BUCHAREST UNIVERSITY OF ECONOMIC STUDIES

Council for Doctoral Studies Doctoral School of Cybernetics and Economic Statistics

The perspective of urban development in the context of circular economy integration

Alin-Cristian Maricuț

PhD supervisor: Prof. Giani-Ionel Grădinaru, Ph.D.

Bucharest, 2024

SUMMARY

In light of current challenges and opportunities, there is a clear need for comprehensive research exploring urban sustainability across Europe, including Central and Eastern European countries like Romania. This research has focused on developing new variables for assessing urban mobility using available geospatial data, thereby advancing knowledge in the field. This doctoral study aims to identify solutions for enhancing urban sustainability within the framework of integrating the circular economy. Additionally, it aims to develop a composite indicator for measuring the degree of urban sustainability, contributing to the formulation of effective policies and strategies at national and international levels. By employing a robust methodology, including bibliometric analysis, advanced statistical methods, and the construction of composite indicators following OECD standards, the study provides a solid foundation for understanding and improving sustainable urban development.

The main findings of the research highlight that the circular economy contributes to approximately 26% of national economic development. Regarding urban development models, no specific patterns were identified among the capitals of the European Union. However, it is observed that cities in Western and Northern Europe are more focused on green and circular city goals with more efficient urban mobility compared to cities in Eastern and Southern Europe. At the national level, Bucharest and Cluj-Napoca are the most developed cities, with the Romanian capital being the most sustainable city in the country. Furthermore, cities like Constanța, Cluj-Napoca, and Craiova exhibit patterns conducive to implementing a subway network.

Keywords: urban development, circular economy, sustainability, European Union, predictive analysis

TABLE OF CONTENTS

SUMMARY 2

ACKNOWLEDGEMENTS 3

- 1. INTRODUCTION 6
 - 1.1. FUNDAMENTAL ASPECTS 6
 - 1.2. OBJECTIVES/WORKING HYPOTHESES 7
 - 1.3. STRUCTURE OF THE DOCTORAL THESIS 8

2. LITERATURE REVIEW 9

- 2.1. URBAN DEVELOPMENT 9
- 2.2. CIRCULAR ECONOMY 20
- 2.3. URBAN METABOLISM 38
- 2.4. **SMART CITY** 50
- 2.5. GREEN CITY 61
- 2.6. CIRCULAR CITY 71

3. RESEARCH METHODOLOGY 84

- 3.1. **DESCRIPTION OF DATA** 84
- 3.2. TREATMENT OF MISSING VALUES 93
- 3.3. DESCRIPTION OF METHODS USED 95
- 4. **RESULTS AND DISCUSSIONS** 102

4.1. IMPACT OF THE CIRCULAR ECONOMY ON ECONOMIC

DEVELOPMENT 102

4.2. ANALYSIS OF URBAN DEVELOPMENT IN EUROPEAN CAPITALS 107

- 4.2.1. Principal Component Analysis 107
- 4.2.2. Global Spatial Autocorrelation 116
- 4.2.3. Local Spatial Autocorrelation 116
- 4.2.4. Estimation of GWR Regression Models 121
- 4.2.5. Implementation of Underground Transport 133
- 4.3. ANALYSIS OF URBAN DEVELOPMENT IN ROMANIA 135
- 4.3.1. Principal Component Analysis 136

4.3.2. Analysis of Peri-Urban Areas 140

- 4.3.3. Urban Mobility in the Peri-Urban Area of the Top 5 Cities in Romania 170
- 4.3.4. Structural Differences of Peri-Urban Areas 171
- 4.3.5. Classification of Peri-Urban Areas 173
- 4.3.6. Is the Subway a Sustainable Means of Transport for the 10 Most Populous Cities in Romania? 175
- 4.3.7. Determining the Association Relationship between the Main Factors of Urban Development 176
- 4.3.8. Composite Indicator for Measuring Urban Sustainability 193

4.4. RECOMMENDATIONS FOR URBAN DEVELOPMENT IN ROMANIA IN THE CONTEXT OF INTEGRATING THE CIRCULAR ECONOMY 202

- 5. CONCLUSIONS 205
 - 5.1. LIMITATIONS OF THE RESEARCH 209
 - 5.2. RESEARCH DEVELOPMENT DIRECTIONS 210
- 6. **REFERENCES** 211
- 7. APPENDICES 231
- 8. LIST OF ABBREVIATIONS AND ACRONYMS 236
- 9. LIST OF TABLES 237
- 10. LIST OF FIGURES 240
- 11. LIST OF APPENDICES 244