

# SKILL MISMATCH IN THE DIGITAL ECONOMY: A SCIENTOMETRIC ANALYSIS USING EIGENVECTOR CENTRALITY

Khalil Bourgou<sup>1</sup>, Anna Dunay<sup>1</sup>, Katalin Lipták<sup>2</sup>

<sup>1</sup>John von Neumann University, Doctoral School of Management and Business Administration, Budapest, Hungary

<sup>2</sup>University of Miskolc, Faculty of Economics, Miskolc, Hungary

**Keywords:** labour market dynamics, skill mismatch, digital economy, eigenvector centrality, scientometric analysis, industry 4.0

**JEL Classification:** J24, O33, I25

## 1 INTRODUCTION

The published literature to date in the area of labour market changes has considered skill mismatches from multiple perspectives including economic modelling [1, 2], regional case studies [3, 4], and surveys of employer needs [5]. Most of this research, however, focuses on micro-level studies, or otherwise qualitative assessments, and tends to pay less attention to the overarching intellectual architecture and coherence of the area of inquiry. Scientometrics utilizes quantitative metrics of publication, citation, and collaboration in order to trace the development of the scholarly knowledge base [6, 7], which serves as a valuable, yet underutilized, method of addressing this gap. Based on Web of Science (WoS) data and visualization tools like VOSviewer, we analyse co-authorship networks, citation links, and keyword co-occurrences to address three questions:

- (1) What are the dominant research clusters and intellectual pathways in skill mismatch research?
- (2) Who are the most influential scholars, institutions, and journals in this area?
- (3) In what ways could network analytic findings inform attempts to more closely align education systems to the demands of labour markets?

Our results highlight the primacy of themes including digital literacy, labour flexibility, and the morality of automation, while also identifying ongoing disconnects between scholarly inquiry and industry demands. By measuring the impact of major players and concepts, this research offers stakeholders interested in closing skills gaps actionable intelligence.

## 2 MATERIAL AND METHODS

For this research we used a scientometric approach to investigate the intellectual structure and development of research on skill mismatches in the digital economy. This approach employs an integrative methodology that combines bibliometric data extraction, network analysis, and Eigenvector Centrality to map contributions, collaborations, and research trends.

We employed the Web of Science (WoS) Core Collection data, where we created a search string that synthesizes a list of keywords representing the broader dynamics of the labor market with the topic of skill mismatches: “Labor Market Dynamics” OR “Labor Market Evolution” OR “Workforce Skill Requirements” OR “Skills Mismatch” OR “Job Demand” OR

“Skill Alignment” OR “Skills Gap” OR “Labor Market Trends” OR “Workforce Adaptability” OR “Occupational Shifts”. This search was limited to literatures published between 1975 and March 2025. The analysis was conducted in three stages:

- (1) Bibliometric Data Extraction and Cleaning, where metadata (e.g., titles, authors, citations, keywords) were exported from WoS and pre-processed using Microsoft Excel and plaintext files to standardize terms;
- (2) Network Construction and Visualization, where co-authorship Networks: Mapped collaborations between authors and countries using VOSviewer, with nodes representing authors/countries and edges indicating joint publications.
- (3) Eigenvector Centrality Analysis, where we studied the influence of the nodes (authors, papers, institutions) in the co-citation network.

### 3 RESULTS

The resulting sample included 3174 articles with keywords, where 857 belonged in Business Economics, 512 in Public Environmental Occupational Health, 430 in Psychology, and 399 in Education Educational research area. Other areas of study (e.g., Engineering and Computer Science) were also investigated. To provide a graphic description of the bibliographic results, the visualization software VOS viewer was used. This software compiles bibliographical data and displays the results in various maps and tables. VOSviewer was then used to analyse and describe the dataset, based on the frequency and relations of keywords. The “Keywords Plus” extracted initially 3686 unique keywords, of which 325 had a frequency of at least 9. In order to enhance reliability, some of the keywords were removed.

Word co-occurrence refers to the simultaneous appearance of terms within a given text, which enables the identification of conceptual connections and associations among ideas. In this regard, VOSviewer was used to analyse and interpret the dataset with an emphasis on the existence and interrelations of the keywords in order to find central themes and their connections. The analysis was done through VOSviewer’s clustering function, which made it easier for important thematic classes in the dataset to be identified. Four clusters were generated, based on 303 items. The clustering methodology used made it possible to gain extensive insight into associations and interactions among the keywords by putting emphasis on the most relevant themes and interrelations among each other within the dataset.

### 4 CONCLUSIONS

We used the scientometric approach, where based on 3,174 Web of Science publications from 1975 to 2025, we identified key research clusters, prominent researchers, and thematic patterns. Some of the most salient themes that emerged were issues currently facing educators in digital literacy, automation ethics, workforce adaptability, and labour market polarization, along with the continuing disconnect between education system products and industry demands. Eigenvector Centrality produced a ranking of institutions and authors with a substantive systemic impact, which concentrated throughout their influence on the intellectual trajectory in the field.

### REFERENCES

- [1] GHOSH, A., WOOLF, B., ZILBERSTEIN, S., LAN, A. 2020. Skill-based Career Path Modeling and Recommendation. IN: WU, X. *et al.* (Eds.). *University of Massachusetts System*, pp. 1156–1165. <https://doi.org/10.1109/BigData50022.2020.9377992>
- [2] HUSSAIN, N., ZAHID, Z. 2014. Analysis of factors affecting satisfaction level on problem based learning approach using structural equation modeling. IN: *AIP Conference Proceedings*, 1635, 2014, pp. 316–322. <https://doi.org/10.1063/1.4903601>.

- [3] ABD RAHIM, R., OMAR, L., ABD KADIR, N., DAHLAL, N. 2009. Soft Skills in Islamic Higher Learning Institutions in Malaysia and Indonesia: A Comparative Analysis. *JATI-Journal of Southeast Asian Studies*. 14(1), 53–61.
- [4] AICHOUNI, M., TOUAHMIA, M., ALSHAMMARI, S., SAID, M. 2024. Future skills and competencies for Industry 4.0 transformation: A Delphi study of the Ha'il region in Saudi Arabia, *International Journal of Advanced and Applied Sciences*. 11(6), 194–204. <https://doi.org/10.21833/ijaas.2024.06.021>
- [5] ADHVARYU, A., KALA, N., NYSHADHAM, A. 2023. Returns to On-the-Job Soft Skills Training. *Journal of Political Economy*. 131(8), 2165–2208. <https://doi.org/10.1086/724320>
- [6] BORNMANN, L., LEYDESDORFF, L. 2014. Scientometrics in a changing research landscape: Bibliometrics has become an integral part of research quality evaluation and has been changing the practice of research. *EMBO Reports*. 15(12), 1228–1232. <https://doi.org/10.15252/embr.201439608>
- [7] GAGGERO, G., BONASSI, A., DELLANTONIO, S., PASTORE, L., ARYADOUST, V., ESPOSITO G. 2020. A Scientometric Review of Alexithymia: Mapping Thematic and Disciplinary Shifts in Half a Century of Research. *Frontiers in Psychiatry*. 11, 611489. <https://doi.org/10.3389/fpsyt.2020.611489>

### **Contact information**

Corresponding author's e-mail: [bourgoukalil@gmail.com](mailto:bourgoukalil@gmail.com)