence with a role in public procurement (Council of Ministers of Albania, 2025), and its latest version completes service requests from spoken commands (Council of Ministers of Albania, 2026). In a decision adopted on 8 October 2026 and published on 9 November 2026, the Constitutional Court rejected an opposition request to annul the related provisions of the presidential decrees on grounds of jurisdiction and standing. It found that the decrees did not make Diella a member of the Council of Ministers, that Diella is an AI platform rather than a natural person with legal capacity, and that the provisions placed responsibility on the Prime Minister, while stating that the use of AI cannot alter the constitutional and legal order or replace public powers, responsibilities and accountability (Constitutional Court of the Republic of Albania, 2026). According to the Public Procurement Agency, procurement legislation now provides a basis for using AI in tendering, but experts consider it insufficient as a framework for oversight (Balkan Insight, 2026). As a non-member, Albania is bound by the AI Act only through the alignment expected in accession, and in September 2026 its Parliament was examining the ratification of the Council of Europe Framework Convention on Artificial Intelligence (RTSH, 2026). Albania thus illustrates the distinction between interface and authority: a visible AI service

has preceded a legal framework that allocates responsibility for its outputs.

Across the three cases, the national indicators capture strategies, digital services and coordination structures, but not the arrangements that determine who may authorise, override or answer for an AI-supported decision. In Estonia, these arrangements are distributed across agencies; in Romania, they are assigned on paper but not yet enforceable; in Albania, an AI interface has gained political visibility before a legal framework has been adopted. The cases do not show that weaker oversight produces lower readiness scores, or the reverse. They show that readiness and accountable deployment can diverge in different directions, which is why the two require separate assessment.

Table 6. Comparative Institutional Characteristics of Government AI Governance

Dimension	Estonia	Romania	Albania
Strategic and institutional coordination	Kratt Strategy (2019); Data and AI White Paper 2024–2030; central coordination, implementation by individual authorities	National AI Strategy 2024–2027; interministerial commission of 34 central institutions; coordinating ministry reorganised in 2025	Digital Agenda 2022–2026; draft AI strategy (2025) not adopted; centralised coordination through AKSHI
Administrative capacity	First in the sample on Public Sector Adoption; weaker AI infrastructure and AI sector scores	35th on Public Sector Adoption; government digital policy 28.4/100 despite strong policy commitments	Strong e-service delivery (e-Albania); 36th on Policy Capacity and Governance
Decision rights and human oversight	Bürokratt escalates to human staff; AI Act high-risk obligations from December 2027	AI Act applies; competent authorities designated by memorandum (March 2026); implementing law pending (August 2026)	AI interface presented as a minister; Constitutional Court: AI cannot transfer public powers or accountability. Court (2026): Diella is not a member of the government and responsibility rests with the Prime Minister
Transparency and accountability	No national AI Act implementing law by spring 2026; accountability rests with deploying authorities	Sanctions not enforceable until the national law enters into force	Procurement law allows AI use; draft AI law not adopted; responsibility for AI outputs not set out in a dedicated act
Main governance issue	Keeping oversight consistent as adoption spreads across agencies	Turning strategic commitments into enforceable supervision	Separating the AI interface from legally allocated authority

Source: Authors' synthesis based on the documents cited in this section; administrative capacity rows draw on Oxford Insights (2025). The last row gives analytical interpretations of the documentary evidence, not measured scores.

6. Discussion and Policy Implications

The results support a multidimensional view of government AI readiness, with three qualifications. First, the association between digital government maturity and readiness is not an artefact of shared indicators, since it persists when the index components drawn from UN and World Bank sources are removed. Because EGDI also contains human capital and telecommunications infrastructure, however, it should be read as broad digital development rather than administrative digitalisation alone, and the relationship may run in both directions (Spivakovskyy et al., 2026). Second, Government Effectiveness adds no information once EGDI is considered, so the data do not reveal an institutional-quality

pathway separate from digital development; within the EU-27, the two cannot be distinguished. Third, much of the explained variance reflects the gap between the Western Balkan states and the rest of the sample. Among EU Member States, income and digital government account for less than half of the differences, leaving room for policy choices and institutional factors that national indices measure poorly. National scores are therefore starting points for administrative diagnosis: they cannot show whether a ministry lacks data specialists, has fragmented procurement responsibilities or is uncertain about its legal authority.

The country comparison also shows why readiness rankings should not be taken as proxies for accountability. Three requirements follow. First, decision rights must be explicit: public bodies should determine which officials may approve, procure, deploy and discontinue an AI system, and when its outputs may be disregarded. Second, human oversight must be operational rather than nominal, since an official without the information, time, competence or authority to question an output cannot exercise meaningful control (Green, 2022). Third, accountability must remain identifiable throughout the system's life cycle, from procurement and data governance to monitoring and the review of individual decisions (Busuioc, 2021). The AI Act gives these requirements legal form for high-risk systems: deployers must assign oversight to persons with the necessary competence, training and authority (Article 26), public bodies must assess the impact on fundamental rights before deployment (Article 27), and affected persons may obtain an explanation of decisions (Article 86) (European Parliament and Council, 2024). Under Regulation (EU) 2026/1744, the obligations for stand-alone high-risk systems apply from 2 December 2027, leaving a limited period to build the corresponding administrative capacity (European Parliament and Council, 2026). Compliance will not by itself ensure sound public management, and many administrative uses of AI, such as citizen-facing assistants, carry only transparency obligations.

Three policy implications follow. First, governments should link AI plans to investment in data quality, interoperability, service processes and staff competence rather than to index rankings. Second, each institution using AI should designate the officials responsible for authorising, procuring, deploying, monitoring and discontinuing systems, and record these assignments. Third, oversight should be resourced: officials need the information, authority and time to assess automated recommendations and intervene in consequential cases, with proportionate procedures for low-risk assistance and stronger safeguards where AI affects benefits, sanctions or other individual outcomes.

For Romania, the immediate priorities are to adopt the implementing law, give the designated authorities enforcement powers and translate the national strategy into public-sector AI policy, the dimension on which it scores lowest. For Estonia, the task is to keep oversight consistent as AI spreads across agencies. For Albania, adopting the draft AI law and aligning it with the AI Act would provide the legal allocation of responsibility that its visible AI services currently lack. These implications derive from documentary comparison and are not demonstrated effects of specific interventions.

Conclusions

This study combined a cross-sectional analysis of 38 European countries with an institutional comparison of Estonia, Romania and Albania. GDP per capita, HDI, Government Effectiveness and EGDI are all positively associated with Government AI Readiness 2025. A model combining log GDP per capita and EGDI accounts for 70% of cross-country variation, and the association with EGDI persists when the index

components that share sources with the explanatory variables are removed. The results provide support for the four hypotheses, although the evidence concerning Government Effectiveness requires qualification. Its positive association with AI readiness remains statistically significant after controlling for economic development (Model 3), but not when digital government maturity is also included (Model 4). Furthermore, the explanatory power of income and digital government falls below half within the EU-27.

The institutional comparison shows what these associations leave out. Estonia's readiness reflects mature public-sector adoption; Romania's position above the model prediction rests on strategic commitments not yet matched by enforceable supervision; and Albania has deployed a highly visible AI service before adopting a legal framework that allocates responsibility for it. Readiness indices therefore measure enabling conditions rather than accountable AI governance, and the allocation of decision rights, meaningful human oversight and identifiable responsibility require separate assessment.

The study contributes to public administration research by testing whether a widely used readiness index overlaps with the indicators used to explain it, and by linking cross-country patterns to the legal and organisational arrangements that govern the use of AI, including the obligations of Regulation (EU) 2024/1689.

Its limitations are those of a cross-sectional design with different reference years, a purposive sample, composite indicators and national-level measures. The direction of the relationship between digital government and readiness cannot be established, and the institutional comparison relies on documents rather than observation of administrative practice. Future research should use longitudinal data, indicator-level index components and organisation-level case studies, including interviews and procedural records, to examine how public authorities exercise oversight in AI-supported decisions as the AI Act's high-risk obligations take effect. Responsible AI in government requires technological and administrative capability together with identifiable human authority and accountability.

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The authors contributed equally to this work.

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ORIGINAL PAPER

Securitizing Human Development and Population Resilience: Citizen Participation and Policy-Making Nexus through Digital Archives

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Abstract:
Introduction: Over the past decade, the relationship between human development and population resilience has been a key theme in specialized research, focusing on new analytical directions such as citizen participation, policy-making, well-being, resilience, and opportunities. During this period, the digitization of scientific content has become invaluable for research initiatives, enabling a systematic analysis of how relevant concepts and themes have evolved, as well as how patterns regarding the interdependencies between security and human development have been revealed within digital archives.
Objectives: To understand how this issue is perceived and analyzed in the specialized literature, we undertake a statistical and analytical study to examine how field specialists and practitioners approach the subject.
Methodology: The research employs a mixed methodological framework organized into three stages. In the first part of the study, we select relevant analytical categories (n=14) and systematically analyze the content available on the Dimensions (Digital Science) platform, grouped by analytical categories and selection criteria. In the second part, the analysis categorizes the document corpus based on the occurrence of the selected topics. In the final part of the study, we examine correlations between the various topics using the Pearson correlation coefficient to analyze the strength and direction of the relationship, based on conventional thresholds: : $|r| > 0.9$ = very strong correlation; $0.7 < |r| \leq 0.9$ = strong correlation, $0,5 < |r| \leq$ = moderate correlation; $0,3 < |r| \leq 0,5$= weak correlation; moderate correlation; $|r| \leq 0.3$ = negligible or non-existent correlation.
Results and conclusions: Research findings demonstrate that security-related topics cannot be analyzed in isolation from themes and subjects associated with human development. Uneven distributions are observed regarding years, document types, and citation counts, indicating a need for targeted sectoral policies grounded in the causal

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relationships and interdependencies between the two fields (security and human development).

Keywords: *security, human development, population resilience, policy, digital.*

Introduction

Recent scholarly debates feature a significant body of literature addressing the direct link between human development, security, population resilience (De Souza, 2015; Coaffee, Fussey, 2015; Hettne, 2010) and citizen participation (Reid-Henry, 2011). This discourse shifts the paradigm of preventive practices, traditionally associated with population resilience, towards a concept of human security framed in terms of fostering human development and strategies for security (Helm, 2015; Olimid, Olimid, 2022; Olimid, Georgescu, 2017). First, it is essential to analyze how the operationalization of the security-human development-population resilience–citizen participation nexus has evolved in the literature over the past decade, as this inquiry sheds light on both policy-making and, crucially, adaptation and resilience (Adger, O'Riordan, 2014), and citizen participation (Hettne, 2010) by mapping population growth (Walker, 2016), environmental security (Schilling, Nash, Ide, Scheffran, Froese, von Prondzinski, 2017) and labour market (Koval, Polyezhayev, Bezkhlibna, 2018). Second, resilience and participation offer multiple analytical perspectives serving as benchmarks for organizational security while also providing a basis for theoretical exploration within the realm of critical infrastructure, policies and processes (Juntunen, Hyvönen, 2014; Olimid, Olimid, 2025) and security-development nexus (Stern, Öjendal, 2011).

Methodology

The study employs a mixed-methods research design comprising three complementary stages. In the first stage, we conduct a systematic content analysis using the Dimensions (Digital Science) (2026) bibliometric database, organized into four analytical groups: "Security", "Resilience and human development", "Digital", and "Public policy and participation" (Column 1, Table 1). The research corpus was systematically organized and analyzed across fourteen topics, as follows: (1) the "Security" analytical group comprises five topics: "human security", "citizen security", "policy security", "information security", and "AI and security"; (2) the "Resilience and human development" analytical group comprises three topics: "social resilience", "population resilience", and "human development"; (3) the "Digital" analytical group comprises four topics: "digital policy", "digital divide", "digital governance", and "trust in technology"; and (4) the "Public policy and participation" analytical group comprises two topics: "policy capacity" and "citizen participation". The analysis for the 2018–2026 period notes that the extracted research data also include publications accepted in advance for 2027 that are already available online. The choice of the Dimensions platform (Digital Science) is justified by the volume and documents available in the database's digital archive. The research corpus was systematically analyzed for the fourteen selected topics. To structure and interpret the research data, we grouped the fourteen topics into four analytical categories, as identified in Columns 1 and 2 of Table 1.

The selection of analytical categories and topics for analysis was based on their relevance to current debates, and the data were extracted on September 27, 2026. The table

lists the total number of publications (Column 3, Table 1), the total number of policy documents (Column 4, Table 1), the total number of citations (Column 5, Table 1), the mean citations per topic (Column 6, Table 1), and the growth in the frequency of each topic's appearance between 2018 and 2025 (Column 7, Table 1).

In the second phase, we grouped the number of publications containing the selected topics by year [Table 2 (1 of 2); Table 2 (2 of 2)]. In the third phase of the research, we used the Pearson correlation coefficient (Table 3) to measure the strength of the linear relationships between the variables in Table 1. We interpreted and analyzed the coefficients based on conventional thresholds as follows: $|r| > 0.9$ = very strong correlation; $0.7 < |r| \leq 0.9$ = strong correlation, $0,5 < |r| \leq$ = moderate correlation; $0,3 < |r| \leq 0,5$= weak correlation; moderate correlation; $|r| \leq 0.3$ = negligible or non-existent correlation.

Results and discussions

The first part of the results section presents the corpus of publications, structured according to the four analytical groups (Table 1, Column 1) for the period 2018-2027. Additionally, the table displays the distribution of the fourteen topics (Column 2) based on the number of publications (Column 3), policy documents (Column 4), number of citations (Column 5), average number of citations (Column 6), and a comparison across topics and analytical groups (Column 7).

Table 1. Comparative overview of publications given the analytical groups (security, resilience and development, digital and public policy and citizen participation) given total number of publications and policy documents

Column	1.	2.	3.	4.	5.	6.	7.
Row	Analytical group	Topic	Publications	Policy documents	Citations	Mean citations	Growth 2018-2025
1.	Security	Human security	6.309.322	417.170	112.84 M	17.88	x 2.1
2.	Security	Citizen security	2.214.223	196.693	30.12 M	13.60	x 1.3
3.	Security	Policy security	5.761.247	864.148	93.84 M	16.29	x 2.0
4.	Security	Information security	8.279.342	774.569	141.27 M	17.06	x 2.1.
5.	Security	AI and security	1.899.211	35.244	27.57 M	14.52	x 5.2
6.	Resilience and human development	Social resilience	2.363.023	134.834	41.4 M	17.52	x 4.3
7.	Resilience and human development	Population resilience	2.191.583	120.484	43.37 M	19.79	x 4.3
8.	Resilience and human development	Human development	33.902.460	609.238	940.59M	27.74	x 1.8
9.	Digital	Digital governance	1.276.010	97.266	16.41 M	12.86	x 4.5

10.	Digital	Digital policy	3.958.003	236.715	67.32M	17.01	x 3.6
11.	Digital	Digital divide	2.036.464	41.264	42.21 M	20.24	x 2.31
12.	Digital	Trust in Technology	4.097.165	205.558	89.54 M	21.86	x 2.5
13.	Public policy and participation	Policy capacity	7.366.837	687.213	146.54M	19.89	x 2.2
14.	Public policy and participation	Citizen participation	2.344.104	170.982	35.53 M	15.16	x 1.3

Source: Digital Science (2018-). Dimensions app [Software]. Retrieved from https://app.dimensions.ai/discover/publication?search_mode=content. The dataset presented in Table 1 also includes 2027 publications (likely available online and retrieved from Dimensions app on 27 september 2026

Number of publications. The analyzed corpus covers the distribution of topics by number of publications. The largest number belongs to the "human development" topic (Row 8, Column 3), with 33,902,460 publications, followed by "information security" with 8,279,342 results (Row 4, Column 3) and "policy capacity" with 7.366.837 results (Row 13, Column 3). At the other end of the spectrum, the topics "AI and security" (Row 5, Column 2), "digital governance" record 1,899,211 and 1,276,010 publications, respectively.

Policy documents. Regarding the results recorded as policy documents, the analysis highlights that the highest numbers belong to the topic of "policy security" [864,148 results], followed by "information security" [774,569 results] and "policy capacity" [687,213 results]. The lowest figures were recorded for the topics of "population resilience" [120,484 results], followed by "social resilience" [134,834 results], "AI and security" [35,244 results], and "digital divide" [41,264 results].

The total number of citations is presented in Column 5 of Table 1. The largest figure belongs to the "human development" topic (Row 8, Column 5), with 940.59 million citations, followed by "policy capacity" with 146.54 million results (Row 13, Column 5) and "information security" with 141.27 million results. At the other end of the spectrum are the topics "AI and security" [27.57 million] and "digital divide" [42.21 million], respectively.

Regarding **mean citations,** notable results are recorded by "human development" [27.74 results] and "digital divide" [20.24 results]. The lowest figures are recorded by "citizen security" [13.60 results] and "AI and security" [14.52 results].

Regarding **growth** [Growth 2018-2025] (Column 7, Table 1), the fastest growth in the number of publications is recorded by "AI and security" (x5.2) and "digital governance" (x4.5). The slowest increases were recorded in "citizen security" (x1.3), "human development" (x1.8) and "citizen participation" (x1.3).

Table 2 (1 of 2) and Table 2 (2 of 2) show the number of publications per year containing the selected topics. The last column indicates the total number of publications for the first seven topics for each year - Table 2 (1 of 2) - while the last column of Table 2 (2 of 2) shows the total for the remaining seven topics. Across the ten-year period analyzed, the highest figures were recorded in 2025 for the topic of "policy security" (472,946 results), in 2021 for "information security" (489,523 results), and in 2024 for "human security" (484,208 results). Conversely, the lowest figures were identified for

topics published in advance (2027), as well as for "human security" (2025: 55,385 results) and "population resilience" (2019: 90,737 results; 2018: 80,879 results).

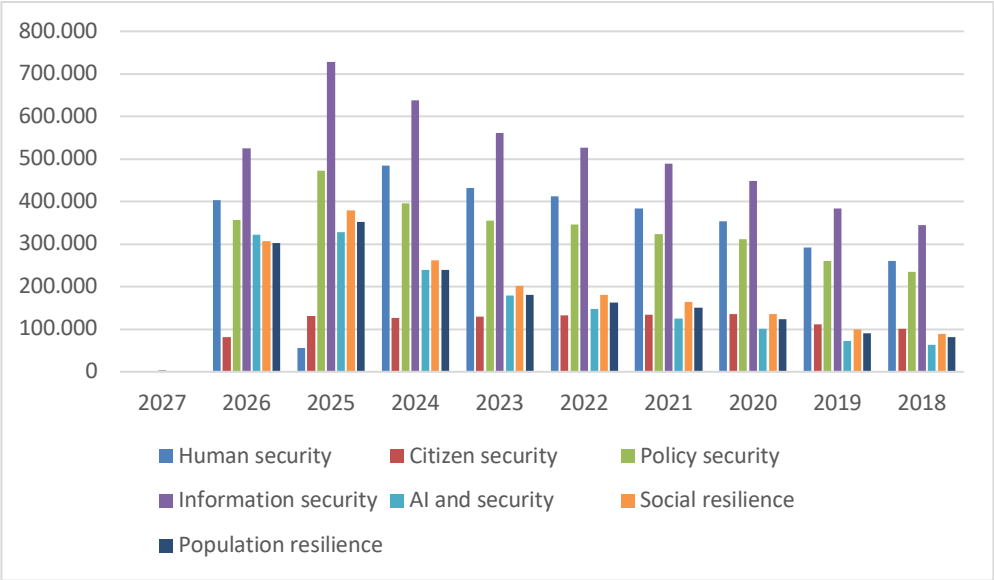
Table 2 (1 of 2). Comparative analysis of publications containing selected topics, by year (2018-2025)

Year	Human security	Citizen security	Policy security	Information security	AI and security	Social resilience	Population resilience	Total
2027 *	2.212	394	2489	3.204	1.756	1.625	1.711	13.391
2026	402.676	81.736	356.403	525.734	321.305	306.628	302.464	1.894.270
2025	55.385	131.479	472.946	728.318	327.548	378.980	351.706	2.390.977
2024	484.208	126.935	395.628	638.047	239.494	261.826	238.975	1.900.905
2023	431.976	129.678	355.222	561.294	179.852	201.823	181.017	1.608.886
2022	412.486	132.925	346.346	527.073	147.535	180.715	162.472	1.497.066
2021	383.024	133.699	323.926	489.523	125.004	164.738	150.525	1.387.415
2020	354.033	135.733	311.472	448.057	101.563	134.972	123.695	1.255.492
2019	291.956	112.052	260.191	383.018	71.976	99.237	90.737	1.017.211
2018	259.672	100.882	235.094	344.272	62.664	88.440	80.879	912.231
Total 2018-2027 *	3.077.628	1.085.119	3.057.228	4.645.336	1.576.941	1.817.359	1.682.470	13.864.453

Source: Digital Science (2018-). Dimensions app [Software]. Retrieved from https://app.dimensions.ai/discover/publication?search_mode=content.
***** The dataset presented in Table 2 (1 of 2) also includes 2027 publications (likely available online and retrieved from Dimensions app on 27 september 2026.

The data in Table 2 (1 of 2) and Figure 1 (1 of 2) indicate the highest aggregate result counts recorded in 2025 (2,390,977 results) and 2026 (1,894,270 results). Within this context, regarding the corpus structure in 2025, the topic "policy security" recorded the highest number of results (472,946), followed by "human security" in 2024 (484,208 results), 2023 (431,976), and 2022 (412,486). The rising trend in results for the "human security" topic, alongside "information security" (2026: 525,734 results; 2024: 638,047; 2023: 561,294 results) [Figure 1 (1 of 2)], provides a comprehensive overview of the frequency with which security-related terms have appeared over the last five years.

Figure 1 (1 of 2). Comparative analysis of publications containing selected topics, by year (2018-2025)



Source: Digital Science (2018-). Dimensions app [Software]. Retrieved from https://app.dimensions.ai/discover/publication?search_mode=content. The dataset presented in Figure 1 (1 of 2) also includes 2027 publications (likely available online and retrieved from Dimensions app on 27 september 2026.

This demonstrates that publications associated with fields such as "human security" and "information security" are evolving progressively in the same direction; that is, increased interest in the specialized literature regarding one topic is linked to a rise in interest in the other topics as well [Figure 1 (1 of 2)].

Table 2 (2 of 2) and Figure 2 (2 of 2) highlight a consolidated cluster of high values recorded between 2018 and 2026 for the topics of "human development" (values ranging from 1,320,874 in 2018 to 2,338,658 in 2025) and "digital policy" (values ranging from 148,892 in 2018 to 532,273 in 2025). The values recorded by these two topics during the specified period demonstrate the existence of a well-structured thematic core, featuring associated concepts and themes that underpin the multisectoral nature of security and development in contemporary times. Other strong associations are observed regarding topics linked to the terms "trust in technology", "policy capacity", and "citizen participation".

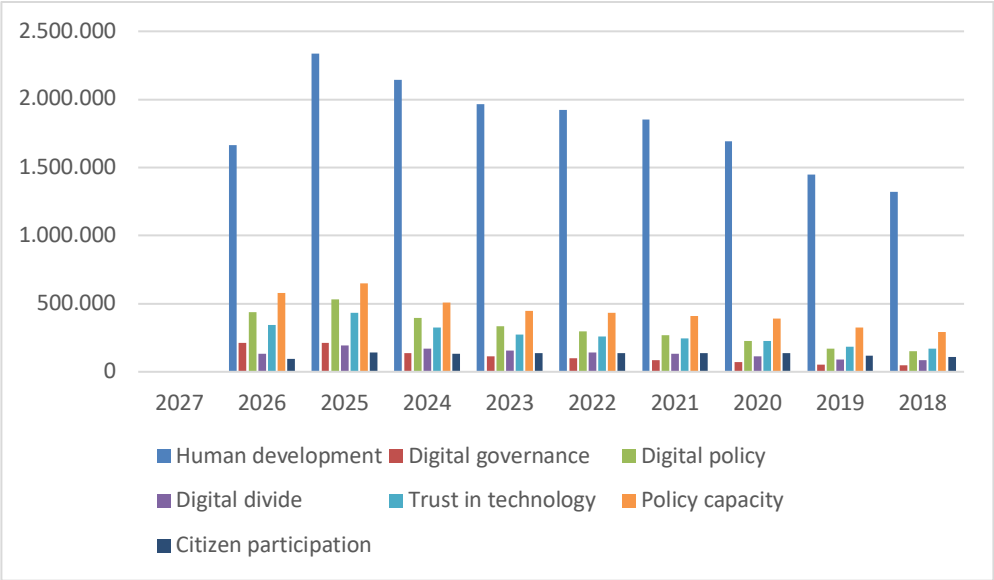
Table 2 (2 of 2). Comparative analysis of publications containing selected topics, by year (2018-2025)

Year	Human development	Digital governance	Digital policy	Digital divide	Trust in technology	Policy capacity	Citizen participation	Total
2027*	6.747	1.100	2.199	949	2.076	3.494	485	17.050
2026	1.664.296	213.425	440.061	133.797	344.596	580.471	95.525	3.472.171
2025	2.338.658	214.148	532.273	194.494	432.044	649.902	143.054	4.504.573
2024	2.143.431	136.185	393.409	168.320	323.858	509.083	131.545	3.805.83
2023	1.966.671	115.805	335.544	155.537	274.699	448.238	135.087	13.431.581
2022	1.923.020	97.956	297.871	141.669	259.482	434.404	138.060	3.292.462
2021	1.850.670	84.839	270.277	130.956	246.242	411.259	136.581	3.130.824
2020	1.692.058	72.455	226.273	112.596	225.959	391.047	139.131	2.859.519
2019	1.446.903	53.112	169.905	89.204	184.209	324.320	116.852	2.384.505
2018	1.320.874	47.198	148.892	84.008	170.006	293.797	106.609	2.171.384
Total 2018-2027*	6.353.328	1.036.223	2.816.704	1.211.530	2.463.171	4.042.521	1.142.929	29.069.900

Source: Digital Science (2018-). Dimensions app [Software]. Retrieved from https://app.dimensions.ai/discover/publication?search_mode=content.
***The dataset presented in Table 2 (2 of 2) also includes 2027 publications (likely available online and retrieved from Dimensions app on 27 september 2026.

Figure 2 (2 of 2) reveals one of the research's most significant findings: the strong association and year-on-year strengthening of the link between the topics of "policy capacity" and "citizen participation". This demonstrates that publications on both topics have grown concurrently, leveraging associations with the themes of "human development" (Column 2), "digital governance" (Column 3), "digital policy" (Column 4), and the "digital divide" (Column 5). There is a clear theoretical explanation for this result: digital transformations and the capacity to generate public policy are increasingly addressed as complementary areas of human development, information security, and institutional governance.

Figure 2 (2 of 2) . Comparative analysis of publications containing selected topics, by year (2018-2025)



Source: Digital Science (2018-). Dimensions app [Software]. Retrieved from https://app.dimensions.ai/discover/publication?search_mode=content.
The dataset presented in Figure 2 (2 of 2) also includes 2027 publications (likely available online and retrieved from Dimensions app on 27 september 2026.

Table 3. Pearson Correlation Matrix – Comparative Overviw (n=14 topics)

	Publications (log)	Policy documents (log)	Citations (log)	Mean citations	Growth 2018-2025
Publications (log)	r = 1	r = 0.771 R^2 = 0.6039 p < 0.01	r = 0.9897 R^2 = 0.9795 p < 0.001	r = 0.7279 R^2 = 0.5298 p < 0.01	r = -0.4939 R^2 = 0.2440 p = 0.0726
Policy doc (log)		r = 1	r = 0.7198 R^2 = 0.5181 p < 0.01	r = 0.2981 R^2 = 0.0889 p = 0.3006	r = - 0.568 R^2 = 0.3443 p < 0.05
Citations (log)			r = 1	r = 0.8169 R^2 = 0.6674 p < 0.001	r = -0.4679 R^2 = 0.2189 p = 0.0916
Mean citations				r = 1	r = -0.2491 R^2 = 0.0621 p =0.3904
Growth 2018-2025					r = 1

Table 3 presents the results of the calculations for Pearson correlation coefficients (r), coefficients of determination (R^2), and associated p-values for five categories of bibliometric indicators calculated for the 14 topics analyzed in Table 1. The five categories of bibliometric indicators are: publications, policy documents, citations, mean citations, and growth (2018–2025). R^2 represents the proportion of the variation in one of the five indicators explained by its relationship with another indicator.

To interpret the data in Table 3, the following levels were applied to the absolute value of r. These levels indicate the strength of the linear relationship established between two bibliometric indicators, as follows: $|r| > 0.9$ = very strong correlation; $0.7 < |r| \leq 0.9$ = strong correlation, $0{,}5 < |r| \leq$ = moderate correlation; $0{,}3 < |r| \leq 0{,}5$= weak correlation; moderate correlation; $|r| \leq 0.3$ = negligible or non-existent correlation.

Thus, Table 3 shows the following correlations between the indicators:

(1) publications – citations ($r = 0.9897$; $R^2 = 0.9795$; $p < 0.001$) indicates a very strong correlation between the two analyzed indicators, with 97.75% shared variance, representing a direct correlation between the number of publications and the number of citations; (2) citations vs. average number of citations ($r = 0.8169$; $R^2 = 0.6674$; $p < 0.001$): indicates a very strong correlation between the two analyzed indicators—citations and average number of citations - showing 66.74% shared variance; this is a direct correlation revealing that topics with a high volume of citations also tend to record a higher citation frequency per publication;

(3) publications vs. public policy documents ($r = 0.771$; $R^2 = 0.6039$; $p < 0.01$): indicates a very strong correlation between the two analyzed indicators, showing 60.39% shared variance - a direct correlation between the two indicators;

(4) publications vs. average number of citations ($r = 0.7279$; $R^2 = 0.5298$; $p < 0.01$): indicates a very strong correlation between the two analyzed indicators, showing 52.98% shared variance - a direct correlation established between the number of publications and the average number of citations.

The last column of Table 3 also highlights negative correlations, as follows: between growth and publications ($r = -0.4939$; $p = 0.0726$) and between growth and citations ($r = -0.4679$; $p = 0.0916$). These recorded values reveal that topics well-established in the scientific literature show slower growth trajectories than those in emerging fields. Table 3 highlights the relationship between the number of publications, relevance, and academic impact, as well as the patterns of uptake and dissemination across the selected analytical categories (security, resilience and development, digital and public policy, and citizen participation).

Conclusions

This research initiated an analytical study of the link between human security and human development using the Dimensions platform, focusing on scientific literature published between 2018 and 2027. The data - presented across both analytical categories and specific topics - highlight the nexus between citizen participation and policymaking; the results demonstrate that these two topics should not be studied in isolation within the thematic core of human development, security, and population resilience. Although the analysis reveals that certain topics account for the majority of publications, policy documents, total citations, and average citations per publication, it is important to note that some themes are generating new, highly influential directions for future research [Table 1; Table 2 (1 of 2); Table 2 (2 of 2)].

A second conclusion concerns the cohesion of the fourteen identified topics. Pearson correlations demonstrate strong links between the selected concepts, reflecting the fact that the nexus of human development, resilience, and human security constitutes a concentrated, multidimensional, and evolving thematic core (Table 3). These two main conclusions certainly have practical and applied implications: specifically, public policy and institutional governance treat security, resilience, and human development as inextricably linked to the strengthening of institutional capacity and the roles played by resilience and civic participation.

Authors' Contributions:

The authors contributed equally to this work.

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ORIGINAL PAPER

More Data, Less Transparency? A Data Pollution Index for Romania's National Open Data Portal

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Abstract:
Open government data portals are usually assessed by the volume of data they publish. This article argues that the growing volume of open government data does not necessarily translate into effective transparency: when published datasets are outdated, redundant, inconsistent or poorly documented, data pollution may undermine their reliability, accessibility and practical usability. Drawing on the ecological approach to information and on the distinction between nominal and effective transparency, we define data pollution as the accumulation of unusable residues in an open data ecosystem, whose costs fall on re-users rather than publishers. To examine the gap between data availability and data quality, we develop a Data Pollution Index (DPI) and apply it to the full catalogue of Romania's national open data portal, data.gov.ro: 5,269 datasets and 39,899 resources from 131 institutions, harvested in November 2026. The index combines indicators of staleness, broken links, format barriers, missing metadata and confirmed redundancy. Three datasets in five show at least one severe form of pollution, and every publication cohort since 2013 contributes polluted datasets. Staleness dominates: 69% of continuously updated datasets have not changed in over two years, and only one recurring series in three is still continued. Almost all files from the portal's first two years are no longer accessible, CSV files account for 6.4% of resources, and 70.5% of datasets give no contact address. Heavy pollution on several dimensions is rarer (6% of datasets) and sensitive to how the

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index is specified, whereas institution rankings are reasonably robust. High-value datasets are less stale and better documented, but more often duplicated. The findings complement existing open data maturity assessments by documenting dataset-level barriers to accessibility and re-use. They suggest that open data policy should monitor the condition and usability of published datasets alongside their volume.
Keywords: *open government data, data pollution, transparency, data quality, composite index, Romania*
JEL Classification: H83, C43, D83, O38

1. Introduction

Open government data portals are usually judged by how much they publish. European policy reinforces this logic: the Open Data Directive (EU) 2019/1024 and the High-Value Datasets Implementing Regulation (EU) 2023/138 oblige public bodies to release more data, in more domains, through more channels. Yet volume is a weak proxy for transparency. Datasets that are outdated, duplicated, contradictory or poorly documented can satisfy disclosure obligations while remaining practically unusable (Lourenço, 2015; Vetrò et al., 2016).

Romania illustrates this tension. Its national portal, data.gov.ro, has operated since 2013, and its catalogue has grown through successive Open Government Partnership (OGP) action plans; in a single cycle, public institutions added about 700 datasets, a 41% increase (OGP, n.d.-a). International benchmarks have improved as well. In 2025, Romania was placed among the "followers" of the European Open Data Maturity assessment and scored 0.59 on the OECD OURdata Index, above the OECD average of 0.53 (data.europa.eu, 2025; OECD, 2026). At the same time, re-users and official evaluations have repeatedly reported uneven quality and missing metadata, and the government itself acknowledges that the portal's publication guidelines are rarely applied by institutions (OGP, n.d.-b; OGP, n.d.-c).

This article argues that the growing volume of open government data does not necessarily translate into effective transparency. When published datasets are outdated, redundant, inconsistent, or poorly documented, data pollution may undermine their reliability, accessibility, and practical usability. To examine the gap between data availability and data quality, we develop and apply a Data Pollution Index (DPI) to Romania's national open data portal.

Three research questions guide the analysis:

1. **RQ1:** Does the growing volume of open data on data.gov.ro translate into effective transparency, or mainly into nominal transparency?
2. **RQ2:** Which forms of data pollution prevail, and how are they distributed across institutions, domains and publication cohorts?
3. **RQ3:** What does the DPI reveal about the gap between Romania's declared open data maturity and the actual state of its data?

The article makes two contributions. Conceptually, it reframes low-quality open data as data pollution: an ecosystem-level phenomenon defined by accumulation, persistence, exposure and externalities, rather than a property of individual datasets. Methodologically, it builds the DPI from the complete metadata of data.gov.ro, harvested through the portal's API on 11 November 2026, and offers an initial validation of the index. Section 2 develops the theoretical framework, and Section 3 outlines the Romanian

context. Section 4 presents the construction of the DPI, and Section 5 reports the results. Section 6 discusses the findings in light of the research questions, and Section 7 concludes with policy recommendations.

2.Theoretical framework: from data quality to data pollution

2.1. Public data as an informational ecosystem

The ecological metaphor treats information not as a static stock but as a living environment of people, practices, technologies and values (Nardi and O'Day, 1999). Open government data research has adopted this lens to describe how data move between publishers, intermediaries and re-users, and how value emerges only when these actors interact (Harrison, Pardo and Cook, 2012; Zuiderwijk, Janssen and Davis, 2014).

We use three ecological concepts. *Data vitality* describes whether published data remain alive: updated, accessible and relevant over time. *Data recycling* describes the transformation of administrative information into new resources, such as research, applications, journalism and civic monitoring tools. *Data pollution* describes what happens when the life cycle breaks down and unusable residues accumulate in the ecosystem. This article measures the third concept and uses the first two to interpret it.

2.2. Nominal versus effective transparency

Heald (2006) distinguishes nominal transparency, the formal availability of information, from effective transparency, which requires that information can be received, processed and used by its audience. When the two diverge, a "transparency illusion" emerges: disclosure indicators rise while the public's capacity to scrutinise government does not. Fung, Graham and Weil (2007) make a similar point: disclosure works only when information is usable and fits into users' decisions.

Open data policy is particularly exposed to this illusion. Janssen, Charalabidis and Zuiderwijk (2012) list as a persistent myth the belief that publishing data automatically yields public value. Lourenço (2015) shows that government portals often publish data that cannot support accountability. Our first research question follows from this distinction: if catalogue growth is accompanied by growing pollution, volume measures nominal, not effective, transparency.

2.3. Why "pollution" and not only "poor quality"

Data quality is classically defined as fitness for use (Wang and Strong, 1996). It is assessed along dimensions such as accuracy, completeness, consistency and timeliness (Batini et al., 2009). In open data research, it has been operationalised at dataset level (Vetrò et al., 2016; Raca et al., 2022) and, for metadata, through the FAIR principles (Wilkinson et al., 2016) and the European Metadata Quality Assessment (MQA).

The term "pollution" is not new, and we use it in a distinct sense. Ben-Shahar (2019) introduced "data pollution" to describe the negative externalities of collecting personal data. Wardle and Derakhshan (2017) use "information pollution" for mis- and disinformation. We borrow Ben-Shahar's externality logic but apply it to public data. We define *data pollution* as the accumulation of outdated, redundant, inconsistent, inaccessible or poorly documented public data in an open data ecosystem, whose costs fall on re-users rather than on publishers.

Four properties, taken from environmental science, distinguish pollution from poor quality:

- **Accumulation:** pollution is a stock. What matters is the load of unusable residues in the whole catalogue, not the average score of a dataset.
- **Persistence:** pollutants remain. A dead link or an abandoned dataset that has stayed uncorrected for years weighs more than one that failed last week.

• **Exposure:** harm depends on who is exposed. A polluted dataset that many people look for matters more than an obscure one, much as an air quality index weighs pollution by the population that breathes it.

• **Externality:** the publisher does not pay the cost. Re-users absorb it in time spent searching, cleaning and verifying, or in errors carried into their own work.

Table 1 summarises the distinction.

Table 1. Data quality and data pollution compared

Aspect	Data quality	Data pollution
Unit of analysis	Individual dataset	Catalogue, institution, ecosystem
Core question	Is this dataset fit for use?	How much unusable residue has accumulated, and who is exposed to it?
Time	Snapshot	Accumulation and persistence over time
Who bears the cost	The user of the dataset	Third parties: re-users, citizens, downstream services
Typical measure	Average quality score	Pollution load, persistence, exposure
Remedy	Correct the dataset	Clean up, retire and govern the data life cycle

Source: Authors' conceptual synthesis based on Wang and Strong (1996), Heald (2006), Ben-Shahar (2019), and the theoretical framework developed in this study.

This distinction is what the DPI must capture to be more than another quality index. Section 4 shows how each property enters the index, and Section 5 tests the index with the validation checks set out in Section 4.5.

3. The Romanian context

Romania has a complete legal and strategic framework for open data, but evidence on implementation points to a persistent quality gap. Law no. 109/2007 transposed the first Public Sector Information Directive. Government Emergency Ordinance no. 41/2016 required institutions to publish datasets on the national portal. Law no. 179/2022 on open data and the re-use of public sector information transposed the Open Data Directive. In 2024, the government adopted a National Open Data Strategy and Action Plan for 2024–2028, whose objectives include publishing high-value datasets with quality assurance and encouraging re-use (data.europa.eu, 2025). Governance is shared by the General Secretariat of the Government and the Authority for the Digitalisation of Romania (data.europa.eu, 2024).

International benchmarks show progress, but an uneven one. In the OECD OURdata Index 2025, Romania scored 0.85 on data accessibility and 0.52 on government support for re-use, both above the OECD averages of 0.67 and 0.40. However, it scored 0.41 on data availability, below the OECD average of 0.53 (OECD, 2026). The European Open Data Maturity assessment placed Romania in the "followers" cluster in 2025 (data.europa.eu, 2025).These international assessments provide valuable but different perspectives on open data maturity. The OECD OURdata Index primarily evaluates the governance, accessibility and re-use of open government data, while the European Open Data Maturity framework also examines quality and impact. In 2025, Romania scored 71.4% on the European quality dimension and 49.1% on impact, indicating that weaknesses are already recognised by existing assessments (data.europa.eu, 2025). The DPI complements these benchmarks by directly examining the observable condition of individual datasets and resources within the national catalogue.

On that condition, the record is critical. During the 2014–2016 OGP cycle, civil society and hackathon participants complained that the portal favoured quantity over quality and that usable metadata were almost absent (OGP, n.d.-b). The 2020 Open Data Maturity assessment named irregular, non-standardised and non-interoperable publication as a barrier to re-use (data.europa.eu, 2020). The 2025–2027 OGP action plan acknowledges that the guidelines available on data.gov.ro are rarely applied by institutions (OGP, n.d.-c). Romania therefore offers a suitable case for testing whether a growing catalogue can coexist with growing pollution.

4. Methodology: constructing the Data Pollution Index

4.1. Data

The analysis covers the full public catalogue of data.gov.ro. On 11 November 2026, we harvested the metadata of all 5,269 public datasets, their 39,899 resources (files) and the 131 institutions that publish them, through the portal's CKAN Action API. We then tested every resource URL with an HTTP request: HEAD first, then a partial GET when the server refused HEAD, with a 25-second timeout. An external validation against the European Metadata Quality Assessment (MQA) scores was initially planned but could not be completed for the November 2026 snapshot. This limitation is discussed in Sections 4.5 and 6.5.

4.2. Indicators

The DPI combines five indicators grouped in the three dimensions named in our thesis: reliability, accessibility and usability. Each indicator is scored between 0 (no pollution) and 1 (maximum pollution) for every dataset. Because all indicators are shares or bounded scores, no further normalisation is needed, and the index does not depend on the sample's minimum and maximum.

Table 2. Structure of the Data Pollution Index

Dimension	Indicator	Operationalisation (0 = clean, 1 = polluted)	Property captured
Reliability	R1 Staleness	The portal has no update-frequency field, so fixed thresholds apply. Continuous datasets: time since a file was last added or modified; 0 below 12 months, 0.5 at 12–24 months, 1 above 24 months. Year-specific datasets (a reference year in the title) are assessed through their series: the latest edition of a recurring series scores 0 if its reference year is 2025 or 2026, 0.5 if 2024 and 1 if 2023 or earlier. Earlier editions and one-off year-specific datasets are historical by nature and excluded. Two datasets belong to the same series when they come from the same institution and their titles are identical once reference years, diacritics, punctuation and letter case are removed	Persistence
Accessibility	A1 Broken links	Share of the dataset's resources that return an HTTP error (400 or above) or cannot be reached; resources without a link count as inaccessible	Accumulation

Dimension	Indicator	Operationalisation (0 = clean, 1 = polluted)	Property captured
Accessibility	A2 Format barriers	Format-related reusability barriers, averaged over the dataset's resources: open, structured formats (CSV, JSON, XML, RDF, ODS, geospatial formats, APIs) = 0; structured but proprietary (XLS, XLSX) = 0.5; unstructured or opaque formats, whose content cannot be processed or identified without opening them (TXT, ZIP, RAR) = 0.75; documents, images and undeclared formats (PDF, DOC, DOCX, ODT, HTML, empty) = 1	Accumulation
Usability	U1 Missing metadata	Share of five elements missing: description of at least 50 characters, at least one tag, an open licence, a contact e-mail, a declared format for every resource	Externality
Usability	U2 Redundancy	1 if redundancy is confirmed: the dataset repeats a file (same SHA-1 hash in the portal's archiver records) or a URL among its own resources, or contains a file identical to one in exactly one other dataset. Files shared by three or more datasets are treated as auxiliary files (nomenclatures, field descriptions) and not counted. Probable redundancy (similar titles, URLs shared with other datasets, same name, format and size) is reported separately. Otherwise 0	Accumulation

Source: Authors' own operationalisation of the Data Pollution Index (DPI), based on the theoretical framework and methodological decisions presented in Section 4.

Inconsistency, the fourth form of pollution in our definition, cannot be detected from metadata. Measuring it requires manual inspection of file contents, so it is outside the scope of this first version of the index (Section 6.5).

4.3. Aggregation and weights

The three dimensions receive equal weights, fixed before the analysis. Within each dimension, indicators are averaged:

$$DPI_i = \frac{1}{3} R1_i + \frac{1}{3} \cdot \frac{A1_i + A2_i}{2} + \frac{1}{3} \cdot \frac{U1_i + U2_i}{2}$$

When R1 is not defined because a dataset is historical by nature, the DPI is the mean of the two remaining dimensions, whose weights rise from one third to one half each. Section 5.6 reports the alternative of scoring these datasets 0 on R1.

The dataset scores are then aggregated in two ways that reflect the ecological properties in Table 1. The *pollution load* of an institution or of the whole catalogue is the share of its datasets with a DPI of 0.5 or above (accumulation). DPI and pollution load are also computed for each publication cohort (year of first publication), which shows whether the stock of pollution grows with the catalogue. Data.gov.ro exposes no view or download counts, so the exposure-weighted variant of the index could not be computed; exposure is discussed qualitatively in Section 6.

To describe how widespread pollution is beyond the index, we also count the datasets that show at least one severe form of it: staleness of more than 24 months or an

abandoned series (R1 = 1), at least one broken link, only documents, images or undeclared formats (A2 = 1), at least two missing metadata elements, or confirmed redundancy.

4.4. Scope of the index

The DPI covers the forms of pollution that can be measured for the whole catalogue: staleness, inaccessibility, format barriers, missing metadata and redundancy. Inconsistency (totals that do not add up, classifications that change between editions, values that differ from official statistics) requires reading the files themselves and is left for future work.

4.5. Validation strategy

The DPI is a formative index: its indicators define the construct rather than reflect a common latent cause. Internal consistency measures such as Cronbach's alpha therefore do not apply. Instead, we check that indicators are not redundant (Diamantopoulos and Winklhofer, 2001) and follow the OECD and JRC (2008) guidance on composite indicators with four tests:

1. **Non-redundancy:** the indicators should be only weakly correlated with each other (Spearman's rho), since each is meant to capture a distinct form of pollution.
2. **Discriminant validity against metadata quality:** a comparison with the European MQA scores of the same datasets was planned, to show that the DPI does not simply reproduce metadata quality. It could not be completed for this snapshot and is left for future work (Section 6.5).
3. **Known groups:** high-value datasets (identified through their HVD tags on the portal), which are subject to stricter EU publication rules, were expected to exhibit lower DPI scores than other datasets, providing a theoretically motivated comparison for assessing the index's ability to distinguish between groups. We report the Mann–Whitney U test with the rank-biserial correlation as effect size, for the index and for each indicator. HVD tags are added by publishers, so they may not cover every dataset that legally falls in this category.
4. **Robustness:** institution rankings are recalculated with equal weights across all five indicators, with weights derived from principal component analysis and by dropping one indicator at a time. Rank stability is reported as Spearman's rho between the alternative rankings. We also vary the staleness thresholds, the treatment of historical datasets and the definitions of broken links and redundancy, and report how the share of heavily polluted datasets changes.

5. Results

Data pollution on data.gov.ro is widespread but mostly partial. Three datasets in five (60.0%) show at least one severe form of pollution, and 15.8% show two or more. Heavy pollution across dimensions is rarer: 6.1% of datasets (322) have a DPI of 0.5 or above, a share that ranges from 2% to 24% depending on how the index is specified (Section 5.6). The mean DPI is 0.26 (median 0.23, interquartile range 0.18–0.37).

5.1. The catalogue

On 11 November 2026, data.gov.ro held 5,269 datasets with 39,899 resources, published by 131 institutions. Publication is highly concentrated: the Ministry of Regional Development and Public Administration alone accounts for 27.7% of datasets, and the five largest publishers for 50.7%. Most datasets (80.8%) are year-specific editions, with a reference year in the title, rather than continuously updated resources. The portal offers no field for declaring an update frequency and no usage statistics.

5.2. Forms of pollution

The prevalence of the five forms of data pollution identified through the Data Pollution Index (DPI) is summarised in Table 3. The results provide an overview of the main deficiencies affecting the accessibility, reliability and usability of datasets published on Romania's national open data portal.

Table 3. Prevalence of the forms of data pollution on data.gov.ro

Indicator	Measure	Value
R1 Staleness	Continuous datasets not updated for more than 24 months	69.0% (median: 51 months since the last update)
R1 Staleness	Recurring series not continued in 2025 or 2026	66.2% of 621 series
A1 Broken links	Unique links that could not be reached	1,243 of 39,801 (3.1%)
A1 Broken links	Resources that cannot be opened, including 82 without a link	1,329 of 39,899 (3.3%); 289 datasets affected, 145 entirely
A2 Format barriers	Resources in XLS or XLSX	42.4%
A2 Format barriers	Resources in CSV	6.4%
A2 Format barriers	Resources in open machine-readable formats, excluding the environment agency	21.2% (53.9% including it)
U1 Missing metadata	Datasets without a contact e-mail	70.5%
U1 Missing metadata	Datasets with no description, or one under 50 characters	35.2%
U1 Missing metadata	Datasets without tags	20.2%
U1 Missing metadata	Datasets without an open licence	3.7%
U2 Redundancy	Datasets with confirmed redundancy	8.6% (452)
U2 Redundancy	Datasets containing a file identical to one in another dataset	316
Probable redundancy	Datasets with probable redundancy only	5.7% (300)

Note: the 39,899 resources include 82 without a link and 16 that repeat a link already used by another resource, which leaves 39,801 unique links. The 1,243 unreachable links are used by 1,247 resources, because four of them appear twice; together with the 82 resources without a link, 1,329 resources cannot be opened.
Source: Authors' calculations based on metadata harvested from data.gov.ro through the CKAN Action API and automated resource accessibility checks, snapshot of 11 November 2026.

Staleness is the dominant form of pollution. Of the 1,647 datasets whose timeliness can be assessed, 62.1% are stale, and the typical continuous dataset was last updated more than four years ago. Files are rarely replaced on the portal: in 90.6% of the resources with both dates, creation and last modification fall on the same day. Updates therefore appear as new files, which is why R1 uses the most recent date of any file in the dataset. Format pollution is less visible in the aggregate than it is in practice. The National Environmental Protection Agency publishes 42.0% of all resources, almost all as XML air-quality files; without it, only one resource in five is in an open machine-readable format, and CSV

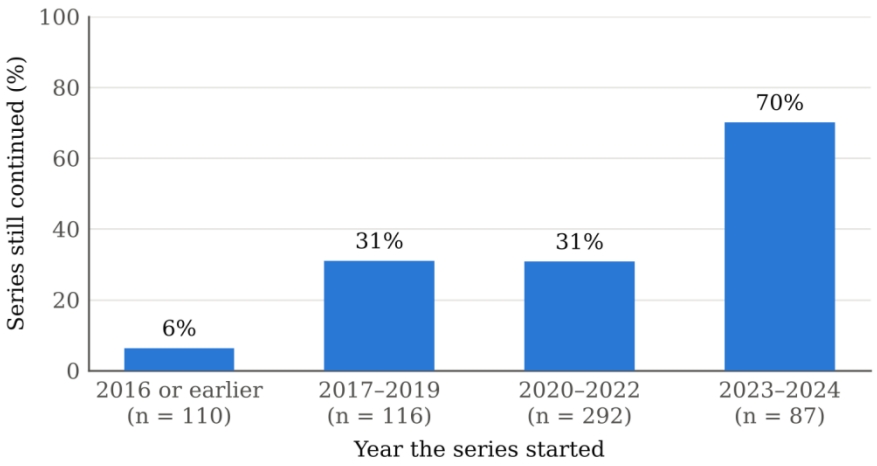
accounts for 6.4% of all files. Missing metadata mostly affects accountability: seven datasets in ten name no contact address for questions or corrections. Redundancy is smaller but concrete: 316 datasets contain a file byte-for-byte identical to one in another dataset. Inspection of these pairs shows the same data published twice under slightly different titles, an updated file published next to the old one, or a file published under another agency's dataset.

Broken links are rare in recent data but almost universal in the oldest. Of the datasets first published in 2013 and 2014, 91% and 95% contain at least one dead link; from 2016 onwards the share stays below 3% in every cohort. The failures differ in kind: 929 are 503 errors, all from the portal's original storage; 212 are refused connections, mostly from a Ministry of Finance server; 58 are timeouts, 17 are 404 errors and 27 are other errors. Counting only failures that are certainly permanent (404 or 410 errors, refused connections, unknown domains, invalid or missing links) leaves 322 resources and changes the index little (Section 5.6).

5.3. Vitality: series that stop

Of the 621 recurring series on the portal, only 33.8% are still alive, meaning that their latest edition refers to 2025 or 2026. Survival declines steeply with age (Figure 1). Only 6.4% of the series started in 2016 or earlier are still continued, against 31% of those started in 2017–2022 and 70.1% of those started in 2023–2024; the 16 series started in 2025–2026 are continued by definition. Because the snapshot is cross-sectional, these shares describe how many series of each age are alive today, not how each series evolved.

Figure 1. Share of recurring series still continued in 2025–2026, by the year the series started



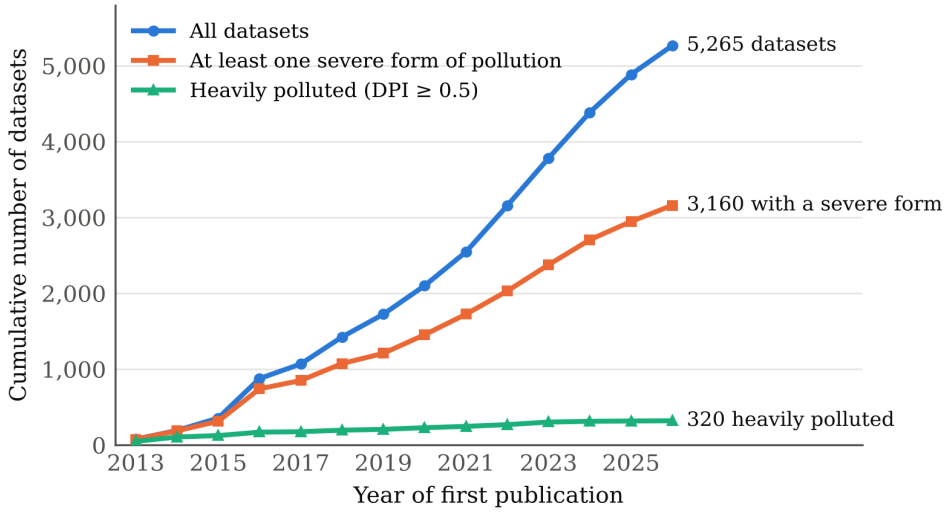
Note: The 16 series initiated in 2025–2026 are excluded from the figure because they are classified as continued by definition. The four groups presented account for 605 of the 621 identified recurring series.
Source: Authors' calculations based on data.gov.ro metadata, snapshot of 11 November 2026.

5.4. Pollution by publication cohort

Grouping datasets by year of first publication shows where the polluted datasets in today's catalogue come from (Figure 2). This is a retrospective view from a single snapshot: it counts the datasets published up to each year that are polluted in November

2026, not how many were polluted at the time. Every cohort contributes polluted datasets. Datasets with at least one severe form of pollution make up 97% of the 2013 and 2014 cohorts, whose files were largely lost, and between 46% and 83% of each later cohort. Heavily polluted datasets come disproportionately from the first two cohorts, which account for 106 of the 320 with a known publication year. Today's pollution therefore has two sources: the loss of early data and the ageing of what was published later. Whether the share of polluted data has grown over time can only be established with repeated snapshots.

Figure 2. Datasets published up to each year, by their pollution status in the November 2026 snapshot (cumulative by year of first publication, 2013–2026)



Note: Pollution status was assessed using the November 2026 snapshot. The figure presents a retrospective distribution by publication cohort and does not represent historical year-by-year measurements of data pollution. Four datasets without a recorded creation date are excluded. Source: Authors' calculations based on data.gov.ro metadata and the Data Pollution Index (DPI), snapshot of 11 November 2026.

5.5. Institutions

Among the 37 institutions with at least 20 datasets, the pollution load ranges from 0% to 46% and the mean DPI from 0.10 to 0.42 (Table 4). The largest publishers have low loads, 2% for the Ministry of Regional Development and Public Administration and 1% for the General Inspectorate for Emergency Situations, although many of their assessable datasets are stale. The highest loads belong to the "Dimitrie Gusti" National Village Museum and the National Institute of Heritage (46% each), the Ministry of Justice (36%) and the National Administration of Penitentiaries (34%); their datasets combine staleness with format barriers, missing metadata or dead links. The National Employment Agency shows that a large publisher can keep its catalogue clean: 197 datasets, a mean DPI of 0.10 and no heavily polluted dataset.

Table 4. Data pollution by institution (institutions with at least 20 datasets; selection)

Institution	Datasets	Mean DPI	Pollution load
Ministry of Regional Development and Public Administration	1,460	0.26	2%
General Inspectorate for Emergency Situations	612	0.24	1%
National Environmental Protection Agency	234	0.23	6%
National Employment Agency	197	0.10	0%
National Institute of Administration	167	0.25	1%
Ministry of Public Finance	109	0.41	20%
National Trade Register Office	82	0.13	0%
Ministry of Justice	81	0.40	36%
General Anticorruption Directorate	74	0.38	23%
National Agency for Fiscal Administration	50	0.13	8%
Tulcea County Council	50	0.10	0%
National Institute of Statistics	49	0.27	12%
"Dimitrie Gusti" National Village Museum	37	0.38	46%
National Administration of Penitentiaries	32	0.42	34%
National Institute of Heritage	28	0.36	46%

Source: Authors' calculations based on data.gov.ro metadata and the Data Pollution Index (DPI), snapshot of 11 November 2026.

5.6. Validation

The five indicators are almost uncorrelated (Spearman's rho between −0.13 and 0.09), as expected for a formative index whose indicators capture distinct forms of pollution. The known-groups test gives a mixed result. The 99 datasets tagged as high-value have a slightly lower mean DPI than the rest (0.23 against 0.26), but the difference is not significant (Mann–Whitney U, one-sided $p = 0.07$) and the effect is small (rank-biserial $r = 0.09$). The indicators show why. High-value datasets are much less often stale (mean R1 of 0.42 against 0.72; $r = 0.46$) and much better documented (U1 of 0.10 against 0.27; $r = 0.50$). Their format barriers are slightly lower, but not significantly ($p = 0.06$), and they do not differ in broken links. But they are twice as often redundant (17% against 8%), because several of them repeat files published elsewhere. HVD tags are added by publishers, so the comparison covers only the datasets that institutions chose to label.

Institution rankings are moderately to highly robust. Their correlation with the baseline ranking is 0.996 with staleness thresholds of 18 and 36 months, 0.98 when historical datasets are scored 0 on staleness or when probable redundancy is added, 0.96 with equal weights for all five indicators or with only definitive link failures, 0.84 when one-off year-specific datasets are treated as series and 0.81 with weights from principal component analysis. Dropping one indicator at a time gives correlations between 0.74 and 0.93, with staleness the most influential. The share of heavily polluted datasets is far less stable. It ranges from 3.5% to 12.7% across these specifications, and from 1.5% without staleness to 24.2% without broken links. That share should therefore be read as an order of magnitude; the prevalence of each form of pollution, the institution rankings and the cohort patterns are the more robust results.

6. Discussion

6.1. Nominal or effective transparency? (RQ1)

The growth of data.gov.ro has produced a large share of nominal transparency. Between 2013 and 2026 the catalogue grew almost seventy-fold, and in today's snapshot three datasets in five, from every publication cohort, show at least one severe form of pollution. Almost two thirds of the datasets that can be assessed for timeliness are stale, only one recurring series in three is still continued, and almost all files from the portal's first two years can no longer be opened. A citizen or journalist who looks for current data therefore meets, more often than not, an edition that stopped years ago. These findings are consistent with Heald's (2006) distinction between nominal and effective transparency: an expanding catalogue may coexist with persistent limitations in the accessibility, timeliness and usability of published data.

Pollution is widespread but mostly partial: about one dataset in sixteen is heavily polluted on several dimensions at once, and that share depends strongly on how the index is specified. The answer to the question in our title is therefore qualified. A single snapshot cannot show that transparency has declined, because it does not observe the past state of the catalogue. It does show that more data has not meant proportionally more usable data, because published datasets begin to age immediately and nothing removes them when they do.

The way progress has been measured reinforces the illusion. Romania's OGP commitments set targets in numbers of datasets, such as a minimum of 535 new or updated datasets in one action plan (OGP, n.d.-a). Targets of this kind reward publication and are blind to what happens to data afterwards.

6.2. The forms of pollution (RQ2)

The findings suggest that a substantial component of data pollution is associated with the persistence of outdated or discontinued datasets within the national portal. However, because the analysis relies on a single snapshot, it cannot establish whether these datasets were fully adequate at the time of their initial publication. The observed patterns nevertheless highlight the importance of data life-cycle management, including regular updates, a clear archival status and the identification of authoritative dataset versions. The portal itself makes this harder: it has no field for declaring an update frequency, so neither publishers nor users can tell an abandoned dataset from a historical one.

The other forms point to specific externalities. The links to the portal's original storage now return errors, yet the datasets that list them remain in the catalogue, so users still find data that no longer exist. The dominance of XLS and XLSX files, with CSV at 6.4% of resources, shifts the cost of conversion to every re-user. The absence of a contact address in seven datasets out of ten removes the feedback channel through which re-users could report errors, so pollution cannot be corrected from outside. Redundancy, including 316 datasets that repeat a file published in another dataset, multiplies search costs and creates doubt about which version is authoritative.

6.3. Declared versus real maturity (RQ3)

Romania's performance in international open data benchmarks presents a mixed picture. In the 2025 OECD OURdata Index, Romania scored above the OECD average overall (0.59 compared with 0.53), particularly in data accessibility and government support for re-use. However, its data availability score remained below the OECD average (0.41 compared with 0.53). Similarly, the European Open Data Maturity assessment

classified Romania among the "followers" in 2025, while recording substantially weaker results in the quality (71.4%) and impact (49.1%) dimensions (OECD, 2026; data.europa.eu, 2025). These assessments already identify important weaknesses, but primarily examine governance arrangements, publication practices and monitoring capabilities. The DPI complements them with direct evidence on the condition of published datasets: 60% exhibit at least one severe pollution indicator. Rather than contradicting existing benchmarks, the findings show how progress in open data governance can coexist with persistent barriers to effective data re-use.

The known-groups analysis provides a similarly qualified result. High-value datasets have a slightly lower mean DPI than other datasets (0.23 versus 0.26), but the overall difference is not statistically significant (one-sided $p = 0.07$; rank-biserial $r = 0.09$). At the indicator level, however, HVD-tagged datasets are substantially less stale and better documented, while showing higher levels of redundancy (17% versus 8%). This pattern is consistent with differences in publication and maintenance practices, but does not establish a causal effect of EU regulatory obligations. The findings suggest that stronger data life-cycle governance should combine requirements for timeliness and documentation with measures to prevent unnecessary duplication and maintain authoritative dataset versions.

6.4. Recycling: an illustration

Public procurement data provide an example of data recycling within the open government data ecosystem. The OpenTender platform collects, transforms and republishes procurement information from European and national sources, combining data from Tenders Electronic Daily (TED) with Romanian procurement datasets published on data.gov.ro (Open Contracting Partnership, n.d.). By integrating information from different sources and making it available in structured formats, the platform illustrates how administrative data can acquire additional value beyond their original publication context.

This example also highlights the importance of maintaining accessible, well-documented and non-redundant source data. Broken links, ambiguous dataset versions and format-related barriers can increase the effort required to integrate and verify information from multiple public sources. However, the present study does not assess OpenTender's processing activities or measure the costs incurred by its operators. The example therefore illustrates the potential consequences of data pollution for downstream re-use rather than providing direct empirical evidence of those costs.

6.5. Limitations

The analysis relies on metadata and on file-level checks, not on the content of the files. Inconsistency, the fourth form of pollution in our definition, is therefore not measured; a manual audit of a stratified sample, coded by two researchers, is the natural next step. Dates may understate the true age of some data: about 13,000 resources carry creation dates from September–December 2016, which suggests a platform migration, so staleness is a lower bound. Series are identified from titles, which may split or merge some series, and historical datasets are separated from continuous ones by the presence of a reference year in the title. Links were checked once, so some failures, such as 503 errors, may be temporary. The portal offers no usage data, so exposure could not be measured. The planned comparison with the European MQA scores could not be completed, so the distinction between pollution and metadata quality rests on the conceptual argument and on the low correlations between indicators. Finally, the DPI describes a single snapshot; the longitudinal analysis of vitality is left for future work.

7. Conclusions and policy recommendations

More data has not meant proportionally more usable data on data.gov.ro. The catalogue has grown steadily, but three datasets in five now show at least one severe form of pollution, mostly datasets and series that were published and then abandoned. Heavy pollution on several dimensions affects a much smaller and less certain share: about 6% in our baseline, and between 2% and 24% across specifications. The DPI makes this residue visible and comparable across institutions and publication cohorts. Its rankings are reasonably robust, but its validity as a measure distinct from metadata quality still has to be confirmed against the European MQA scores.

Four policy implications follow:

1. **Measure the stock, not the flow.** Open data targets in OGP action plans and in the National Open Data Strategy 2024–2028 should track the share of up-to-date, usable datasets alongside the number published.
2. **Govern the life cycle.** The portal should require an update frequency for each dataset, flag datasets that miss it, and let institutions mark editions as historical or retire them.
3. **Make feedback possible.** A contact point should be mandatory, so that re-users can report errors to the publisher.
4. **Prevent redundancy and format barriers at upload.** Simple checks, such as file hashes and a requirement to add CSV alongside XLS files, would stop part of the pollution at its source.

Future work should complete the ecological framework with a Data Ecosystem Vitality Index, follow the DPI through repeated snapshots, compare it with the European MQA scores and measure exposure through usage data where portals provide it.

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Authors’ Contributions:
The authors contributed equally to this work.

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Journal Seek
http://journalseek.net/cgi-bin/journalseek/journalsearch.cgi?field=issn&query=1584-224X

State Library New South Wales, Sidney, Australia,
http://library.sl.nsw.gov.au/search~S1/?searchtype=i&searcharg=1584-224X&searchscope=1&SORT=D&extended=0&SUBMIT=Search&searchlimits=&sear

chorigarg=i1583-9583

Electronic Journal Library
https://opac.giga-hamburg.de/ezb/detail.phtml?bibid=GIGA&colors=7&lang=en&flavour=classic&jour_id=111736

Open University Malaysia
http://library.oum.edu.my/oumlib/content/catalog/778733

Wayne State University Libraries
http://elibrary.wayne.edu/record=4203588

Kun Shan University Library
http://muse.lib.ksu.edu.tw:8080/1cate/?rft_val_fmt=publisher&pubid=ucvpress

Western Theological Seminar
https://col-westernsem.primo.exlibrisgroup.com/discovery/fulldisplay?docid=alma991001225541104770&context=L&vid=01COL_WTS:WTS&lang=en&search_scope=MyInst_and_CI&adaptor=Local%20Search%20Engine&tab=Everything&query=any,contains,1584-224X&facet=rtype,include,journals&mode=Basic&offset=0

Swansea University Prifysgol Abertawe
http://whel-primo.hosted.exlibrisgroup.com/primo_library/libweb/action/search.do?vid=44WHELF_SWA_VU1&reset_config=true#.VSU9SPmsVSk

Vanderbilt Library
https://catalog.library.vanderbilt.edu/discovery/fulldisplay?docid=alma991043322926803276&context=L&vid=01VAN_INST:vanui&lang=en&search_scope=MyInst_and_CI&adaptor=Local%20Search%20Engine&tab=Everything&query=any,contains,1584-224X&offset=0

Wissenschftszentrum Berlin fur Sozial
https://www.wzb.eu/en/literature-data/search-find/e-journals?page=searchres.phtml&bibid=WZB&lang=en&jq_type1=IS&jq_term1=1584-224X&jq_bool2=AND&jq_type2=KS&jq_term2=&jq_bool3=AND&jq_type3=PU&jq_term3=&offset=-1&hits_per_page=50&Notations%5B%5D=all&selected_colors%5B%5D=1&selected_colors%5B%5D=2

Radboud University Nijmegen
https://zaandam.hosting.ru.nl/oamarket-acc/score?OpenAccess=&InstitutionalDiscounts=&Title=&Issn=1584-224&Publisher=
Elektronische Zeitschriftenbibliothek EZB (Electronic Journals Library)
http://rzblx1.uni-regensburg.de/ezeit/detail.phtml?bibid=AAAAA&colors=7&lang=de&jour_id=111736

The University of Hong Kong Libraries
https://julac.hosted.exlibrisgroup.com/primo-explore/search?query=any,contains,1584-224x&search_scope=My%20Institution&vid=HKU&facet=rtype,include,journals&mode=Basic&offset=0

Metropolitan University Prague, Czech Republic
https://s-knihovna.mup.cz/katalog/eng/l.dll?h~=&DD=1&H1=&V1=o&P1=2&H2=&V2=o&P2=3&H3=&V3=z&P3=4&H4=1584-224x&V4=o&P4=33&H5=&V5=z&P5=25
University of the West Library
https://uwest.on.worldcat.org/search?queryString=1584-224x&clusterResults=off&stickyFacetsChecked=on#/oclc/875039367

Elektron ische Zeitschriften der Universität zu Köln
https://www.ub.uni-koeln.de/IPS?SERVICE=METASEARCH&SUBSERVICE=INITSEARCH&VIEW=USB:Simple&LOCATION=USB&SID=IPS3:2d1c5acebc65a3cdc057a9d6c64ce76e&SETCOOKIE=TRUE&COUNT=15&GWTIMEOUT=30&HIGHLIGHTING=on&HISTORY=SESSION&START=1&STREAMING=on&URLENCODING=TRUE&QUERY_alAL=1584-224x&SERVICEGROUP1.SERVICE.SEARCH_EDS=on&SERVICEGROUP1.SERVICE.SEARCH_KUGJSON=on&SERVICEGROUP1.SERVICE.SEARCH_KUGUSBWEB=on&SERVICEGROUP1.SERVICEGROUP.USB:Default=on

EKP Pulications
https://ekp-invenio.physik.uni-karlsruhe.de/search?ln=en&sc=1&p=1584-224X&f=&action_search=Search&c=Experiments&c=Authorities

Valley City State University
https://odin-primo.hosted.exlibrisgroup.com/primo-explore/search?query=any,contains,1584-224X&tab=tab1&search_scope=ndv_everything&sortby=rank&vid=ndv&lang=en_US&mode=advanced&offset=0displayMode%3Dfull&displayField=all&pcAvailabiltyMode=true

Impact Factor Poland
http://impactfactor.pl/czasopisma/21722-revista-de-stiinte-politice-revue-des-sciences-politiques

Universite Laval
http://sfx.bibl.ulaval.ca:9003/sfx_local?url_ver=Z39.88-2004&url_ctx_fmt=info:ofi/fmt:kev:mtx:ctx&ctx_enc=info:ofi/enc:UTF-8&ctx_ver=Z39.88-2004&rfr_id=info:sid/sfxit.com:azlist&sfx.ignore_date_threshold=1&rft.object_id=1000000000726583&rft.object_portfolio_id=&svc.fulltext=yes

Universität Passau
https://infoguide.ub.uni-passau.de/InfoGuideClient.upasis/start.do?Query=10%3d%22BV035261002%22

BSB Bayerische StaatBibliothek
https://opacplus.bsb-muenchen.de/metaopac/search?View=default&oclcno=502495838

Deutsches Museum
https://opac.deutsches-museum.de/TouchPoint/start.do?Query=1035%3d%22BV035261002%22IN%5b2%5d&View=dmm&Language=de
Technische Hochschule Ingolstadt
https://opac.ku.de/TouchPoint/start.do?Branch=3&Language=de&View=thi&Query=35=%22502495838%22+IN+[2]

Hochschule Augsburg, Bibliothek
https://infoguide.hs-augsburg.de/InfoGuideClient.fhasis/start.do?Query=10%3d%22BV035261002%22

Hochschule Weihenstephan-Triesdorf, Zentralbibliothek
Freising, Germany
https://ffwtp20.bib-bvb.de/TouchPoint/start.do?Query=1035%3d%22BV035261002%22IN%5b2%5d&View=ffw&Language=de

OTH- Ostbayerische Technische Hochschule Regensburg, Hochschulbibliothek
OTHBR, Regensburg, Germany
https://www.regensburger-katalog.de/TouchPoint/start.do?Query=1035%3d%22BV035261002%22IN%5b2%5d&View=ubr&Language=de

Staatliche Bibliothek Neuburg/Donau , SBND,
Neuburg/Donau, Germany
https://opac.sbnd.de/InfoGuideClient.sndsis/start.do?Query=10%3d%22BV035261002%22

Universitätsbibliothek Eichstätt-Ingolstadt, Eichstätt, Germany
https://opac.ku.de/TouchPoint/start.do?Branch=0&Language=de&View=uei&Query=35=%22502495838%22+IN+[2]

Bibliothek der Humboldt-Universität Berlin, Universitätsbibliothek der Humboldt-Universität zu Berlin
Berlin, Germany
https://hu-berlin.hosted.exlibrisgroup.com/primo-explore/search?institution=HUB_UB&vid=hub_ub&search_scope=default_scope&tab=default_tab&query=issn,exact,1584-224X

Hochschulbibliothek Ansbach, Ansbach, Germany

https://fanoz3.bib-bvb.de/InfoGuideClient.fansis/start.do?Query=10%3d%22BV035261002%22

Bibliothek der Europa-Universität Viadrina, Frankfurt (Oder)
Frankfurt/Oder, Germany
https://opac.europa-uni.de/InfoGuideClient.euvsis/start.do?Query=10%3d%22BV035261002%22

University of California Library Catalog
https://catalog.library.ucla.edu/vwebv/search?searchCode1=GKEY&searchType=2&searchArg1=ucoclc469823489

For more details about the past issues and international abstracting and indexing, please visit the journal website at the following address:
http://cis01.central.ucv.ro/revistadestiintepolitice/acces.php.

CONFERENCE INTERNATIONAL INDEXING OF THE PAST EDITIONS (2014-2026)

CEPOS Conference 2026

The **Sixteenth International Conference** After Communism. East and West under Scrutiny (Craiova, House of the University, 20-21 March 2026) was evaluated and accepted for indexing in 11 international databases, catalogues and NGO's databases
ConferenceAlerts
Conal Conference Alerts
https://conferencealerts.com/country-listing?country=Romania
CEPOS (site oficial – secțiunea Upcoming 2026)
https://cepos.eu/upcoming2026
Conferencelists.org
https://www.conferencelists.org/event/cepos-16th-international-conference-after-communism-east-and-west-under-scrutiny/?utm_source=chatgpt.com
ConfFinder (Conferences in Romania)
https://conffinder.com/pagesconference/ConferencesListing?country=Romania&utm_source=chatgpt.com
Events notification
https://eventsnotification.com/event/61037
Conferencesked
https://www.conferencesked.com/conference_details/15391/cepos-16th-international-conference-after-communism-east-and-west-under-scrutiny
Conffinder
https://www.conffinder.com/pagesconference/ConferencesListing?country=Romania
Sciencedz
https://www.google.com/search?q=16th+cepos+international+confernece+2026&oq=16th+cepos+international+confernece+2026&gs_lcrp=EgZjaHJvbWUyBggAEEUYOTIJCAEQIRgKGKABMgkIAhAhGAoYoAHSAQkxMDMyOWowajSoAgGwAgE&client=ms-android-motorola-rvo3&sourceid=chrome-mobile&ie=UTF-8#ip=1
Conference daily

https://conferencesdaily.com/european-studies-conferences
Scholarly meet
https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://scholarlymeet.com/country/fr&ved=2ahUKEwikirrDuqeSAxW7wAIHHfhgE2c4FBAWegQIKRAB&usg=AOvVaw3pIVukONrNS4lLm1n6yU_R
Conferencealertz
https://www.conferencealertz.com/conferenceslist?country=Romania

CEPOS Conference 2025

The **Fifteenth International Conference** After Communism. East and West under Scrutiny (Craiova, House of the University, 14-15 March 2025) was evaluated and accepted for indexing in 14 international databases, catalogues and NGO's databases:
Indexation links:
https://academic.oup.com/jcs/article-abstract/67/1/csaf001/7997508?redirectedFrom=PDF
https://scholarlymeet.com/events/ca73318d-42a7-4b5e-bcca-635e0aa1c46b
https://conferences365.com/conferences-in-romania
https://conferencewiki.com/conference-listing/MzA4
https://www.conferencelists.org/event/cepos-15th-international-conference-after-communism-east-and-west-under-scrutiny/
https://www.sciencedz.net/en/conference/110381-cepos-15th-international-conference-after-communism-east-and-west-under-scrutiny
https://conferencealerts.com/show-event?id=262202
https://conferencesdaily.com/cities/craiova
https://cepos.org/upcoming/
https://10times.com/after-communism-east-and-west-under-scrutiny
https://www.researchgate.net/publication/379144286_CENTER_OF_POST-COMMUNIST_POLITICAL_STUDIES_CEPOS_Book_of_abstracts_of_the_14th_International_Conference_After_Communism_East_and_West_under_Scrutiny_Craiova_Romania_15-16_March_2024
https://conferencewiki.com/conference-detail/Cepos-15th-International-Conference-After-communism-East-and-West-under-scrutiny
https://www.conferencelists.org/romania/
https://www.conferencesked.com/conference_details/10148/cepos-15th-international-conference-after-communism-east-and-west-under-scrutiny
https://conffinder.com/pagesconference/ConferencesListing?country=Romania

CEPOS Conference 2024

The **Fourteenth International Conference** After Communism. East and West under Scrutiny (Craiova, House of the University, 15-16 March 2024) was evaluated and accepted for indexing in 11 international databases, catalogues and NGO's databases:
Indexation links:
CEEOL https://www.ceeol.com/search/article-detail?id=1195305
ProQuest, Part of Clarivate
https://www.proquest.com/docview/2863220849/CC02F21AE4DB44F1PQ/1?accountid=50247&sourcetype=Scholarly%20Journals
Oxford Academic (Oxford University Press)
https://doi.org/10.1093/jcs/csad066

Oxford Journal of Church and State-Oxford Academic (Oxford University Press) (Vol. 65, nr 4/2023) în secțiunea Calendar of Events JCS (publicare 28 Noiembrie 2023)
Conference Alerts
https://conferencealerts.com/show-event?id=254313
Science DZ
https://www.sciencedz.net/.../100575-14th-international...
10 Times
https://10times.com/after-communism-east-and-west-under...
The Free Library
https://www.thefreelibrary.com/CEPOS+NEW+CALL+FOR+PAPERS...
Conference 365
https://conferences365.com/.../14th-international...
World University Directory
https://worlduniversitydirectory.com/edu/event/...
Conferences daily
https://conferencesdaily.com/eventdetails.php?id=1625192
Gale Cengage Learning USA https://go.gale.com/ps/i.do?id=GALE%7CA766112846...

CEPOS Conference 2023

The **Thirteenth International Conference** After Communism. East and West under Scrutiny (Craiova, 17-18 March 2023) was evaluated and accepted for indexing in 5 international databases, catalogues and NGO's databases:
Oxford Church & State Journal:
https://academic.oup.com/jcs/articleabstract/65/1/168/7044222?redirectedFrom=fulltext

10 Times: https://10times.com/after-communism-east-andwest-under-scrutiny

Conferencesite.eu:
https://index.conferencesites.eu/conference/57510/13th-international-conference-after-communism-eastand-west-under-scrutiny;

Schoolandcollegelistings
:https://www.schoolandcollegelistings.com/RO/Craiova/485957361454074/Center-of-Post-Communist-Political-Studies-CEPOS

Conferencealerts : https://conferencealerts.com/showevent?id=247851

CEPOS Conference 2022

The **Twelfth International Conference** After Communism. East and West under Scrutiny (Craiova, 18-19 March 2022) was evaluated and accepted for indexing in 6 international databases, catalogues and NGO's databases:
https://www.conferenceflare.com/events/category/social-sciences-and-humanities/art-history/

Vinculation International Diciembre 2021 newsletter n 99
https://issuu.com/fundacionargeninta5/docs/diciembre_2021_fundaci_n_argeninta-ai_ok?fr=sZjg2NjE5NTg3OTY

https://www.schoolandcollegelistings.com/RO/Craiova/485957361454074/Center-of-Post-Communist-Political-Studies-CEPOS

https://10times.com/company/cepos
https://10times.com/after-communism-east-and-west-under-scrutiny

https://conferencealerts.com/show-event?id=238529

https://www.sciencedz.net/conference/82995-cepos-international-conference-2022-after-communism-east-and-west-under-scrutiny

CEPOS Conference 2021

The Eleventh International Conference After Communism. East and West under Scrutiny (Craiova, House of the University, 19-20 March 2021) was evaluated and accepted for indexing in 5 international databases, catalogues and NGO's databases:

https://academic.oup.com/jcs/advance-articleabstract/doi/10.1093/jcs/csaa064/5941887?redirectedFrom=fulltext

https://conferencealerts.com/show-event?id=229654

https://www.sciencedz.net/en/conference/72628-1thinternational-conference-after-communism-east-and-west-underscrutiny

https://10times.com/after-communism-east-and-west-underscrutiny

https://worlduniversitydirectory.com/edu/event/?slib=1thinternational-conference-after-communism-east-and-west-underscrutiny-2

CEPOS Conference 2020

The Tenth International Conference After Communism. East and West under Scrutiny (27-28 March 2020) was evaluated and accepted for indexing in 7 international databases, catalogues and NGO's databases:

Scichemistry
http://scichemistry.org/ConferenceInfosByConferenceTopicId?conferenceTopicId=57

Oxford Journals
https://academic.oup.com/jcs/advance-articlepdf/doi/10.1093/jcs/csz078/30096829/csz078.pdf

Conference alerts
https://conferencealerts.com/show-event?id=215370
https://www.sciencedz.net/en/conference/57625-10thinternational-conference-after-communism-east-and-west-underscrutiny

Intraders

https://www-intradersorg.
cdn.ampproject.org/v/s/www.intraders.org/news/romania/10
th-international-conference-after-communism-east-and-westunderscrutiny/
amp/?amp_js_v=a2&_gsa=1&usqp=mq331AQCKAE%3D#a
oh=15737604302246&referrer=https%3A%2F%2Fwww.google.co
m&_tf=De%20pe%20%251%24s&share=https%3A%2F%2Fwww.i
ntraders.org%2Fnews%2Fromania%2F10th-internationalconference-
after-communism-east-and-west-under-scrutiny%2F

10 times
https://10times.com/after-communism-east-and-west-underscrutiny

The conference alerts
https://theconferencealerts.com/event/46428/10th-internationalconference-
after-communism-east-and-west-under-scrutiny

Scirea
https://www.scirea.org/ConferenceInfosByConferenceCountryId?c
onferenceCountryId=75

CEPOS Conference 2019

The Ninth International Conference After Communism. East and West under Scrutiny (Craiova, House of the University, 29-30 March 2019) was evaluated and accepted for indexing in 6 international databases, catalogues and NGO's databases:

Oxford Academic Journal of Church & State https://academic.oup.com/jcs/article-abstract/60/4/784/5106417?redirectedFrom=PDF

10 Times
https://10times.com/after-communism-east-and-west-under-scrutiny

Conference Alerts
https://conferencealerts.com/show-event?id=205682

Researchgate
https://www.researchgate.net/publication/327905733_CEPOS_9TH_INTERNATIONA
L_CONFERENCE_AFTER_COMMUNISM_EAST_AND_WEST_UNDER_SCRUTI
NY_2019?_iepl%5BviewId%5D=sjcOJrVCO8PTLapcfVciZQsb&_iepl%5Bcontexts%5
D%5B0%5D=publicationCreationEOT&_iepl%5BtargetEntityId%5D=PB%3A3279057
33&_iepl%5BinteractionType%5D=publicationCTA

The Free Library
https://www.thefreelibrary.com/9th+INTERNATIONAL+CONFERENCE+AFTER+C
OMMUNISM.+EAST+AND+WEST+UNDER...-a0542803701
Science Dz.net
https://www.sciencedz.net/conference/42812-9th-international-conference-after-
communism-east-and-west-under-scrutiny

CEPOS Conference 2018

The Eighth International Conference After Communism. East and West under Scrutiny (Craiova, House of the University, 23-24 March 2018) was evaluated and accepted for indexing in 15 international databases, catalogues and NGO's databases:

Conference Alerts, https://conferencealerts.com/show-event?id=186626
Sciencesdz, http://www.sciencedz.net/conference/29484-8th-international-conference-after-communism-east-and-west-under-scrutiny

ManuscriptLink, https://manuscriptlink.com/cfp/detail?cfpId=AYAXKVAR46277063&type=event

Maspolitiques,http://www.maspolitiques.com/ar/index.php/en/1154-8th-international-conference-after-communism-east-and-west-under-scrutiny

Aconf, https://www.aconf.org/conf_112399.html

Call4paper,https://call4paper.com/listByCity?type=event&city=3025&count=count
Eventegg, https://eventegg.com/cepos/

10 times, https://10times.com/after-communism-east-and-west-under-scrutiny
Biblioteca de Sociologie, http://bibliotecadesociologie.ro/cfp-cepos-after-communism-east-and-west-under-scrutiny-craiova-2018/

Science Research Association http://www.scirea.org/topiclisting?conferenceTopicId=5
ResearcherBook http://researcherbook.com/country/Romania

Conference Search Net, http://conferencesearch.net/en/29484-8th-international-conference-after-communism-east-and-west-under-scrutiny

SchoolandCollegeListings, https://www.schoolandcollegelistings.com/RO/Craiova/485957361454074/Center-of-Post-Communist-Political-Studies-CEPOS

Vepub conference, http://www.vepub.com/conferences-view/8th-International-Conference-After-Communism.-East-and-West-under-Scrutiny/bC9aUE5rcHN0ZmpkYU9nTHJzUkRmdz09/

Geopolitika Hungary, http://www.geopolitika.hu/event/8th-international-conference-after-communism-east-and-west-under-scrutiny/

CEPOS Conference 2017

The Seventh International Conference After Communism. East and West under Scrutiny (Craiova, House of the University, 24-25March 2017) was evaluated and accepted for indexing in 10 international databases, catalogues and NGO's databases:

Ethic & International Affairs (Carnegie Council), Cambridge University Press-https://www.ethicsandinternationalaffairs.org/2016/upcoming-conferences-interest-2016-2017/

ELSEVIER GLOBAL EVENTS
LIST http://www.globaleventslist.elsevier.com/events/2017/03/7th-international-conference-after-communism-east-and-west-under-scrutiny

CONFERENCE ALERTS-http://www.conferencealerts.com/show-event?id=171792

10TIMES.COM-http://10times.com/after-communism-east-and-west-under-scrutiny

Hiway Conference Discovery System-http://www.hicds.cn/meeting/detail/45826124
Geopolitika (Hungary)-http://www.geopolitika.hu/event/7th-international-conference-after-communism-east-and-west-under-scrutiny/

Academic.net-http://www.academic.net/show-24-4103-1.html

World University Directory-
http://www.worlduniversitydirectory.com/conferencedetail.php?AgentID=2001769

Science Research Association-
http://www.scirea.org/conferenceinfo?conferenceId=35290

Science Social Community-https://www.science-community.org/ru/node/174892

CEPOS Conference 2016

The Sixth International Conference After Communism. East and West under Scrutiny (Craiova, House of the University, 8-9 April 2016) was evaluated and accepted for indexing in the following international databases, catalogues and NGO's databases:

ELSEVIER GLOBAL EVENTS-
http://www.globaleventslist.elsevier.com/events/2016/04/6th-international-conference-after-communism-east-and-west-under-scrutiny/
Oxford Journals – Oxford Journal of Church & State-
http://jcs.oxfordjournals.org/content/early/2016/02/06/jcs.csv121.extract

Conference Alerts-http://www.conferencealerts.com/country-listing?country=Romania
Conferences-In - http://conferences-in.com/conference/romania/2016/economics/6th-international-conference-after-communism-east-and-west-under-scrutiny/

Socmag.net - http://www.socmag.net/?p=1562

African Journal of Political Sciences-
http://www.maspolitiques.com/mas/index.php?option=com_content&view=article&id=450:-securiteee-&catid=2:2010-12-09-22-47-00&Itemid=4#.VjUI5PnhCUk

Researchgate-
https://www.researchgate.net/publication/283151988_Call_for_Papers_6TH_International_Conference_After_Communism._East_and_West_under_Scrutiny_8-9_April_2016_Craiova_Romania

World Conference Alerts-
http://www.worldconferencealerts.com/ConferenceDetail.php?EVENT=WLD1442
Edu events-http://eduevents.eu/listings/6th-international-conference-after-communism-east-and-west-under-scrutiny/

Esocsci.org-http://www.esocsci.org.nz/events/list/

Sciencedz.net-http://www.sciencedz.net/index.php?topic=events&page=53
Science-community.org-http://www.science-community.org/ru/node/164404/?did=070216

CEPOS Conference 2015

The Fifth International Conference After Communism. East and West under Scrutiny (Craiova, House of the University, 24-25 April 2015) was evaluated and accepted for indexing in 15 international databases, catalogues and NGO's databases:

THE ATLANTIC COUNCIL OF CANADA, CANADA-
http://natocouncil.ca/events/international-conferences/

ELSEVIER GLOBAL EVENTS LIST-
http://www.globaleventslist.elsevier.com/events/2015/04/fifth-international-conf

GCONFERENCE.NET-
http://www.gconference.net/eng/conference_view.html?no=47485&catalog=1&cata=018&co_kind=&co_type=&pageno=1&conf_cata=01

CONFERENCE BIOXBIO-http://conference.bioxbio.com/location/Romania

10 TIMES-http://10times.com/Romania

CONFERENCE ALERTS-http://www.conferencealerts.com/country-listing?country=Romania

http://www.iem.ro/orizont2020/wp-content/uploads/2014/12/lista-3-conferinte-internationale.pdf
http://sdil.ac.ir/index.aspx?pid=99&articleid=62893

NATIONAL SYMPOSIUM-http://www.nationalsymposium.com/communism.php
SCIENCE DZ-http://www.sciencedz.net/conference/6443-fifth-international-conference-after-communism-east-and-west-under-scrutiny

ARCHIVE COM-http://archive-com.com/com/c/conferencealerts.com/2014-12-01 5014609 70/Rome 15th International Academic Conference The IISES/

CONFERENCE WORLD-http://conferencesworld.com/higher-education/
KNOW A CONFERENCE KNOW A CONFERENCE-http://knowaconference.com/social-work/

International Journal on New Trends in Education and Their Implications (IJONTE) Turkey http://www.ijonte.org/?pnum=15&

Journal of Research in Education and Teaching Turkey-http://www.jret.org/?pnum=13&pt=Kongre+ve+Sempozyum
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NATO Council of Canada (section events/ international conferences), Canada, http://atlantic-council.ca/events/international-conferences/

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Georgescu, C. M. (2013b). Patterns of Local Self-Government and Governance: A Comparative Analysis Regarding the Democratic Organization of Thirteen Central and Eastern European Administrations (I). *Revista de Ştiinţe Politice. Revue des Ştiinţe Politice*, 39, 49-58.

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