



# Journal of Intercultural Management

Vol. 18 | No. 1 | 2026



**Editor-in-chief:**

Justyna Fijałkowska

**Text design and typesetting:**

Agnieszka Terczyńska, Studio Grafpa [www.grafpa.pl](http://www.grafpa.pl)

**Cover design:**

Agnieszka Terczyńska, Studio Grafpa [www.grafpa.pl](http://www.grafpa.pl)

**Language editing:**

Agnieszka Zerka-Rosik

**Adjustment:**

Julia Żak

**Editorial office:**

Społeczna Akademia Nauk, Sienkiewicza 9, 90-113 Łódź

e-mail: [wydawnictwo@san.edu.pl](mailto:wydawnictwo@san.edu.pl)

All the articles published in the journal are subject to reviews.

The electronic version is the primary version of the journal.

© copyright Społeczna Akademia Nauk and Authors

under the Creative Commons CC-BY-SA license

<http://creativecommons.org/licenses/by-sa/4.0/>

eISSN 2543-831X

## Contents

Justyna Fijałkowska, Federico Lanzalonga

***Navigating the Computational Turn: Global Trends and Cross-Cultural Challenges in AI-Enabled Financial Statement Analysis***

05

Christian Pierre Barde, Jean-Henry Morin

***Innovation and Knowledge Co-Creation in Intercultural Workshops: The Role of Meta-Context – Lessons from a Swiss-Korean FacLab Experience***

55

Ewa Werpachowska, Tetiana Paientko

***The Role of Economic Factors and Government Policies in the Development of the Polish Housing Market***

95

Mariusz Nyk

***The Concept of the Laffer Curve in Shaping Fiscal Policy in Selected Countries of Central and Eastern Europe***

134



## **Justyna Fijałkowska**

SAN University, Poland

[jfijalkowska@sane.du.pl](mailto:jfijalkowska@sane.du.pl)

ORCID ID: 0000-0002-4236-1491

## **Federico Lanzalonga**

University of Turin, Department of

Management Valter Cantino, Italy

[federico.lanzalonga@unito.it](mailto:federico.lanzalonga@unito.it)

ORCID ID: 0000-0003-3195-3528

# Navigating the Computational Turn: Global Trends and Cross-Cultural Challenges in AI-Enabled Financial Statement Analysis

## **ABSTRACT**

**Objective:** The paper aims to map the recent methodological reconfiguration of financial statement analysis (FSA) and to identify the analytical trajectories emerging between 2015 and 2025. It specifically examines how corporate disclosure is being reshaped by the computational turn, as it expands beyond structured financial data to include narrative, sustainability and machine-readable reporting across different cultural and regulatory contexts.

**Methodology:** A Scopus-based bibliometric design was adopted, applied to a corpus of 454 documents. It combines performance analysis, co-word analysis, thematic mapping and trend-topic analysis, processed through the Bibliometrix/Biblioshiny environment to visualize the evolution of the field.

**Findings:** The results indicate that FSA is undergoing a profound rearticulation, moving from traditional ratio-based interpretation to an AI-enabled ecosystem. The evidence suggests a three-phase evolution: an initial decision-support phase, an intermediate expansion towards broader reporting architectures and non-financial disclosures and a recent computational turn centred on AI-enabled methods. The analysis reveals a five-cluster conceptual structure: (1) the traditional financial-statement core, (2) computational learning methods (ML/DL), (3) predictive applications in auditing and fraud detection, (4) sustainability and ESG extensions and (5) the cross-cultural dimensions of accounting research. Furthermore, the findings highlight a recent shift in which Artificial Intelligence (AI), natural language processing (NLP) and Large Language Models (LLMs) have become foundational to navigating global disclosure processing costs. Finally, the geography of collaboration reveals that methodological innovation in FSA is being shaped through specific cross-cultural research corridors, particularly the Sino–Anglophone and Asia–Pacific networks, while European participation currently lags behind regulatory developments such as CSRD/ESRS.

**Value Added:** The study contributes to the literature by conceptualizing the “computational turn” in FSA, offering an empirically grounded map of field’s methodological evolution. The paper argues that this transformation is a rearticulation rather than a substitution; new computational methods are being embedded within the traditional inferential logic of FSA rather than replacing it. Furthermore, the research integrates previously isolated streams – specifically NLP in accounting, machine learning in finance, ESG analytics and digital reporting – into a unified framework. A key contribution lies in the finding that while AI provides universal analytical power, cross-cultural challenges in the linguistic and contextual interpretation of narrative disclosures remain a critical frontier. By repositioning FSA as a domain where language, accounting tradition and institutional culture jointly dictate the credibility of computational measurements, this study opens a vital research interface between international management and global accounting practices.

**Recommendations:** Future research should develop integrative cross-stream studies that treat the five identified clusters as connected subsystems, with particular attention paid to the interface between computational methods and sustainability reporting. Domain-specific validation frameworks for ML applications in accounting and structured research programmes on LLM-based financial document analysis have been identified as priority agendas.

**Key words:** financial statement analysis, bibliometric analysis, artificial intelligence, computational turn, cross-cultural accounting, bibliometric mapping, corporate disclosure, cross-cultural research

**JEL codes:** M40, M41, G30, F23, M16

## Introduction

Financial statement analysis (FSA) has long been a foundational domain of empirical accounting research, yet its conceptual and methodological boundaries are

now being reconfigured. For much of the twentieth century, FSA was understood primarily as the extraction of value-relevant signals from numerical financial statements through ratios, accruals and other indicators used to support investment, credit and governance decisions (Ou & Penman, 1989; Lev & Thiagarajan, 1993; Altman, 1968). That view, while analytically strong, assumed a relatively stable and narrow informational object: the periodic financial statement as a structured numerical document. Over the past decade, this assumption has become increasingly difficult to sustain. The informational object has expanded to include management commentary, footnotes and sustainability disclosures. At the same time, the analytical toolkit has shifted toward computational methods such as machine learning (ML), natural language processing (NLP) and, more recently, large language models (LLMs). In parallel, the infrastructure of corporate reporting has become progressively digitalised through structured data formats and machine-readable taxonomies. This study examines that shift not as a passing technological development, but as a structural change in how financial information is produced, processed and analysed.

A useful theoretical starting point is the literature on disclosure processing costs. Blankespoor et al. (2020) show that public disclosure does not automatically become usable information: acquisition, parsing and interpretation all involve costs, and those costs vary across users and disclosure formats. When technologies reduce them, as digital reporting systems and automated analytical tools increasingly do, the effects extend to information asymmetries, market liquidity and the distribution of benefits from corporate transparency. This perspective allows the methodological changes documented in this study to be interpreted as endogenous responses to informational frictions rather than as isolated technological shocks. It also helps distinguish this paper from technology-centred surveys. The question here is not which computational method performs best, but how the analytical ecosystem of FSA has changed as the costs and capabilities of processing corporate disclosure have changed.

The literature on this reconfiguration is extensive but fragmented, and can be organised around six interrelated streams: traditional FSA grounded in ratios and accruals; computational analysis of corporate text; machine learning and predictive analytics applied to structured accounting data; digital corporate

reporting infrastructures (XBRL and taxonomies); sustainability disclosure analytics; and the recent frontier of generative AI and large language models.

What is still missing is an integrative and empirically grounded account of how they connect, diverge and jointly reconfigure the field during the period in which methodological discontinuity has been most visible, roughly 2015 to 2025. Malchev et al. (2025) offer a broad bibliometric overview of FSA from 1937 to 2023, but the contemporary period is only one segment within a longer historical arc, and the study centres on the keyword “financial statement analysis” without specifically targeting methodological innovation. This paper addresses a narrower and more specific gap: the lack of a bibliometric mapping able to trace the intersections among structured numerical data, NLP and ML methods, digital reporting infrastructures and sustainability-related disclosures during the decade marked by deep learning diffusion, iXBRL adoption, ESG standardisation and the rise of generative AI. The research gap is therefore not simply empirical, in the sense of an unexplored area, but analytical. The field still lacks a synthesis that treats FSA as a data-type × task × method ecosystem. Specifically, it remains to be shown how that ecosystem has been reorganised by the joint expansion of informational inputs and computational capacity.

Against this background, the study is guided by three research questions:

- RQ1:** *How has the literature on financial statement analysis evolved between 2015 and 2025 in terms of scientific production, source distribution and geographical patterns?*
- RQ2:** *What conceptual structure characterises this literature, and how are its main methodological and thematic streams organised?*
- RQ3:** *Which methodological trajectories are emerging most clearly in contemporary financial statement analysis?*

While the methodological reconfiguration of FSA is often presented as a technical phenomenon, it is also a profoundly intercultural one. Financial statements are produced under different national accounting traditions (IFRS, US GAAP, Chinese Accounting Standards and numerous local frameworks), narrated in different languages and interpreted by analysts whose disclosure-processing practices are

themselves culturally embedded. Sentiment lexica calibrated on US 10-K filings do not necessarily transfer to annual reports prepared in Mandarin, Polish or Bahasa Indonesia; ESG materiality judgments differ systematically between European stakeholder-oriented and Anglo-American shareholder-oriented reporting cultures; and the speed at which AI-based analytical tools are adopted varies with national institutional environments. This intercultural dimension is not a peripheral concern of contemporary FSA – it is constitutive of how computational methods perform in practice. The study therefore reads its bibliometric evidence not only as a map of methodological innovation, but also as a map of how that innovation is unevenly distributed across national, linguistic and institutional contexts. In doing so, it situates FSA within the broader concerns of intercultural management research.

In this paper, FSA includes not only the analysis of numerical financial statements, but also the computational analysis of management commentary, footnotes and sustainability disclosures, insofar as these materials serve as inputs for tasks such as prediction, classification, extraction and anomaly detection that remain aligned with the informational aims of traditional FSA. The study is descriptive and bibliometric in design. Its purpose is to map the structure and recent evolution of the literature rather than to compare the performance of individual methods. Digital reporting infrastructure (XBRL and taxonomies), computational methods (ML, NLP and LLMs), and sustainability-related content (ESG disclosures) are treated as distinct but interacting dimensions. The paper contributes an empirically grounded map of the methodological reconfiguration of FSA between 2015 and 2025. In doing so, it distinguishes and connects the six streams identified above and locates emerging frontiers such as multimodal data integration, interpretability in accounting settings and LLM-enabled document analysis within the broader evolution of the field. The remainder of the paper is organised as follows. Section *Materials and methods* outlines the bibliometric methodology and corpus construction. Section *Current state of knowledge* presents the descriptive and science-mapping results. Section *Results* discusses the findings in light of the research question and theoretical framework. Section *Discussion* concludes with implications for research and practice.

## Materials and methods

The study adopts a Scopus-based bibliometric design to map the recent evolution of financial statement analysis and to identify the methodological innovations emerging within the field (Massaro et al., 2016; Calandra et al., 2025).

Bibliometric analysis is particularly appropriate when a research domain expands rapidly across adjacent disciplines and produces a body of literature too broad to be assessed effectively through a purely narrative review. In such settings, bibliometric methods provide a transparent and reproducible basis for identifying publication trends, conceptual concentrations and thematic trajectories (Secinaro et al., 2025). In the present case, the literature on financial statement analysis increasingly intersects with artificial intelligence, machine learning, predictive analytics, automation, sustainability-related metrics, data visualisation and blockchain-enabled reporting infrastructures. A bibliometric approach is therefore suitable for capturing the structure and recent reconfiguration of the field (Cobo et al., 2011; Paul & Criado, 2020).

The empirical design was organised into four sequential steps: study design, data collection, data analysis and interpretation. This structure follows the logic of workflow mapping approaches towards literature reviews in which the review process is organised around the definition of the study design, the collection of bibliographic data, the analysis of the dataset, the visualisation of results and their interpretation (Zupic & Čater, 2015). The study design phase defined the research objective, the scope of the review and the conceptual boundaries of financial statement analysis. The data collection phase identified and exported the bibliographic records from Scopus. The data analysis phase combined performance analysis and keyword-based science mapping. Finally, the interpretation phase connected the empirical bibliometric evidence to the broader methodological transformation of financial statement analysis.

The bibliographic dataset was retrieved from Scopus on April 2026. Scopus was selected because of its broad multidisciplinary coverage and its suitability for bibliometric studies in business, management, accounting, finance and related fields (Okoli & Schabram, 2010). The search was conducted in the TITLE-ABS-KEY

field and combined a core block related to financial statement analysis with a second block capturing the methodological and technological developments currently associated with the field.

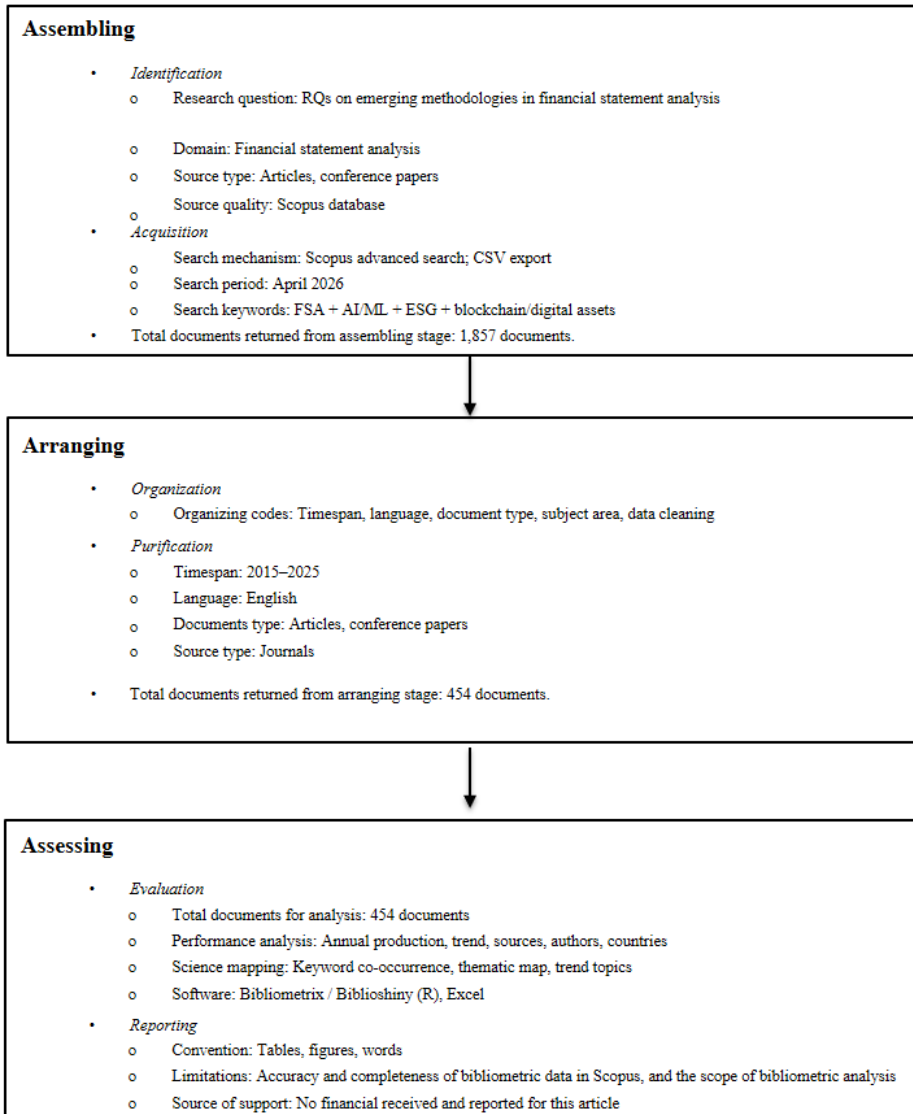
The first block included terms such as “financial statement analysis”, “analysis of financial statements”, “financial statement\*”, “financial report\*”, “annual report\*”, “accounting information”, “accounting data” and “financial ratio\*” in proximity with analys\*.

The second block included “artificial intelligence”, “machine learning”, “deep learning”, “predictive analytics”, automat\*, “robotic process automation”, “real-time reporting”, “continuous reporting”, “continuous analytics”, “continuous monitoring”, “ESG”, sustainab\*, “data visualization”, dashboard\*, “blockchain”, “distributed ledger”, “digital asset\*” and tokeni?ation.

The search was restricted to English-language documents indexed in Business, Management and Accounting, Economics, Econometrics and Finance, Decision Sciences and Computer Science, and to the document types article and conference paper (Sadraei et al., 2023; Fijałkowska & Lanzalonga, 2025). The inclusion of conference papers was retained because technologically dynamic areas such as artificial intelligence, machine learning, digital reporting and blockchain often develop partly through conference-based dissemination before stabilising in journal outlets (Secinaro et al., 2022). The data collection protocol was designed consistently with systematic review procedures aimed at reducing selection bias through the explicit reporting of search criteria, inclusion parameters and screening decisions (Paul et al., 2021). Figure 1 summarises the search protocol and corpus construction process.

The initial Scopus query returned 1,847 records. The corpus was then refined through a sequential screening and cleaning procedure. In the first stage, preliminary eligibility filters were applied on the basis of the study design, including timespan, language, document type, subject area and general relevance to the domain of financial statement analysis. This stage reduced the initial set to 743 records. In the second stage, a manual thematic and conceptual screening of titles and abstracts was conducted.

**Figure 1.** Search protocol and corpus construction of the bibliometric dataset



Source: Authors' elaboration based on Paul et al. (2021)

This screening aimed to retain only those contributions in which the financial-statement-analysis dimension and the methodological-innovation dimension

were simultaneously and substantively present. Records were excluded when the expression “financial statement” appeared only in a generic or definitional sense, when the study addressed accounting or reporting only incidentally, or when artificial intelligence, machine learning, blockchain, ESG analytics or other digital methods were applied to contexts not directly related to financial statement analysis. Following this manual screening, 454 records were retained for bibliometric processing.

The empirical analysis was conducted through Biblioshiny (Aria & Cuccurullo, 2017). Performance analysis was used to describe the main characteristics of the corpus, including annual scientific production, source distribution, authorship patterns and country-level production. Keyword-based science mapping was then used to explore the conceptual structure of the field. More specifically, co-word analysis was employed to identify thematic proximity through keyword co-occurrence, while thematic mapping and trend-topic analysis were used to distinguish central, emerging and declining themes and to trace the temporal visibility of the methodological trajectories currently reshaping financial statement analysis (De Bem Machado et al., 2022). Co-citation analysis was not employed in this study, as the cited references field (CR) was empty or missing in the Scopus extraction processed by Bibliometrix, making citation-based techniques such as co-citation mapping, bibliographic coupling and historiographic mapping unavailable for this corpus (Cobo et al., 2011; van Eck & Waltman, 2010).

Finally, transparency and reproducibility were pursued by explicitly reporting the database used, the extraction date, the search field, the search logic, the filtering criteria, the corpus-cleaning procedure and the analytical tools employed, following the reporting standards recommended for bibliometric studies (Donthu et al., 2021). In this sense, the methodology is designed to provide an auditable basis for the subsequent results section in which the evolution of the field is examined through publication growth, source distribution, country patterns, keyword networks, thematic positioning and trend topics.

## Current state of knowledge

Research on financial statement analysis has developed along several streams whose joint evolution provides the conceptual background for the present mapping. The traditional FSA literature established that the calculation of ratios is straightforward but the derivation of valid inferential rules from accounting signals is far more demanding. Ou and Penman (1989), Lev and Thiagarajan (1993) and Piotroski (2000) framed FSA as a structured inferential problem in which information is extracted from financial statements to support investment, credit and governance decisions. Altman (1968) provided the foundational contribution to bankruptcy prediction, anchoring a quantitative tradition that has remained an empirical reference point for subsequent work.

A second stream addresses the computational analysis of corporate text. Loughran and McDonald (2011) demonstrated that general-purpose sentiment dictionaries systematically misclassify financial language, motivating the development of domain-specific lexica and, later, more advanced NLP approaches. Loughran and McDonald (2016) surveyed the methodological landscape of textual analysis in accounting and finance, while Bochkay et al. (2023) addressed more recent issues such as construct validity, deep learning and the conditions under which textual measures capture economically meaningful variation. This stream is particularly relevant for this study because it documents how the analytical perimeter of FSA has expanded from numerical disclosures to narrative ones.

A third stream applies machine learning and predictive analytics to structured accounting data. Liaras et al. (2024) review this literature and highlight three recurring patterns: the dominance of supervised models, persistent implementation risks linked to data quality and feature selection, and the additional gains observed when numerical and textual features are combined. These gains are most pronounced in fraud detection and financial distress prediction, two task families in which corpus-level studies such as those of Hajek and Henriques (2017), Nguyen and Huynh (2022) and Nießner et al. (2023) have produced substantial cumulative evidence.

Three further streams extend the informational and infrastructural scope of FSA but have so far remained partly disconnected from the previous threads.

The first concerns digital corporate reporting, including XBRL filings, iXBRL mandates and the taxonomy choices that support machine-readable disclosure. Troshani and Rowbottom (2021) describe this literature as fragmented across the reporting supply chain, while Rowbottom et al. (2021) argue that digitalisation is not analytically neutral: making a principles-based reporting system machine-readable introduces standardisation pressures that can reshape what becomes measurable and comparable. The second concerns sustainability disclosure analytics, an area gaining regulatory relevance through the Corporate Sustainability Reporting Directive and the ESRS framework. Ferjančič et al. (2024) use advanced topic modelling to trace thematic evolution in the sustainability sections of annual reports, while Seow (2025) reviews the use of ML in ESG analytics and identifies persistent problems of data standardisation and model explainability. The third frontier concerns generative AI and large language models, where Stratopoulos and Wang (2025) propose a framework for AI-accounting research and discuss early applications of LLMs to the automated retrieval of information from unstructured corporate documents.

A further stream, less visible in the methodologically focused corpus but conceptually important, examines how national culture and institutional context shape accounting practices and disclosure behaviour. Following the foundational framework of Gray (1988), which links the cultural dimensions identified by Hofstede (1980) to accounting values such as conservatism, secrecy, professionalism and uniformity, subsequent work (Salter & Niswander, 1995; Doupnik & Tsakumis, 2004) has documented systematic cross-jurisdictional variation in how financial information is produced and interpreted. This stream remains largely separate from the computational FSA literature mapped here, yet its concerns become increasingly relevant as analytical methods cross linguistic and institutional borders. Sentiment dictionaries, machine-learning models and large language models are not culturally neutral instruments: they encode the disclosure conventions, rhetorical norms and accounting traditions of the corpora on which they were trained. The intercultural dimensions discussed in section *Intercultural dimensions of methodological transfer* below should be read as an attempt to reconnect these two literatures – the computational and the cultural – within a unified analytical perspective.

Each of these streams has generated a substantial body of evidence on its own, yet they have developed largely in isolation from one another. The bibliometric analysis presented in the next section is designed to examine how they cluster, intersect and jointly configure the current state of the field, treating FSA as a data-type × task × method ecosystem rather than as a fixed set of ratio-based techniques.

## Results

This section reports the main descriptive findings of the bibliometric analysis. Specifically, it examines the corpus through annual scientific production, trend topics, co-word clustering, geographical collaboration patterns and the most relevant authors in order to identify the methodological trajectories currently reshaping research on financial statement analysis.

### *Descriptive bibliometric analysis*

**Table 1.** Main information about the analysed corpus

| Description                        | Results   |
|------------------------------------|-----------|
| <i>Main information about data</i> |           |
| Timespan                           | 2015:2025 |
| Sources (journals, books, etc.)    | 298       |
| Documents                          | 454       |
| Annual growth rate (%)             | 27.48     |
| Document average age               | 3.73      |
| Average citations per document     | 13.97     |
| References                         | 0         |
| <i>Document contents</i>           |           |
| Keywords Plus (ID)                 | 1,390     |
| Author's keywords (DE)             | 1,530     |

| Description                          | Results |
|--------------------------------------|---------|
| <b>Authors</b>                       |         |
| Authors                              | 1,273   |
| Authors of single-authored documents | 65      |
| <b>Authors' collaboration</b>        |         |
| Single-authored documents            | 65      |
| Co-authors per document              | 3.02    |
| International co-authorships (%)     | 26.65   |
| <b>Document types</b>                |         |
| Article                              | 339     |
| Conference paper                     | 108     |
| Review                               | 7       |

Source: Authors' elaboration based on Scopus data processed in Bibliometrix. Note: the value reported as "References: 0" should not be interpreted literally as the absence of bibliographic references in the analysed documents. It reflects the fact that the cited references field (CR) was empty or missing in the Scopus extraction processed by Bibliometrix.

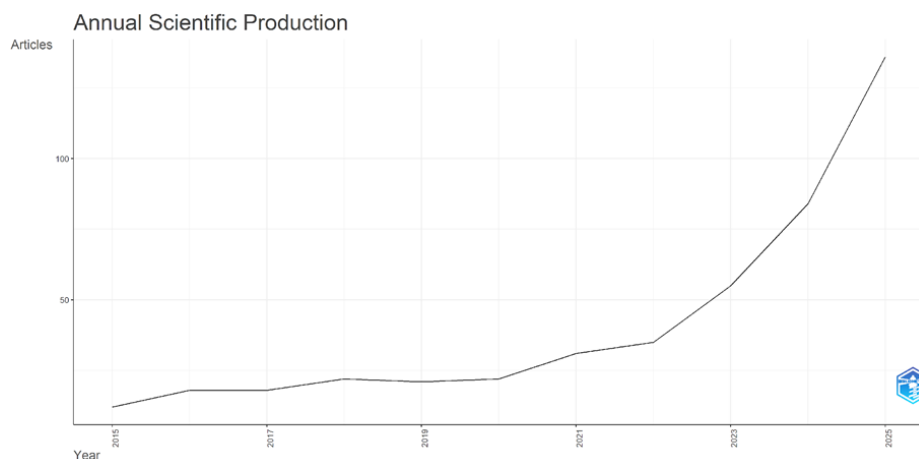
As shown in Table 1, these documents are distributed across 298 sources and involve 1,273 authors, with 1,530 author keywords and 1,390 Keywords Plus. Taken together, these figures already suggest that financial statement analysis is no longer confined to a narrowly delimited accounting niche but has developed into a broader and increasingly heterogeneous research space. Within the corpus, this expansion is visible in the coexistence of studies on ESG disclosure and firm performance (Atan et al., 2016), web-based financial report analysis and visualisation systems (Liu et al., 2016), textual approaches to bankruptcy prediction (Nguyen & Huynh, 2022), machine-learning-based methods for analysing financial statements (Li & Zhou, 2024), and AI-assisted interpretations of narrative and audit-related disclosures (Hasan et al., 2025; Küster et al., 2025; Wang & Kang, 2025).

The descriptive evidence also highlights the collaborative and document-profile characteristics of the field. The average number of co-authors per document is 3.02, while international co-authorship reaches 26.65%, indicating that collaboration is common although cross-border integration is not yet dominant. This is consistent with a field that is expanding rapidly but still partly segmented

across regional and methodological agendas. The document mix is led by journal articles (339), followed by conference papers (108) and a smaller number of reviews (7). This composition is analytically relevant. On the one hand, it indicates that a substantial share of the literature is already consolidated in journal outlets. On the other hand, the strong presence of conference contributions suggests that part of the field is still being shaped by frontier experimentation, especially in fast-moving areas such as deep learning, natural language processing and generative AI applied to financial reports and financial statement analysis (Lin & Yang, 2025; Mehul et al., 2025; Wang & Kang, 2025). In this sense, the profile reported in Table 1 is fully consistent with the methodological choice to retain conference papers in the corpus when mapping emerging analytical trajectories.

Figure 2 reinforces this reading from a temporal perspective. Annual scientific production remains relatively limited in the first part of the period and then rises sharply in the most recent years. The curve moves from a modest initial base in 2015 to a markedly steeper expansion after 2021, culminating in a strong peak in 2025. Read descriptively, this pattern indicates that research on financial statement analysis has entered a clear expansionary phase only in the most recent period. Read substantively, however, the figure suggests more than simple growth in publication counts. It points to a reconfiguration of the field in which financial statement analysis is increasingly treated not only as a traditional ratio-based or reporting-based practice but also as a broader methodological domain connected to textual analysis, predictive modelling, digital transformation and sustainability-related information structures.

**Figure 2.** Annual scientific production



Source: Authors' elaboration based on Scopus data processed in Bibliometrix.

**Table 2.** Summary table of documents published before and after 2017

|                                               | 2015–2016                                                                                              | 2017–2025                                                                                         |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Number of published documents</b>          | 30                                                                                                     | 424                                                                                               |
| <b>Number of sources</b>                      | 26                                                                                                     | 278                                                                                               |
| <b>Top five author keywords</b>               | Corporate social responsibility; Profitability; Content analysis; Sustainability; Corporate governance | Machine learning; Sustainability; Artificial intelligence; Deep learning; Sustainable development |
| <b>Sum of citations received by documents</b> | 528                                                                                                    | 5,813                                                                                             |

Source: Authors' elaboration based on Scopus data processed in Bibliometrix.

Table 2 makes this change more visible by comparing the two time slices of the corpus, namely 2015–2016 and 2017–2025. Because the observation window begins in 2015, the first slice is necessarily shorter and should therefore be interpreted with caution. Even so, the contrast between the two periods is informative. The early slice is smaller in both document volume and source variety and is characterised by keywords centred on corporate social responsibility,

profitability, content analysis, sustainability and corporate governance. This profile suggests that the initial configuration of the field was more strongly rooted in reporting quality, disclosure practices and sustainability-related corporate communication. Early corpus contributions are consistent with this orientation, including work on the effect of financial reporting quality on sustainability information disclosure, ESG disclosure and firm performance, and CSR content analysis in annual reports (Martínez-Ferrero et al., 2015; Atan et al., 2016; Markhayeva, 2016).

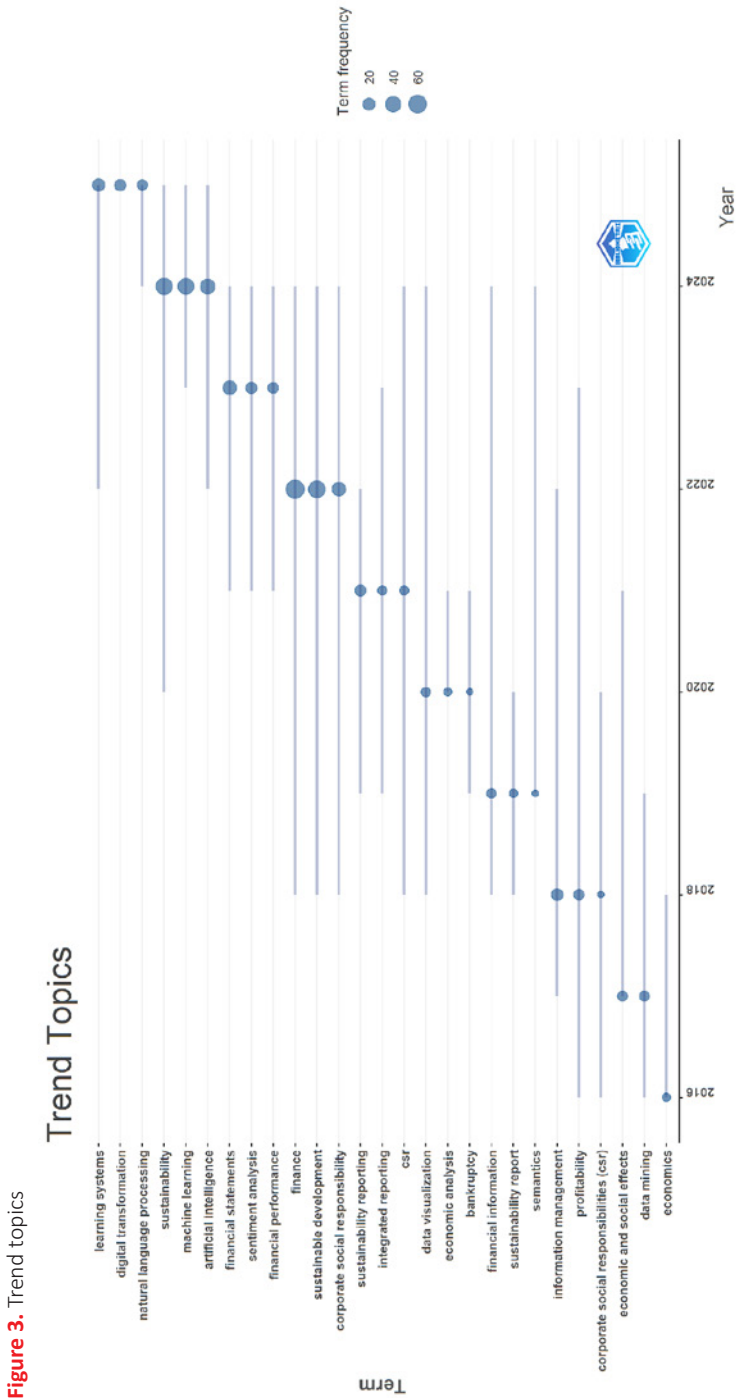
By contrast, the second slice shows a much larger and more diversified body of research and a different thematic centre of gravity. Its leading keywords are machine learning, sustainability, artificial intelligence, deep learning and sustainable development, indicating that the field has moved towards a hybrid configuration in which conventional financial analysis increasingly coexists with computational, AI-assisted and digitally-mediated approaches. Recent corpus contributions reflect exactly this shift, addressing themes such as large-language-model-based corporate risk evaluation, data visualisation in financial reporting and analysis, intelligent fraud detection through machine learning, big-data-based financial risk warning and deep-learning-based financial statement analysis (Lin & Yang, 2025; Wang & Kang, 2025; Zeng & Dai, 2025). In this sense, Table 2 does not simply document a temporal increase in publications. It captures a substantive transition in the field's analytical orientation, from disclosure-centred and sustainability-related readings of reporting practices towards computationally-enhanced forms of financial statement analysis.

A second reading of Table 2 highlights a cultural-geographical undercurrent: the early period's keywords (CSR, sustainability, content analysis) reflect a Continental European stakeholder-oriented agenda, while the later period's vocabulary (machine learning, AI, deep learning) signals the rise of a more Anglophone and East-Asian technology-centred research culture. This shift in analytical vocabulary is not merely topical; it tracks the relative weight of different national accounting and research traditions within the field over the decade.

### ***Trend topics and thematic reorientation***

Figure 3 provides a more fine-grained view of the thematic reorientation underlying the recent expansion of the field. Rather than showing a uniform accumulation of topics, the trend-topic map suggests a sequential restructuring of research attention. The earliest layer of visible topics is anchored in relatively general and economically framed terms, such as economics, data mining, economic and social effects, information management and profitability. This early configuration indicates that the literature initially approached financial statement analysis as a broad decision-support and information-processing domain, with methodological innovation present but not yet dominant.

A transitional phase becomes visible between roughly 2019 and 2023, when topics related to reporting architectures and disclosure practices gain salience. Terms such as financial information, sustainability report, sustainability reporting, integrated reporting, CSR, corporate social responsibility, semantics and data visualization suggest that the field progressively widened from traditional statement-based analysis towards broader reporting environments in which financial, narrative and non-financial information are jointly examined. This shift is consistent with corpus contributions that focus on integrated reporting adoption, transparency and accountability through reporting infrastructures (Darus et al., 2019), heterogeneity in sustainability and integrated-report disclosure (Injeni et al., 2022), environmental auditing within integrated reporting and the quality of stakeholder-engagement disclosure under mandatory non-financial reporting regimes (Bananuka et al., 2019; Hichri, 2023; Petruzzelli & Badia, 2024).



Source: Authors' elaboration based on Scopus data processed in Bibliometrix.

The most recent phase, concentrated in 2023–2025, marks a clearer methodological turn. While financial statements, financial performance and sentiment analysis remain central, they are increasingly co-visible with machine learning, artificial intelligence, digital transformation, natural language processing, learning systems and the broader umbrella of sustainability. Read together, these topics indicate that current research is not abandoning the traditional objects of analysis but is instead reprocessing them through computational techniques and digitally enriched information environments. Recent studies in the corpus reflect exactly this movement: machine-learning approaches to narrative disclosure tone and analysts' forecast accuracy (Acheampong & Elshandidy, 2025), textual fraud detection in annual reports (Zhu et al., 2025), machine-learning methods for analysing financial statements, AI-based interpretation of key audit matters, deep-learning models for financial statement analysis, GenAI-based querying of annual reports and AI-enabled ESG disclosure and digital-transformation effects on ESG performance (Hasan et al., 2025; Lin & Yang, 2025; Mehul et al., 2025).

Overall, the trend-topic evidence suggests that the recent growth of the field is associated not simply with a rise in publication volume, but with a substantive reorientation from conventional financial interpretation towards hybrid analytical configurations in which accounting data, textual disclosures, sustainability-related information and AI-based methods increasingly intersect. In this sense, the temporal profile of the topics supports the argument that methodological innovation is becoming one of the principal organising logics of contemporary research on financial statement analysis.

### ***Conceptual structure of the field: Co-word clustering***

Figure 4 examines the conceptual structure of the field through co-word clustering. Consistent with the methodological design, the aim here is not to reconstruct citation genealogy, but to identify the thematic proximities through which recent research on financial statement analysis is being organised. Read in this way, the dendrogram does not portray a fragmented set of disconnected niches. Rather, it reveals an internally differentiated but still connected field, structured around

five colour-coded clusters that jointly show how financial statement analysis is expanding beyond its traditional statement-based boundaries.

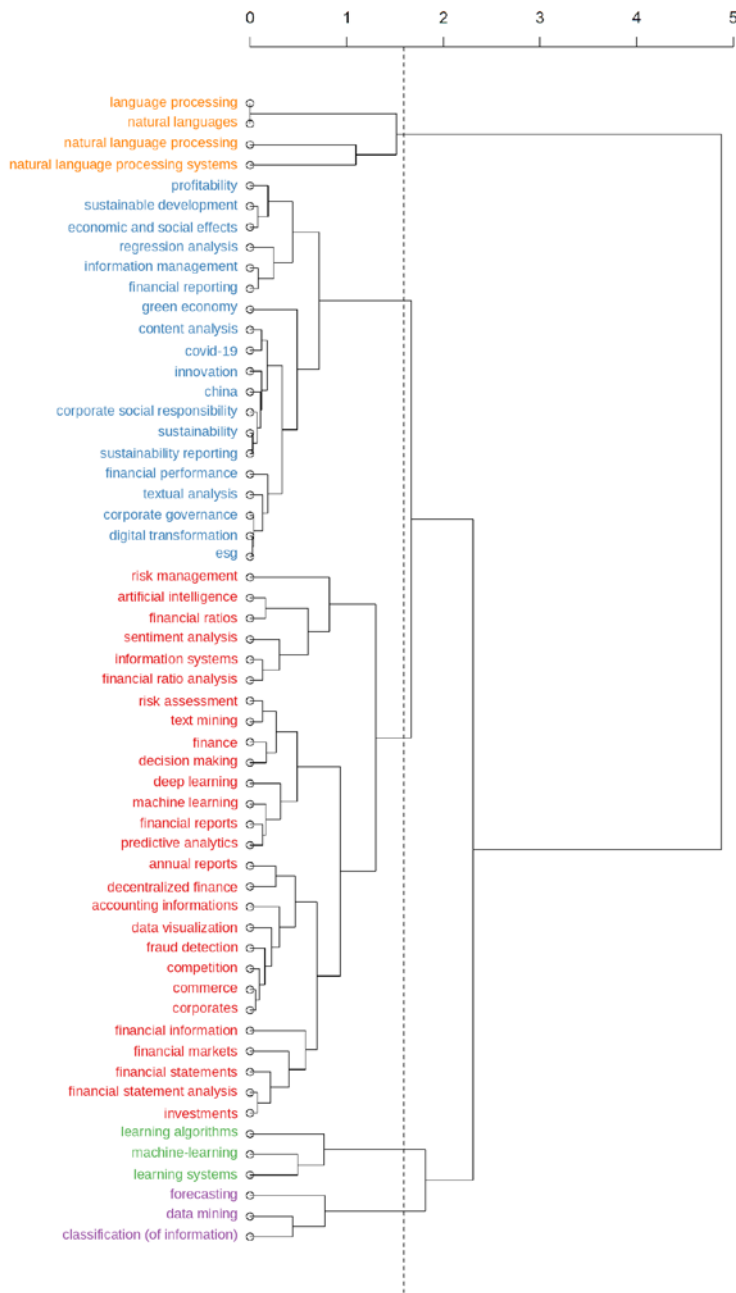
The yellow cluster isolates terms related to language-centred analytical infrastructures, including natural language processing, language processing, natural language processing systems and natural languages. This cluster is comparatively specialised and more distant from the rest of the conceptual structure, suggesting that language-processing approaches still represent a more technical and method-specific stream rather than the dominant core of the field. At the same time, its presence is substantively important. It indicates that part of recent research is moving towards the treatment of annual reports, narrative disclosures and other textual materials as analysable data objects, thus extending financial statement analysis into computational linguistics and automated text interpretation. This reading is consistent with corpus contributions that apply AI and text-based techniques to disclosure tone, audit-related narratives, corporate risk evaluation and report-querying architectures (Hasan et al., 2025; Küster et al., 2025; Wang & Kang, 2025). The cultural specificity of this frontier deserves explicit acknowledgement: the NLP tools that dominate the yellow cluster were developed and validated almost exclusively on English-language US corporate filings, which means their analytical reach into Chinese, European or Latin American disclosure environments remains empirically uneven and methodologically contested.

The blue cluster groups together terms associated with broader reporting, governance and sustainability-oriented concerns, such as sustainable development, sustainability, corporate social responsibility, corporate governance, ESG, financial reporting, sustainability reporting, financial performance, profitability, content analysis, textual analysis and green economy. This part of the dendrogram shows that the field is no longer confined to the narrow interpretation of financial statements as purely quantitative accounting artefacts. Instead, it is increasingly embedded in a wider disclosure architecture where governance quality, stakeholder-oriented transparency, sustainability communication and non-financial reporting matter alongside conventional financial indicators. The inclusion of terms such as China, COVID-19 and innovation also suggests that

this stream is frequently studied through contextualised empirical settings and contemporary institutional transformations.

This interpretation is coherent with corpus studies on integrated reporting adoption, sustainability disclosure heterogeneity, stakeholder-engagement disclosure, environmental auditing and AI-enabled ESG disclosure dynamics (Bananuka et al., 2019; Qian et al., 2025; Rauf & Baolei, 2025).

Figure 4. Factorial analysis: dendrogram



Source: Authors' elaboration based on Scopus data processed in Bibliometrix.

The red cluster represents the largest and most central conceptual core of the field. It includes terms such as finance, financial statements, financial statement analysis, financial reports, annual reports, financial ratios, financial ratio analysis, financial information, financial markets, investments, risk assessment, risk management, decision making, fraud detection, information systems and decentralised finance. What emerges here is not the disappearance of the traditional analytical nucleus of the field but its rearticulation. Conventional objects of analysis remain highly visible, yet they are increasingly connected to risk-oriented, decision-support and digitally-mediated applications. The proximity of artificial intelligence, sentiment analysis and fraud detection to this central financial core suggests that computational and diagnostic logics are no longer external additions to financial statement analysis; they are becoming embedded within its main analytical domain. This pattern is consistent with corpus contributions on fraud detection in annual reports, textual bankruptcy analysis, AI-based corporate failure prediction and automated financial statement evaluation (Nguyen & Huynh, 2022; Nießner et al., 2023; Lin & Yang, 2025).

The green cluster is more explicitly associated with the computational learning architecture that now supports methodological innovation in the field. Terms such as machine learning, deep learning, machine-learning, learning algorithms, learning systems, text mining and predictive analytics indicate that a substantial share of recent research is oriented towards automated pattern recognition, model-based prediction and scalable analysis of both structured and unstructured information. This cluster is particularly important because it signals that financial statement analysis is increasingly being redefined not only by what it studies, but also by how it studies it. In other words, the field is shifting from traditional ex post interpretation towards more automated, predictive and model-driven forms of analysis. This reading aligns with corpus studies on machine-learning-based methods for analysing financial statements, AI-assisted narrative interpretation, deep-learning approaches to financial-report analysis and fuzzy-logic-enhanced automated statement analysis (Li & Zhou, 2024; Hasan et al., 2025; Lin & Yang, 2025; Liu, 2025).

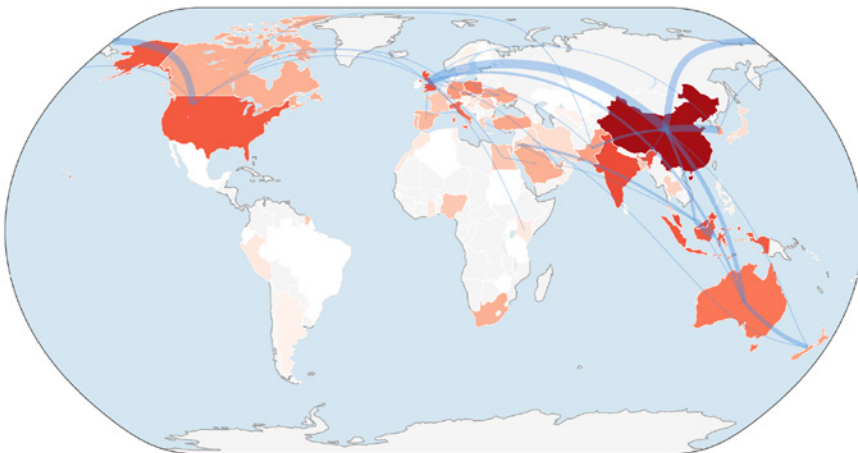
The purple cluster captures a closely related but more application-oriented predictive branch, built around forecasting, data mining and classification (of information). If the green cluster reflects the methodological engine of computational innovation, the purple cluster reflects its operational outputs. The

clustering of these terms suggests that recent work increasingly uses digital tools not simply to describe reporting information, but to classify, forecast and transform it into decision-relevant signals. In this sense, the purple cluster marks the movement from methodological potential to applied analytical use. This is consistent with corpus contributions on competition-sensitive business forecasting, intelligent early fraud detection and AI-supported corporate risk evaluation (Nießner et al., 2022; Wang & Kang, 2025; Zeng & Dai, 2025).

Taken together, the co-word structure suggests that recent innovation in financial statement analysis is additive rather than substitutive. The field continues to be anchored in its traditional financial-reporting and ratio-analysis core, but that core is increasingly surrounded and reshaped by broader sustainability and governance concerns, by computational learning methods, predictive applications and specialised language-processing approaches. In this sense, the dendrogram supports the view that the recent growth of the field is associated with a progressive hybridisation of analytical objects, data types and research methods, rather than with a simple expansion of an otherwise unchanged accounting domain.

### ***Geographical collaboration patterns***

**Figure 5.** Country collaboration world map



Source: Authors' elaboration based on Scopus data processed in Bibliometrix.

Consistent with the methodological design, the country collaboration map is read here as an indicator of the social structure of the field rather than as a proxy for research quality or causal influence. The purpose of this subsection is to identify where the debate is most visibly connected internationally and how those collaboration patterns relate to the current reconfiguration of financial statement analysis.

Figure 5 shows that international collaboration is present but not evenly distributed across the corpus. The network is clearly hub-based. China emerges as the most visible connector, with recurrent links to the United Kingdom, the United States, South Korea, Australia and several Asian partners. Around this core, a second layer of regional collaboration is visible in the Asia-Pacific area, especially among Malaysia, Indonesia, Australia and New Zealand. By contrast, large portions of the map remain weakly connected, suggesting that the field is internationally active but still far from fully integrated.

This pattern is informative. The geography of collaboration appears to follow the main problem settings currently driving the literature: AI-assisted investment and forecasting, machine-learning applications to bankruptcy and risk evaluation, digital reporting infrastructures and the intersection between financial disclosure and sustainability. China's centrality is consistent with several corpus contributions that connect Chinese institutions with Anglo-American or wider international partners in precisely these domains, including work on AI and accounting-information transparency (Zhao et al., 2024), AI-agent collaboration in investment analysis, machine-learning-based bankruptcy prediction, forward-looking information and integrated reporting, and CSR assurance and firm value (Qu et al., 2019; Choi et al., 2025; Farooq et al., 2025).

Read through an intercultural-management lens, the geography of collaboration also reflects deeper institutional and linguistic asymmetries. The Sino–Anglophone corridor connects two financial reporting cultures with substantively different disclosure traditions, audit institutions, and stakeholder expectations; the productivity of this corridor suggests that methodological innovation in FSA is being shaped through cross-cultural knowledge integration rather than within any single national tradition. The Asia-Pacific cluster, by contrast, exhibits intra-regional cultural proximity that lowers the costs of joint research on shared ESG

and sustainability concerns. The relative weakness of European participation, despite the regulatory weight of CSRD, points to a possible mismatch between regulatory leadership and research community formation – an issue that inter-cultural management scholarship is well positioned to investigate.

At the same time, the map does not point to a single global research centre. It instead suggests a segmented internationalisation of the field. One segment is organised around China and its links with major English-speaking systems. Another is anchored in regional collaboration across Southeast Asia and the broader Asia-Pacific space, where sustainability practices, green finance, banking performance and reporting quality appear particularly salient. This is reflected in corpus studies developed across Indonesia and Malaysia on ownership concentration and sustainability practices, green bonds and investor attention, sustainability programmes in banking, and social and environmental reporting (Indrasari et al., 2021; Aini et al., 2023; Sukmadilaga et al., 2023; Fariyah et al., 2024).

Overall, the collaboration evidence suggests that recent methodological innovation in financial statement analysis is being shaped through selective cross-border networks rather than through a uniformly globalised research community. The field is international, but its internationalisation is structured around a limited number of active corridors linking countries where digital finance, AI adoption, sustainability reporting and advanced analytical techniques are particularly visible. In this sense, the geography of collaboration reinforces the broader result already emerging from the previous subsections: the contemporary evolution of financial statement analysis is being driven by hybrid research agendas at the intersection of accounting, computational methods and digitally-mediated disclosure environments.

### ***Most relevant authors***

The author-level distribution further clarifies the social organisation of the field. Table 3 shows a relatively dispersed authorship structure rather than a strongly concentrated intellectual core. No single author dominates the corpus by a wide margin. The most productive author labels reach four publications, while a broader second tier is clustered around three. Read bibliometrically, this pattern

suggests that recent work on financial statement analysis is being developed through multiple partially connected micro-streams rather than through one stable and highly centralised school of thought.

**Table 3.** Most relevant authors

| Rank | Author       | Articles | Articles fractionalised |
|------|--------------|----------|-------------------------|
| 1    | Li, Z.       | 4        | 1.28                    |
| 2    | Yang, M.     | 4        | 0.93                    |
| 3    | Ali, W.      | 3        | 0.75                    |
| 4    | Ghani, E. K. | 3        | 0.92                    |
| 5    | Li, H.       | 3        | 1.50                    |
| 6    | Li, X.       | 3        | 1.53                    |
| 7    | Nießner, T.  | 3        | 1.00                    |
| 8    | Schumann, M. | 3        | 1.00                    |
| 9    | Tsiouni, M.  | 3        | 0.67                    |
| 10   | Wang, L.     | 3        | 1.58                    |
| 11   | Wang, S.     | 3        | 0.78                    |
| 12   | Wang, W.     | 3        | 1.00                    |
| 13   | Zhang, X.    | 3        | 1.70                    |
| 14   | Zhu, X.      | 3        | 0.75                    |

Source: Authors' elaboration based on Scopus data processed in Bibliometrix.

This fragmentation is consistent with the hybrid character already visible in the previous subsections. The field currently brings together scholars working on bankruptcy prediction, text mining, AI-based classification, financial forecasting, ESG disclosure, green accounting, integrated reporting and sector-specific applications of ratio analysis. In that sense, author productivity does not simply identify individual prominence; it also signals the coexistence of several methodological entry points into the broader domain of financial statement analysis.

A first visible stream is the computational and AI-oriented branch. Authors such as Nießner and Schumann are associated with contributions on AI-based corporate failure prediction, competition-sensitive financial forecasting, and the systematisation of AI-based methods in financial statement analysis, which aligns

closely with the methodological turn identified in the trend-topic and co-word evidence (Nießner et al., 2021; Nießner et al., 2022; Nießner et al., 2023). Their presence among the most productive authors indicates that one of the most coherent author-based clusters in the corpus is built around predictive modelling, text mining and AI-supported analytical architectures.

A second stream is linked to sustainability, disclosure quality and governance-related extensions of financial analysis. This is reflected, for example, in the work of Maama on green accounting and ESG accounting in banking environments, in Ghani's co-authored contributions on sustainability practices, cost of debt and green-bond-related investor reactions in ASEAN contexts, and in Tsiouni's work on ESG advisory and financially grounded sustainability assessment in agri-food settings (Maama & Appiah, 2019; Maama, 2021; Aini et al., 2023; Tsiouni et al., 2023; Tsiouni et al., 2024). These contributions reinforce the result already emerging from the conceptual structure: financial statement analysis is increasingly being embedded in wider reporting and sustainability-oriented problem settings.

Overall, the most-relevant-authors analysis suggests that the field is not yet organised around a narrow canonical centre. Instead, it appears to be evolving through parallel clusters of scholars who share an interest in methodological innovation but apply it to different analytical objects: failure prediction, forecasting, disclosure interpretation, ESG reporting and sustainability-linked performance evaluation. This helps explain why the recent expansion of the literature is accompanied by thematic diversification rather than by simple cumulative growth.

## Discussion

The combined evidence from the trend-topic analysis and the co-word dendrogram provides a clear, if nuanced, answer to the study's research questions. Multiple families of computational methods are emerging across the corpus, and their emergence is not uniform: it follows a structured, temporally layered process in

which new methods attach to progressively expanded analytical objects rather than displacing the traditional financial-statement core. The most accurate characterisation of the methodological transformation underway is therefore not substitution but rearticulation: FSA is acquiring new instruments and extending its reach, while retaining the inferential ambition that has defined the field since its empirical foundations (Ou & Penman, 1989; Lev & Thiagarajan, 1993).

### ***Temporal trajectory and phases of methodological reconfiguration***

The temporal trajectory of the field suggests that this rearticulation has proceeded in three broadly identifiable phases whose sequencing is not arbitrary. The earliest visible layer (pre-2019) reflects a broad decision-support framing in which financial statement analysis was approached as an information-processing domain without yet being reshaped by dedicated computational architectures. The intermediate phase (2019–2023) is marked by the progressive entry of reporting-architecture concerns into the thematic core of the field, signalling that the informational object of FSA was expanding before the methods used to analyse it had fully adapted. The most recent phase (2023–2025) completes the reorientation: machine learning, artificial intelligence, NLP and digital transformation become co-visible with financial statements and sentiment analysis, indicating that the methodological response has arrived at scale. This three-phase sequence is coherent with the disclosure processing cost framework developed by Blankespoor et al. (2020). As the informational object expanded, the cost-benefit calculus of deploying computational methods shifted. Methods that would have been disproportionately expensive relative to the analytical gains they offered on narrowly structured numerical statements became progressively more tractable as disclosures grew in volume, textual complexity and structural heterogeneity. The 2021+ growth inflection point in the publication curve reinforces this reading: it coincides with the widespread availability of pre-trained language models, the extension of iXBRL mandates to major reporting jurisdictions and the institutionalisation of ESG reporting under frameworks subsequently formalised through the CSRD/ESRS architecture. The acceleration is, in this sense, endogenous.

### ***Conceptual architecture of the field: The five-cluster structure***

The co-word dendrogram brings the conceptual architecture of this transformation into structural relief. Interpreted jointly, the five clusters do not reveal a fragmented field but a centrifugally differentiated one – that is a field organised around a strong, persistent centre from which more specialised thematic and methodological extensions radiate outward as concentric layers, rather than coexisting as disconnected niches: new methods and informational objects are being added at the periphery while the traditional analytical core remains recognisable at the centre. Each cluster occupies a distinct position in this architecture and corresponds to a specific dimension of the methodological reconfiguration currently underway.

#### ***The red cluster: Reconfiguration of the traditional core***

The red cluster's internal reconfiguration: computational and diagnostic logics embedded within the traditional FSA core rather than appended to it, is the most structurally significant finding of the mapping. This is the rearticulation that the foundational literature anticipated but could not yet operationalise: the inferential agenda of Ou and Penman (1989) and Lev and Thiagarajan (1993) is now being pursued with fundamentally different instruments, applied to a broader and more heterogeneous informational object.

The persistence of this cluster across a decade of bibliometric output reflects what Blankespoor et al. (2020) identify as the enduring information-processing demands placed on financial statement users: even as analytical tools evolve, the foundational structure of the income statement, balance sheet and cash flow statement continues to organise the field's cognitive architecture. This observation is consistent with the historical perspective offered by Ou and Penman (1989) and subsequently by Lev and Thiagarajan (1993), whose articulation of fundamental signals established the template for ratio-based and accrual-based inference that still constitutes the baseline against which new methods are benchmarked. The survival of this cluster thus does not indicate analytical stasis. Rather, it confirms that the conceptual vocabulary of traditional FSA remains the

referential grammar of the discipline, even as its syntax is increasingly rewritten by algorithmic and computational methods documented in adjacent clusters.

### ***The green cluster: The computational learning engine***

Immediately adjacent to the red core, the green cluster captures the methodological engine driving the current reconfiguration: machine learning, deep learning, learning algorithms, text mining and predictive analytics. Its proximity to the central cluster is structurally significant; it maps, in spatial bibliometric terms, the process by which computational methods have been internalised rather than appended to the traditional analytical domain. The field is being redefined not only by what it studies, but by how it studies it: the shift from traditional ex post interpretation towards automated, model-driven analysis is directly reflected in the thematic weight of this cluster (Liaras et al., 2024; Li & Zhou, 2024; Hasan et al., 2025).

The consolidation of this methodological cluster reflects a broader disciplinary shift that Liaras et al. (2024) characterise as the transition from interpretive to model-driven financial analysis. In this reconfigured framework, the analyst's role shifts from applying standardised ratios to curating training datasets, selecting model architectures and evaluating out-of-sample predictive performance. The practical implications of this transition are already visible in the empirical literature: gradient boosting and neural network models consistently outperform logistic regression on bankruptcy prediction tasks, while hybrid architectures combining textual and numerical signals demonstrate incremental accuracy gains that no individual feature class achieves alone. At the same time, the cluster's lexical proximity to text mining and natural language processing underscores the dual nature of the machine learning contribution; simultaneously a computational method and an information-extraction strategy, operating on structured financial data and unstructured narrative disclosure alike.

### ***The purple cluster: Applied predictive outputs***

If the green cluster reflects methodological potential, the purple cluster reflects its practical deployment: forecasting, data mining, and classification as

decision-oriented outputs. Their joint adjacency to the red core suggests that this deployment is being absorbed into the mainstream analytical domain rather than remaining confined to specialised technical sub-fields (Nießner et al., 2022; Wang & Kang, 2025; Zeng & Dai, 2025).

The applied orientation of this cluster is significant for understanding the practical trajectory of the field. Whereas the green cluster documents methodological capability, the purple cluster documents deployment: the transformation of that capability into working decision-support systems, credit-scoring models and regulatory-grade classification tools. Liaras et al. (2024) observe that this deployment logic increasingly shapes how financial institutions procure and evaluate analytical services, creating feedback loops between academic model development and commercial system design. For the bibliometric mapping, the fact that output-oriented terms cluster separately from method-oriented terms suggests that the research community has developed distinct epistemic norms around the building of methods and the reporting of outcomes; a division of labour that may warrant closer attention in future systematic reviews of the field's practical impact.

### ***The blue cluster: Sustainability and governance extension***

The blue cluster extends the informational scope of FSA beyond the narrow interpretation of financial statements as purely quantitative artefacts. FSA is increasingly embedded in a wider disclosure architecture where non-financial information, stakeholder-oriented transparency and sustainability communication matter alongside conventional financial indicators (Ferjančič et al., 2024; Seow, 2025; Qian et al., 2025).

The growth of this cluster acquires additional urgency in the context of regulatory developments underway at the time of writing. The European Union's Corporate Sustainability Reporting Directive (CSRD), effective for large undertakings from 2024, imposes mandatory double-materiality reporting that substantially expands the informational perimeter of what constitutes a financial statement. Ferjančič et al. (2024) document how preparers are responding to this expansion, and Seow (2025) analyses the implications for analytical practice. Both

contributions reinforce the view emerging from the bibliometric evidence: that sustainability is no longer a supplementary disclosure layer but a constitutive element of the informational environment in which financial analysis is conducted. For researchers in the field, this regulatory acceleration implies that co-word proximity between ESG terms and core FSA vocabulary will likely intensify further, making the blue cluster one of the fastest-growing areas of the literature in the coming years.

### ***The yellow cluster: The language-processing frontier***

The yellow cluster's distance from the central core is not merely spatial but epistemological: it signals that language-processing approaches represent a frontier-facing stream that has not yet been absorbed into the dominant analytical core of FSA. This positioning is consistent with the observation by Bochkay et al. (2023) that NLP approaches in accounting are still navigating unresolved questions of construct validity and domain-specific adaptation. The conference paper share of the corpus reinforces this reading: frontier experimentation in LLMs and generative AI is producing outputs that have not yet fully migrated to journal consolidation (Stratopoulos & Wang, 2025).

The conceptual distance of this cluster from the computational core is not merely spatial but epistemological. Natural language processing and automated text interpretation operate on a fundamentally different category of financial data that traditional ratio-based and even machine-learning-based approaches do not adequately capture. The foundational lexical resources developed by Loughran and McDonald (2011, 2016) established the empirical basis for this research trajectory, demonstrating that generic sentiment dictionaries systematically misclassify financial language and that domain-specific lexicons are required. Subsequent contributions by Bochkay et al. (2023) and by Stratopoulos and Wang (2025) have extended this insight into earnings call transcripts, MD&A sections and forward-looking disclosures, showing that language choices by management carry systematic information content beyond what structured numerical data convey. The yellow cluster thus represents the frontier where FSA intersects with computational linguistics and communication theory.

Reading the five clusters together, the co-word structure reveals a field in organised transition. The red cluster acts as a centripetal anchor, while the green and yellow clusters operate as centrifugal forces extending the field's reach in complementary directions: the former through structured numerical prediction, the latter through unstructured language interpretation. The purple and blue clusters occupy intermediary positions, translating methodological capability into applied outputs and expanding the thematic scope towards sustainability and governance. This architecture is not accidental. It reflects the underlying logic of what Blankespoor et al. (2020) call the disclosure-processing cost framework: as processing costs decline through automation and computational scaling, the informational perimeter of the field expands to accommodate data types and analytical questions that were previously prohibitively expensive to address. The bibliometric map is, in this sense, a structural record of how declining processing costs have reorganised the research frontier of financial statement analysis over the past decade.

### ***The absent cluster: Digital corporate reporting as invisible infrastructure***

Against the legibility of the five-cluster structure, the non-emergence of a distinct digital corporate reporting cluster is itself an interpretable finding rather than a gap in the evidence. Two readings are available. The first is a corpus-level explanation: keyword-based filtering on methodological innovation may have underweighted the digital reporting literature, which often organises itself around regulatory and standardisation vocabulary rather than analytical method terms. The second, and arguably more substantive, reading connects to the characterisation by Troshani and Rowbottom (2021) of digital reporting research as fragmented and sparse across the reporting supply chain, and to the argument by Rowbottom et al. (2021) that taxonomy design is performative but structurally invisible to the users of the resulting data. If digital reporting is functioning as background infrastructure rather than as a recognised research programme within the FSA community, its partial absorption into the red and blue clusters is expected rather than surprising. The implication is not that digital reporting is unimportant; it is that its influence on FSA methodologies may be indirect and

undertheorised, and that future work should attend explicitly to the infrastructure–analytics interface rather than treating data quality and structure as given.

### ***Geographical and social structure of the field***

The geographical collaboration evidence contextualises and reinforces the thematic findings. China’s position as the most visible international hub reflects the concentration within Chinese and Sino-international research of precisely the problem settings that dominate the computational and sustainability clusters: AI-assisted investment analysis, ML-based bankruptcy prediction, digital reporting adoption and the FSA–sustainability intersection. More interpretively significant than the China and Asia-Pacific patterns documented in section *Geographical collaboration patterns* is the relative absence of strong European and North American hub structures, despite the fact that the most consequential current driver of sustainability disclosure standardisation, the CSRD/ESRS framework, is a European regulatory initiative. This pattern may indicate a lag between regulatory development and research output that bibliometric evidence can identify but not causally explain. If so, it points to a high-priority empirical opportunity: the research community best positioned to analyse the analytical consequences of CSRD-compliant sustainability disclosures is not yet the most bibliometrically visible contributor to this literature. The dispersed authorship structure reinforces this picture of a field in structural transition, generating methodological innovation across multiple entry points without yet having consolidated around a canonical intellectual centre.

### ***Unresolved methodological tensions***

The growth and hybridisation documented across the corpus do not, however, resolve the methodological tensions that the introduction flagged. The dominance of ML methods in the green cluster does not guarantee that those methods are being applied with sufficient attention to accounting meaning, construct validity or audit-trail requirements. The concerns raised by Loughran and McDonald (2011, 2016) regarding domain-specific validity in textual analysis apply with at

least equal force to the broader ML and predictive analytics literature. The identification by Seow (2025) of data standardisation and explainability as persistent structural problems in ESG-ML research points to a gap that the bibliometric evidence can observe but cannot close: the field is innovating rapidly, but the rigour conversation has not kept pace with the rate of methodological adoption. This asymmetry between innovation speed and validation depth is arguably the most consequential open problem the present mapping identifies.

### ***Intercultural dimensions of methodological transfer***

A further unresolved tension emerges when the methodological evidence is read against the intercultural dimension of FSA practice. Computational methods, particularly those grounded in NLP, are rarely culturally neutral. Sentiment dictionaries developed for English-language US filings encode American disclosure conventions and rhetorical norms; transferring them to filings prepared in different languages and under different accounting cultures introduces measurement error that is itself culturally patterned. Loughran and McDonald (2011) demonstrated this problem within a single language; the multilingual and multi-jurisdictional expansion of FSA documented in this corpus suggests it now operates at a substantially larger scale. Similarly, large language models trained predominantly on English corporate text may underperform when applied to disclosures shaped by collectivist communication styles, indirect rhetorical conventions or different materiality frameworks. The bibliometric evidence cannot resolve these tensions, but it can identify them as priority areas. Future research at the intersection of intercultural management and computational FSA should examine how analytical models perform across reporting cultures, how cross-border analyst teams navigate interpretive disagreements amplified by AI tools, and how international standard-setters can design taxonomies that remain machine-readable without flattening the cultural specificity of disclosure practices.

## **Limitations**

Several limitations of the study should be acknowledged. Scopus coverage, while broad, may underrepresent regional journals and non-English-language contributions; this may partially account for the relative underrepresentation of European digital reporting research noted above. The keyword-based corpus construction introduces a dual risk: relevant contributions that use different terminology may have been excluded, while some included studies may sit adjacent to, rather than strictly within, the domain of financial statement analysis as defined here. Co-word analysis maps thematic proximity as evidenced by keyword co-occurrence, but it cannot capture theoretical lineage, methodological quality or the direction of influence between streams; the clusters should be read as empirical configurations rather than as causal genealogies. The study also inherits the intrinsic limitations of Scopus in terms of author disambiguation: surname-initial combinations may conflate distinct researchers or fragment a single author's output across name variants, particularly for East Asian contributors; the author-level analysis in Table 3 should accordingly be read as name-cluster productivity rather than individual attribution. Finally, the corpus was extracted on 3 April 2026, and the field is evolving rapidly enough that some findings, especially those concerning the yellow cluster and the conference paper frontier, may already require updating.

## **Implications for research and practice**

These limitations notwithstanding, the mapping offers actionable signals for both researchers and practitioners. For researchers, the clearest implication is the need for integrative, cross-stream work: the vertical reviews that have mapped individual streams – NLP in accounting (Bochkay et al., 2023), ML in finance (Liaras et al., 2024), ESG analytics (Seow, 2025), digital reporting (Troshani & Rowbottom, 2021) – each capture part of the conceptual architecture revealed by the dendrogram, but necessarily miss the dynamics at the intersections. Studies that treat the five clusters as analytically connected rather than as separate research programmes are likely to produce the most substantively

novel contributions at the current frontier. The underrepresentation of European digital reporting research, combined with the regulatory urgency of the CSRD/ESRS rollout, points to a high-priority empirical gap that the present mapping can locate but not fill. For practitioners and standard-setters, the embedding of AI and fraud detection within the traditional FSA core indicates that the computational re-tooling of analytical workflows is not a future prospect but an ongoing structural transformation. The open problem of explainability and interpretability in these applications is therefore not merely academic: it is operationally relevant for audit firms, financial analysts and regulators who must account for how analytical conclusions are reached and what assurance can be attached to computationally generated outputs.

## Final remarks

This paper set out to map the recent methodological reconfiguration of financial statement analysis using a Scopus-based bibliometric design applied to a corpus of 454 documents published between 2015 and 2025. It proceeded from the theoretical presupposition that methodological innovation in FSA is an endogenous response to changing disclosure processing costs (Blankespoor et al., 2020): as the informational object of the field has expanded to absorb narrative disclosures, sustainability reporting and machine-readable digital formats, the cost-benefit calculus of deploying computational methods has shifted from disproportionate through tractable to necessary. It further presupposed that FSA is most productively understood as a data-type × task × method ecosystem rather than as a fixed set of ratio-based techniques – a conceptual reframing that justified constructing a corpus spanning NLP, ML, ESG analytics and digital reporting, and that enabled the identification of cross-stream dynamics not accessible through vertical reviews of individual sub-fields.

The evidence supports a unified interpretive claim: the 2015–2025 period FSA has not abandoned its foundational inferential ambition, but is now pursuing it with fundamentally different instruments and across a more heterogeneous

informational object. The temporally structured pattern of methodological adoption is consistent with the processing cost logic: each phase corresponds to a moment at which the expansion of the informational object made a new category of methods economically and technically tractable. The 2021+ growth inflection, coinciding with the availability of pre-trained language models, the extension of iXBRL mandates and the institutionalisation of ESG reporting, is not incidental but endogenous to this dynamic.

The conceptual structure of the field, as revealed by the co-word dendrogram, is centrifugally organised. The red cluster remains dominant but has been internally reconfigured: artificial intelligence, sentiment analysis and fraud detection are now embedded within it rather than external to it. Surrounding this rearticulated core, the green and purple clusters form an immediately adjacent computational layer, while the blue and yellow clusters extend progressively outward towards sustainability-governance concerns and the NLP frontier, respectively. This architecture confirms that recent innovation is additive rather than substitutive: new methods and informational objects are accumulating at the periphery while the traditional core persists, yielding a field that is simultaneously more capable and more conceptually dispersed than it was a decade ago. The non-emergence of a distinct digital reporting cluster is the most revealing finding of this kind: XBRL- and taxonomy-related terms are absorbed into adjacent clusters, suggesting that digital reporting is functioning as invisible infrastructure – enabling the computational and sustainability streams without generating a visible research community of its own, a result consistent with the characterisation of this literature as fragmented and sparse (Troshani & Rowbottom, 2021) and with the argument that taxonomy construction is performative but structurally invisible to downstream users (Rowbottom et al., 2021).

The paper makes three contributions. Theoretically, it operationalises the disclosure processing cost framework (Blankespoor et al., 2020) at the level of collective research practice rather than individual investor behaviour, demonstrating that the phased adoption of computational methods in FSA is empirically traceable to successive expansions of the informational object – a result that both validates and extends the framework beyond its original application. Empirically, it provides the first bibliometric mapping explicitly focused on the

methodological discontinuity of the 2015-2025 period, producing a five-cluster architecture and a three-phase temporal structure that are original contributions not available from the prior comprehensive bibliometric review of FSA (Malchev et al., 2025) or from any of the vertical reviews covering individual streams (Liaras et al., 2024; Seow, 2025). Methodologically, it demonstrates that reframing FSA as a data-type × task × method ecosystem renders the fragmented literature on NLP, ML, digital reporting and ESG analytics mutually comparable: a conceptual contribution that holds independently of the specific bibliometric results and that may serve as an organising framework for future integrative research.

The five-cluster architecture generates a structured and prioritised research agenda. The most pressing need is integrative cross-stream research: the centrifugal structure of the field means that the most consequential analytical developments are taking place at the intersections between clusters that are currently studied in isolation. Future studies should explicitly design corpora and analytical frameworks that treat the five clusters as connected subsystems, with particular attention to the interface between the computational layer and the sustainability extension. Closely related is the infrastructure-to-analytics pipeline: the non-emergence of a distinct digital reporting cluster signals that the relationship between taxonomy design, XBRL data quality and downstream analytical feasibility remains undertheorised (Troshani & Rowbottom, 2021; Rowbottom et al., 2021). Future research should map this pipeline explicitly rather than treating structured data as a given input to ML models. The geographical evidence generates a third priority: European FSA research on CSRD/ESRS analytics. The lag between the regulatory ambition of the European sustainability reporting framework and the bibliometric visibility of European scholars in this corpus is a structural gap that empirical and methodological studies should urgently address, examining how CSRD-compliant disclosures are being structured, processed and analytically exploited.

Two further priorities concern the methodological integrity and the frontier trajectory of the field. On integrity: the dominance of ML methods in the green cluster does not guarantee that they are being applied with accounting-consistent construct validity, explainability, or audit-trail requirements. Following Bochkay et al. (2023) and Loughran and McDonald (2011), future research

should develop domain-specific validation frameworks that address the specific interpretive demands of accounting and regulatory contexts: frameworks that go beyond predictive accuracy to ask what computational measures actually mean in the accounting sense, whether they can be replicated across reporting regimes and jurisdictions and whether they satisfy the transparency requirements that audit and regulatory oversight impose. On the frontier: the yellow cluster's peripheral position and the concentration of conference papers in LLM and generative AI applications signal that this methodological wave is real but not yet consolidated. Structured research programmes on LLM-based financial document analysis represent the most consequential open agenda this mapping has identified (Stratopoulos & Wang, 2025).

Future research may also address methodological constraints by integrating Web of Science data, extending the time horizon, and combining co-word with co-citation and bibliographic-coupling analyses in a multi-layer network framework.

Beyond its methodological contribution, the study has implications for intercultural management research. The geography of collaboration, the language-processing frontier, and the uneven adoption of AI-based analytical tools across reporting jurisdictions all indicate that FSA is becoming a domain in which culture, language and institutional context shape what computational methods can credibly measure. Reframing FSA as a data-type × task × method × jurisdiction ecosystem – adding the intercultural axis to the three already discussed – opens a research agenda at the intersection of accounting, computer science and intercultural management. This agenda is particularly relevant for global enterprises whose internal financial reporting must satisfy multiple cultural and regulatory audiences simultaneously, and for analysts working across linguistically and institutionally heterogeneous markets.

What the field now requires is not more vertical depth in any individual cluster but analytical frameworks capable of operating across all five simultaneously: integrating the inferential ambition of traditional FSA, the computational power of ML and NLP, the expanding informational scope of sustainability disclosure and the enabling but largely invisible infrastructure of digital reporting. The bibliometric evidence presented here establishes that the field has the

structural preconditions for such integration: a rearticulated core, an adjacent computational layer and progressively outward extensions towards sustainability and language-processing frontiers. Realising that integration, however, requires crossing the disciplinary and methodological boundaries that the centrifugal architecture of the field has so far kept apart.

## References

- Acheampong, A., & Elshandidy, T. (2025).** Does sustainability disclosure improve analysts' forecast accuracy? Evidence from European banks. *Financial Innovation*, 11(1), 1–32. <https://doi.org/10.1186/s40854-024-00693-5>.
- Aini, A. N., Sukmadilaga, C., & Ghani, E. K. (2023).** Green Bonds, Investor Attention and Stock Market Reaction: Evidence from ASEAN Countries. *International Journal of Energy Economics and Policy*, 13(6), 334–343. <https://doi.org/10.32479/ijeeep.15162>.
- Altman, E. I. (1968).** Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The Journal of Finance*, 23(4), 589–609. <https://doi.org/10.1111/j.1540-6261.1968.tb00843.x>.
- Aria, M., & Cuccurullo, C. (2017).** bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>.
- Atan, R., Razali, F. A., Said, J., & Zainun, S. (2016).** Environmental, social and governance (ESG) disclosure and its effect on firm's performance: A comparative study. *International Journal of Economics and Management*, 10(Special Issue 2), 355–375.
- Bananuka, J., Tumwebaze, Z., & Orobia, L. (2019).** The adoption of integrated reporting: A developing country perspective. *Journal of Financial Reporting and Accounting*, 17(1), 2–23. <https://doi.org/10.1108/JFRA-09-2017-0089>.
- Blankespoor, E., deHaan, E., & Marinovic, I. (2020).** Disclosure processing costs, investors' information choice, and equity market outcomes: A review. *Journal of Accounting and Economics*, 70(2–3), 101344. <https://doi.org/10.1016/j.jacceco.2020.101344>.
- Bochkay, K., Brown, S. V., Leone, A. J., & Tucker, J. W. (2023).** Textual analysis in accounting: What's next? *Contemporary Accounting Research*, 40(2), 765–805. <https://doi.org/10.1111/1911-3846.12825>.

- Calandra, D., Lanzalonga, F., Secinaro, S., & Storti, C. C. (2025).** From traditional to digital: Unravelling performance measurement systems and accounting methods in drug treatment through a systematic review and content analysis. *The British Accounting Review*, 57(6), 101665. <https://doi.org/10.1016/j.bar.2025.101665>.
- Choi, A., Kim, S., Lee, H., & Park, J. (2025).** Corporate Social Responsibility (CSR) and Firm Value: International Evidence on the Role of CSR Assurance. *Journal of International Financial Management and Accounting*, 36(3), 502–536. <https://doi.org/10.1111/jifm.12234>.
- Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011).** An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field. *Journal of Informetrics*, 5(1), 146–166. <https://doi.org/10.1016/j.joi.2010.10.002>.
- Darus, F., Safihie, S. F. M., & Yusoff, H. (2019).** Propagating transparency and accountability through integrated reporting: An empirical insight from a developing country. *International Journal of Financial Research*, 10(5), 92–109. <https://doi.org/10.5430/ijfr.v10n5p92>.
- De Bem Machado, A., Secinaro, S., Calandra, D., & Lanzalonga, F. (2022).** Knowledge management and digital transformation for Industry 4.0: A structured literature review. *Knowledge Management Research & Practice*, 20(2), 320–338. <https://doi.org/10.1080/14778238.2021.2015261>.
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021).** How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133, 285–296. <https://doi.org/10.1016/j.jbusres.2021.04.070>.
- Doupnik, T. S., & Tsakumis, G. T. (2004).** A critical review of tests of Gray’s theory of cultural relevance and suggestions for future research. *Journal of Accounting Literature*, 23, 1–48.
- Farihah, E., Sukmadilaga, C., Ghani, E. K., & Lestari, T. U. (2024).** Assessing Banks’ Performance in Sustainability Practices and Programs during the COVID-19 Pandemic: The Case of Indonesian Banks. *Global Business and Finance Review*, 29(6), 31–46. <https://doi.org/10.17549/gbfr.2024.29.6.31>.
- Farooq, M. B., Ahmed, A., Khan, R., & Hassan, M. K. (2025).** Forward-looking information: Does IIRC framework adoption matter? *Sustainability Accounting, Management and Policy Journal*, 16(1), 292–315. <https://doi.org/10.1108/SAMPJ-11-2023-0857>.
- Fijałkowska, J., & Lanzalonga, F. (2025).** Working Later in Life: How Research Frames the Challenges and Possibilities of Ageing at Work. *Journal of Intercultural Management*, 17(2), 5–37. <https://doi.org/10.2478/joim-2025-0005>.

**Ferjančič, U., Ichev, R., Lončarski, I., Montariol, S., Pelicon, A., Pollak, S., Sitar Šuštar, K., Toman, A., Valentinčič, A., & Žnidaršič, M. (2024).** Textual analysis of corporate sustainability reporting and corporate ESG scores. *International Review of Financial Analysis*, 96, 103669, 1–15. <https://doi.org/10.1016/j.irfa.2024.103669>.

**Gray, S. J. (1988).** Towards a theory of cultural influence on the development of accounting systems internationally. *Abacus*, 24(1), 1–15. <https://doi.org/10.1111/j.1467-6281.1988.tb00200.x>.

**Hajek, P., & Henriques, R. (2017).** Mining corporate annual reports for intelligent detection of financial statement fraud – A comparative study of machine learning methods. *Knowledge-Based Systems*, 128, 139–152. <https://doi.org/10.1016/j.knosys.2017.05.001>.

**Hasan, A., Aly, D., & Hussainey, K. (2025).** The impact of corporate governance on narrative disclosure tone: A machine learning approach. *Journal of Applied Accounting Research*, 26(3), 577–602. <https://doi.org/10.1108/JAAR-10-2023-0323>.

**Hichri, A. (2023).** Integrated reporting, audit quality: Presence of environmental auditing in an international context. *European Business Review*, 35(3), 397–425. <https://doi.org/10.1108/EBR-03-2022-0044>.

**Hofstede, G. (1980).** *Culture's consequences: International differences in work-related values*. Sage Publications.

**Indrasari, A., Nadhifah, N., Arifin, N. R., Sasongko, N., & Sari, M. P. (2021).** Motivational Factors of Implementing Corporate Social and Environmental Reporting and Its Impact on Performance. *The Journal of Asian Finance, Economics and Business*, 8(2), 883–892. <https://doi.org/10.13106/jafeb.2021.vol8.no2.0883>.

**Injeni, G., Tumwebaze, Z., Bananuka, J., & Mukyala, V. (2022).** Agency and institutional-related factors and the heterogeneity of sustainability and integrated report information disclosures in Kenya. *Journal of Financial Reporting and Accounting*, 20(5), 809–840. <https://doi.org/10.1108/JFRA-10-2020-0305>.

**Küster, S., Steindl, T., & Götttsche, M. (2025).** The informational content of key audit matters: Evidence from using artificial intelligence in textual analysis. *Contemporary Accounting Research*, 42(4), 2392–2423. <https://doi.org/10.1111/1911-3846.13070>.

**Lev, B., & Thiagarajan, S. R. (1993).** Fundamental information analysis. *Journal of Accounting Research*, 31(2), 190–215. <https://doi.org/10.2307/2491270>.

- Li, T., & Zhou, J. (2024).** A Study of Machine Learning-Based Methods for Analyzing Financial Statements. In: L. C. Jain, V. E. Balas, R. Kountchev, & V. K. Pandey (Eds.), *Frontiers in Artificial Intelligence and Applications* (pp. 870–877). IOS Press. <https://doi.org/10.3233/FAIA241182>.
- Liaras, E., Nerantzidis, M., & Alexandridis, A. (2024).** Machine learning in accounting and finance research: A literature review. *Review of Quantitative Finance and Accounting*, 63(4), 1431–1471. <https://doi.org/10.1007/s11156-024-01306-z>.
- Lin, W., & Yang, T. (2025).** Design and Development of Deep Learning based Financial Statement Analysis. In: 2025 *International Conference on Intelligent Computing and Knowledge Extraction (ICICKE 2025)*. IEEE. <https://doi.org/10.1109/ICICKE65317.2025.11136439>.
- Liu, R. (2025).** Enhancing automated financial statement analysis using fuzzy logic algorithms. *Discover Computing*, 28, 323. <https://doi.org/10.1007/s10791-025-09858-x>.
- Liu, Y.-W., Liu, L.-C., Wang, C.-J., & Tsai, M.-F. (2016).** FIN10K: A web-based information system for financial report analysis and visualization. In: *Proceedings of the 25th ACM International Conference on Information and Knowledge Management* (pp. 2441–2444). ACM. <https://doi.org/10.1145/2983323.2983328>.
- Loughran, T., & McDonald, B. (2011).** When is a liability not a liability? Textual analysis, dictionaries, and 10-Ks. *The Journal of Finance*, 66(1), 35–65. <https://doi.org/10.1111/j.1540-6261.2010.01625.x>.
- Loughran, T., & McDonald, B. (2016).** Textual analysis in accounting and finance: A survey. *Journal of Accounting Research*, 54(4), 1187–1230. <https://doi.org/10.1111/1475-679X.12123>.
- Maama, H. (2021).** Institutional environment and environmental, social and governance accounting among banks in West Africa. *Meditari Accountancy Research*, 29(6), 1314–1336. <https://doi.org/10.1108/MEDAR-02-2020-0770>.
- Maama, H., & Appiah, K. O. (2019).** Green accounting practices: Lesson from an emerging economy. *Qualitative Research in Financial Markets*, 11(4), 456–478. <https://doi.org/10.1108/QRFM-02-2017-0013>.
- Massaro, M., Dumay, J., & Guthrie, J. (2016).** On the shoulders of giants: Undertaking a structured literature review in accounting. *Accounting, Auditing & Accountability Journal*, 29(5), 767–801. <https://doi.org/10.1108/AAAJ-01-2015-1939>.
- Malchev, D., Trpeska, M., & Cvetkoska, V. (2025).** Mapping the Evolution of Financial Statement Analysis: A Comprehensive Bibliometric Review. *Croatian Economic Survey*, 27(2), 107–146. <https://doi.org/10.15179/ces.27.2.4>.

**Markhayeva, B. (2016).** *Corporate Social Responsibility in Kazakhstan: Content analysis of annual reports of the listed oil and gas companies.* In D. Vasilenko & N. Khazieva (Eds.), *Proceedings of the 4th International Conference on Management, Leadership and Governance (ICMLG 2016)* (pp. 217–225). Academic Conferences Limited.

**Martínez-Ferrero, J., Garcia-Sanchez, I. M., & Cuadrado-Ballesteros, B. (2015).** Effect of financial reporting quality on sustainability information disclosure. *Corporate Social Responsibility and Environmental Management*, 22(1), 45–64. <https://doi.org/10.1002/csr.1330>.

**Mehul, K., Kanagavalli, V. R., Saradha, K., R., Gowtham, P. N., Sachin, M. P, Surya, U., Godhandaraman, R., Girish, S., & Naveen, R. (2025).** Gen AI Driven FAQ Chatbot Using Advanced RAG Architecture for Querying Annual Reports. In: *2025 International Conference on Computing and Communication Technologies (ICCCCT 2025)*. IEEE. <https://doi.org/10.1109/ICCCCT63501.2025.11020025>.

**Nguyen, B.-H., & Huynh, V.-N. (2022).** Textual analysis and corporate bankruptcy: A financial dictionary-based sentiment approach. *Journal of the Operational Research Society*, 73(1), 102–121. <https://doi.org/10.1080/01605682.2020.1784049>.

**Nießner, T., Nickerson, R. C., & Schumann, M. (2021).** Towards a taxonomy of AI-based methods in financial statement analysis. In: *27th Annual Americas Conference on Information Systems (AMCIS 2021)*. Association for Information Systems. [https://aisel.aisnet.org/amcis2021/data\\_science\\_decision\\_support/data\\_science\\_decision\\_support/6/](https://aisel.aisnet.org/amcis2021/data_science_decision_support/data_science_decision_support/6/).

**Nießner, T., Nießner, S., & Schumann, M. (2022).** Influence of Corporate Industry Affiliation in Financial Business Forecasting: A Data Analysis Concerning Competition. In: *28th Americas Conference on Information Systems (AMCIS 2022)*. Association for Information Systems. [https://aisel.aisnet.org/amcis2022/sig\\_dsa/sig\\_dsa/12](https://aisel.aisnet.org/amcis2022/sig_dsa/sig_dsa/12).

**Nießner, T., Nießner, S., & Schumann, M. (2023).** Is It Worth the Effort? Considerations on Text Mining in AI-Based Corporate Failure Prediction. *Information*, 14(4), 215. <https://doi.org/10.3390/info14040215>.

**Okoli, C., & Schabram, K. (2010).** A guide to conducting a systematic literature review of information systems research. *SSRN*. <https://dx.doi.org/10.2139/ssrn.1954824>.

**Ou, J. A., & Penman, S. H. (1989).** Financial statement analysis and the prediction of stock returns. *Journal of Accounting and Economics*, 11(4), 295–329. [https://doi.org/10.1016/0165-4101\(89\)90017-7](https://doi.org/10.1016/0165-4101(89)90017-7).

- Paul, J., & Criado, A. R. (2020).** The art of writing literature review: What do we know and what do we need to know? *International Business Review*, 29(4), 101717. <https://doi.org/10.1016/j.ibusrev.2020.101717>.
- Paul, J., Lim, W. M., O’Cass, A., Hao, A. W., & Bresciani, S. (2021).** Scientific procedures and rationales for systematic literature reviews (SPAR-4-SLR). *International Journal of Consumer Studies*, 45(4), O1–O16. <https://doi.org/10.1111/ijcs.12695>.
- Petruzzelli, S., & Badia, F. (2024).** The quality assessment of stakeholder engagement disclosure in the EU mandatory non-financial reporting framework. *Journal of Applied Accounting Research*, 25(1), 126–148. <https://doi.org/10.1108/JAAR-11-2022-0290>.
- Piotroski, J. D. (2000).** Value investing: The use of historical financial statement information to separate winners from losers. *Journal of Accounting Research*, 38(Supplement), 1–41. <https://doi.org/10.2307/2672906>.
- Qian, J., Lin, H., & Chen, C. (2025).** Digital transformation and ESG performance: Evidence from China’s carbon-intensive firms. *Applied Economics*, 58(18), 3569–3582. <https://doi.org/10.1080/00036846.2025.2488529>.
- Qu, Y., Quan, P., Lei, M., & Shi, Y. (2019).** Review of bankruptcy prediction using machine learning and deep learning techniques. In: E. Herrera-Viedma, J. Kacprzyk, A. M. Madureira, & I. F. Hassanien (Eds.), *Procedia Computer Science* (pp. 895–899). Elsevier. <https://doi.org/10.1016/j.procs.2019.12.065>.
- Rauf, F., & Baolei, Q. (2025).** Enhancing ESG disclosure through AI adoption: The moderating role of institutional quality. *Applied Economics*, 1–19. <https://doi.org/10.1080/00036846.2025.2547117>.
- Rowbottom, N., Locke, J., & Troshani, I. (2021).** When the tail wags the dog? Digitalisation and corporate reporting. *Accounting, Organizations and Society*, 92, 101226. <https://doi.org/10.1016/j.aos.2021.101226>.
- Sadraei, R., Biancone, P., Lanzalonga, F., Jafari-Sadeghi, V., & Chmet, F. (2023).** How to increase sustainable production in the food sector? Mapping industrial and business strategies and providing future research agenda. *Business Strategy and the Environment*, 32(4), 2209–2228. <https://doi.org/10.1002/bse.3244>.
- Salter, S. B., & Niswander, F. (1995).** Cultural influence on the development of accounting systems internationally: A test of Gray’s [1988] theory. *Journal of International Business Studies*, 26, 379–397. <https://doi.org/10.1057/palgrave.jibs.8490179>.

- Secinaro, S., Brescia, V., Lanzalunga, F., & Santoro, G. (2022).** Smart city reporting: A bibliometric and structured literature review analysis to identify technological opportunities and challenges for sustainable development. *Journal of Business Research*, 149, 296–313. <https://doi.org/10.1016/j.jbusres.2022.05.032>.
- Secinaro, S., Lanzalunga, F., Oppioli, M., & De Nuccio, E. (2025).** The effects of disruptive technologies on accountability in fintech industry: Using bibliometric analysis to develop a research agenda. *Research in International Business and Finance*, 76, 102816, 1–19. <https://doi.org/10.1016/j.ribaf.2025.102816>.
- Seow, R. Y. C. (2025).** Connecting the dots in ESG review research: Insights from systematic literature review and bibliometric analysis. *Journal of Economic Surveys*. <https://doi.org/10.1111/joes.70045>.
- Stratopoulos, T. C., & Wang, V. X. (2025).** Artificial intelligence and accounting research: A framework and agenda. *International Journal of Accounting Information Systems*, 56, 100760. <https://doi.org/10.1016/j.accinf.2025.100760>.
- Sukmadilaga, C., Santoso, M. E. P., & Ghani, E. K. (2023).** Ownership concentration, sustainability practices, and cost of debt: Evidence from ASEAN countries. *Asian Economic and Financial Review*, 13(6), 416–430. <https://doi.org/10.55493/5002.v13i6.4796>.
- Troshani, I., & Rowbottom, N. (2021).** Digital corporate reporting: Research developments and implications. *Australian Accounting Review*, 31(3), 213–232. <https://doi.org/10.1111/auar.12334>.
- Tsiouni, M., Kountios, G., Kousenidis, K., Kousenidis, D., Tzamaloukas, O., & Simitzis, P. (2023).** Financial Ratio Analysis as an Advisory Tool for Sustainable Pig Farm Management in Greece. *Sustainability*, 15(21), 15536. <https://doi.org/10.3390/su152115536>.
- Tsiouni, M., Kountios, G., Papadavid, G., & Kyriakidou, A. (2024).** *The Role of ESG Advisory as an Innovative Tool for Sustainable Financial Development: The Evidence of the Food Companies*. In: A. Christofe et al. (Eds.), *Proceedings of SPIE – The International Society for Optical Engineering*. SPIE. <https://doi.org/10.1117/12.3036915>.
- van Eck, N. J., & Waltman, L. (2010).** Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84, 523–538. <https://doi.org/10.1007/s11192-009-0146-3>.
- Wang, H., & Kang, Z. (2025).** Linking High-Risk Companies to Special Treatment (ST) Status: A Large Language Model Approach for Corporate Risk Evaluation. In: *ADMIT 2024 – 3rd International Conference on Algorithms, Data Mining, and Information Technology* (pp. 413–417). ACM. <https://doi.org/10.1145/3701100.3702877>.

**Zeng, S., & Dai, S. (2025).** Synergizing domain knowledge and machine learning: Intelligent early fraud detection enhanced by earnings management analysis. *International Review of Finance*, 25(2), e70021. <https://doi.org/10.1111/irfi.70021>.

**Zhao, X., Zhai, G., Chales, V., Gherman, T., Lee, H., Pan, T., & Shang, Y. (2024).** Enhancing enterprise investment efficiency through artificial intelligence: The role of accounting information transparency. *Socio-Economic Planning Sciences*, 96, 102092. <https://doi.org/10.1016/j.seps.2024.102092>.

**Zhu, X., Wu, H., Chang, Y., & Li, J. (2025).** Accounting fraud detection through textual risk disclosures in annual reports: From the perspective of SEC guidelines. *Accounting and Finance*, 65(2), 1837–1862. <https://doi.org/10.1111/acfi.13390>.

**Zupic, I., & Čater, T. (2015).** Bibliometric methods in management and organization. *Organizational Research Methods*, 18(3), 429–472. <https://doi.org/10.1177/1094428114562629>.

**Christian Pierre Barde**

Chonnam National University, Korea

chbparafe@chonnam.ac.kr

ORCID ID: 0009-0002-6703-9367

**Jean-Henry Morin**

University of Geneva, Switzerland

jean-henry.morin@unige.ch

ORCID ID: 0000-0003-4525-2220

Innovation and Knowledge  
Co-Creation in Intercultural  
Workshops: The Role of Meta-  
-Context – Lessons from a Swiss-  
-Korean FacLab Experience

## **ABSTRACT**

**Objective:** This paper investigates knowledge co-creation in a transdisciplinary and intercultural design workshop conducted in November 2025 at Chonnam National University, Korea. Fifty-nine students from information systems, law, architecture, and tourism management (University of Geneva, Switzerland, and Chonnam National University, Korea) collaborated to design a Creative Transdisciplinary Learning Space (FacLab).

**Methodology:** The workshop operationalized an integrated framework combining C-K theory, Meta-Context (M), Design Thinking, and the 3Hs (Head, Heart, Hands) model. Using qualitative analysis of participant questionnaires, workshop artifacts, and facilitator observations of team interactions, the study examines how participants appropriated the proposed theoretical tools, how disciplinary and cultural backgrounds influenced collaboration, and which forms of knowledge artifacts emerged.

**Findings:** Results show that while structured design frameworks supported ideation, contextual factors – particularly intercultural interaction and time pressure – were dominant in shaping the creative and knowledge processes, including the selection of which knowledge is worth transmitting and the prioritization of rapid co-construction of shared foundational knowledge. The study identifies seven recurring participant roles that structured collaborative dynamics and proposes practical recommendations for designing knowledge-intensive collaborative workshops.

**Value Added:** These findings contribute to research on knowledge management in situated, cross-cultural learning environments and provide empirical insight into how theoretical innovation frameworks operate in practice. For intercultural management, the findings highlight how linguistic asymmetries and cultural differences in communication styles shape knowledge co-creation – underscoring the need for intercultural intelligence in globally distributed teams.

**Recommendations:** Practitioners should invest as much in designing the conditions for collaboration (who sits next to whom, how breaks are structured, how language differences are accommodated) as in selecting the methods for collaboration. Structured intercultural encounters, when properly facilitated, can transform diversity from a challenge into a competitive advantage.

**Key words:** knowledge co-creation, transdisciplinary collaboration, C-K theory, meta-context, intercultural learning, design workshop, intercultural intelligence, global enterprise management, linguistic asymmetry, cultural dimensions

**JEL codes:** M14, O32, Z10

## Introduction

### *Research Context*

The collaboration between the University of Geneva (UNIGE) and Chonnam National University (CNU) represents a long-term commitment to exploring how knowledge emerges at the intersection of disciplines and cultures. Two institutional platforms ground this partnership.

Geneva FacLab, initiated by Jean-Henry Morin, extends the traditional FabLab concept beyond fabrication toward the co-construction of both tangible and intangible knowledge artifacts (Morin & Moccozet, 2021). The 4C<sup>2</sup> Square Platform, initiated by Christian Pierre Barde, serves as a cross-pollination hub fostering hybrid ecosystems in which sciences, arts, and humanities converge.

Both initiatives share guiding principles including transversality, collaboration, learning-by-doing, and serendipity. Transversality encourages the crossing of disciplinary boundaries; collaboration promotes co-creation across institutions and cultures; learning-by-doing emphasizes knowledge generated through immersive practice; and serendipity supports openness to unexpected insights emerging from collective exploration.

## ***The Workshop as a Knowledge Laboratory***

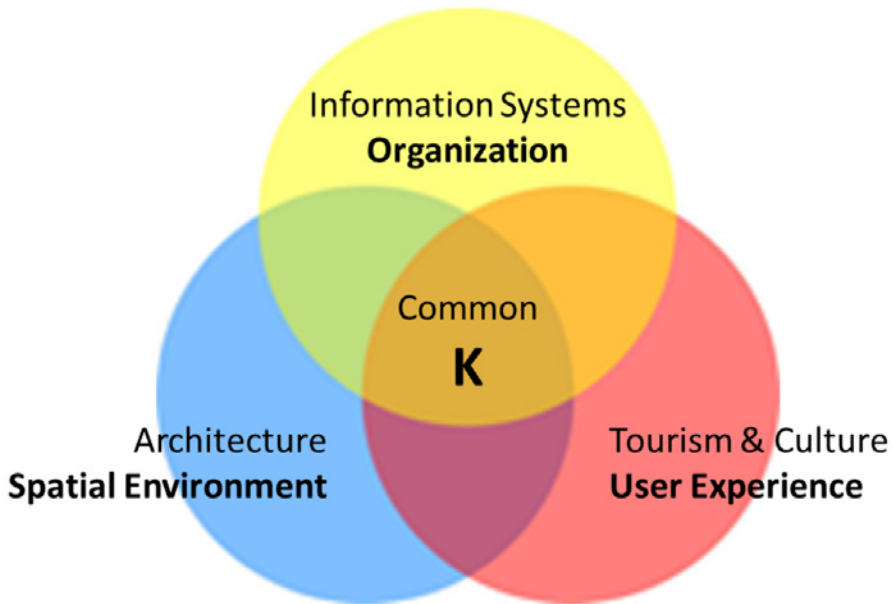
These principles were operationalized during a six-hour intensive workshop organized in November 2025 at CNU's Yeosu campus in Korea. Fifty-nine students participated: twenty-six from UNIGE (Information Systems and Law) and thirty-three from CNU (Tourism and Culture Management, and Urban and Architectural Design). The participants were organized into ten mixed teams tasked with co-designing foundational principles for a future CNU FacLab. Two prior similar workshops took place in 2023 and 2024 serving as preparation to the one documented in this paper.

The design brief intentionally prioritized social, intellectual, and pedagogical interactions over physical space design. Teams were asked to produce use-case scenarios describing the lived experience of future users of the FacLab – in essence, to craft a “movie script for innovation” – allowing them to compress the entire creative process into visual narratives.

The workshop therefore functioned as a knowledge laboratory. The artifacts generated by the teams – storyboards, sketches, and concept maps – together with detailed post-workshop questionnaires provide valuable insight into how knowledge is created, negotiated, and transformed in time-compressed, intercultural, and transdisciplinary contexts.

The six-hour format is itself significant. It forced participants to rapidly establish common ground (Figure 1), negotiate meaning across disciplinary and cultural boundaries, and produce tangible outputs within a single afternoon. Such compression makes it possible to observe which knowledge processes are essential and which can be streamlined in collaborative workshop settings.

**Figure 1.** Prioritization of a rapid co-construction of a shared foundational knowledge to facilitate mutual understanding, define a shared orientation, and initiate the co-creation process



Source: Authors' own elaboration.

## ***Research Questions***

This paper addresses four main research questions:

1. How did students understand and apply the proposed theoretical framework (C-K theory, meta-context, Design Thinking, and the 3Hs)?
2. How did disciplinary and cultural backgrounds shape participants' contributions and perceptions?
3. What types of participant profiles emerged during the collaborative process? (The resulting seven-role typology is presented in Table 1).
4. What lessons can be drawn for designing future knowledge-intensive collaborative workshops?

## Theoretical Framework

The workshop operationalized an integrated framework combining four complementary approaches.

C-K Theory (Concept–Knowledge) provides a model of innovative design in which concepts evolve through interaction with existing knowledge structures (Hatchuel & Weil, 2003). Meta-Context (M) extends this model by recognizing that C-K dynamics are always embedded within broader material, social, cultural, and temporal contexts (Barde, 2025).

Design Thinking (Brown, 2009) contributed a human-centered process framework organized around iterative phases such as empathizing, defining, ideating, prototyping, and testing. Finally, the 3Hs (Head, Heart, Hands) model emphasizes the integration of analytical reasoning, empathic engagement, and practical experimentation in collaborative learning environments (Barde, 2022).

These four frameworks are not merely juxtaposed but articulated in a specific sequence that guides the innovation process from purpose through context to action:

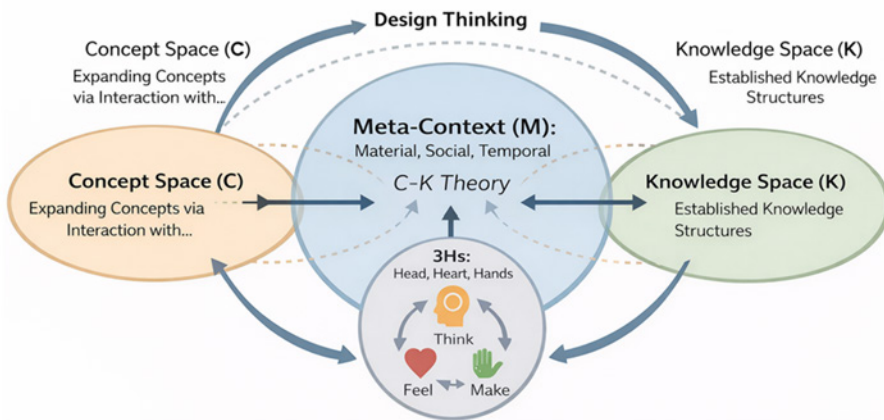
- First, define the meaningful *Why* with the 3Hs (Head, Heart, Hands). The 3Hs establish the holistic purpose of collaboration: analytical reasoning (Head), empathic engagement (Heart), and practical experimentation (Hands). This answers the question: *Why are we innovating, for which purpose and for whom?*
- Second, understand the contextual *How-Come* with CK+M (Concept–Knowledge–Meta-Context). C-K theory models the interplay between concepts and knowledge as a cognitive mechanism – the dynamic process by which new concepts are generated through the expansion and transformation of existing knowledge structures. Meta-Context (M) recognizes that this cognitive interplay is always embedded within material, social, cultural, and temporal conditions. This answers the question: *How-come certain concepts emerge or fail, given the specific context?*
- Third, execute the procedural *What/Which* with Design Thinking. Design Thinking provides a structured, iterative process – empathize, define, ideate, prototype, test – for translating purpose and contextual

understanding into tangible outcomes. This answers the question: *What/which steps should we take to materialize our ideas?*

This integrated approach ensures purposeful, context-aware, and actionable innovation. The 3Hs supply the *direction*, CK+M supplies the *situational awareness*, and Design Thinking supplies the *methodological discipline*.

Together these frameworks formed a toolkit (Figure 2). However, rather than treating them as prescriptive tools, we investigate how they were *appropriated*, *simplified*, or *set aside* under real-world constraints. This inversion – from normative application to empirical observation – constitutes our primary contribution to knowledge management literature.

**Figure 2.** Integrated framework combining CK theory, MetaContext (M), Design Thinking, and the 3Hs (Head, Heart, Hands)



Source: Authors' own elaboration.

Where prior KM research has often focused on the *design* of knowledge creation processes (Nonaka & Takeuchi, 1995) or the *structural conditions* for their success (Wenger, 1998), this study examines what happens when theoretically elegant frameworks encounter the messiness of intercultural, time-compressed collaboration. The central finding – that meta-contextual factors (linguistic asymmetries, time pressure, informal interactions) often override

formal frameworks – challenges assumptions about the transportability of design methodologies across cultural and temporal contexts.

From an intercultural management perspective, these frameworks must be understood as operating within specific cultural logics. Design Thinking, originating in Western human-centered design traditions, emphasizes explicit verbalization, structured phases, and individual agency. C-K theory, rooted in French engineering epistemology, privileges formal conceptual logic. By contrast, the Korean participants in our study often favored relational, non-verbal, and context-sensitive modes of interaction – drawing, gesturing, implicit understanding. The workshop thus became a site where competing epistemic cultures (Knorr Cetina, 1999) encountered one another. The meta-context (M) therefore includes not only time pressure and physical space but also deeper cultural schemas about how knowledge is legitimately created and shared. A comprehensive operationalization of Meta-Context (M) was presented during the 19th SIG Design Theory Workshop at Paris-Mines (Barde & Morin, 2026), titled *The Meta-context (M) as the third dimension of C-K theory: Feedback from an intercultural and transdisciplinary workshop*. In this paper, we focus on the subset of M dimensions that emerged from our workshop data: linguistic asymmetries, time pressure, cultural norms, material space, and mediating frameworks (storyboards, methodologies). For the complete layered concentric model of Meta-Context, see Appendix 2.

The operationalization of these frameworks also generated an empirically derived typology of participant roles (summarized later in Table 1), which maps directly onto the 3Hs model.

### ***Positioning Within Knowledge Management and Design Research***

This study sits at the intersection of three research traditions: knowledge management, design theory, and experiential learning. Rather than reviewing each exhaustively, we highlight points of departure that define our contribution.

From SECI to situated knowledge dynamics. Nonaka and Takeuchi's (1995) SECI model conceptualizes knowledge creation as a spiral between tacit and explicit knowledge. Our study extends – and complicates – this perspective

in three ways. First, the compressed six-hour format collapses the temporal assumptions of SECI, forcing simultaneous rather than sequential knowledge conversion. Second, intercultural interaction revealed that “externalization” (tacit to explicit) is not merely a cognitive act but a linguistically and emotionally mediated negotiation. Third, the meta-context (M) operates not as a neutral container for SECI processes but as an *active filter* that determines which knowledge is expressible and which remains silenced.

The findings suggest a shift from C-K as a universal logic of design to CK+M as a situated ecology of design<sup>1</sup>. Our findings suggest that in intercultural, time-compressed settings, the Meta-Context (M) operates as an *independent space* – not a subset of K – shaping which concepts survive and which knowledge is mobilized. We propose CK+M as a situated ecology (see Discussion for full elaboration).

The pedagogical and methodological dimension of the workshop is informed by experiential learning research. Kolb’s (1984) learning cycle – concrete experience, reflective observation, conceptualization, and experimentation – provides a lens for understanding how participants moved between action and reflection within the compressed six-hour format. Similarly, Schön’s (1983) concept of reflective practice highlights how professionals learn through iterative interaction between theory and action. Our study observes the emergence of intangible outcomes within this timeframe – intercultural competencies, shared trust, collaborative routines – but whether these constitute a durable *boundary infrastructure* persisting beyond the workshop remains an open question. We offer this concept as a proposition for future research rather than a demonstrated finding.

Finally, intercultural collaboration constitutes a key contextual dimension of the workshop. Prior studies in international organizational behavior have shown that multicultural teams can generate innovative perspectives by combining diverse cognitive and cultural frameworks (Adler & Gundersen, 2008). Cultural research by Hofstede (2001) further demonstrates how differences

---

1 A situated ecology of design focusing on the dynamic and adaptive process emerging from the interactions within a specific ecosystem.

in communication styles, attitudes toward hierarchy, and perceptions of time influence collaborative dynamics. Our workshop brought Swiss and Korean participants together, providing a situated context in which these dimensions – previously studied largely through surveys or controlled experiments – could be observed in real-time, intercultural knowledge co-creation.

Following Buchanan (1992), design thinking operates as a “new liberal art” – an integrative discipline that connects and combines useful knowledge from the arts and sciences alike in ways suited to the problems and purposes of the present. The workshop embodied this transdisciplinary logic: information systems, architecture, tourism, and law were treated as *placements* (not fixed categories) – flexible boundaries for invention. Innovation emerged when teams repositioned their problems across Buchanan’s four orders of design: from signs (storyboards as visual communication) through things (physical FacLab artifacts) through actions (collaborative processes) to environments (the learning ecosystem as a whole).

As organizations increasingly rely on cross-border, time-compressed collaborative events (design sprints, innovation workshops, hackathons), the ability to navigate cultural differences in communication styles, attitudes toward hierarchy, and norms of knowledge sharing becomes a strategic competency. Participants developed *intercultural intelligence*: the capacity to read, adapt to, and leverage cultural diversity for mutual benefit.

The workshop design functioned as a *dual third space* – simultaneously cultural and physical. Culturally, following Bhabha (1994), the encounter between Swiss and Korean participants created hybrid norms of collaboration that belonged to neither original culture. Physically, following Oldenburg (1989), the indoor open space where students interacted, shared knowledge, and co-created was also where they had lunch and coffee together. Delivered in the same open space, meals became moments of informal exchange that blurred the line between work and sociality.

Critically, this space was neither CNU nor UNIGE. Although the workshop was hosted on CNU’s campus (in the Department of Architecture and Urban Design), the nearly equal number of Swiss and Korean participants – combined with the

diversity of disciplines (Information Systems, Law, Architecture, Tourism) – transformed the location into an *in-between timespace*: an improbable cross-road where students from different nationalities and faculties could meet, away from their usual institutional territories. The physical setting became a background; the social space became foreground.

By bringing these perspectives together, this paper contributes to the literature in three ways. First, it provides empirical insight into how theoretical design frameworks are appropriated by participants in a real collaborative setting. Second, it highlights the central role of contextual factors – particularly intercultural interaction and time compression – in shaping knowledge creation processes. Third, it proposes a typology of participant roles that illuminates how diverse knowledge postures interact during transdisciplinary collaboration.

## Methodology

### *Workshop Design*

Ten mixed teams of five to six students participated in a structured six-hour design workshop organized around the integrated theoretical framework. The compressed format was intentionally designed to create productive time pressure, encouraging rapid knowledge negotiation across disciplinary and cultural boundaries.

The workshop schedule included an introductory session presenting the theoretical toolkit, followed by two ideation rounds separated by an informal networking lunch. During the first round, teams generated the initial concepts. The second round focused on refining the ideas and producing storyboard-based prototypes describing future FacLab experiences. Final presentations were followed by a qualitative feedback session in which participants completed detailed questionnaires.

The schedule balanced structured guidance and creative autonomy, allowing observation of how participants navigated between convergent and divergent thinking modes within a limited timeframe.

## **Data Collection**

Three main sources of qualitative data were collected.

- First, post-workshop questionnaires were completed by twenty-three participants (twelve from UNIGE and eleven from CNU). The questionnaire addressed participants' perceived knowledge contributions and acquisitions, reflections on the creative process, perceptions of contextual influences, and evaluations of the methodological tools used during the workshop.
- Second, team artifacts – including storyboards, concept maps, and presentation materials – provided direct evidence of the ideas and narratives produced by the teams.
- Third, facilitator observations documented how teams navigated challenges, what questions emerged, and how group dynamics evolved in real time. These interactions provided contextual insights that complemented the questionnaire responses and team artifacts.

## **Participant Profile Construction**

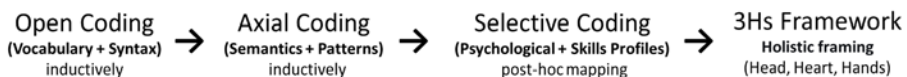
The seven participant profiles presented in the findings were developed through iterative thematic analysis of the 23 questionnaires. One researcher independently coded responses for recurring postures, roles, and reflective attitudes expressed by participants. Through comparative clustering, seven distinct profiles emerged, validated by cross-participant comparison and team-level analysis. Profiles were not mutually exclusive; participants often embodied multiple roles either simultaneously or at different stages of the workshop. For detailed coding examples and profile distribution, see Appendix A.

## Analytical Approach

A qualitative analytical approach was adopted, combining inductive thematic coding with profile typology development. The analysis followed a five-stage process (detailed in Appendix A), with the core coding work concentrated in Stages 2 and 3. Coding proceeded in three inductive phases (Figure 3):

1. **Open coding** – All 23 questionnaires were read holistically. Passages describing contributions, challenges, tool use, and reflective insights were coded using descriptive labels (e.g., “structuring discussion”, “language anxiety”, “drawing as method”).
2. **Axial coding** – Codes were grouped into higher-order semantic categories (e.g., “methodological orientation”, “relational facilitation”, “visual materialization”, “feasibility checking”, “speculative exploration”, “integrative synthesis”, “meta-cognitive reflection”).
3. **Selective coding** – These categories were refined into the seven participant profiles presented in Table 1. Each profile emerged from the specific types of Key Contributions that participants consistently made to their teams – ranging from methodological structuring to empathic facilitation to visual materialization. Each profile is therefore defined by a core orientation, key contribution, and potential limitation.

**Figure 3.** Three-phase inductive coding process



Source: Authors’ own elaboration.

Only after the profiles were identified did we map them onto the 3Hs model (Table 1). This post-hoc mapping serves as validation and synthesis, not as a coding constraint. The 3Hs therefore informed the *interpretation* of findings, not the *generation* of codes.

Analytical triangulation was achieved by cross-referencing questionnaire insights with team artifacts (storyboards, concept maps) and facilitator observations of team interactions.

## **Limitations**

Several limitations should be acknowledged. The sample size of 23 respondents restricts generalizability. Self-reporting bias may influence participants' reflections. Regarding language: Korean students were given the option to respond in Korean; their responses were subsequently translated into English for analysis using AI-powered translation tools, with manual review for accuracy. This translation process may have introduced some loss of nuance, which we acknowledge. Finally, the compressed six-hour format may not reflect knowledge dynamics in longer collaborative processes.

## **Findings**

Our analysis yielded seven recurrent participant profiles (Table 1), which we present after first examining framework appropriation and comparative dynamics.

### ***Understanding and Application of the Theoretical Framework***

- Design Thinking emerged as the most accessible framework for participants. Students frequently highlighted its structured sequence of steps and its focus on user experience as helpful guides for the creative process.
- C-K Theory showed more uneven adoption. Some teams consciously used concept–knowledge mapping to structure their ideation processes, while others perceived the framework as too abstract for the limited time available.

- Meta-Context (M) proved to be intuitively recognized even when not explicitly referenced. Participants frequently emphasized contextual elements such as the intercultural environment, time pressure, and physical space as either enablers or inhibitors of creativity.
- The 3Hs model was explicitly named by only a few participants, yet its presence was pervasive implicitly: analytical reasoning (Head), empathic engagement (Heart), and practical making (Hands) recurred as patterns even when unnamed.

Overall, theoretical tools were selectively adopted based on perceived usefulness and accessibility. Concrete and visual tools tended to dominate practice, while more abstract frameworks served primarily as conceptual background.

### ***Comparative Analysis: UNIGE and CNU Students – Cultural Dimensions in Action***

Comparative analysis revealed in general distinctive patterns between Swiss and Korean participants that align with and complicate established cultural frameworks.

- **Communication styles.** UNIGE students more frequently relied on explicit, structured verbal articulation and methodological framing. CNU students more often used intuitive, relational, and non-verbal forms of interaction – drawing, gesturing, or implicit understanding through shared silence. As one Korean participant noted, “We didn’t need to say everything. We could understand each other by looking at the sketches” (Yeji Kim, Architecture, CNU). This reflects Hofstede’s (2001) distinction between low-context (Swiss) and high-context (Korean) communication cultures.
- **Attitudes toward hierarchy and expertise.** UNIGE students, particularly those from Information Systems, confidently positioned themselves as methodological experts. CNU students, especially those from Tourism, initially deferred to Swiss peers on technical vocabulary (e.g., “use case”, “prototyping”). However, this asymmetry shifted over the six hours. By the

final presentations, Korean students had asserted their expertise in spatial imagination and user experience, domains where they felt culturally and professionally competent. This suggests that intercultural intelligence involves not only recognizing difference but also creating conditions for *reciprocal expertise recognition*.

- **Underlying values and norms.** Swiss participants emphasized efficiency, structured timelines, and explicit deliverables. Korean participants prioritized relational harmony, group consensus, and the quality of social interaction during the process. One Swiss participant remarked, “I wanted to move fast, but my Korean teammates’ concern for comfort made our ideas better” (Hugo Borel, Information Systems, UNIGE). This tension between task-oriented and relationship-oriented norms is a classic challenge in intercultural management. The workshop succeeded when teams learned to *alternate* between these logics rather than privileging one over the other.
- **Intercultural intelligence as outcome and CQ framework.** Beyond the artifacts produced, participants reported lasting shifts in their ability to work across cultures. A Korean student reflected: “Before, I feared speaking English. Now I know my ideas matter beyond perfect grammar” (Jun Jeong, Tourism, CNU). A Swiss student noted: “Drawing can be more powerful than talking – I will bring this to my international team” (Matthias Meyer, Information Systems, UNIGE). These quotations illustrate the development of tolerance, empathy, and mutual adjustment – core outcomes emphasized by the *Journal of Intercultural Management*.

Importantly, these observed patterns reflect an interaction between national culture and disciplinary training. The Swiss participants – studying Information Systems and Law – operated within disciplines that reward explicit verbalization, structured framing, and linear reasoning. The Korean participants – studying Architecture and Tourism/Culture Management – operated within disciplines that cultivate spatial thinking, relational attunement, and divergent exploration. This combination of national culture (low-context Swiss vs. high-context Korean) and disciplinary epistemology (analytic/structured vs. synthetic/emergent) amplified

a fundamental creative dynamic: the oscillation between divergence and convergence. Swiss teams often drove convergent phases (structuring, defining, narrowing), while Korean teams often drove divergent phases (exploring, associating, opening new possibilities). The most successful teams learned to oscillate between these poles rather than remaining trapped in either. This is a *trend* observable at the group level, not a deterministic prediction applicable to every individual personality.

These observations can be mapped onto the four dimensions of cultural intelligence (CQ) as conceptualized by Ang and Van Dyne (2008). CQ is defined as “the capability of an individual to function effectively in situations characterized by cultural diversity” (Ang & Van Dyne, 2008, p. 3), comprising four dimensions: metacognitive CQ (cultural awareness and strategic thinking), cognitive CQ (knowledge of norms and conventions), motivational CQ (interest, confidence, and perseverance), and behavioral CQ (appropriate verbal and non-verbal actions).

The explicit verbal structuring by Swiss students reflects high metacognitive CQ, while the Korean preference for drawing and gesturing represents alternative behavioral CQ strategies – specifically, the use of non-verbal channels to accomplish collaborative goals. Linguistic asymmetries and confidence gaps (cognitive and motivational dimensions) shaped who could speak with authority, but these shifted over the six hours as reciprocal expertise emerged.

Most significantly, the workshop itself appeared to develop Motivational CQ (Drive). CQ Drive encompasses intrinsic interest (enjoyment of diverse interaction), extrinsic interest (perceived benefits of cross-cultural collaboration), and self-efficacy (confidence in one’s ability to function effectively in diverse settings) (Ang & Van Dyne, 2008). One Korean student’s reflection – “English is about confidence. Don’t be afraid, we are all the same people, only the languages we speak are different” (Jun Jeong) – captures the self-efficacy dimension of CQ Drive. The Korean student who noted that his main initial contribution was his “conversational English” (Jin-Hyun Kwon) also reveals how self-efficacy (or its absence) shaped participation.

The growth in Swiss participation from 15 students in 2024 to 26 in 2025 – driven entirely by positive word-of-mouth following the first workshop – provides

indirect evidence of CQ Drive development. The 2024 participants who shared their positive experiences with peers implicitly communicated all three sub-dimensions: they enjoyed the workshop (intrinsic interest), perceived tangible learning outcomes (extrinsic interest), and felt confident enough to recommend it to peers (self-efficacy). The workshop thus functioned as a natural developmental intervention for CQ, even without explicit CQ training. This aligns with Ang & Van Dyne's (2008) contention that CQ is learnable through structured exposure and reflective experience.

### ***Disciplinary Contributions***

Distinct disciplinary perspectives were also observed.

Students from digital systems and information services emphasized process design, user experience modeling, and scenario construction. Architecture and urban design students contributed spatial imagination, material awareness, and attention to atmosphere and modularity.

Tourism and culture management students often focused on social interaction, intercultural mediation, and the creation of welcoming community spaces. Law students brought attention to governance structures, institutional frameworks, and normative considerations.

The most successful teams integrated these perspectives, producing storyboards that placed human interactions at the center of spatial and organizational design.

### ***Participant Profiles***

Analysis of questionnaire responses revealed seven recurring participant profiles summarized in Table 1: Methodologist, Empathic Mediator, Visual Creator, Pragmatic Solver, Speculative Dreamer, Collaborative Synthesizer, and Reflective Observer.

**Table 1.** Participant Roles in Transdisciplinary Workshop Teams

| Profile                   | Core Orientation       | Key Contribution                                       | Potential Limitation                |
|---------------------------|------------------------|--------------------------------------------------------|-------------------------------------|
| Methodologist             | Structure and process  | Organizes workflow, clarifies steps                    | May restrict exploration            |
| Empathic Mediator         | Human relations        | Facilitates communication, reduces tension             | May overlook constraints            |
| Visual Creator            | Visual thinking        | Translates ideas into sketches and storyboards         | Risk of superficial solutions       |
| Pragmatic Solver          | Feasibility            | Anchors ideas in realistic implementation              | May limit radical ideas             |
| Speculative Dreamer       | Conceptual exploration | Generates innovative and unconventional ideas          | Risk of impracticality              |
| Collaborative Synthesizer | Integration            | Connects ideas and disciplines into coherent solutions | May smooth over productive conflict |
| Reflective Observer       | Meta-analysis          | Captures lessons and process insights                  | Risk of lower direct participation  |

Source: Authors' own elaboration.

These seven profiles map onto the 3Hs framework:

- Methodologists, Pragmatic Solvers, and Reflective Observers embody the analytical Head;
- Empathic Mediators and Collaborative Synthesizers represent the relational Heart;
- Visual Creators exemplify the materializing Hands.
- The Speculative Dreamer draws on all three.

This mapping confirms that the 3Hs framework captures both the *purpose* and the *functional roles* of collaboration. Teams combining a Methodologist, Empathic Mediator, Visual Creator, and Collaborative Synthesizer navigated the compressed timeframe most effectively. The rapid emergence and complementarity of these roles proved particularly important in the compressed workshop environment, where there was no time for gradual role negotiation. These profiles transcended disciplinary and cultural boundaries, suggesting that role diversity may be as important as disciplinary diversity in transdisciplinary collaborative settings.

## Theory and Practice Under Time Pressure

The six-hour format revealed a dynamic tension between theoretical frameworks and practical action. Theory provided a shared vocabulary and conceptual orientation. Practice, however, often reshaped or simplified these frameworks in response to situational constraints.

Participants frequently reported that drawing, humor, informal conversation, and shared meals played crucial roles in advancing collaboration. These elements functioned as mediators between abstract theoretical tools and lived collaborative practice. Meta-Context therefore appeared as the key intermediary space in which theory was translated into action and practice reinterpreted through conceptual reflection.

## Human-Centered Artifacts as Boundary Objects

The instruction to focus on human interactions rather than spatial layout significantly influenced the artifacts produced by the teams. Storyboards and sketches became narratives describing student journeys, encounters, and collaborative moments rather than traditional architectural plans.

These visual narratives functioned as what Star and Griesemer (1989) term *boundary objects*: artifacts that are “both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites”. The storyboards served precisely this role in three ways.

- First, they were *plastic enough* to accommodate diverse disciplinary interpretations – architects could read spatial implications, information systems students could extract user flows, and tourism students could identify moments of intercultural encounter. Each group could adapt the artifact to its own professional lens while contributing to a shared representation.
- Second, they were *robust enough* to maintain a common identity across these different interpretations. The narrative structure of the comic – a sequence of panels depicting human interaction – provided

a universally recognizable format that transcended language barriers. As one participant noted, “The ‘movie script’ approach freed us from thinking about walls and furniture. We thought about moments” (Sihyeong Noh, Tourism, CNU).

- Third, they facilitated what Star and Griesemer (1989) call ‘translation’ between different social worlds. Carlile (2002, 2004) extends the boundary object concept by distinguishing three progressively complex knowledge boundaries: syntactic (differences in vocabulary), semantic (differences in interpretation), and pragmatic (differences in interests). The storyboards in our workshop operated across all three. They provided a shared visual lexicon that transcended language barriers (syntactic), accommodated diverse disciplinary readings of the same sketches (semantic), and enabled teams to negotiate which ideas to pursue or abandon when knowledge asymmetries emerged (pragmatic). By materializing abstract ideas into concrete visual sequences, the storyboards created exactly this kind of shared referent – a pragmatic boundary object around which team members could negotiate meaning, resolve misunderstandings, and align their contributions. They became the ‘common ground’ where disciplinary knowledge intersected and new, shared understandings could emerge.

In addition to these tangible artifacts, the workshop generated intangible outcomes such as intercultural competencies, collaborative practices, and shared design principles – as reported by participants. A key open question for future research is whether workshops can generate a durable boundary infrastructure – that is, collaborative engagement that endures beyond the event itself, despite students’ competing agendas, workloads, and daily duties.

### ***Challenges and Power Asymmetries in Collaboration***

Despite the overall success of the workshop, the collaboration was not without tensions. Three interrelated challenges emerged from participant responses:

linguistic hierarchies, knowledge asymmetries, and frustration with the workshop's intensity.

- **Linguistic hierarchies.** English proficiency created an uneven playing field. While Swiss students generally communicated with greater ease, several Korean participants described language as an emotional barrier. One student noted that “English is about confidence. Don’t be afraid, we are all the same people, only the languages we speak are different” (Jun Jeong), revealing that *fear* and *confidence* shaped participation as much as actual language skills. Another observed that his main initial contribution was his “conversational English” (Jin-Hyun Kwon), suggesting that Korean students’ value was sometimes reduced to language ability rather than disciplinary expertise. For some, reliance on translation tools – Google Translate was cited as the “most useful tool” (Ben Jebara Ylies) – signaled a communication deficit that shaped their participation.
- **Knowledge asymmetries.** Prior familiarity with the FacLab concept or with design methodologies also created imbalances. Korean students faced a “knowledge gap about the FacLab” (Gwon Yeong Kim), as they had never encountered the concept before. Non-Information Systems students struggled with methodological terms like “use case” (Cédric Truong), requiring “pedagogical explanations” from those who knew. These asymmetries had concrete consequences: teams abandoned concepts when they could not be made accessible to all members. One team dropped their first use-case because Korean members “indicated they had never experienced this type of collaboration” (Marie Ferlin); another abandoned a chatbot idea due to “too big a technical knowledge gap” (Nam Thang Nguyen). Beyond knowledge gaps, time pressure also led to *voluntary knowledge withholding*. One Information Systems student chose not to share certain technical knowledge because “it would be too long and complicated to explain”. This phenomenon – the *selection of transmissible knowledge* – reveals that time compression actively shapes judgments about what knowledge is *worth* sharing, systematically privileging simple, visual, universally accessible knowledge while silencing complex, technical, or culturally specific expertise.

- **Frustration and cognitive overload.** Several participants expressed frustration with the workshop’s intensity. One described “too much information at the beginning exceeded our capacity” (Marie Ferlin) and found instructions “too vague”. Another rated the experience “useful but tiring” and explicitly requested “more breaks” (Kwon Jin-Hyun). Physical constraints added to the pressure: “we didn’t really have space to discuss and design things comfortably” (Matthias Meyer). Time pressure left some feeling rushed despite the positive atmosphere (Thibaut de Mallac de Vessac). Concerning the theoretical frameworks, one participant admitted he “did not understand well” the combination of different frameworks (Kwon Jin-Hyun). Another noted that his team “didn’t really use C-K. It was too abstract and we didn’t have time to understand it” (Marie Ferlin).

These challenges do not negate the workshop’s achievements but rather contextualize them. They reveal that even in successfully collaborative settings, power asymmetries persist. Linguistic hierarchies shaped who could speak with confidence; knowledge asymmetries determined which ideas survived; and frustration with cognitive overload affected the depth of engagement. The meta-context (M), in this light, includes not only enabling conditions – intercultural diversity, visual tools, shared meals – but also structural inequalities and practical constraints that shape who can participate and on what terms. Acknowledging these tensions is essential for designing future workshops that are not only creative but also more inclusive and equitable.

## Discussion

While our research questions were formulated before data collection and focused on observed dynamics, the findings nevertheless carry implications for a question that emerged inductively from the analysis: how intercultural intelligence – understood as the capacity to navigate differences in language, behavior, attitude, and underlying values – might be deliberately cultivated through structured workshop

design. We offer preliminary observations on this emergent theme, while acknowledging that systematic investigation would require dedicated research design.

### ***CK+M as a Situated Ecology, Not a Universal Logic***

The findings suggest that CK+M represents more than a simple extension of C-K theory. It signals an epistemological shift<sup>2</sup>: from seeking a *universal logic of design* based on formal interactions between Concept (C) and Knowledge (K) spaces, toward pursuing a *situated ecology of design* that focuses on dynamic, adaptive processes emerging from interactions within a specific ecosystem.

The theoretical rationale for this shift – extracting M from K – is motivated by an analogy to computational linguistics and representation learning. In traditional C-K theory, context is treated as a subset of Knowledge (K). This works when the relevant context is bounded. However, in intercultural, time-compressed settings, the meta-context (M) becomes irreducibly complex. It cannot be fully encoded into K without losing precisely what enables creativity: the unknown set of interactions that emerge from changing conditions.

The computational parallel is instructive – not as a direct analogy between specific terms, but as a reflection of a *shared structural problem*. Both C-K theory (in its standard mathematical formulation) and AI models must contend with the irreducible complexity of context. Standard C-K theory integrates Meta-Context (M) into Knowledge (K), treating contextual conditions as a subset of what is already known or knowable. AI models similarly integrate context into semantico-pragmatics – the layer of meaning that depends on embedded assumptions and situational cues. In both cases, full integration is mathematically or computationally intractable. Simplification – “reducing” M to a manageable subset – is required to make the model operational.

Yet this operational necessity creates a blind spot. C-K theory operates on two levels: as an *observation of a cognitive process* (how designers actually think)

---

<sup>2</sup> This claim was first articulated at the 19th SIG Design Theory Workshop (Barde & Morin, 2026).

and as a *mathematization of that process* (a formal model that requires closure). The mathematical version must reduce M to remain tractable. But the cognitive reality that the model aspires to describe does not obey this reduction. The milieu (M) is never fully controllable; it contains genuine unknowns that cannot be pre-specified or absorbed into K.

For creative tasks – moving toward the unknown – this distinction matters profoundly. Crucially, the unknown is not homogeneous. Standard C-K theory locates the unknown primarily in the Concept space (C): the exploratory, generative unknown of “what might we imagine?”. But our workshop data reveal another kind of unknown, equally consequential: the *emergent, exogenous unknown* of M. Will time pressure accelerate or suffocate our ideation? Will a linguistic misunderstanding derail a promising concept? Will an informal conversation during lunch unlock a creative block? These are not merely “hidden variables” that could have been added to K in advance. They are *dynamically emergent* – they arise from the situation itself and cannot be predicted or controlled.

The unknown is therefore distributed across C, K, and M, and crucially, in the *dynamic interactions* among all three. A team may generate a novel concept (C), but whether that concept survives depends on time pressure, linguistic asymmetries, or a shared meal that shifts group dynamics (M) – none of which were “known” in advance. CK+M therefore treats M as an independent space, not a subset of K. This allows for adaptive feedback loops that respond to changing contextual conditions without pretending that the milieu can be fully controlled. Fully controlling the milieu would, in fact, destroy the conditions for creativity – not only because creativity requires freedom, but because the emergent unknown in M is a genuine source of novelty, not merely noise to be filtered out.

In this view, the Meta-Context (M) is not merely a subset of K – a reservoir of contextual knowledge to be mobilized – but an *independent space* that interacts with both C and K. M comprises the material, social, cultural, temporal, and affective conditions that shape how concepts are generated, how knowledge is mobilized, and how their interplay unfolds. Appendix 2 provides a systematic

layering of these conditions, from the core human actor to the outermost existential frame.

Evidence from the workshop confirms that M operates as an independent source of unknowns, distinct from the exploratory unknown of C:

- **Linguistic asymmetries** (M) filtered which concepts could be articulated and whose knowledge was heard. These asymmetries were “unknown” in advance. They emerged dynamically through interaction.
- **Time pressure** (M) forced teams to abandon abstract frameworks (C-K) in favor of concrete, visual tools, and triggered *the selection of transmissible knowledge* – participants consciously withheld complex knowledge judged “too long to explain”. Time pressure was a parameter and also an emergent condition that intensified or relaxed unpredictably.
- **Informal interactions** (shared meals, humor) (M) functioned as invisible infrastructure for trust and creativity.

The indeterminate, emergent nature of the workshop reflects Buchanan’s (1992) characterization of design problems as “wicked” – ill-formulated, with confusing information, conflicting values, and ramifications that defy simple resolution.

Thus, under time pressure and intercultural difference, the meta-context often became the *dominant force* shaping creative processes – not merely a background condition but an active, structuring agent. The unknown in M – emergent, exogenous, irreducible – proved as consequential as the unknown in C.

### ***Intercultural Collaboration as Meta-Context***

Intercultural interaction constituted the most visible dimension of the meta-context. Differences in assumptions, working styles, and expectations forced participants to articulate tacit knowledge and negotiate shared meanings. These dynamics can be interpreted through Nonaka and Takeuchi’s (1995) SECI model of knowledge creation, which describes cycles of socialization, externalization,

combination, and internalization. In the workshop setting, these phases occurred in compressed and overlapping forms.

### ***Cross-Cultural Collaborative Events: From Workshop to Workplace***

Our findings are derived from a student workshop and do not directly generalize to corporate environments. However, for practitioners designing cross-cultural collaborative events – whether in universities, NGOs, or enterprises – the following observations may be instructive as hypotheses to test in their own contexts.

- **First, formal frameworks are necessary but not sufficient.** Structured methodologies such as Design Thinking or C-K theory provide shared vocabulary and procedural guidance. However, in cross-cultural settings, these frameworks are selectively appropriated, simplified, or abandoned depending on local cultural logics and time constraints. Practitioners should therefore treat methodologies as adaptable scaffolds rather than universal prescriptions. Pre-event calibration – discussing how different cultural backgrounds approach time, hierarchy, and knowledge sharing – may be as important as teaching the methodology itself.
- **Second, linguistic asymmetries are not merely technical barriers but emotional ones.** Korean participants in our study described language not only as a tool for communication but as a source of anxiety, self-doubt, and occasional hesitation. English proficiency often served as a proxy for confidence, social status, and psychological safety. Practical remedies observed in our setting included: providing translation tools, pairing participants strategically, and explicitly validating non-native speakers' contributions. One Korean student's advice – "English is about confidence. Don't be afraid, we are all the same people, only the languages we speak are different" (Jun Jeong) – offers a guiding principle for facilitators.
- **Third, informal meta-contextual elements – shared meals, humor, drawing, physical proximity – are not optional "icebreakers" but core infrastructure for knowledge co-creation.** In our workshop, the lunch break was repeatedly cited as a turning point where relationships deepened and creative blocks dissolved. Designing for *relational time* – spaces

where cultural guards can lower and genuine mutual understanding can emerge – is as important as designing the formal agenda. This includes attention to who sits next to whom, how breaks are structured, and how language differences are accommodated.

- **Fourth, cultural intelligence (CQ) can be developed through structured collaborative events, even without explicit CQ training.** Our data suggest that the workshop activated motivational CQ (Drive) – specifically, intrinsic interest in diverse interaction, extrinsic interest in tangible outcomes, and self-efficacy (confidence in one’s ability to function effectively across cultures). The growth in Swiss participation from 15 students in 2024 to 26 in 2025, driven by positive word-of-mouth, offers indirect evidence that participants experienced the workshop as both enjoyable and confidence-building. For practitioners, this implies that cross-cultural collaborative events should be designed not only for task completion but also as opportunities for CQ development – a goal that can be advanced through structured reflection, balanced participation, and psychological safety.

### ***Participant Profiles as Knowledge Roles***

As presented in Table 1 and Appendix A, these participant profiles function as complementary knowledge roles. Their rapid emergence under time pressure (detailed in Findings) suggests that facilitators should deliberately design team compositions to encourage role diversity.

### ***Implications for Workshop Design***

Several practical implications emerge from the analysis. Pre-workshop preparation materials may help participants better understand theoretical frameworks before the session begins. Visual and narrative tools appear particularly effective for facilitating intercultural collaboration. Informal interaction spaces such as shared meals can act as catalysts for creativity and trust-building. In addition, integrating digital translation tools and visual communication methods may help overcome linguistic barriers in international workshops.

## Limitations and Future Research

Future research could explore longer-term effects of such workshops on participants' collaborative practices. Comparative studies involving different workshop durations or formats could also help clarify the role of time compression in knowledge co-creation processes. Further work might also investigate linguistic dynamics, develop quantitative measures of framework adoption, or analyze video recordings to capture real-time interactions and role emergence.

## Conclusion

The UNIGE–CNU workshop illustrates how knowledge co-creation unfolds in transdisciplinary and intercultural settings under strong temporal constraints. Three main contributions emerge.

First, the findings provide empirical support for the CK+M framework by demonstrating the central role of meta-context – particularly linguistic asymmetries, time pressure, and informal interactions – in shaping creative dynamics. Second, the study identifies a typology of seven participant profiles that function as complementary knowledge roles in collaborative processes, offering a practical diagnostic tool for managers and facilitators. Third, it illustrates how theoretical tools (C-K, Design Thinking, 3Hs) are transformed through situated practice and mediated by cultural and contextual factors.

The study challenges assumptions about the transportability of formal innovation frameworks across cultural and temporal contexts, showing that meta-contextual factors often override methodological design. Practitioners should therefore invest as much in designing the *conditions* for collaboration as in selecting the *methods*. For intercultural management, the workshop demonstrates that cultural differences are not barriers to be overcome but resources to be leveraged. The development of intercultural intelligence – tolerance, empathy, mutual adjustment – is both a precondition for and an outcome of successful knowledge co-creation.

From a practical perspective, the study suggests that effective collaborative workshops should: (1) prioritize intercultural encounter as a deliberate design element; (2) integrate visual and narrative tools that transcend language barriers; (3) acknowledge and mitigate linguistic asymmetries through translation support and psychological safety; and (4) protect informal interaction spaces (shared meals, breaks) as core infrastructure for trust and creativity.

The productive tension between theory and practice, when mediated by a rich and carefully designed meta-context, becomes a powerful driver of innovation, knowledge creation – and of the intercultural intelligence that global enterprises increasingly require.

## References

- Adler, N. J., & Gundersen, A. (2008).** *International dimensions of organizational behavior* (5th ed.). Thomson/South-Western.
- Ang, S., & Van Dyne, L. (2008).** Conceptualization of cultural intelligence: Definition, distinctiveness, and nomological network. In: S. Ang & L. Van Dyne (Eds.), *Handbook of cultural intelligence: Theory, measurement, and applications* (pp. 3–15). M.E. Sharpe.
- Barde, C. P. (2022).** Digitalization genesis and interaction with our society. *Society's Digitalization Symposium*, Chonnam National University.
- Barde, C. P. (2025).** The hidden third dimension of the CK Theory? *18th International Paris Workshop of the Design Theory SIG*.
- Barde, C. P., & Morin, J.-H. (2026).** Designing the MetaContext: An empirical study of the 3Hsdriven CK+M principle for humancentric learning ecosystems. *19th International Paris Workshop of the Design Theory SIG*, Mines Paris – PSL.
- Bhabha, H. K. (1994).** *The location of culture*. Routledge.
- Brown, T. (2009).** *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*. Harper Collins.
- Buchanan, R. (1992).** Wicked problems in design thinking. *Design Issues*, 8(2), 5–21. <https://doi.org/10.2307/1511637>.

**Carlile, P. R. (2002).** *Transferring, translating and transforming: An integrative framework* (Working paper). MIT Sloan School of Management. Retrieved from <https://dspace.mit.edu/handle/1721.1/3813>. Access: 22.05.2026.

**Carlile, P. R. (2004).** Transferring, translating, and transforming: An integrative framework for managing knowledge across boundaries. *Organization Science*, 15(5), 555–568. <https://doi.org/10.1287/orsc.1040.0094>.

**Hatchuel, A., & Weil, B. (2003).** A new approach of innovative design: An introduction to CK theory. *International Conference on Engineering Design. ICED 03*.

**Hofstede, G. (2001).** *Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations* (2nd ed.). Sage Publications.

**Knorr Cetina, K. (1999).** *Epistemic cultures: How the sciences make knowledge*. Harvard University Press.

**Kolb, D. A. (1984).** *Experiential learning: Experience as the source of learning and development*. Prentice Hall.

**Morin, J.-H., & Moccozet, L. (2021).** Build to think, build to learn: What fabrication and creativity bring to rethink higher education. *ITM Web of Conferences*, 38(29). <https://doi.org/10.1051/itmconf/20213802004>.

**Nonaka, I., & Takeuchi, H. (1995).** *The knowledgecreating company*. Oxford University Press.

**Oldenburg, R. (1989).** *The great good place: Cafés, coffee shops, community centers, beauty parlors, general stores, bars, hangouts, and how they get you through the day*. Paragon House.

**Schön, D. A. (1983).** *The reflective practitioner: How professionals think in action*. Basic Books.

**Star, S. L., & Griesemer, J. R. (1989).** Institutional ecology, 'translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39. *Social Studies of Science*, 19(3), 387–420.

**Wenger, E. (1998).** *Communities of practice: Learning, meaning, and identity*. Cambridge University Press.

## **Appendix A: Participant Profile Construction – Detailed Methodology**

### **A.1 Overview**

The seven participant profiles presented in Table 1 were developed through a systematic, multi-stage qualitative analysis of the 23 post-workshop questionnaires. This appendix provides transparency on the construction process, including coding procedures, validation steps, and profile distribution. The analysis followed a five-stage process, with the three coding phases (Open, Axial, Selective) embedded within Stages 2 and 3.

### **A.2 Five-Stage Construction Process**

#### **Stage 1: Individual Case Analysis**

Each participant's responses were first analyzed holistically to identify their dominant postures, contributions, and reflective patterns. For each individual, we documented:

- **Initial knowledge contribution:** Disciplinary or methodological expertise brought to the team
- **Acquired knowledge:** What they reported learning from the collaboration
- **Decision-making drivers:** Criteria guiding their choices (empathy, feasibility, cultural relevance, etc.)
- **Tool engagement:** Interaction with theoretical frameworks (C-K, Design Thinking, 3Hs)
- **Creative process description:** How they described their team's ideation and concept development
- **Reflective depth:** Level of meta-cognitive analysis in their responses

## Stage 2: Thematic Coding of Postures

Applying open coding, we coded all 23 responses for recurring behavioral and cognitive postures using descriptive labels based on vocabulary and syntax. Examples of coded excerpts include:

| Excerpt                                                                                                                              | Coded Posture                   |
|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| "I brought my experience in management and leadership... I structured the discussions using semi-structured interviews" (Hugo Borel) | Structuring, organizing         |
| "The main challenge was creating comfort to share failures" (Florentin Carrard)                                                      | Empathic, user-centered         |
| "We used the large white sheets to draw our ideas – that was our real method" (Marie Ferlin)                                         | Visual, materializing           |
| "We had to abandon the chatbot idea because it created too big a technical knowledge gap" (Nam Thang Nguyen)                         | Pragmatic, feasibility-oriented |
| "We started from a provocation: 'my superpower is sleeping' – and that became our rest area concept" (Matthias Meyer)                | Speculative, exploratory        |
| "I tried to connect the different perspectives and find common ground between disciplines" (Sihyeong Noh)                            | Integrative, synthesizing       |
| "The workshop gave me time to reflect on fundamental problems beyond immediate academic requirements" (Yeji Kim)                     | Reflective, meta-analytical     |

## Stage 3: Pattern Recognition and Clustering

**Axial coding** grouped the open codes into higher-order semantic categories (e.g., "methodological orientation", "relational facilitation", "visual materialization", "feasibility checking", "speculative exploration", "integrative synthesis", "meta-cognitive reflection").

**Selective coding** refined these categories into the seven participant profiles presented in Table 1, each defined by a core orientation, key contribution, and potential limitation.

Through iterative comparison of coded postures across participants, we identified recurring clusters of traits that consistently appeared together. For example, participants who emphasized methodological structuring (Marie Ferlin, Manon Hardy, Cédric Truong) also tended to express concern about process clarity and tool application – these coalesced into the Methodologist profile.

## Stage 4: Validation Through Cross-Participant and Team-Level Analysis

We tested the emerging typology by examining whether participants within the same team exhibited complementary profiles. For instance, in Team 6, Celian (technical/process perspective) and Kim Gwon Yeong (relational/communication perspective) demonstrated the complementarity of the Methodologist and Empathic Mediator profiles within a successful collaboration.

## Stage 5: Post-Hoc Mapping to 3Hs Framework

Only after the seven profiles were identified did we map them onto the 3Hs framework (Table 1). This post-hoc mapping serves as validation and synthesis, not as a coding constraint. The 3Hs therefore informed the *interpretation* of findings, not the *generation* of codes.

### A.3 Profile Distribution

The seven profiles were not mutually exclusive; participants often embodied multiple profiles either simultaneously or at different stages of the workshop. The table below shows the distribution of dominant and secondary profile manifestations across the 23 respondents.

**Important caveat:** This profile construction represents a first, exploratory attempt based on qualitative analysis of participant questionnaires. No specialist in psychology was involved in the profiling process. The resulting typology should therefore be considered a preliminary framework – a starting point for an ongoing process that would benefit from a multidisciplinary team (including psychology, management, and design research). The five-stage methodological approach (individual case analysis → thematic coding → pattern recognition → validation → post-hoc mapping) is the primary contribution. The interpretation of the profiles themselves – their validity, stability, and generalizability – requires deeper consideration and future validation.

| Profile                          | Primary Role (n=) | Secondary Presence (n=) | Representative Participants                                                |
|----------------------------------|-------------------|-------------------------|----------------------------------------------------------------------------|
| <b>Methodologist</b>             | 8                 | 5                       | Marie Ferlin, Manon Hardy, Cédric Truong, Hugo Borel, Alexandre Vavas seur |
| <b>Empathic Mediator</b>         | 7                 | 9                       | Jun Jeong, Taehee Kwon, Yeji Kim, Gwon-Yeong Kim, Jin-Hyun Kwon            |
| <b>Visual Creator</b>            | 6                 | 8                       | Matthias Meyer, Yeji Kim, Alexandre Vavas seur, Minseok Bang               |
| <b>Pragmatic Solver</b>          | 9                 | 4                       | Ben Jebara Ylies, Jin-Hyun Kwon                                            |
| <b>Speculative Dreamer</b>       | 4                 | 6                       | Matthias Meyer, Florentin Carrard                                          |
| <b>Collaborative Synthesizer</b> | 5                 | 7                       | Sihyeong Noh, Florent Giroud, Thibaut de Mallac de Vessac                  |
| <b>Reflective Observer</b>       | 6                 | 3                       | Maha Kinis, Nam Thang Nguyen, Neroshenan Selva                             |

Note: “Primary Role” indicates a profile that was dominant for a participant. Because participants often embodied multiple profiles either simultaneously (co-dominant) or sequentially across different workshop phases, a single participant may be counted in more than one primary role. Similarly, “Secondary Presence” indicates non-dominant manifestations. Therefore, the sums of both columns (45 and 42) exceed the number of respondents (23). This reflects the multi-faceted and fluid nature of participant roles, not a counting error.

#### **A.4 Profile Fluidity and Team Complementarity**

Our analysis revealed that these profiles should be understood as dynamic roles rather than fixed personality types. Individual participants shifted between profiles depending on the phase of the workshop:

- A **Pragmatic Solver** during ideation might become a **Visual Creator** during prototyping
- A **Speculative Dreamer** might later act as a **Collaborative Synthesizer** to integrate ideas
- An **Empathic Mediator** might also demonstrate **Reflective Observer** traits in post-workshop analysis

The most effective teams demonstrated a balanced distribution of complementary profiles. Team 4 (Yeji Kim and Marie Ferlin) exemplified this: architectural spatial thinking (Visual Creator) combined with methodological structuring (Methodologist) to produce grounded, shareable concepts. Team 6 (Celian and Kim Gwon Yeong) showed how technical/process perspectives (Methodologist) and relational/communication perspectives (Empathic Mediator) can complement each other within a successful collaboration.

### ***A.5 Implications for Workshop Design***

This typology offers practical value for future transdisciplinary workshops:

- **Team composition:** Deliberately seeking diverse profiles can enrich creative dynamics
- **Facilitation:** Facilitators can identify which profiles are present or absent in a team and adapt their interventions accordingly
- **Participant awareness:** Helping participants recognize their own profiles and those of teammates can improve collaboration

The profiles transcend disciplinary and cultural boundaries: Methodologists appeared among both UNIGE and CNU students, as did Empathic Mediators and Visual Creators. This suggests that these roles reflect fundamental postures in collaborative creative work rather than culturally specific behaviors.

### ***Appendix B: The Meta-Context (M) – A Layered Concentric Model***

This annex provides the complete operationalization of Meta-Context (M) as presented at the 19th SIG Design Theory Workshop (Barde & Morin, 2026). The model is offered as a reference for readers wishing to explore M beyond the subset of dimensions that emerged empirically from the workshop reported in this paper.

## Conceptual Rationale

Meta-Context (M) denotes the ensemble of conditions – material, social, cultural, temporal, affective, and existential – within which concept (C) and knowledge (K) dynamics unfold. Unlike traditional C-K theory, which treats context as background, the concentric model positions M as an *active structuring force* that shapes:

- Which concepts can be articulated and survive
- Which knowledge is mobilized (or withheld)
- How C and K interact over time

The model comprises six concentric layers, from the most immediate and experientially close to the most distal and foundational.

### Layer 1: Core – The Human Actor

The individual's internal and immediate experiential capacities.

| Dimension                  | Description                                           |
|----------------------------|-------------------------------------------------------|
| Affective & Emotional      | Feelings, moods, motivation, attachment               |
| Cognitive & Perceptual     | Thinking patterns, attention, sensemaking             |
| Embodied & Relational      | Physical presence, gestures, interpersonal attunement |
| Linguistic & Communicative | Verbal and non-verbal exchange, dialogue              |
| Aesthetic & Sensory        | Sense of beauty, harmony, sensory preferences, taste  |

### Layer 2: Immediate Interaction Sphere

The shared space of direct co-creation between participants.

| Dimension                       | Description                                              |
|---------------------------------|----------------------------------------------------------|
| Social & Relational Dynamics    | Trust, power, roles, collaboration rituals               |
| Symbolic & Imaginative Exchange | Shared stories, metaphors, humor, collective imagination |

### Layer 3: Mediating Environment

The tangible and procedural means through which interaction occurs.

| Dimension                                 | Description                                                                                                |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Material & Physical Setting               | Natural and built environments, space, ambiance                                                            |
| Mediating Frameworks & Modes              | Fiction (scenarios, narratives), simulation (digital twins, models), realization (prototypes, productions) |
| Methodological & Tool-Based Framework     | Design Thinking, C-K, 3Hs, software, physical tools                                                        |
| Institutional & Organizational Structures | Institutions, corporations, associations, team rules                                                       |

### Layer 4: Spatial-Temporal Frame

The dimensions of space and time that bound the process.

| Dimension                    | Description                                                                           |
|------------------------------|---------------------------------------------------------------------------------------|
| Temporal Structure           | Duration, rhythm, deadlines, sequences                                                |
| Spatial & Geographic Context | Physical/virtual location, cultural geography, movement through space-time            |
| Historical Context           | Past events, traditions, path dependencies, legacy (past, present, future trajectory) |

### Layer 5: Systemic & Infrastructural Context

The broader human-made systems that enable and constrain co-creation.

| Dimension                         | Description                                                   |
|-----------------------------------|---------------------------------------------------------------|
| Cultural & Intercultural Norms    | Values, etiquette, communication styles, epistemic cultures   |
| Technological Context             | Digital platforms, AI, connectivity, technological ecosystems |
| Legal & Regulatory Context        | Laws, IP, safety regulations, compliance frameworks           |
| Socioeconomic & Political Context | Resources, capital, power dynamics, policies, market forces   |

Layer 6: Existential & Metaphysical Frame

The deepest, often implicit, layers of meaning and belief.

| Dimension                           | Description                                                         |
|-------------------------------------|---------------------------------------------------------------------|
| Philosophical & Ontological Context | Assumptions about reality, knowledge, being                         |
| Ideological & Ethical Context       | Belief systems, morals, political ideologies                        |
| Theological / Cosmological Context  | Ultimate meaning, transcendence, cosmic order, spiritual narratives |

In the present study, the following M dimensions emerged from workshop data as most influential:

- linguistic asymmetries (Layer 1, Core),
- time pressure and rhythm (Layer 3, Temporal Structure),
- material space and shared meals (Layer 2, Material Setting), and
- mediating frameworks such as storyboards (Layer 2, Mediating Frameworks & Modes).
- Cultural and intercultural norms (Layer 4) shaped communication styles and epistemic hierarchies.

Reference

**Barde, C. P., & Morin, J.-H. (2026).** Designing the MetaContext: An empirical study of the 3Hsdriven CK+M principle for humancentric learning ecosystems. *19th International Paris Workshop of the Design Theory SIG*, Mines Paris – PSL.

Acknowledgements

The authors wish to express their sincere gratitude to all who supported the FacLab initiative, which aims to implement a Creative Transdisciplinary Learning Space at Chonnam National University’s Yeosu campus. We are particularly indebted to the Department of Architecture and Urban Design, whose commitment made this series of workshops possible. Special thanks go to Professor Seung-wan Lim (Director of the Department), Professor Jun-taek Kim, Professor Kim Sunhyung,



and Professor Jaehoon Bae for their unwavering support and collaboration. We also extend our appreciation to Professor Eun Jeong Noh of the Department of Culture and Tourism Management for her valuable partnership. Finally, we thank Ma Seul-gi for her assistance in workshop organization and facilitation, as well as all participating students from the University of Geneva and Chonnam National University, whose energy and creativity brought the workshop to life.

## **Ewa Werpachowska**

University of Vienna

[ewa.m.werpachowska@gmail.com](mailto:ewa.m.werpachowska@gmail.com)

ORCID ID: 0009-0004-3446-7749

## **Tetiana Paientko**

Business School, HTW Berlin University  
of Applied Sciences

[tetiana.paientko@htw-berlin.de](mailto:tetiana.paientko@htw-berlin.de)

ORCID ID: 0000-0002-2962-308X

# The Role of Economic Factors and Government Policies in the Development of the Polish Housing Market

## ABSTRACT

**Objective:** The objective of this study is to empirically examine the combined effects of macroeconomic demand-side determinants and policy interventions within a unified analytical framework, focusing on the housing markets of Warsaw, Kraków and Wrocław.

**Methodology:** The analysis employs a quantitative research design based on a fixed-effects panel data regression model using quarterly data from 2014Q1 to 2024Q4. Housing prices on the secondary market serve as the dependent variable, while income, interest rates, unemployment and policy implementation are included as explanatory variables. Data are sourced from the National Bank of Poland (NBP) and the Central Statistical Office (GUS). Model diagnostics address multicollinearity, serial correlation and cross-sectional dependence, with Driscoll–Kraay standard errors applied to ensure robustness.

**Findings:** The results indicate that income is the primary driver of housing prices in major Polish cities, confirming the importance of demand-side economic fundamentals. Unemployment also exhibits a statistically significant positive relationship with housing prices, reflecting atypical market dynamics during periods of economic shocks, including the COVID-19 pandemic and geopolitical events in Eastern Europe. Interest rates do not show a statistically significant effect. Contrary to initial expectations, the introduction of government housing policies is associated with a short-term decline in housing prices, suggesting delayed or indirect policy effects rather than immediate price inflation.

**Value Added:** This study contributes to the literature by integrating economic determinants and housing policy variables in a unified empirical model for the Polish housing market in the post-2014 period. It extends prior research by focusing on recent data and large urban agglomerations, providing updated evidence on price formation mechanisms under conditions of economic disruption and active policy intervention.

**Recommendations:** The findings suggest that housing price dynamics in Poland are driven primarily by economic fundamentals rather than short-term policy measures. Policymakers should therefore account for income growth and labour market conditions when designing housing interventions. Future housing policies may benefit from improved timing, clearer targeting and alignment with prevailing market prices to enhance effectiveness and reduce unintended short-term distortions.

**Key words:** housing market, housing prices, economic determinants, government housing policy, panel data analysis, Polish housing market

**JEL codes:** R31, E24, E43, C23

## Introduction

Housing is a fundamental component of both citizens' well-being and national economic stability (Brzezicka et al., 2022). Over the past decades, Poland has experienced significant fluctuations in the residential real estate market, characterised by rising prices, growing demand and increasing difficulties in accessing affordable housing (Melnychenko et al., 2022). Despite an exceptionally high home-ownership rate of 87 percent – one of the highest in the European Union (Eurostat, 2024) – housing prices in many Polish cities have almost doubled since 2014. This price growth has substantially outpaced income and wage dynamics, intensifying public debate on market overheating and the risk of speculative bubbles (Trojanek et al., 2023). Importantly, a high ownership rate does not necessarily reflect a well-functioning housing market (Narodowy Bank Polski, 2024). Poland ranks last in the EU in terms of rooms per person, with an average of only 1.1 rooms, and more than one-third of the Polish households experience overcrowding, pointing to structural deficiencies in housing availability and quality (Eurostat, 2024). These developments underscore the urgency of identifying the drivers behind housing price dynamics, as they carry significant social and macroeconomic implications.

Recent years have further intensified these pressures due to a sequence of external shocks. The SARS-CoV-2 pandemic disrupted housing market activity, initially leading to transaction stagnation, followed by a rapid increase in dwelling prices that further reduced affordability (Narodowy Bank Polski, 2022). In parallel, geopolitical developments on Poland's eastern border have exerted additional demand-side pressure. Three years after the onset of Russian aggression against Ukraine, more than 1.5 million Ukrainians reside in Poland, predominantly in large urban agglomerations (Gov.pl, 2025). A further inflow of migrants originates from Belarus; official statistics report over 100,000 legal residents, mainly concentrated in the Mazowieckie voivodeship (Gov.pl, 2023, July 12), while existing studies suggest that actual numbers may be higher due to undocumented migration flows (Petrakova, 2022). This sustained population inflow has increased housing demand in major cities, contributing to rising prices and reduced availability for both Polish nationals and incoming migrants (Trojanek & Gluszak, 2022).

In response to these challenges, successive Polish governments have implemented a range of targeted housing policies since 2014, aiming to reduce financial barriers to homeownership and improve access to housing. Programs such as *Mieszkanie dla Młodych*, *Mieszkanie Plus*, *Mieszkanie na Start*, and *Pierwsze Mieszkanie* were designed to address different aspects of housing affordability and market access (Narodowy Program Mieszkaniowy, 2016; Ustawa z dnia 27 września 2013 r. o pomocy państwa w nabyciu pierwszego mieszkania przez młodych ludzi, 2013; Ustawa z dnia 20 lipca 2018 r. o pomocy państwa w ponoszeniu wydatków mieszkaniowych w pierwszych latach najmu mieszkania, 2018; Ustawa z dnia 1 października 2021 r. o gwarantowanym kredycie mieszkaniowym i Bezpiecznym Kredycie 2%, 2021). However, these interventions have generated considerable debate regarding their actual effectiveness and potential unintended consequences, particularly in terms of price formation and demand stimulation.

Although prior research has examined housing price dynamics either through macroeconomic determinants or through the lens of housing policy interventions, studies that systematically integrate both dimensions remain scarce. This lack of comprehensive empirical evidence limits the understanding of whether observed price increases are primarily driven by economic fundamentals, policy-induced

demand effects, or the interaction between the two. Addressing this gap is particularly relevant in the Polish context, where rapid price growth coincides with repeated policy interventions and pronounced economic shocks.

Considering this background, this study investigates how selected economic factors and the introduction of government housing policies have influenced housing prices in Poland's three largest cities – Warsaw, Kraków and Wrocław – over the period 2014–2024. The chosen timeframe captures major policy initiatives as well as significant macroeconomic and geopolitical events affecting the Polish economy and housing market. The empirical analysis is based on quantitative methods using secondary data from the National Bank of Poland (NBP) and the Central Statistical Office (GUS). The effects of key macroeconomic variables, including wages, GDP, interest rates and unemployment, alongside the introduction of housing policy measures, are examined using a panel regression framework.

The findings contribute to the literature by providing updated empirical evidence on housing price determinants in Poland's major urban markets and by explicitly integrating economic and policy-related drivers within a single analytical framework. From a practical perspective, the results offer insights for policymakers regarding the effectiveness and potential side effects of housing policy instruments, particularly in large metropolitan areas where demand pressures are most pronounced.

The remainder of the paper is structured as follows. The chapter following the introduction presents the legal background and identifies the research gap through a structured literature review. The third chapter outlines the applied methodology and data collection process. The fourth chapter presents the empirical results, followed by a discussion of the findings. The final chapter summarizes the main conclusions, outlines policy implications and discusses limitations and directions for future research.

# Theoretical Background and Literature Review

## *Legal Background*

Constitutionally, the Polish government is obliged to prioritise actions addressing housing needs, including measures aimed at improving housing accessibility and supporting citizens in securing adequate housing (Glocker & Plouin, 2016; Groeger, 2016; Matel, 2024). A pivotal turning point for the Polish housing market occurred in 1990 with the transition from a centrally planned economy to a market-based system. Although privatisation gradually improved housing availability, the overall quality and standard of housing remained significantly below European benchmarks for many years (Glocker & Plouin, 2016; Gomułka, 2016; Kisiel et al., 2021). Poland's accession to the European Union in 2004 marked another important shift, as declining domestic interest rates increased access to mortgage financing. However, according to the OECD, although lower-income households were increasingly able to purchase dwellings, they often lacked sufficient resources to cover maintenance and quality improvements, limiting the broader effectiveness of increased homeownership (Glocker & Plouin, 2016, p. 6).

In line with these constitutional obligations and the persistence of structural housing challenges, successive Polish governments introduced a range of policy initiatives aimed at improving housing conditions and affordability. The first major programme, *Rodzina na Swoim* (Family on Their Own), launched in 2006, was designed to support households unable to afford homeownership independently. Due to its growing fiscal burden, the programme was terminated in 2013, prompting policymakers to introduce new instruments intended to address evolving housing market constraints (Groeger, 2016).

From 2014 onward, a new wave of housing policies targeted broadly similar groups of beneficiaries. The *Mieszkanie dla Młodych* (Housing for the Young) programme was designed for young individuals without prior homeownership. Eligibility was restricted to individuals under 35 years of age, although this criterion did not apply to families with at least three children (Glocker & Plouin,

2016). The programme primarily targeted households capable of obtaining mortgage financing and initially applied only to the primary housing market. Following criticism regarding limited availability of eligible dwellings, the programme was extended to include secondary market housing (Groeger, 2016; Mirczak, 2018). Nevertheless, restrictive criteria related to apartment size and price excluded a substantial share of housing stock, limiting programme uptake (Matel, 2024). After four years, the programme was discontinued, with assessments suggesting that it disproportionately benefited higher-income households and contributed to price inflation among eligible properties (Narodowy Bank Polski, 2016).

In 2016, alongside the ongoing *Mieszkanie dla Młodych* programme, the government introduced *Mieszkanie Plus* (Apartment Plus) as part of the National Housing Programme (Narodowy Program Mieszkaniowy, 2016). At that time, Poland ranked near the bottom among EU countries in terms of housing availability and affordability, prompting the programme's focus on increasing supply. Its objectives included improving access to housing for households excluded from market-based rental or ownership options, promoting family formation and stimulating housing investment. As stated in Resolution No. 115/2016 of the Council of Ministers, the programme aimed to "increase access to housing for individuals whose income currently prevents them from purchasing or renting on commercial terms" (Resolution No. 115/2016, p. 49). The programme assumed the construction of new rental dwellings with regulated rents capped below market levels. Tenants were granted the option to purchase their apartments after a 30-year rental period (Mirczak, 2018).

Three years later, in 2019, the *Mieszkanie na Start* (Housing for Start) programme was introduced. Unlike *Mieszkanie Plus*, this initiative focused on rent subsidies rather than direct support for construction. The programme provided financial assistance to eligible tenants in newly built or revitalised dwellings, with eligibility determined by income thresholds and household composition. Importantly, the construction of the dwellings themselves was not directly subsidised by the state. Additional eligibility criteria applied to both tenants and properties (Ustawa z dnia 20 lipca 2018 r. o pomocy państwa w ponoszeniu wydatków mieszkaniowych w pierwszych latach najmu mieszkania, 2018).

The most recent housing initiative, *Pierwsze Mieszkanie* (First Apartment), implemented in mid-2023, introduced two complementary financing instruments. The first component, *Bezpieczny Kredyt 2%* (2% Secure Credit), guarantees that borrowers' financing costs do not exceed a fixed rate of 2%, with the difference between the market-based interest rate and the statutory cap covered through public subsidies (Ustawa z dnia 1 października 2021 r. o Gwarantowanym Kredycie Mieszkaniowym i Bezpiecznym Kredycie 2%, 2021). The second component, the *Konto Mieszkaniowe* (Housing Account), supports savings for future home purchases. Under this scheme, individuals aged 13 to 45 commit to regular monthly deposits ranging from 500 PLN to 2,000 PLN. Account holders may defer one payment per year without penalty, provided that at least eleven qualifying deposits are made annually. Savings are indexed annually to inflation, enhancing their real value over time (Gov.pl, 2023).

In addition to targeted housing programmes, the Polish government introduced temporary mortgage repayment relief measures, known as *wakacje kredytowe* (credit holidays), in response to the economic deterioration associated with the SARS-CoV-2 pandemic and the Russian aggression against Ukraine. These measures allowed borrowers to temporarily suspend loan repayments, aiming to reduce household financial stress and support liquidity in the housing market (Narodowy Bank Polski, 2024).

Table 1 summarises the key housing policy programmes implemented in Poland between 2014 and 2024, outlining their objectives, target groups and principal mechanisms. This overview provides an essential institutional context for the subsequent empirical analysis, as the effects of these policy interventions constitute a central focus of the research.

**Table 1.** Overview of government policies in Poland 2014–2027

| Program                | Program Name      | Time Span      | Objective                                                                                                                      | Key Features                                                                                         | Target Group                                                                                                                                                                                                                   |
|------------------------|-------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mieszkanie dla Młodych | Housing for Young | 2014 - 2018    | increasing the availability of housing for young people, supporting family growth, increasing investment in the housing market | co-financing of the down payment when taking out a loan to purchase one's own apartment              | married couples and individuals up to 35 years of age purchasing their first apartment using a mortgage loan, families raising at least three children (no age restrictions or ownership restrictions regarding the apartment) |
| Mieszkanie Plus        | Apartment Plus    | 2016 - 2019    | increase of availability of housing for people who could not afford purchase of apartment                                      | provision of affordable rental apartments with an option to come to ownership after specified period | individuals whose income does not allow to take mortgage                                                                                                                                                                       |
| Mieszkanie na Start    | Housing for Start | 2019 - Present | reduce the financial burden of rent in initial rental period                                                                   | rent subsidies for rentals in new apartments                                                         | low to moderate income households, young adults and families with childrens                                                                                                                                                    |
| Pierwsze Mieszkanie    | First Apartment   | 2023 - 2027    | support first time homebuyers                                                                                                  | subsidized mortgages with fixed 2% interest rate housing account,                                    | Loan: no eligibility criteria<br>Housing account : 13 - 45 years olds                                                                                                                                                          |

Source: Systematised by authors.

The overview of Polish housing policies presented in Table 1 indicates a clear evolution in policy orientation over the past decade. The initial programme, *Mieszkanie dla Młodych* (Housing for the Young), was primarily designed to stimulate homeownership through financial incentives, particularly in the form of subsidies supporting mortgage down payments. Subsequent initiatives, including *Mieszkanie Plus* (Apartment Plus) and *Mieszkanie na Start* (Housing for Start), expanded the policy focus beyond ownership by addressing rental affordability and broader market access. These programmes targeted households whose housing needs were not necessarily linked to the immediate purchase of a dwelling, reflecting a gradual diversification of policy instruments.

The most recent initiative, *Pierwsze Mieszkanie* (First Apartment), integrates savings and borrowing mechanisms by offering subsidised mortgage financing alongside an inflation-indexed savings account. Unlike earlier programmes, it does not impose income thresholds, thereby extending eligibility to a wider group of potential participants. At the same time, the programme maintains a strong emphasis on homeownership, indicating continuity in the underlying policy objective of promoting owner-occupied housing.

From a policy analysis perspective, the sequence of housing interventions suggests a predominantly reactive approach to emerging market pressures rather than a long-term, coordinated strategy. Although the programmes were introduced with the intention of reducing barriers to housing access, their cumulative

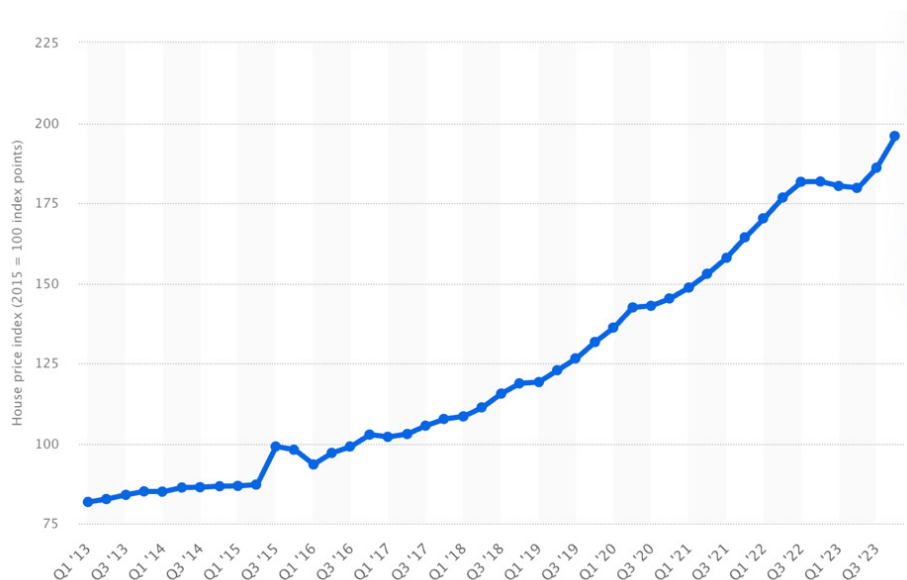
effects on price dynamics and market sustainability remain uncertain (Bochenek et al., 2023; Kiszluk, 2023; Radzimski, 2014). The relatively frequent introduction of new policy instruments – often at intervals of approximately three years and with limited clarity regarding their duration – may contribute to uncertainty among market participants. Such conditions have the potential to influence decision-making by both households and developers, potentially affecting participation in policy-supported housing schemes.

To assess the effectiveness and limitations of these housing policies more systematically, it is necessary to situate them within a broader theoretical framework. Accordingly, the following section presents key theories of housing market price formation, which provide the analytical foundation for the empirical analysis developed in subsequent chapters.

### ***Analysis of Recent Publications***

The interaction between economic factors and government policies plays a central role in shaping housing markets worldwide, and the Polish housing market is no exception. Following recovery from the global housing crisis of 2008, the Polish residential real estate market entered a new cycle in 2014 (Narodowy Bank Polski, 2020; Trojanek et al., 2023). As illustrated in Figure 1, the period between 2014 and 2024 was characterised by substantial price volatility. Over this decade, the house price index – measuring changes in transaction prices of dwellings relative to the base period of Q3 2015 – nearly doubled between 2014 Q1 and 2023 Q4 (Eurostat, n.d.; Statista, 2024). This pronounced increase indicates a sharp escalation in residential property values and underscores the extent of market fluctuations observed during the period.

**Figure 1.** EMF house price index in Poland from the 1st quarter of 2013 to the 4th quarter of 2023



Source: Adopted from Statista (2024).

Trojanek et al. (2023) analysed the period under consideration using a new generation of recursive housing bubble detection methods applied to both price-to-rent and price-to-income ratios for the capitals of 18 Polish voivodeships. Their findings indicate no statistically significant episodes of housing bubbles between 2014 and 2022, suggesting that the observed price appreciation was broadly consistent with underlying market fundamentals rather than driven by speculative behaviour. These results reduce the likelihood that housing price dynamics in Poland during this period were primarily shaped by speculative demand and instead emphasise the importance of analysing fundamental economic determinants of price formation.

The role of market fundamentals in housing price formation has been widely examined in the literature. The National Bank of Poland, in its annual reports, identifies unemployment, income and GDP as key determinants of housing prices, although it does not provide quantified estimates of their individual impacts (Narodowy Bank Polski, 2024). The relationship between unemployment and

housing prices was empirically assessed by Grum and Govekar (2016) using a multiple linear regression framework. Their results indicate an inverse relationship between unemployment and housing prices. In addition to unemployment, the study examined the effects of GDP, industrial production and stock market indicators; however, only unemployment proved statistically significant for Poland. In contrast, Melecky and Paksi (2024) identified GDP as one of the primary drivers of housing prices across 15 European countries. Based on this body of evidence, the following hypothesis is formulated:

**H1:** *An increase in GDP leads to an increase in housing prices.*

Income effects have also been extensively analysed in the context of housing markets. Ryś and Ryś (2025) examined the relationship between average income and housing prices using a linear regression model and found a statistically significant association. Their results indicate that a one PLN increase in income corresponds to a 1.70 PLN increase in apartment transaction prices. The study focused on the seven largest Polish cities over a twelve-year period. These findings are consistent with the panel analysis conducted by Leszczyński and Olszewski (2014), which examined the previous housing market cycle in Poland and demonstrated that both income levels and unemployment significantly affect housing price formation, in line with neoclassical theoretical predictions. International evidence further supports these conclusions. Égert and Mihaljek (2007) found a strong positive relationship between income – measured by GDP per capita – and housing prices across multiple countries. Given the consistency of empirical evidence at both national and international levels, the following hypothesis is proposed:

**H2:** *An increase in average individual income has a positive effect on housing prices.*

Interest rates, which are of critical importance to mortgage affordability, exhibit a more nuanced relationship with housing market dynamics. The Polish housing market is commonly classified as credit-oriented, with approximately 71% of

household loans consisting of mortgages (Melnychenko et al., 2022). However, according to Narodowy Bank Polski (2023a), a substantial share of primary market housing transactions – approximately 76% of purchase value – is financed through buyers' own funds. This high cash component suggests that the sensitivity of housing prices to interest rate changes may vary across market segments. While the effects of interest rates on the Polish housing market have not been extensively examined in domestic empirical studies, international evidence provides mixed results. In Lithuania, a comparable transitioning economy, Cohen and Karpavičiūtė (2017) found no statistically significant impact of interest rates on housing prices, largely due to the dominance of cash-financed purchases. Conversely, Belke and Keil (2017), analysing 127 German regions, reported a statistically significant positive effect of interest rates – proxied by yields on ten-year government bonds – on both house and apartment prices. Similarly, Vonlanthen (2023) demonstrated that a decline in interest rates in Switzerland increased median house prices by 1.5% and owner-occupied apartment prices by 2.5%. Given the importance of interest rates as both a monetary policy instrument and a housing affordability determinant, and considering the lack of quantitative evidence for Poland, the following hypothesis is formulated:

### **H3:** *Interest rates influence housing prices.*

The analysis of interest rate effects is particularly relevant in the Polish context due to recent monetary policy adjustments. In response to inflationary pressures associated with the SARS-CoV-2 pandemic, the policy interest rate was raised sharply from approximately 2–3% to nearly 9%. This tightening of monetary conditions reduced credit availability and borrowing capacity, potentially dampening housing demand and affecting price dynamics (Łaszek et al., 2024).

Inflation is also frequently cited as a determinant of housing prices. During periods of elevated inflation, real assets such as housing are often perceived as stores of value, increasing demand for property investment. Poland's inflation surges during the SARS-CoV-2 pandemic and the war in Ukraine illustrate this mechanism, as households sought protection against currency depreciation (Narodowy Bank Polski, 2023b, 2024). However, empirical evidence on the inflation–housing price nexus is mixed.

Cohen and Karpavičiūtė (2017), analysing the Lithuanian housing market, found that inflation did not Granger-cause housing price changes and instead observed an inverse relationship, with housing prices influencing inflation. Considering these findings and the conceptual understanding of inflation as a general price-level phenomenon, this study treats inflation as a background macroeconomic condition rather than a direct explanatory variable and excludes it from the regression model.

Supply-side determinants are also important in housing price formation but are less extensively analysed in this study due to data limitations. Construction costs and supply-chain disruptions can significantly affect housing prices (Melecky & Paksi, 2024). Existing literature highlights factors such as land availability, infrastructure, permits and profit margins, although their quantitative effects are often not explicitly estimated (Brzezicka et al., 2022). Additionally, Narodowy Bank Polski (2023) identifies the SARS-CoV-2 pandemic and the war in Ukraine as major supply-side shocks, contributing to increased construction costs, labour shortages and material price inflation. Given the limited availability of consistent supply-side data at the city level, the present study focuses primarily on demand-side determinants of housing prices in Poland.

Finally, the literature underscores the importance of analysing government housing policies, which may stimulate both housing demand and supply (Brzezicka et al., 2022). Empirical evidence suggests that policy interventions yield mixed outcomes. While many programmes are designed to improve housing accessibility, some have contributed to adverse market effects (Kiszluk, 2023). A prominent example is the *Mieszkanie dla Młodych* (Housing for the Young) programme. Although its stated objective was to enhance housing access for younger households, its regulatory framework enabled developers to increase prices of eligible apartments. As a result, the programme contributed to higher developer margins rather than improved affordability, undermining its social objective (Narodowy Bank Polski, 2015). Furthermore, policy instruments often lag behind actual market developments. Subsidy price limits were frequently set well below prevailing market prices, reducing programme effectiveness (Narodowy Bank Polski, 2022). This gap was particularly pronounced in the cities analysed in this study, reaching up to 40% in Kraków, highlighting the misalignment between policy design and market conditions.

Further studies highlight inefficiencies in state-supported housing mechanisms. Bochenek et al. (2023) emphasise that lengthy administrative procedures can delay households' access to housing subsidies, thereby reducing the effectiveness of policy interventions. Moreover, the most recently introduced policy instrument – the *Bezpieczny Kredyt 2%* (Secure Loan) – appears to have temporarily stimulated housing demand, while also coinciding with a rapid increase in apartment prices (Narodowy Bank Polski, 2024). These observations are consistent with international evidence. In the United States, Floetotto et al. (2016) demonstrate that government interventions such as homebuyer tax credits lead to short-term increases in housing prices and transaction volumes but ultimately reduce overall welfare for many households. Their general equilibrium model further indicates that certain housing policy measures can distort market dynamics.

Taken together, these findings suggest that housing policies may contribute to upward pressure on prices, particularly in the period immediately following their introduction. On this basis, the following hypothesis is formulated to capture the potential short-term price effects of policy interventions:

**H4:** *The introduction of stimulating housing policies leads to an increase in housing prices.*

Despite an extensive body of literature examining individual housing price determinants, existing studies often analyse economic factors and policy interventions in isolation. As a result, the combined effects of simultaneous macroeconomic conditions and housing policy measures remain insufficiently explored, especially in the context of recent developments in Poland. The limited integration of policy variables into housing price models represents a notable gap in the literature, particularly given the active role of the Polish government in addressing housing market challenges through the policies discussed in subchapter *Legal Background*. While economic analyses offer valuable insights into fundamental drivers of price dynamics, they frequently overlook the interaction between sudden policy interventions and market outcomes. The following chapter therefore outlines the methodological framework applied to test the hypotheses formulated in this section.

# Methodology

## *Research Design*

To address the stated hypotheses, a quantitative research methodology was adopted, as it is well suited to capturing the complexity of housing market dynamics and the interactions between economic factors and policy interventions. Zhao and Liu (2023) provide a comprehensive review of empirical methodologies applied in housing market research, including studies on housing prices, their determinants, and the effects of housing policies. Their review identifies several widely used approaches, notably vector autoregression (VAR) models, general equilibrium (GE) models, difference-in-differences (DiD) designs and regression-based methods.

Among these, VAR models are identified as the most frequently applied technique in analyses of housing price formation (Zhao & Liu, 2023). For example, Duan et al. (2021) employed a VAR framework to study housing prices in Beijing, focusing on the dynamic interrelationships among time-series variables. While VAR models effectively capture temporal dependencies and feedback effects, they are limited in their ability to account for cross-sectional heterogeneity, such as differences across cities. This limitation is particularly relevant in the present study, which explicitly examines variation across multiple urban areas.

General equilibrium models represent another prominent methodological framework in housing market analysis (Zhao & Liu, 2023). Piskorski and Tchisty (2017), for instance, applied a general equilibrium approach to analyse the effects of mortgage design on housing price formation. Although GE models offer a comprehensive representation of market interactions, they are inherently complex and require extensive and highly detailed data. Given the scope, data availability and time constraints of the current study, the application of a general equilibrium framework was not feasible.

Zhao and Liu (2023) also highlight the use of difference-in-differences models, which are commonly employed to identify causal effects of policy interventions or structural changes by comparing treated and control groups. An example is provided by Diao et al. (2017), who used a DiD design to analyse changes in

housing prices in Singapore following the construction of new metro stations. However, the DiD approach is not suitable for the present analysis, as the macroeconomic conditions and housing policy measures considered apply uniformly across Poland, leaving no distinct control group for comparison.

Taking into account these considerations, a panel regression model was selected as the most appropriate methodological approach for this study. Panel data techniques allow for the simultaneous analysis of temporal and cross-sectional variation, making them particularly suitable for examining housing price dynamics across multiple cities over time. The following subsection outlines the structure of the panel regression model and explains its specific application in the context of this research.

Panel data analysis, also referred to as longitudinal data analysis, involves observations of multiple entities – such as cities – collected over several time periods. By combining cross-sectional and time-series dimensions, panel data enables the simultaneous examination of both spatial and temporal dynamics within a single empirical framework. Panel data models are typically classified into three main types: Pooled Ordinary Least Squares (OLS), the Fixed Effects (FE) model and the Random Effects (RE) model.

The Pooled OLS model assumes homogeneity across entities and therefore does not account for individual-specific effects. It serves as a baseline specification, allowing for an initial assessment of whether models incorporating entity-level heterogeneity provide a better fit. In this approach, all observations are pooled and estimated using a common intercept and slope coefficients, analogous to a standard linear regression model. In contrast, the Fixed Effects model explicitly accounts for unobserved heterogeneity by allowing entity-specific intercepts. This specification assumes that individual-specific effects may be correlated with the explanatory variables and effectively controls for all time-invariant characteristics of the entities, making it particularly suitable when entities differ systematically in ways that may influence the dependent variable. The Random Effects model, by comparison, treats individual-specific effects as random and assumes that they are uncorrelated with the explanatory variables. This model is appropriate when variations across entities are considered random rather than structurally linked to the regressors (Baltagi, 2021).

The application of panel data models requires several diagnostic tests to ensure the validity and robustness of the empirical results. Initially, potential correlation among variables must be assessed, followed by tests for multicollinearity. Variance inflation factors exceeding commonly accepted thresholds may indicate inflated standard errors and unreliable coefficient estimates. After model estimation, additional diagnostics are conducted to detect serial correlation, heteroskedasticity, and cross-sectional dependence, all of which may bias inference if left unaddressed (Baltagi, 2021).

Applying panel data models to the analysis of housing prices in Polish cities between 2014 and 2024 enables the examination of how economic variables – such as income, GDP and interest rates – and government policy measures affect housing markets across both space and time. A Fixed Effects specification is particularly well suited to this context, as major Polish cities are likely to exhibit persistent and unobservable differences that influence housing price dynamics. This approach facilitates a clearer identification of how economic conditions and policy interventions shape local housing markets. Prior empirical research on the Polish housing market has similarly employed Fixed Effects models, supporting their relevance in this context (Leszczyński & Olszewski, 2014). Nevertheless, the final model choice is determined empirically using the Hausman test.

The empirical analysis was conducted using RStudio, which was selected for its flexibility, open-source nature and strong community support. The primary package used for panel data estimation was **plm**, while diagnostic tests were implemented using the **lmtest** package. Additional packages were utilised for data preparation and visualisation purposes (Croissant & Millo, 2008; Hothorn & Zeileis, 2002; R Core Team, 2025).

The methodological framework of this study is strongly informed by the work of Leszczyński and Olszewski (2014), whose analysis of the previous housing cycle in Poland provides an important foundation for the empirical approach adopted in this research.

## Data Collection

Data used in the study were collected from the National Bank of Poland and the Central Statistical Office databases. The sample contains data from the first quarter of 2014 to the last quarter of 2024. Capturing quarterly data was essential for observing clearly the effects of the variables in such a short period of time. For exact operational definitions of the variables, please refer to Table 2.

**Table 2.** Variables definitions and data sources

| Variable | Definiton                                                                      | Frequency | Level   | Data Source             |
|----------|--------------------------------------------------------------------------------|-----------|---------|-------------------------|
| SPRICE   | price for 1m <sup>2</sup> on the secondary market                              | Quarterly | City    | National Bank of Poland |
| GDP      | Gross Domestic Product                                                         | Quarterly | Country | Statistical Office      |
| INCOME   | Average gross income                                                           | Quarterly | Region  | Statistical Office      |
| RATE     | Interest rate for motgage                                                      | Quarterly | Country | National Bank of Poland |
| POLICY   | Existence of the goveremnt policy if 1 - quarter of introduction of the policy | Quarterly | Country | National Bank of Poland |
| UNEMPL   | registered unemployment rate                                                   | Quarterly | City    | Statistical Office      |

Source: Authors own analysis based on GUS and NBP data.

The dependent variable, **SPRICE**, is defined as the transaction price per square metre of residential property on the secondary market in each analysed city. The data are obtained from the National Bank of Poland, which compiles housing price statistics based on market surveys and questionnaires conducted among market participants (Narodowy Bank Polski, 2024). The independent variables included in the model are gross domestic product (GDP), interest rates (RATE), income, policy implementation (POLICY) and the unemployment rate (UNEMPL).

The **POLICY** variable is specified as a binary indicator, taking the value of one in the quarter in which a given housing policy was introduced and zero in all remaining quarters. Income data are collected at the regional level, allowing the model to capture differences in local economic conditions across the analysed cities. In contrast, GDP and interest rates are national-level variables and do not vary across cities; therefore, they are classified as entity-invariant regressors. The interest rate used in the analysis represents the average interest rate on new PLN-denominated residential real estate loans, excluding renegotiated contracts. The registered unemployment rate (**UNEMPL**) is included as a control variable.

All financial variables are expressed in the national currency, Polish zloty (PLN). The panel structure of the dataset corresponds to a long-balanced panel, as defined by Baltagi (2021).

The raw datasets were initially collected in CSV and PDF formats and subsequently consolidated into a single Excel spreadsheet to facilitate data processing in RStudio. Particular attention was paid to maintaining the correct panel data structure during data preparation (Baltagi, 2021). The dataset contains no missing observations. The final sample consists of  $N = 3$  cities observed over the period from Q1 2014 to Q4 2024, covering eleven years and yielding a total of 132 observations across nine variables.

The selection of variables was strongly informed by the empirical model applied by Leszczyński and Olszewski (2014), as well as by the broader empirical literature reviewed in subchapter *Analysis of Recent Publications*. To account for potential non-linear relationships between housing prices and their determinants, all variables included in the regression model were transformed into logarithmic form. Logarithmic transformation also supports distributional normality and facilitates elasticity-based interpretation of the estimated coefficients. This transformation approach is consistent with that applied in the study by Leszczyński and Olszewski (2014).

The following chapter provides a detailed descriptive analysis of the dataset, followed by the presentation and discussion of the regression results.

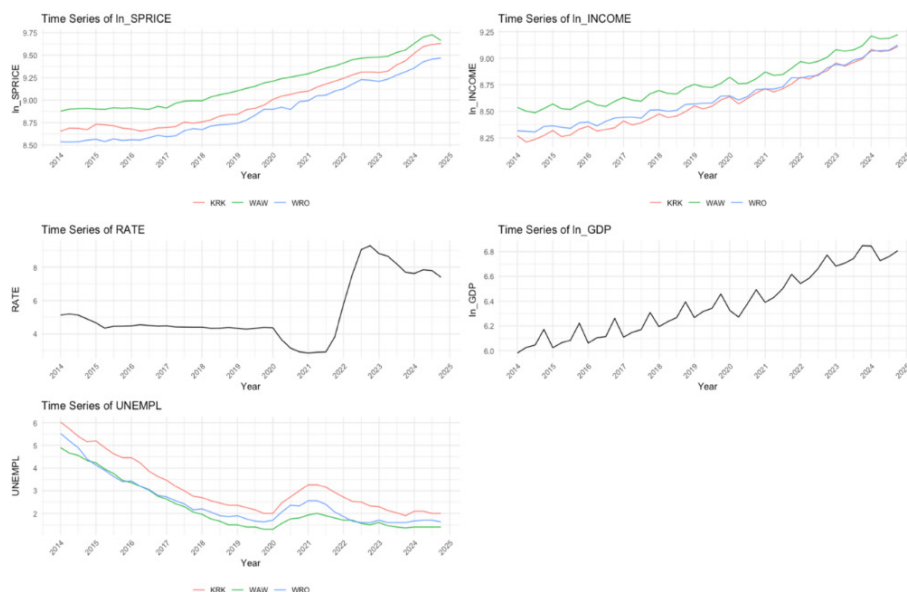
## Analysis

### *Descriptive Results*

To ensure data quality and consistency, a descriptive analysis was conducted prior to model estimation. First, the data structure was examined to confirm its suitability for panel data analysis. The **QUARTER** variable was reformatted to enable correct temporal ordering and further processing within the panel framework. Subsequently, **GDP**, **SPRICE** and **INCOME** were transformed into logarithmic form to support econometric analysis and facilitate interpretation.

Time-series plots of the key variables were then examined. As illustrated in Figure 2, housing prices display a clear upward trajectory across all analysed cities, indicating a strong and persistent growth trend.

**Figure 2.** Time Series of variables used in the study



Source: Authors' analysis based on GUS and NBP data.

The visual analysis suggests a positive association between housing prices and city size. Notable accelerations in price growth are observed around 2018 and again towards the end of 2023. Similarly, the logarithmic income series exhibits a steady increase over time. While Warsaw consistently records the highest housing prices and income levels, Kraków demonstrates a strong and sustained increase in prices, nearly closing the gap with Warsaw. At the same time, Wrocław shows income levels closer to those of Warsaw while maintaining relatively lower apartment prices, suggesting comparatively more favourable affordability conditions. Overall, the parallel upward trajectories of **ln\_INCOME** and **ln\_SPRICE** provide preliminary visual support for Hypothesis 2, which posits a positive relationship between income and housing prices.

The interest rate series reveals a pronounced spike in mid-2021, reflecting heightened inflationary pressures following the SARS-CoV-2 pandemic. This development corresponds to the government's decision to raise borrowing costs as part of a broader monetary tightening aimed at curbing consumer spending and addressing pandemic-related economic imbalances (Łaszek et al., 2024; Narodowy Bank Polski, 2022). The **GDP** series displays a general upward trend, with periodic fluctuations associated with year-end effects. The sharp contraction observed in 2020 clearly reflects the economic impact of the SARS-CoV-2 pandemic, which is also evident in the interest rate series reaching historically low levels during the same period (Narodowy Bank Polski, 2021). The subsequent economic rebound coincides with renewed growth in income and housing prices, consistent with the pro-cyclical relationship between economic expansion and housing demand predicted by the neoclassical theory (Ge & Runeson, 2006).

The unemployment rate (**UNEMPL**) exhibits a general downward trend across all analysed cities, indicating long-term labour market improvement. However, the time series also clearly captures the economic disruptions associated with the SARS-CoV-2 pandemic, during which unemployment increased markedly. Following its peak in 2021, unemployment rates began to decline, signalling economic recovery. This recovery phase coincides with rising interest rates and renewed housing market activity. The observed inverse relationship between unemployment and housing prices is consistent with findings reported in the literature, further supporting the relevance of labour market conditions as a determinant of housing price dynamics. Overall, the descriptive analysis indicates that economic factors are substantial in shaping housing prices in major Polish cities. To further assess the relationships between the explanatory variables and housing prices, scatterplots were constructed with each determinant plotted against housing prices.

The scatterplots reveal notable differences in the strength of associations across variables. In particular, the relationship between **RATE** and **ln\_SPRICE** appears weaker and more dispersed compared to other determinants, suggesting that interest rates may not constitute the dominant driver of housing prices in the subsequent regression models. In contrast, the remaining variables exhibit relatively strong linear relationships with **SPRICE**, indicating their

potential explanatory power with respect to housing price dynamics. Additionally, the relationship between **POLICY** and **ln\_SPRICE** was examined by marking the quarter of policy introduction with a vertical reference line in the relevant plots. All scatterplots and time-series visualisations are provided in Appendix 1.

To assess the degree of correlation among the regressors, Pearson correlation coefficients were calculated. As illustrated in Figure 3, **ln\_GDP** and **ln\_INCOME** exhibit a very high correlation coefficient of 0.92, signalling potential multicollinearity concerns. This strong correlation is consistent with existing economic evidence, as approximately 50% of Poland's gross domestic product consists of employee compensation, implying a close structural link between income and GDP growth (FRED, 2021). As wages and salaries increase, they directly contribute to GDP, thereby reinforcing this collinearity. No similarly problematic correlations were observed among the remaining variables.

**Figure 3.** Correlation of variables



Source: Authors' analysis based on GUS and NBP data.

To further assess multicollinearity, a pooled OLS regression model was estimated, and Variance Inflation Factors (VIFs) were calculated. The results confirmed the presence of multicollinearity, with VIF values exceeding six for both **ln\_INCOME** and **ln\_GDP**. Consequently, GDP was excluded from the regression model. Income was retained as it serves as a more direct proxy for household purchasing power, which economic theory identifies as a key determinant of housing demand. Following the exclusion of GDP, VIF values for the remaining variables fell below four, indicating that multicollinearity was no longer a concern (James et al., 2013).

To assess the presence of heteroskedasticity, the Breusch–Pagan test was first applied to the residuals of the pooled OLS model. For hypothesis testing, the significance level ( $\alpha$ ) was set at 0.05. This threshold was consistently applied across all statistical tests conducted in the study. The null hypothesis of homoskedasticity was evaluated based on whether the p-value fell below the specified significance level. The test results yielded a p-value greater than 0.05; therefore, the null hypothesis could not be rejected, indicating no evidence of heteroskedasticity in the pooled OLS residuals (Breusch & Pagan, 1979).

Subsequently, model selection tests were performed to determine the appropriate panel specification. To assess whether panel effects were present or whether a simple OLS model was sufficient, the Breusch–Pagan Lagrange Multiplier (LM) test for random effects was conducted. The test produced a p-value below the significance threshold, indicating statistically significant panel effects and supporting the use of a panel data model rather than a pooled OLS specification. Under standard circumstances, the Hausman test is then employed to determine whether a Fixed Effects (FE) or Random Effects (RE) model is more appropriate, based on the correlation between unobserved individual effects and the explanatory variables (Baltagi, 2021). However, due to the small cross-sectional dimension of the dataset – comprising only three cities – the Random Effects model could not be estimated, as it requires the number of cross-sectional units to exceed the number of parameters. Consequently, only the Fixed Effects model was feasible given the structure of the data.

Following the selection of the FE specification, additional diagnostic tests were conducted to assess model validity. The choice of diagnostic procedures

was guided by the methodological frameworks outlined by Baltagi (2021) and Croissant and Millo (2008). First, the Breusch–Pagan test was again applied to the residuals of the FE model. As in the pooled OLS case, the test failed to reject the null hypothesis, indicating no evidence of heteroskedasticity (Breusch & Pagan, 1979).

Next, serial correlation was examined using the Breusch–Godfrey/Woolridge test for autocorrelation in panel data models. The test yielded a p-value below the significance level, indicating the presence of serial correlation in the residuals. In addition, cross-sectional dependence was assessed using the Pesaran CD test. The results showed a very small p-value, leading to rejection of the null hypothesis of cross-sectional independence and indicating the presence of cross-sectional dependence in the data.

To address the simultaneous presence of serial correlation and cross-sectional dependence, the use of Driscoll–Kraay standard errors was adopted, as recommended in the literature (Driscoll & Kraay, 1998). Driscoll–Kraay standard errors are robust to heteroskedasticity, serial correlation and cross-sectional dependence. The estimator accounts for common shocks and spillover effects across entities by pooling covariance information over time and across cross-sectional units. Unlike conventional heteroskedasticity-robust or cluster-robust standard errors, which address only within-cluster correlation, the Driscoll–Kraay approach remains valid in the presence of contemporaneous correlation across units (Driscoll & Kraay, 1998).

With the model specification validated and appropriate corrections applied, the following subsection presents the estimation results and interprets them in relation to the research hypotheses.

### ***Modelling Outcome***

The fixed effects panel regression qualifies how quarterly changes in fundamentals translate into prices of one m<sup>2</sup> of the housing within Poland's three largest cities. The estimated model, after accounting for the issues addressed in the above section, yielded significant results to address the research question. The equation for the model could be established as follows:

$$\ln(\text{SPRICE}_{it}) = \alpha_i + \beta_1 \ln(\text{INCOME}_{it}) + \beta_2 \text{RATE}_t + \beta_3 \text{POLICY}_t + \beta_4 \text{UNEMPL}_{it} + u_{it},$$

where  $i = 1,2,3$  denotes cities and  $t = 2014Q1, \dots, 2024Q4$  (44 periods in total). Individual effects  $\alpha_i$  absorb time-invariant city heterogeneity, such as differences in population, land availability and other factors mentioned in the literature to be affecting price formation.

The summary statistics of the estimated model, presented in Table 3, indicate a very strong overall model fit. The coefficient of determination ( $R^2$ ) shows that approximately 98% of the variation in the dependent variable is explained by the explanatory variables included in the model. The adjusted  $R^2$  is only marginally lower than the unadjusted  $R^2$ , suggesting that the inclusion of multiple regressors meaningfully contributes to explanatory power and does not result in overfitting. This consistency supports the relevance of the selected variables for explaining housing price dynamics (James et al., 2013).

As discussed in the previous section, the initial coefficient estimates required correction due to the presence of serial correlation and cross-sectional dependence in the residuals. Consequently, statistical inference was conducted using Driscoll–Kraay standard errors to ensure the robustness and reliability of the estimated coefficients.

**Table 3.** Summary statistics overview

|                                        | (1)      |
|----------------------------------------|----------|
| ln_INCOME                              | 1.288*** |
|                                        | (0.042)  |
| RATE                                   | -0.005   |
|                                        | (0.005)  |
| POLICY                                 | -0.037** |
|                                        | (0.012)  |
| UNEMPL                                 | 0.028*** |
|                                        | (0.007)  |
| R <sup>2</sup>                         | 0.976    |
| Adj. R <sup>2</sup>                    | 0.974    |
| Observations                           | 132      |
| * p < 0.05, ** p < 0.01, *** p < 0.001 |          |

Source: Authors’ own analysis based on GUS and NBP data.

The estimation results indicate that only three determinants exhibit statistically significant effects on housing prices. Hypothesis 1 could not be tested due to the presence of multicollinearity among the explanatory variables; as a result, GDP was excluded from the final specification and does not enter the empirical analysis.

The first significant determinant is **ln\_INCOME**, defined as the logarithm of average gross quarterly earnings. The estimated coefficient of 1.29, with a standard error of 0.042, implies that a 1% increase in household purchasing power is associated with an approximately 1.3% increase in transaction prices on the secondary housing market. This finding supports Hypothesis 2, which posited a positive relationship between income and housing prices, and underscores the importance of demand-side economic fundamentals in shaping housing market outcomes over the study period.

Turning to monetary policy instruments, the interest rate variable (**RATE**) does not reach statistical significance in explaining housing price dynamics. Although the estimated coefficient indicates a negative relationship, the effect is not statistically distinguishable from zero. Consequently, Hypothesis 3, which hypothesised a significant impact of interest rates on housing prices, is not supported by the empirical results. This outcome is consistent with the descriptive evidence obtained from scatterplot analysis, which suggested a weak association between interest rates and housing prices.

The policy variable (**POLICY**), capturing the introduction of government housing programmes, yields a statistically significant coefficient indicating an approximate 0.04% decrease in housing prices in the quarter of policy implementation, with a standard error of 0.012. This result runs counter to Hypothesis 4, which anticipated a short-term price increase following policy introduction. Instead, the findings suggest that housing policies exerted a modest dampening effect on prices in the short run, at least within the quarterly timeframe captured by the binary indicator.

The unemployment rate (**UNEMPL**), included as a control variable based on prior literature, also emerges as statistically significant. In contrast to earlier empirical findings and the descriptive time-series analysis, the estimated coefficient indicates a positive relationship between unemployment and housing

prices (Grum & Govekar, 2016; Leszczyński & Olszewski, 2014). While this result may appear counterintuitive, it can be rationalised by the presence of omitted macroeconomic or structural factors that may simultaneously influence labour market conditions and housing demand.

Finally, the use of a Fixed Effects model allows for the estimation of city-specific intercepts. These fixed effects capture time-invariant characteristics unique to each city, represented by the individual effects ( $\alpha_i$ ) in the model specification. The estimated fixed effects for the analysed cities are reported in Table 4.

**Table 4.** Fixed Effect Estimates

| City | Fixed-Effect |
|------|--------------|
| KRK  | -2.132       |
| WAW  | -2.154       |
| WRO  | -2.277       |

Source: Authors’ analysis based on data from GUS and NB.

The estimated fixed effects capture city-specific influences that are not explicitly accounted for by the explanatory variables included in the baseline model. These estimates indicate that, on average, housing prices in the analysed cities are lower than the overall sample mean once broader economic conditions and policy measures are controlled for. The negative values suggest that time-invariant local characteristics – such as structural, institutional or spatial factors – are associated with comparatively lower housing prices, reflecting persistent differences across cities.

Overall, the estimation results provide insight into the determinants of housing price formation in three major Polish cities over the period from 2014 to 2024. The findings indicate that economic fundamentals, particularly income dynamics, are decisive in driving housing prices than government policy interventions. The model thus offers a clear response to the guiding research question by demonstrating how macroeconomic factors and public policy interact in shaping housing market outcomes in Poland.

## Discussion

The fixed-effects panel data analysis provides clear evidence that macroeconomic fundamentals and policy interventions jointly shaped urban housing markets during the analysed period. The model identifies income and unemployment as significant economic drivers of housing prices, while the introduction of housing policies is associated with a short-term downward adjustment in prices. GDP was excluded from the final specification due to high collinearity with income. The results therefore highlight the dual role of economic fundamentals and institutional interventions in residential price formation. This chapter situates these empirical findings within the theoretical perspectives and empirical evidence discussed in chapter *Theoretical Background and Literature Review*.

The findings strongly support the neoclassical view that housing markets are primarily driven by fundamental economic forces. The neoclassical framework assumes that prices adjust to equilibrate supply and demand (Ge & Runeson, 2006). When demand-side determinants such as income improve, housing demand shifts outward. Given that housing supply is relatively inelastic in the short run, demand shocks are predominantly absorbed through price increases rather than quantity adjustments (Łaszek et al., 2021). The positive and statistically significant coefficient on income is consistent with this mechanism and aligns with the expected sign derived from the model proposed by Égert and Mihaljek (2007). These results indicate that, in major Polish cities, strong demand fundamentals translated directly into higher housing prices, as new supply could not immediately offset rising demand. The significance of unemployment in the model also broadly corresponds to neoclassical theory, which links labour market conditions to housing demand.

The empirical results are also consistent with earlier panel data analyses conducted for Poland, particularly the study by Leszczyński and Olszewski (2014), which strongly influenced the methodological approach and variable selection in this paper. Their analysis of 17 voivodeship capitals concluded that economic fundamentals – especially income and unemployment – significantly affect housing prices, while interest rates do not exert a statistically significant effect. This study confirms these findings with respect to income and interest rates,

suggesting structural similarities between the housing cycles examined. Notably, the insignificance of interest rates persists despite differences in interest rate measurement between the two studies.

However, the positive relationship between unemployment and housing prices observed in this study diverges from neoclassical expectations and from earlier empirical evidence. One plausible explanation lies in the extraordinary economic conditions during the analysed period. The SARS-CoV-2 pandemic triggered a severe economic slowdown and widespread labour market disruptions, including business closures, school and childcare shutdowns, and increased labour force withdrawals (Adamowicz, 2022). These developments contributed to the simultaneous rise in unemployment and inflation, creating an atypical macroeconomic environment in which housing demand and prices continued to increase despite deteriorating labour market conditions. Furthermore, the outbreak of war in Ukraine and the subsequent inflow of refugees into Poland intensified housing demand, particularly in large urban centres, potentially supporting price growth even amid rising unemployment (Łaszek et al., 2024). It should also be acknowledged that the positive unemployment coefficient may reflect model limitations. Although variance inflation factors were within acceptable ranges, income and unemployment remain correlated, which may introduce estimation bias.

The strong income effect identified in this study is also consistent with the findings of Ryś and Ryś (2025). Given the overlap in the analysed periods, the results reinforce the robustness of the income-price relationship and further validate the neoclassical interpretation of housing market dynamics. Importantly, beyond confirming the central role of income, this study demonstrates that additional economic and institutional factors jointly shape price formation.

The lack of a statistically significant effect of interest rates aligns with the findings of Cohen and Karpavičiūtė (2017), who argue that in developing or transition economies interest rates may play a less decisive role in housing price determination than in more mature markets. This result is somewhat unexpected considering National Bank of Poland reports indicating that secondary market transactions are predominantly mortgage-financed (Narodowy Bank Polski, 2024). One explanation may lie in the specificity of large urban

agglomerations. Housing prices in cities such as Warsaw, Kraków and Wrocław are substantially higher than the national average, potentially constraining mortgage affordability and increasing reliance on household savings. Differences in wealth distribution and demographic characteristics may further weaken the transmission of interest rate changes to housing prices in these markets.

With respect to housing policy interventions, the findings diverge from results reported by Floetotto et al. (2016), Narodowy Bank Polski (2015) and Kiszluk (2023), which generally associate policy support with price increases. A closer examination of policy design and the construction of the policy dummy variable provide a coherent explanation for this discrepancy. Statutory price ceilings determining subsidy eligibility consistently lagged behind prevailing market prices. As a result, only a limited subset of dwellings qualified for support, shifting demand towards lower-priced properties and potentially reducing average transaction prices in the short run. Moreover, lengthy administrative procedures may have delayed demand responses in the quarter of policy introduction (Bochenek et al., 2023). Frequent policy changes, limited funding horizons, and uncertainty regarding programme continuity may also have discouraged immediate market responses by both developers and buyers. Finally, differences in empirical design may contribute to divergent findings. While Floetotto et al. (2016) model policy interventions using continuous quantitative measures, the binary policy indicator employed in this study captures only the timing of policy introduction rather than its scale or intensity.

Overall, this paper integrates macroeconomic fundamentals with housing policy analysis to examine housing price dynamics in Poland in the post-2014 period. By doing so, it addresses a clear gap in the literature: the absence of studies that simultaneously account for economic drivers and policy interventions using recent data in the Polish context. Existing research has typically focused either on market fundamentals or on policy effects in isolation. In contrast, this study demonstrates how economic conditions and government interventions interact in shaping housing market outcomes in major Polish cities, thereby contributing to a more comprehensive understanding of residential price formation.

## Conclusions

This study examined the interplay between economic factors and government housing policies in shaping housing prices in Poland's three largest cities over the period 2014–2024. Using a quantitative research design based on a fixed-effects panel regression model, the analysis demonstrates that both macroeconomic fundamentals and policy interventions play a meaningful role in housing market dynamics. In addressing the central research question – how economic factors and government policies influence housing prices in Poland – the results indicate that income and unemployment act as positive drivers of transaction prices on the secondary housing market, while the introduction of housing policies is associated with a short-term decline in prices. Contrary to initial expectations, interest rates do not exhibit a statistically significant effect in the estimated model. GDP could not be tested empirically due to high collinearity with income and was therefore excluded from the regression specification.

Several limitations of the study should be acknowledged. First, the applied regression framework allows for the identification of correlations rather than causal relationships. Although the selected economic and policy variables are grounded in established theory, incorporating causality tests would strengthen the robustness of the findings. Future research should therefore explicitly address causal mechanisms. Moreover, alternative theoretical perspectives highlight the role of social and institutional factors in housing market formation. The present analysis focuses primarily on demand-side determinants, which limits the ability to capture the full range of forces influencing housing prices. A more comprehensive framework incorporating supply-side, social and institutional variables would provide a fuller understanding of price formation.

In addition, the study relies exclusively on transaction prices from the secondary housing market. Due to limited access to the initial data, offer prices and primary market data were not included. Future research incorporating both market segments, as well as offer price information, could yield a more complete picture of housing market dynamics. The geographical scope of the analysis is also limited to highly urbanised areas, which constrains the generalisability of the results. Extending the analysis to smaller cities and less

urbanised regions would address this limitation and broaden the empirical relevance of the findings. Finally, the policy variable captures only the timing of policy introduction rather than its full duration or intensity. While short-term effects appear beneficial in terms of price moderation, long-term impacts may differ substantially. Future studies could improve measurement by incorporating information on programme scale, government expenditure, or the number of supported loans or contracts, although such data are currently not publicly available.

Despite these limitations, the study yields several important implications. From a theoretical perspective, it contributes to the literature by integrating economic fundamentals and housing policy interventions within a single empirical framework for the Polish housing market. The findings reinforce the relevance of the neoclassical approach by demonstrating a strong relationship between economic determinants and housing prices, while also highlighting how crisis conditions can alter conventional relationships, particularly in the case of unemployment. From a practical standpoint, the results offer valuable insights for policymakers. By illustrating how economic shifts and policy introductions influence market outcomes, the study can inform more effective policy design aimed at improving housing affordability. The lack of a significant interest rate effect suggests that central banks may need to rely more heavily on alternative macroprudential tools when addressing housing market imbalances.

In conclusion, the housing market extends beyond its economic function; it plays a central role in social well-being, public health and national stability. Continuous, evidence-based research is essential for informing effective housing policies and ensuring that access to adequate housing remains a core public objective. As homeownership and housing security should not be reserved for a privileged minority, governments must prioritise affordability and inclusiveness when designing housing interventions. Rigorous, data-driven analyses such as this study are therefore critical to ensuring that housing remains a fundamental pillar of social welfare rather than a vehicle for speculative excess.

## References

- Adamowicz, M. (2022).** COVID-19 Pandemic as a Change Factor in the Labour Market in Poland. *Sustainability*, 14(15), 9197. <https://doi.org/10.3390/su14159197>.
- Baltagi, B. H. (2021).** *Econometric Analysis of Panel Data* (6th ed.). Springer Cham. <https://doi.org/10.1007/978-3-030-53953-5>.
- Belke, A., & Keil, J. (2017).** Fundamental determinants of real estate prices: A panel study of German regions (Working Paper No. 731; Ruhr Economic Papers). *RWI – Leibniz Institute for Economic Research*. <https://doi.org/10.4419/86788851>.
- Bochenek, M., Szczepańska-Przekota, A., Przekota, G., & Hadław, M. (2023).** Podażowe i cenowe konsekwencje zmian w rządowych programach mieszkaniowych w Polsce w latach 1998–2021. *Horyzonty Polityki*, 14(47), 229–250. <https://doi.org/10.35765/hp.2321>.
- Breusch, T. S., & Pagan, A. R. (1979).** A Simple Test for Heteroscedasticity and Random Coefficient Variation. *Econometrica*, 47(5), 1287–1294. <https://doi.org/10.2307/1911963>.
- Brzezicka, J., Łaszek, J., Olszewski, K., & Wisniewski, R. (2022).** The missing asymmetry in the Polish house price cycle: An analysis of the behaviour of house prices in 17 major cities. *Journal of Housing and the Built Environment*, 37(2), 1029–1056. <https://doi.org/10.1007/s10901-021-09861-w>.
- Cohen, V., & Karpavičiūtė, L. (2017).** The analysis of the determinants of housing prices. Independent *Journal of Management & Production*, 8(1), 49–63. <https://doi.org/10.14807/ijmp.v8i1.521>.
- Croissant, Y., & Millo, G. (2008).** Panel Data Econometrics in R: The plm Package. *Journal of Statistical Software*, 27(2), 1–43. <https://doi.org/10.18637/jss.v027.i02>.
- Diao, M., Leonard, D., & Sing, T. F. (2017).** Spatial-difference-in-differences models for impact of new mass rapid transit line on private housing values. *Regional Science and Urban Economics*, 67, 64–77. <https://doi.org/10.1016/j.regsciurbeco.2017.08.006>.
- Driscoll, J. C., & Kraay, A. C. (1998).** Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data. *The Review of Economics and Statistics*, 80(4), 549–560. <https://doi.org/10.1162/003465398557825>.
- Duan, J., Tian, G., Yang, L., & Zhou, T. (2021).** Addressing the macroeconomic and hedonic determinants of housing prices in Beijing Metropolitan Area, China. *Habitat International*, 113, 102374. <https://doi.org/10.1016/j.habitatint.2021.102374>.

- Égert, B., & Mihaljek, D. (2007).** Determinants of House Prices in Central and Eastern Europe. *Comparative Economic Studies*, 49(3), 367–388. <https://doi.org/10.1057/palgrave.ces.8100221>.
- Eurostat (2024).** Housing in Europe. Publications Office of the European Union. Retrieved from: <https://data.europa.eu/doi/10.2785/5544429>. Access: 4.10.2025.
- Eurostat (n.d.).** Glossary: House price index (HPI). Statistics Explained. Retrieved from: [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:House\\_price\\_index\\_\(HPI\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:House_price_index_(HPI)). Access: 4.10.2025.
- Floetotto, M., Kirker, M., & Stroebel, J. (2016).** Government intervention in the housing market: Who wins, who loses? *Journal of Monetary Economics*, 80, 106–123. <https://doi.org/10.1016/j.jmoneco.2016.04.005>.
- FRED (2021).** Share of Labour Compensation in GDP at Current National Prices for Poland (Series ID No. LABSHPLA156NRUG). University of Groningen & University of California, Davis. Retrieved from: <https://fred.stlouisfed.org/series/LABSHPLA156NRUG>. Access: 4.10.2025.
- Ge, X. J., & Runeson, G. (2006).** A Dynamic Model of Housing Markets and House Prices. In: *AUBEA 2006: Proceedings of the 31st Australasian University Building Educators Association Conference: 11–14 July 2006*. University of Technology, Sydney.
- Glocker, D., & Plouin, M. (2016).** Overview of Housing Policy Interventions in Poland. *OECD Regional Development Working Papers*, 7. <https://doi.org/10.1787/5j1pl4n838f2-en>.
- Gomułka, S. (2016).** Poland's economic and social transformation 1989–2014 and contemporary challenges. *Central Bank Review*, 16(1), 19–23. <https://doi.org/10.1016/j.cbrev.2016.03.005>.
- Gov.pl (2023).** Program Pierwsze Mieszkanie – Mieszkanie dla ciebie. Retrieved from: <https://www.gov.pl/web/mieszkanie-dla-ciebie/program-pierwsze-mieszkanie>. Access: 4.10.2025.
- Gov.pl (2023, July 12).** Obywatele Białorusi w Polsce – raport. Urząd do Spraw Cudzoziemców. Retrieved from: <https://www.gov.pl/web/udsc/obywatele-bialorusi-w-polsce--raport2>. Access: 4.10.2025.
- Gov.pl (2025, February 24).** Obywatele Ukrainy w Polsce – raport. Urząd do Spraw Cudzoziemców. Retrieved from: <https://www.gov.pl/web/udsc/obywatele-ukrainy-w-polsce--aktualne-dane-migracyjne2>. Access: 4.10.2025.
- Groeger, L. (2016).** Programy wspierania budownictwa mieszkaniowego w Polsce i ich wpływ na rynek nieruchomości mieszkaniowych. *Space – Society – Economy*, 18, 131–146. <https://doi.org/10.18778/1733-3180.18.09>.

- Grum, B., & Govekar, D. K. (2016).** Influence of Macroeconomic Factors on Prices of Real Estate in Various Cultural Environments: Case of Slovenia, Greece, France, Poland and Norway. *Procedia Economics and Finance*, 39, 597–604. [https://doi.org/10.1016/S2212-5671\(16\)30304-5](https://doi.org/10.1016/S2212-5671(16)30304-5).
- Hothorn, T., & Zeileis, A. (2002).** Diagnostic Checking in Regression. *Relationships*, 2(3), 7–10.
- James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013).** *An Introduction to Statistical Learning: With Applications in R*. Springer Science & Business Media.
- Kisiel, R., Zielińska-Szczepkowska, J., & Dzieżyk, K. (2021).** Housing policy in Poland. *Studia Prawno-Ekonomiczne*, 118, 227–247. <https://doi.org/10.26485/SPE/2021/118/12>.
- Kiszluk, K. (2023).** Ocena rozwiązań zaproponowanych w ramach programu “Pierwsze Mieszkanie” w świetle dotychczasowej polityki mieszkaniowej państwa. *Roczniki Administracji i Prawa*, 3(XXIII), 169–177. <https://doi.org/10.5604/01.3001.0053.9517>.
- Łaszek, J., Olszewski, K., & Augustyniak, H. (2024).** How the War between Russia and Ukraine Caused a Multi-Cycle in the Polish Housing Market. *Critical Housing Analysis*, 11(1), 15–30. <https://doi.org/10.13060/23362839.2024.11.1.561>.
- Łaszek, J., Olszewski, K., & Sobiecki, R. (2021).** *Real estate at exposure: New challenges, old problems*. Oficyna Wydawnicza SGH – Szkoła Główna Handlowa.
- Leszczyński, R., & Olszewski, K. (2014).** An analysis of the primary and secondary housing market in Poland: Evidence from the 17 largest cities. *Baltic Journal of Economics*, 17(2), 136–151. <https://doi.org/10.1080/1406099x.2017.1344482>.
- Matel, A. (2024).** Realizacja programu “Mieszkanie dla Młodych” w kontekście regionalnych różnic w dostępności dochodowej mieszkań. *Optimum. Economic Studies*, 1(91), 65–79. <https://doi.org/10.15290/oes.2018.01.91.05>
- Melecky, A., & Paksi, D. (2024).** Drivers of European housing prices in the new millennium: Demand, financial, and supply determinants. *Empirica*, 51(3), 731–753. <https://doi.org/10.1007/s10663-024-09611-5>.
- Melnychenko, O., Osadcha, T., Kovalyov, A., & Matskul, V. (2022).** Dependence of Housing Real Estate Prices on Inflation as One of the Most Important Factors: Poland’s Case. *Real Estate Management and Valuation*, 30(4), 25–41. <https://doi.org/10.2478/remav-2022-0027>.
- Mirczak, D. (2018).** Rządowe programy mieszkaniowe w Polsce w latach 2006–2017. *Studia Politicae Universitatis Silesiensis*, 22, 59–72.

**Narodowy Bank Polski (2015).** Raport o sytuacji na rynku nieruchomości mieszkaniowych i komercyjnych w Polsce w 2014 r. Retrieved from: <https://nbp.pl/publikacje/cykliczne-materialy-analityczne-nbp/rynek-nieruchomosci/raport-roczny/>. Access: 4.10.2025.

**Narodowy Bank Polski (2016).** Raport o sytuacji na rynku nieruchomości mieszkaniowych i komercyjnych w Polsce w 2015 r. Retrieved from: <https://nbp.pl/publikacje/cykliczne-materialy-analityczne-nbp/rynek-nieruchomosci/raport-roczny/>. Access: 4.10.2025.

**Narodowy Bank Polski (2020).** Raport o sytuacji na rynku nieruchomości mieszkaniowych i komercyjnych w Polsce w 2019 r. Retrieved from: <https://nbp.pl/publikacje/cykliczne-materialy-analityczne-nbp/rynek-nieruchomosci/raport-roczny/>. Access: 4.10.2025.

**Narodowy Bank Polski (2021).** Raport o sytuacji na rynku nieruchomości mieszkaniowych i komercyjnych w Polsce w 2020 r. Retrieved from: <https://nbp.pl/publikacje/cykliczne-materialy-analityczne-nbp/rynek-nieruchomosci/raport-roczny/>. Access: 4.10.2025.

**Narodowy Bank Polski (2022).** Raport o sytuacji na rynku nieruchomości mieszkaniowych i komercyjnych w Polsce w 2021 r. Retrieved from: <https://nbp.pl/publikacje/cykliczne-materialy-analityczne-nbp/rynek-nieruchomosci/raport-roczny/>. Access: 4.10.2025.

**Narodowy Bank Polski (2023a).** Information on home prices and the situation in the housing and commercial real estate market in Poland in 2023 Q3. Retrieved from: <https://nbp.pl/en/publications/cyclical-materials/real-estate-market/quarterly-report/>. Access: 4.10.2025.

**Narodowy Bank Polski (2023b).** Raport o sytuacji na rynku nieruchomości mieszkaniowych i komercyjnych w Polsce w 2022 r. Retrieved from: <https://nbp.pl/publikacje/cykliczne-materialy-analityczne-nbp/rynek-nieruchomosci/raport-roczny/>. Access: 4.10.2025.

**Narodowy Bank Polski (2024).** Raport o sytuacji na rynku nieruchomości mieszkaniowych i komercyjnych w Polsce w 2023 r. Retrieved from: <https://nbp.pl/publikacje/cykliczne-materialy-analityczne-nbp/rynek-nieruchomosci/raport-roczny/>. Access: 4.10.2025.

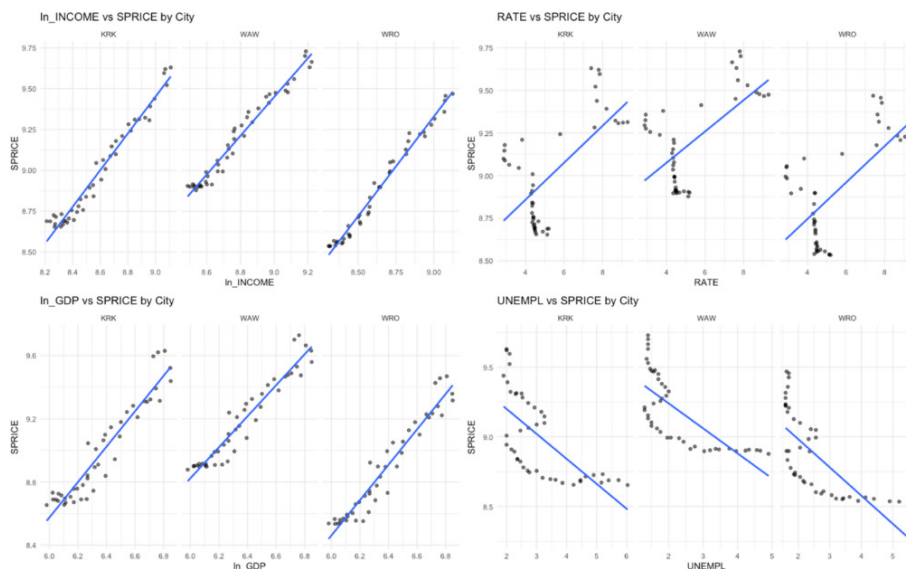
**Narodowy Program Mieszkaniowy (2016).** Uchwała Nr. 115/2016 Rady Ministrów z dnia 23 sierpnia 2016 r. w sprawie przyjęcia Narodowego Programu Mieszkaniowego. Retrieved from: <https://www.gov.pl/web/rozwoj-technologie/narodowy-program-mieszkaniowy>. Access: 4.10.2025.

**Petrakova, Y. (2022).** Belarus in the Eurasian Migration System: The Challenges of the Last Decade and Their Consequences. *Central and Eastern European Migration Review*, 11(1), 125–144. <https://doi.org/10.54667/ceemr.2022.05>.

- Piskorski, T., & Tchisty, A. (2017).** An Equilibrium Model of Housing and Mortgage Markets with State-Contingent Lending Contracts (Working Paper No. 23452). *National Bureau of Economic Research*. <https://doi.org/10.3386/w23452>.
- R Core Team (2025).** R (Version 4.4.3) [macOS]. R Foundation for Statistical Computing. Retrieved from: <https://www.r-project.org/>. Access: 4.10.2025.
- Radzimski, A. (2014).** Subsidized mortgage loans and housing affordability in Poland. *Geo-Journal*, 79(4), 467–494. <https://doi.org/10.1007/s10708-014-9533-2>.
- Ryś, M., & Ryś, M. (2025).** The interplay of income growth and housing prices: A decade of real estate dynamics in Poland's largest cities. *Financial Internet Quarterly*, 21(1), 94–104. <https://doi.org/10.2478/fiqf-2025-0007>.
- Statista (2024).** EMF house price index in Poland 2023. Statista. Retrieved from: <https://www.statista.com/statistics/614934/emf-house-price-index-poland-europe/>. Access: 4.10.2025.
- Trojanek, R., & Gluszek, M. (2022).** Short-run impact of the Ukrainian refugee crisis on the housing market in Poland. *Finance Research Letters*, 50, 103236. <https://doi.org/10.1016/j.frl.2022.103236>.
- Trojanek, R., Gluszek, M., Tanas, J., & Van De Minne, A. (2023).** Detecting housing bubble in Poland: Investigation into two housing booms. *Habitat International*, 140, 102928. <https://doi.org/10.1016/j.habitatint.2023.102928>.
- Ustawa z Dnia 1 Października 2021 r. o Gwarantowanym Kredycie Mieszkaniowym i Bezpiecznym Kredycie 2% (2021).** Dz.U. 2021 poz. 2133. Retrieved from: <https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20210002133>. Access: 4.10.2025.
- Ustawa z dnia 20 lipca 2018 r. o pomocy państwa w ponoszeniu wydatków mieszkaniowych w pierwszych latach najmu mieszkania (2018).** Dz.U. 2018 poz. 1540. Retrieved from: <https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20180001540>. Access: 4.10.2025.
- Ustawa z Dnia 27 Września 2013 r. o Pomocy Państwa w Nabyciu Pierwszego Mieszkania Przez Młodych Ludzi (2013).** Dz.U. 2013 poz. 1304. Retrieved from: <https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=wdU20130001304>. Access: 4.10.2025
- Vonlanthen, J. (2023).** Interest rates and real estate prices: A panel study. *Swiss Journal of Economics and Statistics*, 159(1), 6. <https://doi.org/10.1186/s41937-023-00111-0>.
- Zhao, C., & Liu, F. (2023).** Impact of housing policies on the real estate market – Systematic literature review. *Heliyon*, 9(10), e20704. <https://doi.org/10.1016/j.heliyon.2023.e20704>.

# Appendix 1

**Figure 4.** Scatterplots of variables against SPRICE



Source: Authors own analysis based on GUS and NPB data.

## **Mariusz Nyk**

Warsaw University of Technology,  
Department of Administration and  
Social Sciences  
[mnyk@interia.pl](mailto:mnyk@interia.pl)  
ORCID ID: 0000-0002-9967-6427

# The Concept of the Laffer Curve in Shaping Fiscal Policy in Selected Countries of Central and Eastern Europe

## ABSTRACT

**Objective:** The objective of the paper is to analyse contemporary trends in fiscal policy of the European Union and to interpret them in light of the Laffer curve theory, with particular reference to selected post-transition economies of Central and Eastern Europe (Poland, the Czech Republic, Slovakia, Estonia and Latvia). The study seeks to identify the extent to which the logic of the Laffer curve is reflected in the design and outcomes of national tax systems.

**Methodology:** The paper is based on a critical review of the economic literature and a comparative analysis of tax policies in selected EU Member States. A qualitative approach has been adopted, combining theoretical reflection on the Laffer curve with a descriptive examination of tax-rate structures, fiscal reforms and budgetary outcomes. The analysis draws on both seminal and contemporary works on supply-side economics, the taxation of labour and capital and the evolution of fiscal governance in the European Union.

**Findings:** The study shows that, although the Laffer curve provides an intuitive framework for explaining the relationship between tax rates and budgetary revenues, its practical application in EU fiscal policy is limited. Post-transition economies of Central and Eastern Europe – most notably Estonia, Slovakia, and Latvia – have implemented reforms inspired by supply-side reasoning, yet the observed effects on revenues and growth have been heterogeneous and strongly conditioned by institutional quality, tax administration efficiency and the scale of the informal economy. In the case of Poland, the examples of VAT and CIT illustrate that the effectiveness of the tax system is determined not solely by statutory rates but also by the capacity of the fiscal apparatus to enforce compliance.

**Value Added:** The paper contributes to the ongoing debate on the usefulness of the Laffer curve as an analytical instrument by situating it in the specific context of post-transition EU economies. It highlights the tension between the simplifying assumptions of the model and the institutional, political, and social complexity of real fiscal systems, thereby offering a more nuanced interpretation of the relationship between tax rates and public revenues. From the perspective of intercultural management, the study demonstrates that the effectiveness of fiscal reforms inspired by the Laffer curve is strongly mediated by culturally embedded factors such as tax morale, the level of generalised trust, attitudes towards the state, and the prevailing organisational culture of public administration. These factors differ substantially across the analysed countries of Central and Eastern Europe, which helps to explain why identical fiscal instruments produce divergent outcomes in different national and cultural contexts.

**Recommendations:** Fiscal authorities in Central and Eastern Europe should treat the Laffer curve as a heuristic rather than an operational rule for setting tax rates. Decisions on the structure and level of taxation should take into account the quality of tax administration, the level of public trust, the structure of the economy and broader social objectives such as redistribution and social security. Further empirical research, including country-specific econometric studies, is recommended in order to better identify the location of particular tax systems along the Laffer curve.

**Key words:** Laffer curve, fiscal policy, tax policy, Central and Eastern Europe, European Union, tax morale, cultural determinants of taxation

**JEL codes:** E62, H20, H30, H61

## Introduction

Fiscal policy is one of the key instruments through which the state influences the economy, performing allocative, redistributive and stabilization functions. In the specific context of the European Union, its character results from the division of competences between the national and supranational levels, necessitating a balance between national fiscal sovereignty and the coordination requirements of the Stability and Growth Pact. At the same time, economic theory provides analytical tools that allow for an assessment of the effectiveness of tax policies, among which the concept of the Laffer curve occupies a particularly prominent place.

The concept of the Laffer curve was developed and popularized as early as the 1970s thanks to the reflections proposed by the American economist Arthur Laffer. It is based on the intuitive premise that a continuous increase in taxes cannot lead to an analogous rise in budgetary revenues, because there exists a specific point beyond which a further increase in taxation produces the opposite effect – a decline in budgetary revenues from taxes collected. This means that maximum budgetary revenues can be achieved only at a particular point, beyond which the situation reverses and, consequently, negatively affects the scope for stimulating economic growth through fiscal instruments. While the model is often criticized for its simplicity, it remains a vital reference point for supply-side economics, particularly in economies seeking optimal development models.

The objective of this paper is to analyse contemporary trends in the fiscal policy of the European Union and to interpret them in light of the theory of the Laffer curve. Particular reference is made to selected post-transition economies of Central and Eastern Europe – Poland, the Czech Republic, Slovakia, Estonia and Latvia – which have served as unique testing grounds for reforms inspired by supply-side reasoning. The study seeks to identify the extent to which the logic of the Laffer curve is reflected in the design and outcomes of national tax systems.

The methodology adopted for this paper is based on a critical review of economic literature and a comparative analysis of tax policies in selected EU Member States. A qualitative approach is utilized, combining theoretical reflection

on the Laffer curve with a descriptive examination of tax-rate structures, fiscal reforms and budgetary outcomes. The analysis draws on both seminal works of supply-side economics and contemporary studies regarding the taxation of labour and capital.

The value added of this study lies in situating the theoretical model within the specific institutional and cultural context of the CEE region. From the perspective of intercultural management, the paper demonstrates that the effectiveness of fiscal reforms is strongly mediated by factors such as tax morale, the level of generalized trust in state institutions and the prevailing organizational culture of public administration. Consequently, the study offers a more nuanced interpretation of the relationship between tax rates and public revenues, highlighting the tension between simplifying model assumptions and the social complexity of real fiscal systems.

## Literature Review and Research Gap

The scholarly debate surrounding the Laffer curve can be organised into three relatively distinct, though increasingly overlapping, strands of literature. The first and oldest strand is rooted in supply-side economics and concerns the existence and location of a revenue-maximising tax rate. Building on the original intuition popularised by Laffer (2004), this literature has sought to estimate the elasticity of taxable income and to identify the point at which rate increases become self-defeating. Empirical contributions in this tradition – most notably the elasticity-of-taxable-income research initiated by Feldstein (1995) and synthesised by Saez et al. (2012) – suggest that revenue-maximising rates are highly sensitive to the breadth of the tax base, the availability of avoidance opportunities and the time horizon considered. The methodological lesson emerging from this body of work is that the Laffer curve is not a single, stable schedule but a family of context-dependent relationships, a conclusion that resonates with the dynamic and multi-peaked interpretations advanced by Cichocki and Kokoszcyński (2016).

The second strand reframes the revenue question as a problem of institutional and administrative capacity rather than statutory rates. Within this perspective, the effective position of an economy on the Laffer curve is determined less by the nominal burden than by the state's ability to enforce compliance and to constrain the informal economy. The work of Schneider and Enste (2000) on the shadow economy, together with the broader institutional-economics tradition associated with Acemoglu and Robinson (2012), demonstrates that weak enforcement, regulatory complexity and low state capacity systematically depress realised revenues below their theoretical maximum. This literature provides the conceptual foundation for the increasingly accepted claim – central to the present paper – that improvements in tax administration can produce an “upward shift” of the Laffer curve without any change in rates.

The third and most recent strand, which is of particular relevance to this journal, locates the determinants of tax compliance in the behavioural and cultural sphere. Research on tax morale – understood as the intrinsic motivation to pay taxes – has shown that compliance cannot be explained by deterrence and economic self-interest alone. The seminal contributions of Torgler (2007) and the behavioural framework proposed by Alm and Torgler (2006) establish that voluntary compliance is strongly correlated with generalised trust, perceived procedural fairness and the legitimacy of public institutions. These findings connect directly to the cross-cultural management literature, in particular to Hofstede's (2001) dimensions of power distance and individualism – collectivism, and to the conceptualisation of generalised trust developed in comparative political economy. Taken together, this strand implies that two economies with identical statutory rates and comparable administrative capacity may nonetheless occupy markedly different positions on the Laffer curve, simply because their taxpayers are embedded in different cultural settings.

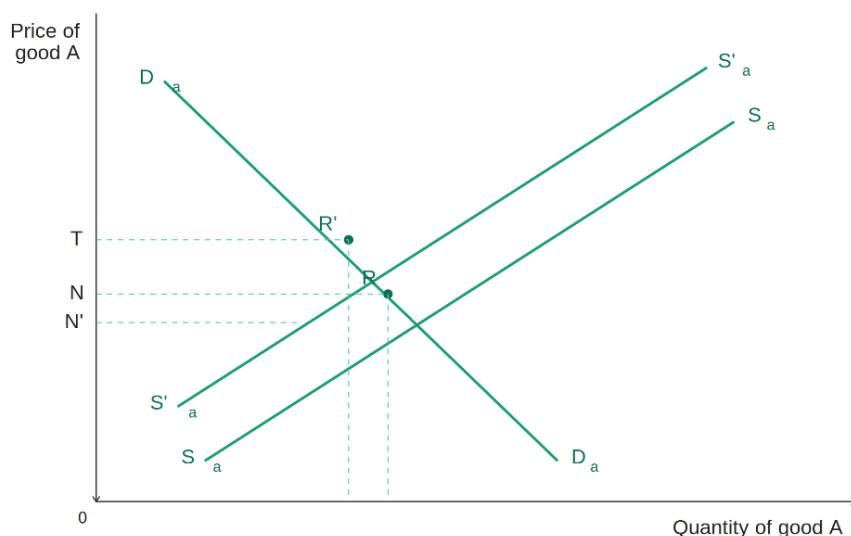
Reviewing these three strands reveals a clear research gap. The supply-side and the institutional literatures are well developed but largely culture-blind, treating taxpayers as homogeneous rational agents or as subjects of administrative control. The tax-morale and cross-cultural literatures, by contrast, are rich in behavioural insight but have rarely been integrated with the macroeconomic logic of the Laffer curve, and they have seldom been applied systematically to

the post-transition economies of Central and Eastern Europe. These economies constitute a particularly informative setting, because they implemented broadly similar, supply-side-inspired reforms – flat taxes, simplified bases and distributed-profit corporate taxation – within a single historical window, yet against the background of divergent levels of institutional trust and civic culture inherited from the period of central planning. The present paper addresses this gap by interpreting the Laffer curve not as an isolated macroeconomic schedule but as a culturally mediated relationship, and by using the comparative experience of five CEE countries to illustrate how cultural determinants shape the divergent outcomes of formally identical fiscal instruments.

## Theoretical Outline of the Laffer Curve

The Laffer curve formulates the view that the private sector uses resources redirected as a consequence of tax-reduction tendencies more effectively than the public sector (Dankowska, 2010). This is accompanied by a reduction in public expenditure and an increase in production in the economy. This, in turn, is expected to translate into economic growth and a higher tax base. Taking the Laffer curve into account, the position according to which even at the moment of a decline in the average tax rate it is possible to achieve increased budgetary revenues remains justified. Proponents of supply-side economics additionally argue that an increase in output translates into higher economic activity of the population, since people receive more attractive remuneration for their work. Tax reductions introduced are therefore compensated by an expansion of the tax base under conditions of low unemployment and high economic activity of employed persons (Pasternak-Malicka, 2014). The Laffer curve is an economic concept that allows a better understanding of how the effects of imposing tax burdens are shaped in terms of their impact on the demand for and supply of particular goods (for a broader discussion see: Miravete et al., 2018). Taxes affect changes in the supply of and demand for particular goods on the market (see Figure 1).

**Figure 1.** Economic Effects of Imposing Tax Burdens in the Context of Their Impact on the Demand–Supply Forces of an Exemplary Good



Source: Own elaboration based on Miravete et al., 2018.

In interpreting the figure, it should be emphasized that the consequences of imposing fiscal burdens ought to be considered in terms of their impact on the demand and supply side of the market. This implies the influence of taxes on the economic decisions of consumers. The curve  $D_a$  represents the demand for the exemplary good A, while the curve  $S_a$  represents the market availability, that is the supply of that good. Equilibrium is reached at the point of intersection of the curves, that is at point R. This allows for an explanation of the price at which the producer sells the good and which the consumer is willing to pay for it. This is, however, the net price, excluding the tax rate. In the event of good A being subjected to a higher tax rate (which is represented by the change indicated on segment NT), there is an upward shift of the supply curve, because a higher tax rate implies the need to increase the price of the good. This is automatically followed by a reduction in the demand for that good. The change in

price is illustrated by segment  $ON'$ . The final economic effect is not only a reduction in the demand for good A but also in its supply. At the same time, the point of market equilibrium shifts towards point  $R'$ . The consequence of raising the tax rate is, above all, a decrease in revenues from the sale of the good as a result of a weakening of demand and a fall in its net price (in contrast to the rise in its gross price). The literature on the subject indicates that this means a negative impact of continuously increased taxes in terms of their effect on the economic behaviour of producers and consumers, in the classical interpretation of the Laffer curve (Gwiazdowski, 2017).

The concept of the Laffer curve is subject to certain criticism and limitations when it comes to explaining the relationship between changes in tax rates and the level of budgetary revenues from taxes collected. The basic objection concerns the simple, symmetrical graphical presentation of the curve itself. In fact, no circumstances exist that would explain why the curve takes precisely this shape. In the model formulation of the Laffer curve, the application of two extreme tax rates – 0% and 100% – results in exactly the same tax revenues, namely zero. Adopting symmetry as an axiom in the concept gives rise to certain practical problems. It inclines interpreters towards the dogmatic conclusion that raising or lowering taxes represents one of two strategies from which the state chooses one within a given, often not precisely specified, time horizon. Moreover, supporters of the Laffer curve usually arrive at the conclusion that there is a considerable margin for potentially reducing the applicable tax rate (all the more so the closer one moves towards the inflection point of the curve) (Piekarz, 2019).

It is also worth noting that in the interpretation of the Laffer curve, a temporary decline in tax revenues is illustrated by crossing the inflection point of the curve. This leads to excessive simplification and disregard for more nuanced economic and legal-tax factors, such as those resulting from a deteriorating economic situation, temporary difficulties of firms in carrying out investments burdened with VAT, permissible tax deferral deadlines, and the like. Similar simplifications make it more difficult to obtain an accurate picture of the situation regarding a temporary decline in revenues to the state budget or to the budgets of territorial self-government units. Critics of the concept under analysis

explain that in practical terms the Laffer curve may differ significantly from its textbook counterpart. In the scholarly literature, it is additionally argued that the curve itself may have more than one maximum.

Critics of the concept of the Laffer curve use the argument that the conclusion stemming from it – namely, the need to lower tax rates in order to maximize tax revenues – applies, but only under appropriate macroeconomic conditions. Accordingly, the view has been popularized that the rationale for reducing the tax rate is strictly dependent on whether the rate currently in force exceeds the so-called saturation point on the curve. This is, in other words, the optimal value of the tax rate. Estimating such a value is a necessary operation in order to be able to confirm the relationship between reducing the tax rate and an increase in tax revenues to the state budget. In the critique of the Laffer curve, there also appears the argument that a tax cut is not necessarily directly linked to the effect of an increase in tax revenues to the state budget. It may equally well be explained by the results of an improving economic situation or by effectiveness in sealing the tax system. Another line of criticism is the argument that the reactions of taxpayers themselves are most often not sufficiently significant in practice to explain the relationship between a change in the tax rate and the level of tax revenues (Przybylska-Mazur, 2017).

In the literature on the subject, it is indicated that the Laffer curve has a dynamic character, which is particularly visible in the case of developing economies. This implies a continuous shift of the curve to the right, associated with broadening the scope for possible tax increases without detriment to budgetary revenues. The theoretical presentation of the curve, on the other hand, has a static character and does not reflect these nuances. Moreover, it is incorrect to explain that the inflection point of the curve as the maximum tax rate for the optimization of budgetary revenues simultaneously means the best conditions for raising the standard of living of the population. The optimal point on the Laffer curve refers to the maximization of government or self-government revenues rather than to optimal conditions for capital accumulation. It is the latter that is regarded as the key factor influencing the rise in the standard of living of the population.

The Laffer curve functions as a simple, static single-sector model, taking into account only two factors of production, that is labour and capital. The single-sectoral nature of the concept analysed causes economic activity to be treated as a whole, without distinguishing between groups of taxpayers, dynamics in different branches of the economy or flexibility in shaping changes in tax rates. This makes it a general and simplified model that may constitute an interesting point of departure but should not be regarded as the final solution to the dilemma concerning the level of tax rates in a specific country. Moreover, the interpretation of the Laffer curve implies treating taxes as public-law obligations performing exclusively one function, namely generating budgetary revenues in connection with the taxation of income resulting from the creation of products in the economy. In reality, the functions of taxes are more diverse, as is the relationship between budgetary revenues and the incentives and restrictions imposed by the state. The Laffer curve is based on the assumption that the change in the level of public revenues is determined by two factors, namely the level of taxation of capital and of labour. Contemporary authors regard such a stance as excessively simplified (Cichocki & Kokoszczyński, 2016).

The critique of the concept is based on additional premises. Mention should be made of the difficulties in empirically determining the optimal tax rate, regardless of the structure of the economy but also under specific political and economic conditions. Doubts also arise in the interpretation of historical data, at least when long-term trends in budgetary revenues are analysed. The concept is furthermore based on simplified assumptions explaining the behaviour of taxpayers themselves. In practice, such behaviour is more unpredictable and sometimes irrational, which is in line with behavioural economics. The model also disregards such important elements determining budgetary revenues as the degree of bureaucracy and the quality of activities of the tax administration, the business cycle or structural differences when comparing particular economies (Piekarz, 2019).

An additional – and, in the authors' view, frequently underestimated – limitation of the Laffer curve concerns its implicit assumption of cultural homogeneity among taxpayers. The model presupposes a universal rationality of economic agents, whereas research on tax morale and fiscal psychology demonstrates that

the willingness to pay taxes, the perception of fairness of the tax system and the propensity to engage in tax avoidance or evasion vary considerably across cultures. From the perspective of intercultural management, these differences can be interpreted through the lens of well-established frameworks describing cross-cultural variation – such as the level of generalised trust in public institutions, the degree of power distance or individualism versus collectivism. Societies characterised by high trust in the state and a developed civic culture tend to exhibit higher voluntary tax compliance, which effectively shifts the Laffer curve upwards. Conversely, in societies marked by low trust, a large informal sector and limited perceived legitimacy of the state, even moderate tax rates may produce revenues significantly below the theoretical maximum. This cultural dimension is of particular importance in the context of Central and Eastern Europe, where decades of centrally planned economy shaped specific attitudes towards the state, taxation and public authority – attitudes that continue to influence the effectiveness of fiscal policy in the post-transition period.

Recognising the cultural embeddedness of fiscal behaviour has direct implications for the management of tax systems. Tax administration is not a purely technical activity; it is a domain in which the organisational culture of public institutions interacts with the civic culture of taxpayers. Comparative analyses of fiscal reforms in culturally diverse environments indicate that the same instrument – for example a flat tax or a deferred corporate income tax – may yield markedly different outcomes depending on the intercultural context of its implementation. This observation provides a bridge between the macroeconomic logic of the Laffer curve and the microfoundations of taxpayer behaviour rooted in culture, and it justifies the inclusion of cross-cultural considerations in the assessment of fiscal policy in the European Union.

# European Trends in the Shaping of Fiscal Policy

Fiscal policy in the European Union (EU) remains within the competence of the Member States; however, it is subject to coordination at the Community level. A key role is played here by the Stability and Growth Pact, which defines the permissible levels of the budget deficit (3% of GDP) and of public debt (60% of GDP). These mechanisms were reinforced after the financial crisis of 2008–2012, when the weaknesses of fiscal governance in the euro area became apparent. In recent years, however, an evolution of the approach has been visible. In response to the COVID-19 pandemic and to structural challenges such as the energy transition and digitization, the EU has permitted greater fiscal flexibility. The temporary suspension of fiscal rules and the launching of the NextGenerationEU fund are examples of a departure from a restrictive austerity policy towards an active stabilization policy.

Contemporary tendencies in EU fiscal policy can be grouped into several key areas. First, a shift is observed from austerity policy towards a policy supporting economic growth. This means greater emphasis on public investment, particularly in the areas of innovation, green energy and infrastructure. Second, the importance of a structural approach to public finances is growing. Instead of focusing exclusively on the short-term level of the deficit, attention is being paid to the quality of expenditures and their impact on the growth potential of the economy. Third, the EU is intensifying its efforts to harmonize tax systems and limit tax avoidance. The introduction of a minimum corporate tax and the initiatives counteracting base erosion and profit shifting (BEPS) attest to the growing role of international cooperation. Fourth, fiscal oversight mechanisms are being developed, such as the European Semester, which enables ongoing monitoring of the budgetary policies of the Member States (Stiglitz, 2015).

Analysing EU fiscal policy through the lens of the Laffer curve, several significant relationships can be indicated. Many Member States are characterised by a relatively high level of taxation, particularly of labour taxes. This may suggest that some economies are approaching the 'right-hand side' of the Laffer curve,

where further tax increases lead to a decline in revenues. Moreover, EU efforts aimed at limiting tax avoidance can be interpreted as an attempt to increase the efficiency of the tax system without the need to raise rates (Laffer, 2004). In this sense, such a policy may lead to a 'shift of the Laffer curve upwards', that is, to an increase in revenues at a given level of taxation. It is worth emphasizing that tax harmonization in the EU limits tax competition between states. On the one hand, this fosters the stability of budgetary revenues; on the other, it may hinder the adjustment of tax systems to specific national conditions, which is important from the standpoint of Laffer's theory. Contemporary EU fiscal policy places greater emphasis on the expenditure side than on the revenue side. This means that the optimization of tax rates is not the sole, or even the main, objective of fiscal policy.

Despite its popularity, the Laffer curve has limited applicability in the analysis of EU fiscal policy. This results from several reasons. The theory simplifies economic reality, neglecting many factors such as the structure of the tax system, tax progression, or institutional differences between countries. It should be noted that EU fiscal policy also pursues social goals, such as income redistribution or ensuring social security, which are not taken into account in the Laffer model. Furthermore, economic integration within the EU means that fiscal decisions of one country affect other states, which additionally complicates the analysis (Krugman & Obstfeld, 2018).

A crucial element shaping contemporary EU fiscal trends is the implementation of the reformed economic governance framework, which shifted the focus from uniform, one-size-fits-all austerity measures to country-specific medium-term fiscal-structural plans. This evolution acknowledges that the 'optimal' position on the Laffer curve is highly dependent on a nation's specific debt sustainability and investment needs, particularly regarding the 'Twin Transition' (green and digital). Furthermore, the increasing role of environmental taxes (carbon pricing) and the digital services tax represents a structural shift in how EU Member States define their tax bases. From the perspective of the Laffer curve, these new forms of taxation introduce additional complexity, as their primary goal is often behavioural change (e.g. reducing emissions) rather than pure revenue

maximization, potentially creating a ‘double dividend’ but also complicating the traditional trade-off between tax rates and budgetary inflows.

Furthermore, a significant trend in the European fiscal landscape is the rapid digital transformation of tax administrations, often referred to as ‘Tax Administration 3.0’. The implementation of real-time reporting systems, AI-driven audit selection, and mandatory e-invoicing across the EU has fundamentally altered the practical relevance of the Laffer curve. By reducing the compliance gap and limiting the scope of the informal economy, these technological advancements effectively allow Member States to maintain or even increase fiscal revenues without raising statutory tax rates. This phenomenon can be interpreted as an ‘upward shift’ of the Laffer curve, where the efficiency of the fiscal apparatus, rather than the tax rate itself, becomes the primary determinant of budgetary success. Additionally, in the post-2024 era, EU fiscal policy has increasingly focused on ‘fiscal resilience’, prioritizing the ability of national budgets to absorb external shocks (such as energy price volatility) while maintaining long-term investment capacity. This shift suggests that contemporary European fiscal policy is moving away from the static optimization of rates towards a dynamic management of the tax base and administrative efficiency.

### ***The Polish Tax System in Light of the Laffer Curve***

The Polish tax system is mixed in character and encompasses direct taxes, such as personal income tax (PIT) and corporate income tax (CIT), as well as indirect taxes, primarily the tax on goods and services (VAT). Each of these taxes may be located at a different point on the Laffer curve, which means that there is no single universal answer to the question of the optimal level of taxation. Analysing VAT, which constitutes the main source of budgetary revenues in Poland, it is worth paying attention to the increase in the standard rate to 23% in 2011. Initially, this led to an increase in budgetary revenues; however, in subsequent years the problem of the growing VAT gap emerged, resulting, among others, from tax fraud and tax avoidance. Only the sealing of the system in the second half of the decade led to a significant increase in revenues. In the context of the Laffer curve, this can be interpreted as a signal that the level of the tax rate

alone does not determine revenues – equally important is the effectiveness of the tax administration.

Personal income tax (PIT) in Poland is characterised by a progressive tax scale (12% and 32%) and by a relatively high tax wedge, that is the difference between the cost of employing a worker for the employer and their net remuneration. A high tax wedge may limit the propensity to take up legal work and foster the development of unregistered economic activity. From the perspective of the Laffer curve, it can be argued that for some taxpayers the effective taxation of labour may be approaching a level at which further increases would bring diminishing budgetary revenues (Raczkowski et al., 2020).

The situation is different in the case of CIT. The introduction of a reduced rate of 9% for small taxpayers was aimed at increasing the number of enterprises and encouraging the formalization of economic activity. In this case, a mechanism consistent with the Laffer curve can be observed: a reduction of the tax rate may lead to a broadening of the tax base and, consequently, to an increase in state revenues in the longer term.

It should be emphasized, however, that the Laffer curve has a model character and simplifies economic reality. In practice, tax revenues are affected not only by rates but also by such factors as the level of economic development, the structure of the labour market, the efficiency of public administration, and the tax culture of society. Therefore, attempts to unambiguously determine whether Poland is located on the ‘left’ or the ‘right’ side of the curve are burdened with considerable uncertainty. To summarise, the Polish tax system provides examples both confirming and undermining the intuition that follows from the Laffer curve. In some areas, such as CIT for small firms, a reduction of rates may foster an increase in revenues through an increase in economic activity. In others, such as VAT or the taxation of labour, the key role is played not only by the rates themselves, but also by the effectiveness of their enforcement and by the reactions of taxpayers. Ultimately, the Laffer curve remains a useful analytical tool, but its application in economic policy requires caution and consideration of a broad institutional context.

## *The Tax System of the Czech Republic*

The tax system of the Czech Republic is frequently cited as an example of a relatively simple and predictable fiscal model in Central Europe. In the context of economic theories such as the Laffer curve, it offers an interesting field for analysing the relationship between the level of tax rates and the budgetary revenues of the state. The Czech tax system is based on relatively moderate rates and on a transparent structure. Personal income tax has a linear character (with elements of progression through the so-called solidarity surcharge), and the basic rate is 15%, with a higher rate for the highest earners. Corporate income tax is maintained at the level of 19%, which is competitive on a European scale. Moreover, the VAT system comprises three rates: a standard rate and two reduced rates (Musiałkiewicz, 2024).

From the perspective of the Laffer curve, Czech tax policy seems to aim at maintaining rates at a level that does not excessively inhibit economic activity. Relatively low income taxes may foster foreign investment and increase the motivation to work and to undertake entrepreneurial activity. As a result, the tax base is broadened, which may compensate for lower tax rates. It is worth noting that over the recent decades the Czech Republic has achieved stable economic growth and a relatively low level of unemployment, which indirectly confirms the effectiveness of its fiscal model. This does not mean, however, that the system is ideal. Critics point to limited tax progression and potential income inequalities. In addition, budgetary revenues depend not only on tax rates but also on the effectiveness of the tax administration, on the structure of the economy, and on global economic conditions. Analysing the Czech tax system through the lens of the Laffer curve, it can be stated that this country seeks to maintain a balance between fiscal effectiveness and economic incentives. There is, however, no unequivocal empirical evidence concerning the exact location of the point of maximum revenues on the Laffer curve, which means that tax policy largely remains a matter of pragmatic governmental decisions.

To summarise, the Czech tax system constitutes an example of a moderate approach to taxation, which is consistent with the general assumptions of the Laffer curve. Maintaining relatively low and stable rates may foster economic

growth and ensure stable budgetary revenues, although the effectiveness of this model depends on numerous factors that go beyond the theory itself.

## ***The Slovak Tax System***

The Slovak tax system is often cited as an example of a relatively simple and competitive fiscal model in Central Europe. In the context of the Laffer curve, it constitutes an interesting case study, showing how tax policy may affect state revenues, economic activity and the behaviour of taxpayers. At the beginning of the twenty-first century, Slovakia introduced a series of tax reforms aimed at simplifying the system and increasing its transparency. The best-known change was the introduction of the so-called flat tax – a uniform rate of income tax for both natural persons and enterprises. This reform was intended to encourage investment, reduce tax avoidance and stimulate economic growth.

The Slovak reform was largely inspired by precisely this idea. The reduction and simplification of tax rates was expected to shift the economy towards a more optimal point on the Laffer curve. In practice, this led to an increase in the country's attractiveness to foreign investors and to a reduction of the shadow economy. In the first years after the reform, an increase in budgetary revenues and an acceleration of economic growth were recorded, which was frequently interpreted as a confirmation of the theory. This does not mean, however, that the Slovak system is without flaws. Over time, critical voices appeared, pointing to growing social inequalities and to the limited progressivity of the tax system. In response to these problems, the government partially departed from a pure flat tax, introducing more differentiated rates. This shows that the practical application of the Laffer curve requires taking into account not only economic effectiveness but also social and political aspects (Musiałkiewicz, 2024).

To summarise, the Slovak tax system constitutes an interesting example of the use of economic theories in practice. Reforms inspired by the Laffer curve contributed to economic growth and to an increase in budgetary revenues, but at the same time revealed the limitations of this concept. Ultimately, an effective tax policy must find a balance between efficiency and social justice.

## *The Estonian Tax System*

The Estonian tax system is frequently cited in the context of the Laffer curve, as it provides an interesting example of an approach that seeks to reconcile relatively low and simple taxes with a high collection of state revenues. After regaining independence in the 1990s, Estonia opted for a radical simplification of the tax system. A linear income tax was introduced, together with a unique solution concerning the taxation of enterprises – the profits of firms are not taxed at the moment they are generated but only when they are distributed (for example as dividends). Such a model encourages the reinvestment of capital and supports economic development. In addition, the Estonian system is characterized by a high degree of transparency and widespread digitization, which reduces administrative costs and limits the scale of tax avoidance (Safjan, 2024).

The Estonian tax system can be interpreted as a practical application of the ideas underlying the Laffer curve. Maintaining moderate tax rates and simplifying regulations make taxpayers more inclined to comply with them. As a result, the tax base is broader and revenues are stable, despite relatively low fiscal burdens. Moreover, incentives to reinvest profits increase economic activity, which indirectly translates into higher state revenues in the long run. This does not mean, however, that the Estonian model is universal and directly transferable to every country. Its effectiveness also results from factors such as a high level of social trust, an efficient administration and consistent economic policy. Nevertheless, it constitutes an interesting example of how an appropriately designed tax system may approach the optimal point described by the Laffer curve.

To summarise, the Estonian tax system demonstrates that simplicity, transparency and moderate rates may foster both economic development and stable budgetary revenues. In the context of the Laffer curve, it constitutes evidence that lower taxes do not always imply lower revenues – provided that they are accompanied by a well-designed structure of the fiscal system.

## ***The Latvian Tax System***

As one of the post-transition economies of Central and Eastern Europe, after regaining independence in 1991 Latvia opted for a relatively simple and transparent tax system. Among other changes, a linear personal income tax and moderate rates of corporate income tax were introduced. Of particular importance was the 2018 reform, which changed the method of taxation of enterprises – retained profits ceased to be taxed, and the tax was levied only at the moment of their distribution (for example in the form of dividends). Such a construction of the tax system may be interpreted as an attempt to shift the economy towards a more efficient point on the Laffer curve. The reduction of the effective taxation of reinvested profits was intended to encourage enterprises to increase investment, which in the longer run should lead to economic growth and, consequently, to an increase in the tax base (Musiałkiewicz, 2024).

The empirical effects of these reforms are complex. On the one hand, Latvia recorded an increase in investment and an improvement in the competitiveness of the economy. A simple tax system also fosters transparency and reduces administrative costs. On the other hand, budgetary revenues may have been lower in the short term, which is a typical challenge associated with policies inspired by the Laffer curve – the benefits often appear only in a longer time horizon. An important aspect is also the question of the elasticity of labour and capital supply. The Laffer curve assumes that the reactions of economic entities to tax changes are significant. In the case of Latvia, as a small and open economy, capital mobility is high, which means that tax competitiveness is of particular importance. Excessively high taxes could lead to an outflow of investment to other countries of the region.

To summarise, the Latvian tax system constitutes an interesting example of the practical application of ideas akin to the concept of the Laffer curve. Through the reduction of effective taxation and the simplification of the system, the state sought to increase economic activity and to broaden the tax base. Although the effects of such measures are not immediate and require long-term evaluation, the case of Latvia shows that an appropriate adjustment of the level of taxation may foster both economic growth and the stability of public finances.

## Conclusions

The Laffer curve is a concept suggesting that there exists an optimal level of taxation at which state revenues are maximized. In the countries of Central and Eastern Europe, after the systemic transformation, it was often a point of reference in designing fiscal reforms. Following the collapse of centrally planned economies, many countries of the region – including Poland, the Czech Republic, Slovakia, Latvia and Estonia – sought to simplify their tax systems and to stimulate economic activity. One of the most visible examples was the introduction of flat taxes. Estonia, already in the 1990s, implemented a simple system with a uniform PIT rate, which was intended to increase tax collection and the transparency of the system. Similar reforms were subsequently adopted by Slovakia (with the reform of 2004). In practice, however, the use of the Laffer curve had a more heuristic than strict character. Governments assumed that excessively high taxes discourage work and investment, while tax reductions might broaden the tax base and, in the longer term, stabilise revenues. The effects were mixed. In some countries (for example Estonia) the simplification of the system indeed improved compliance and growth dynamics. In other cases, it led in the short term to a decline in budgetary revenues and to the necessity of fiscal corrections.

It is worth emphasizing that the Laffer curve does not indicate a specific level of the optimal rate – this depends on the structure of the economy and on institutions. In the countries of the Central and Eastern European region, factors such as the effectiveness of the tax administration, the level of trust in the state, or the scale of the informal economy were of greater importance than the level of the rates themselves.

The comparative analysis of the five post-transition economies examined in this paper – Poland, the Czech Republic, Slovakia, Estonia and Latvia – clearly shows that identical or analogous fiscal instruments produce markedly different outcomes depending on the cultural and institutional context of their implementation. The Estonian case, in particular, illustrates how a combination of high social trust, a transparent and digitalised administration and a culture of civic cooperation may bring the tax system closer to the optimal point described by the Laffer curve. In turn, the more modest or uneven effects of analogous reforms in other

countries of the region can be attributed, at least in part, to differences in tax morale, attitudes towards the state and the organisational culture of fiscal authorities. From the perspective of intercultural management, this leads to a practical conclusion: the transfer of fiscal ‘best practices’ between countries cannot be treated as a purely technical operation. Effective policy design requires an understanding of the cultural determinants shaping the behaviour of both taxpayers and public administration, as well as the capacity to adapt instruments to the intercultural specificity of a given economy. In this sense, the Laffer curve – although originally formulated as a macroeconomic concept – is most usefully interpreted as part of a broader, culturally sensitive framework of fiscal governance.

To summarise, in Central and Eastern Europe, the concept of the Laffer curve was an important element in justifying pro-market reforms and the simplification of taxes, but its application had a political-practical rather than a precisely empirical character. The fiscal policy of the European Union, in turn, is evolving towards greater flexibility, coordination and orientation towards long-term economic growth. Although the Laffer curve provides a useful tool for analysing the relationship between taxation and budgetary revenues, its importance in practice is limited. Contemporary EU fiscal policy takes into account a broader economic and social context in which fiscal effectiveness constitutes only one of many elements of decision-making.

## References

- Acemoglu, D., & Robinson, J. A. (2012).** *Why Nations Fail: The Origins of Power, Prosperity, and Poverty*. Crown Business.
- Alm, J., & Torgler, B. (2006).** Culture differences and tax morale in the United States and in Europe. *Journal of Economic Psychology*, 27(2), 224–246. <https://dx.doi.org/10.2139/ssrn.562861>.
- Cichocki, S., & Kokoszcyński, R. (2016).** Ewolucja krzywej Laffera jako narzędzia analizowania unikania opodatkowania: od prostych modeli teoretycznych do modeli DSGE. *Ekonomia. Rynek, Gospodarka, Społeczeństwo*, 45. <http://dx.doi.org/10.17451/eko/45/2016/200>.

- Dankowska, M. (2010).** Wyższa akcyza panaceum na dziury budżetowe? In: B. Czarny (Ed.), *Pociąg do pracy i inne studia przypadku do nauczania ekonomii*. Warszawa: Krajowa Szkoła Administracji Publicznej.
- Feldstein, M. (1995).** The effect of marginal tax rates on taxable income: A panel study of the 1986 Tax Reform Act. *Journal of Political Economy*, 103(3), 551–572.
- Gwiazdowski, R. (2017).** *Krzywa Laffera*. Warszawa: Warsaw Enterprise Institute – Związek Przedsiębiorców i Pracodawców.
- Hofstede, G. (2001).** *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations* (2nd ed.). Sage Publications.
- Krugman, P., & Obstfeld, M. (2018).** *International Economics: Theory and Policy*. Pearson.
- Laffer, A. (2004).** *The Laffer Curve: Past, Present, and Future*. Heritage Foundation.
- Miravete, E. J., Seim, K., & Thurk, J. (2018).** Market Power and the Laffer Curve. *Econometrica*, 86(5), 1651–1687.
- Musiakiewicz, R. (2024).** *Systemy podatkowe w państwach Europy Środkowo-Wschodniej*. Warszawa: Difin.
- Pasternak-Malicka, M. (2014).** Efekt Laffera w kontekście podatku od nieruchomości na przykładzie gminy Wiązownica. In: M. G. Woźniak (Ed.), *Nierówności społeczne a wzrost gospodarczy*. Rzeszów: Wydawnictwo Uniwersytetu Rzeszowskiego.
- Piekarz, R. (2019).** *Podatkowy labirynt. Wyzwania polskiego systemu danin publicznych*. Kraków: Klub Jagielloński.
- Przybylska-Mazur, A. (2017).** Optymalne wielkości podatków w aspekcie kreowania wzrostu gospodarczego. *Ekonometria*, 1(17), 99–111. <http://doi.org/10.15611/ekt.2017.1.08>.
- Raczkowski, K., Schneider, F., & Węgrzyn, J. (2020).** *Ekonomia systemu podatkowego*. Warszawa: PWN.
- Saez, E., Slemrod, J., & Giertz, S. H. (2012).** The elasticity of taxable income with respect to marginal tax rates: A critical review. *Journal of Economic Literature*, 50(1), 3–50. <https://doi.org/10.1257/jel.50.1.3>
- Safjan, W. (2024).** *Estoński CIT*. Gdańsk: Wydawnictwo ODDK.
- Schneider, F., & Enste, D. H. (2000).** Shadow economies: Size, causes, and consequences. *Journal of Economic Literature*, 38(1), 77–114. <https://doi.org/10.1257/jel.38.1.77>.
- Stiglitz, J. (2015).** *Economics of the Public Sector* (4th ed.). W.W. Norton & Company.
- Torgler, B. (2007).** *Tax Compliance and Tax Morale: A Theoretical and Empirical Analysis*. Edward Elgar.

eISSN2543-831X



SPOŁECZNA AKADEMIA NAUK

