

BUCHAREST UNIVERSITY OF ECONOMIC STUDIES
FACULTY OF CYBERNETICS, STATISTICS AND ECONOMIC INFORMATICS
DOCTORAL SCHOOL OF CYBERNETICS AND ECONOMIC STATISTICS

HABILITATION THESIS

Analysis and quantification of the impact of economic and social phenomena related to the labour market and sustainable development from a quantitative perspective

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The habilitation thesis **Analysis and quantification of the impact of economic and social phenomena related to the labour market and sustainable development from a quantitative perspective** presents the main scientific and teaching achievements obtained by the author, Lecturer Oțoiu Adrian, after the conferral of the PhD degree in Cybernetics and Statistics in 2015, and sets the future directions of his career development.

The paper is structured in two parts. Part I briefly summarizes the main professional achievements related to both teaching and research activities, as well as the future professional development goals.

The teaching activity is analysed in Chapter 1.1, focusing on the subjects taught, contributions to the development of ICT-based content, participation in editorial activities supporting the publication of the department's journal, and the use of machine learning methods in real contexts, including the completion of master's studies and participation in competitions.

Chapter 1.2 briefly outlines the scientific research activity in terms of the main directions pursued and the scientific output. Thus, the analysis of economic and social phenomena fall under the following research themes: **analysis of the evolution of the Romanian labour market, the impact of technology on the labour market and competitiveness, composite indicators; methodology and applications in the field of well-being and ecology, the links between higher education and technology, and the analysis of socio-demographic phenomena and their impact on the economy and society**. Relevant publications highlighting the contributions made to each specific research theme are presented, along with their impact in terms of scientometric indicators (AIS, ISI quartile ranking, fields of classification) and the research visibility achieved in terms of citations, awards and invitations to disseminate results.

Chapter 2 focuses on the author's teaching and research development goals, which build on previous achievements through the pursuit of concrete objectives: improvement of teaching activities and the promotion of modern academic content, geared towards meeting the expectations and requirements of the labour market and digitisation, identification of specialised areas of research on the impact of digitisation on the labour market, the methodology and/or application of composite indicators in specific fields, and the use of modern data science methods for analysing economic and social developments deemed to have a major impact in the short and medium term.

The second part of the habilitation thesis consists of chapters detailing significant scientific results for eight representative articles, focused on specific research themes.

Thus, chapter 3 analyses important features of the Romanian labour market, focusing on both their theoretical relevance in the national context and the implications of the in-depth knowledge of its functionality. To this effect, economic policy recommendations are suggested to ensure its sustainability, and maintain its ability to adapt to contemporary challenges effected by major structural developments: digitalization, shortage of skilled labour, etc.

Chapter 4 examines the impact of technology and innovation on the labour market by looking at the structure of the IT workforce in the US, the impact of the ICT and R&D sectors on the EU regional economies and labour markets, and the risks associated with changes of the occupational structure effected by digitisation and Industry 4.0. Findings reveal the importance of the foreign-born workforce in ensuring the sustainable development of the US ICT sector, and the impact of the ICT and R&D sectors in regional development for young and mature workers. Analysis of the potential risks associated with digitisation on the occupational structure reveals the occupations and occupational groups most likely to be either negatively affected, or enjoying stable or growth outlooks, as inputs for making informed career guidance decisions.

Chapter 5 details two important contributions in the field of composite indicators, focusing on a critical examination of the most popular ones in the human well-being and ecology domains. Research results and conclusions reveal the importance of a quantitative-based approach, which ensures a better match between indicator results and the actual developments in the field of ecology, through the selection of input variables characterised by a relatively high variability, sensitive to environmental changes. A critical examination of the ability of composite indicators to capture the impact of major events (wars and tsunamis) on affected countries has revealed serious shortcomings in their methodology and sensitivity, thus initiating a debate on the state of knowledge concerning the impact of these events.

The final chapter analyses how certain education policy measures can be evaluated, by developing an in-depth knowledge of the affected entities, and analysing the potential benefits and outcomes of these measures. The analysis of the policy of earmarking government-funded university admission places for rural applicants reveals the potential effectiveness of this measure, along with the limitations and distortions that may arise in the admission process, through building an ex-ante evaluation model which can be used for policy design and implementation.