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Review of doctoral dissertation: Digitally driven employment. Empirical evidence for the European countries by Helena Anacka, MA

This review focuses on the doctoral dissertation by Helena Anacka, MA, entitled “Digitally driven employment. Empirical evidence for the European countries,” prepared under the academic supervision of prof. dr hab. Ewa Lechman. This review was prepared at the request of Chair of the Scientific Field Council Social Sciences, Krzysztof Leja, PhD, Eng, Prof. PG, in connection with my appointment as a reviewer of the aforementioned thesis.

1. The main topic of the dissertation.

The author creates a composite European Digital Skills Index or EDSI, with the aim to distinguish between countries advanced in terms of digital technology and digital skills, those that are upper-intermediate, those that are lower-intermediate ones, as well as the countries that are lagging behind in terms of digital adoption. The Author differentiates 10 occupational groups established based on the ISCO classification with the goal to determine the impact of digitalization on employment in these occupational groups.

2. Dissertation structure

The doctoral dissertation consists of six chapters. It is written in English.

The thesis begins with an introduction outlining its importance, novelty, and three main objectives, followed by the conceptual framework (Chapter 1). Chapter 2 examines the socio-economic and historical context of digital technologies, tracing technological revolutions and their role in modern labor markets. Chapter 3 presents a rich literature review on digitalization, skills, and employment, while Chapter 4 shortly describes the empirical methodology. Chapter 5 summarizes the regression models and discusses the results. The study concludes with Chapter 6, which presents key findings, limitations, and identifies future research directions.

3. Detailed Review.

Advantages of the thesis.

The author has conducted an impressive literature review of over 300 publications, discussing all the key research articles on the topics of skills, employment and technology.

However, there is no meta-analysis of the papers. The papers are discussed individually, with no general summary provided. The author uses SLR but does not go further to combine quantitative data from similar studies to produce more precise, statistically robust overall estimates of the effect of technology on employment, for example.

Major drawbacks.

1.1. Thesis editing.

The text requires thorough proofreading. Many sections are difficult to understand. This should be a minor comment, but reading some parts of the text is really challenging. This is somewhat surprising given that the thesis discusses technology, and there are several tools that can help to improve the texts in foreign languages.

The monograph is very long, almost 200 pages. There are many repetitions of the papers discussed, and many detailed, unnecessary detailed descriptions of Tables.

1.2. Research gaps.

In theory, research gaps are summarized in section 1.2. The author claims that based on the literature review, she has identified a research gap, i.e. insufficient and scattered evidence regarding the identification of the potentially diverse impact of digitalization on employment across ten different occupational groups (using the ISCO classification). However, I cannot see which part of the literature review discusses that. It is also unclear what the purpose of the research is, what questions it aims to answer and what the hypothesis is. These seem to be discussed only partially in section 3.3.

The author does not mention the ILO's 2023 estimates of the potential occupational exposure to generative AI (GenAI) technology and the employment shares of affected occupations. I understand not using the 2025 update. Could this methodology help to better identify the link between exposure to AI and task automation on employment?

1.3. Methodology

I have several issues with the methodology of the thesis. Below, I provide more reservations on the index constructed and the panel models, and here I list some other major comments.

- Correlation does not imply causation. The word 'impact' is misused in many statements throughout the dissertation, whether in the thesis itself or in the review of papers. For example, causal dependencies are mentioned even though the analysis only includes correlations (Klenert, 2023, p. 56). On p. 118, it states that 'the less digitally advanced the group of countries, the weaker the impact of digitalisation on different occupations in Europe'. This is pure correlation and is likely spurious.
- Also, in the literature review, the author should clearly state which papers study causality and which study only correlations.
- The analysis is based on ten-level ISCO groups, which are very general, and I have doubts regarding their usefulness.
- The statement 'Our research addressed this gap by differentiating ten occupational groups established based on the ISCO classification, and identifying the impact of digitalisation on employment in these groups' is simply untrue; no such analysis is presented in the dissertation. The same applies to the claim 'We verified the impact of

internet use on different professions in four groups of European countries at different stages of their digital adoption'.

1.4. Indexes, including EDSI.

- The various indexes mentioned in Section 1.2 should be discussed earlier. What are their respective advantages and disadvantages? How is digitalisation manifested across three key dimensions: individual, professional, and educational? Why did the author choose these dimensions and why are they important? If I understand correctly, the educational dimension is based on literacy measures. Does this make sense for EU countries?
- I would like to see a more detailed analysis of the three dimensions and their variations.
- So, countries differ in terms of the ESDI index and its sub-indices. Is this surprising? Why is there no study of potential drivers, such as institutional ones, which are only mentioned later in the text? The author concludes that *European countries differ substantially in terms of digital skills across the three dimensions considered. Individual, Professional, and Educational ones. Distinguished in this way, country groups differ in terms of digital volume, geographical and socio-economic proximity, as well as various skills development dynamics in 2008–2023*. Is there any interesting or unexpected finding? What would Table 5.1 look like if the countries were sorted by GDP per capita instead of the ESDI? I really struggle to see the value of the constructed ESDI index.
- Many findings are presented and described without explanation (e.g. 'Figure 5.7 shows that the relationships are very different from those obtained when treating the whole sample as one'). Pages 102–110 include a detailed description of countries within particular groups. What is the purpose of describing such data?

1.5 Models

- My main reservation regarding the Models briefly discussed in pages 80- 81, concerns the sample sized (section 5.4). The number of observations used is clearly too low to give any precise and reliable estimates. If I understand correctly, there are 37 observations in Q1? And 27 in Q4 ? And once the models are run separately for each of the 10 ISCO categories, the number of observations is even lower? Where are these numbers shown?
- The author estimates 280 models. What is the research strategy?

- The β estimated for different Q-groups and Occupations are not comparable. I would suggest calculating marginal effects.
- Table 5.2.1A – not clear how many observations there are, is the number of e.g. professionals and managers the same?
- P.125 – Armed forces are discussed, as novelty. However, I believe these data were excluded from collection for a long time and I am not sure these should be used in time series.

1.6. Detailed comments.

- In many places, the author uses the terms 'occupations' and 'professions' interchangeably. Is this intentional?
- Chapter 2 goes into too much detail when discussing technological development.
- P. 41 – are the selected 63 articles a lot? Few?
- The author states that it is essential to distinguish between the following concepts: exposure to technology at work, digital skills, and work tasks. This distinction should have been made much earlier.
- P 43: The author discusses non-routine competencies without explaining what these are. Previously, she only mentioned digital competencies.
- When discussing hypotheses on pages 43–45, it is unclear whether the evidence refers to correlation or causal effect.
- Chapter 3 provides a comprehensive review, albeit in a somewhat disorganised manner. There is no summary or conclusion; it is just a description of the papers one by one. Many papers are discussed several times.
- Chapter 4: The introduction is unclear.
- Section 4.2 is also unclear. What is meant by 'different models as a dependent variable called Employment (e.g. in total and by employment groups)'?
- What added value does the detailed description of changes in occupational structure on p. 116 offer?
- Section 4.2 – instead of writing that the share of missing values was marginal, present the respective data. In page 79 missing values are mentioned again, but it seems that their share is much larger?
- P. 90 “catch up due to e.g. regional proximity” – what is meant by that?

- Chapter 5.2 “Related literature suggests that different stages of economic and digital development can significantly impact country’s employment” – is ‘impact’ the right word? Are these studies causal, is the direction of causality confirmed?
- P.95 - *The unveiled clear positive association between EDSI results and total employment does not confirm the common concern about mass jobs reductions and losses associated with more intense digital use at workplace* – it is absolutely not allowed to draw such strong conclusions just by looking at a graph. What is the correlation and why isn’t it shown at the graph? In a similar vein, is there anything surprising in the “finding” that “Professional workers and Managers are positively associated with EDSI index values”, and agricultural workers are not? Or that the computer use at work indicator seems to be negatively associated with employment among Agriculture workers”? The further statement that “These results are additional support for the claim for the skill-biased technological change hypothesis” is unacceptable and is not based on research.
- P. 101 – what is “labor activity”?
- In p.101 it says “ Relying on the descriptive analysis results of employment *versus* EDSI country-specific values, we also observe that, in 2011, the economies with highest labor activity were the United Kingdom, Germany, Netherlands, France and Spain, hence also countries with high digital skills performance. On the contrary, countries like, e.g. Bulgaria, Greece and Croatia performing relatively poorly in terms of digital skills, were also economies with relatively lower labor activity” (...). I read it as a suggestion/ finding that there is a link/ correlation between employment rates and skills? How do you know it is not spurious?
- The literature review misses the following works

Gmyrek, P., Berg, J., Bescond, D., 2023. Generative AI and Jobs: A global analysis of potential effects on job quantity and quality, ILO Working Paper 96, <https://www.ilo.org/publications/generative-ai-and-jobs-global-analysis-potential-effects-job-quantity-and>, DOI: <https://doi.org/10.54394/FHEM8239>

Hardy, W., Keister, R., & Lewandowski, P. (2018). Educational upgrading, structural change and the task composition of jobs in Europe. *Economics of Transition*, 26(2), 201-231.

Lewandowski, P., Park, A., Hardy, W., Du, Y., & Wu, S. (2022). Technology, skills, and globalization: Explaining international differences in routine and nonroutine work using survey data. *The World Bank Economic Review*, 36(3), 687-708.

De La Rica, S., Gortazar, L., & Lewandowski, P. (2020). Job tasks and wages in developed countries: Evidence from PIAAC. *Labour Economics*, 65, 101845.

Bachmann, R., Gonschor, M., Lewandowski, P., & Madoń, K. (2024). The impact of robots on labour market transitions in Europe. *Structural Change and Economic Dynamics*, 70, 422-441.

4. *Assessment of the work*

The work addresses an important and topical research issue. Unfortunately, its research contribution is very limited. The literature review is extensive, but the author devotes little attention to summarizing the results to date when describing subsequent articles and to determine detailed research gaps. The index and models developed raise many methodological concerns and contribute little to the current state of knowledge about skills and the impact of technology on the labor market.

5. *Conclusion.*

I believe that the presented work does not meet the requirements for a doctoral dissertation referred to in Article 187 of the Act of July 20, 2018, on Higher Education and Science. The analysis in the dissertation is not an original solution to a scientific problem in the economic or social sphere. **My conclusion is negative.**

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