

## SCIENTIFIC REVIEW

by Prof. D.Sc. Rositsa Rangelova Pavlova, Economic Research Institute at the Bulgarian Academy of Sciences,

of a dissertation work for the award of the educational and scientific degree "Doctor" in Professional field 3.8. Economics, PhD program: Economics and Management (Industry) at the Department "Economics and Management by Sectors", Faculty of Economics of Sofia University "St. Kliment Ohridski" on the basis of the provision of art. 4, para. 5, 6 and 7 of the Law on the Development of the Academic Staff in the Republic of Bulgaria (ZRASRB), decision of the Faculty Council Protocol No. 10/18.06.2024 and Order No. RD 38-340/28.06.2024 of the Rector of the SU " St. Kliment Ohridski"

**PhD student:** Reni Ivanova Pancheva

**Dissertation topic:** DEVELOPMENT OF THE CIRCULAR ECONOMY IN THE EUROPEAN UNION

**Scientific supervisor:** Prof. Dr. Georgi Mengov

### 1. Brief biographical data for the doctoral candidate

The autobiography of Reni Pancheva shows that she is a product and permanently attached to the Faculty of Economics of SU "St. Kliment Ohridski", which I regard as a positive phenomenon for the creation of personnel and continuity. In 2017, she graduated with a Bachelor degree there, subject Economics. In October 2019 - February 2020, he completed the Master's program "Energy Markets and Services", for which he received a certificate of excellent success. She then became a full-time doctoral student in the Economics and Management (Industry) programme at the Department of Economics and Management by Industry (July 2021 - July 2024), which completed on time and successfully.

The active activity of Reni Pancheva is impressive, among which she is a co-founder of a member of the club "Specter" (2014). Of the awards received, I will mention the most important ones: student of the year in the category "Economic Sciences", 2017; student of the year, third place in the "Doctoral student of the year" category, awarded on 25 May 2023 by the Student Council at SU "St. Kliment Ohridski"; award "Dr. Ilko Eskenazi — Bulgaria and the European Union" in the field of economic sciences, awarded on 23 November 2022 by the International Foundation "St. St. Cyril and Methodius"; first prize in the category "PhD students at a university or scientific institute" from the competition "Business models for circular economy", awarded on 17 February 2023 by the "Economy 2000" Club, etc.

These biographical data show the acquired very good professional training of Reni Pancheva and her natural orientation towards the topic of the dissertation work.

I judge the fulfillment of the **minimum national requirements** by her application in the dissertation work. The doctoral candidate submits a total of 100 points with a minimum of 30 points required for acquiring the ONS "doctor" in Scientific field 3. Social, economic and legal sciences, Professional field 3.8. Economics.

## 2. General characteristics of the dissertation work

The dissertation has a total volume of 155 pages, which includes an introduction, three chapters, a conclusion, scientific contributions, a list of publications, a list of abbreviations used (which, however, are not always followed in the text, for example EU) and a bibliography. 19 figures and 18 tables are provided. The bibliography contains 241 sources, of which 27 are in Bulgarian and 214 are in English. My notes on it are as follows: (1) is it a bibliography or references, and (2) for greater clarity and overview, this long list could be separated into at least two sections: (a) scientific literature and (b) documents and regulations of national and international organizations.

The **main objective** of the dissertation is (I quote) "to measure the effects of significant macroeconomic and social factors on some of the most frequently used circular economy indicators and to analyze their impact on the transformation of economic systems in the European Union in the transition process". However, this objective reflects third chapter, and before it are the first and second chapters, in which there is a rather thorough, consistent and well presented emergence and development of the topic of the circular economy in the EU, which should be included.

The **main research thesis** is as follows (I quote): "Economic development, R&D investment and resource productivity of a country have a significant impact on the transformation of its economic system and are therefore decisive for the success or failure of the transition to a circular economy". In my opinion, it is true, but limited in scope.

To achieve the goal and, accordingly, the defense of the research thesis are formulated 4 main relevant and sequentially arranged tasks (I describe them with my comment):

(1) To study and systematize up-to-date publications in established scientific journals in the field of study, public policy and regulations. To study fundamental European documents.

(2) To follow critically the development of the European framework for monitoring the transition to a circular economy and to report progress on key indicators in recent years, comparing the performance of Bulgaria with that of the EU.

(3) To identify the most frequently used circular indicators for the circular economy in material and energy aspects, to establish proven and potentially significant factors for them. For this purpose, to collect and process quantitative data at the macroeconomic level from regional and global bases. To use a combination of tools, performing regression and statistical tests and subsequent cluster analysis.

(4) To interpret the results of the literature review, the comparative analysis and the econometric analysis and to formulate recommendations for improving the European framework for monitoring the transition and optimizing the policies promoting the circular transformation of economies.

In order to fulfill the set tasks, a relevant **methodology** is used, a literature review was made and the quantitative data were processed through a number of statistical analysis methods and tests (for stationarity, cointegration, causality, fixed or random effects, serial correlation and spatial dependence). For the estimation of panel regression models.

**Data for the study** of the factors affecting the most commonly the circular economy were extracted from the international databases of Eurostat, WB, UN, European Confederation of Waste-to-Energy Installations and Climate Watch.

The structure of the dissertation by chapters reflects the consistency and logic of the research. A certain disproportion is noticeable in the large volume of the third chapter compared to the others. It is good practice to allocate a special point at the end of each chapter for the conclusions reached by the PhD student as a result of the research. **The first chapter** as a rule, introduces into the research, in this case tracing the concept of circular economy from its origin to its modern development. Various ideas of individual authors and their development have been examined consistently and reasoned, as a result of which today's body of knowledge has been created. This is done with correct citation, a critical and analytical look at the ideas in the cited sources. The main principles, strategies and business models of the circular economy system are briefly presented. An analysis of the definitions of circular economy existing in the literature is made, and the new working definition derived by the author deserves attention. The comparison between sustainable development and the circular economy is interesting and useful, and my note here is whether the place of this point should not be after the one for the definitions of the circular economy, that is, it should be defined first and then compared with other concepts. Appropriately, this chapter concludes with an analysis of the various indicators for reporting the transition to a circular economy, how they are organized in different monitoring frameworks, and what their advantages and disadvantages are. My main positive impression of this chapter is the completeness of the analysis, its analytical and critical tone, and the clarity of presentation.

**The second chapter** examines the development of the institutional framework for the transition to the circular economy in the EU. The main documents (directives, strategies, etc.) from the European legislation were examined, making a consistent and critical overview of fundamental strategic and legislative documents. The difference between the approaches to the circular economy of the EU and that of other countries in the world - China, Japan, the USA - is also mentioned. Special attention is paid to the Plan for the transition to a circular economy and the strategic and legislative documents underlying it. The comparative analysis of 6 groups of key indicators between the EU and Bulgaria definitely deserves a positive assessment. The development of the European transition monitoring framework has been tracked and a critical analysis has been made (mainly based on a database from the European Court of Auditors and works of scientists), as well as recommendations for improving the Framework have been made. The main imperfection of the European framework is that it, like the others, also emphasises material indicators, but lacks sufficient energy, social and environmental indicators. Yet the Framework is one of the few that takes into account technological advances and materials re-fed into the economy. It continues to improve, and its revised version includes metrics that bring more social and environmental nuances. I find the way in which this chapter has been developed satisfactory - a good knowledge of the matter, an objective and constructive tone regarding what has been achieved and what has not been achieved in the transition to a circular economy.

**The third chapter** is devoted to an empirical analysis of the influence of macroeconomic and social factors on the transition to a circular economy in the EU. At the beginning of this chapter, the indicators that can and have been used here are presented and analyzed (as the PhD student calls it - indicator insight). This is very relevant and shows the PhD student's understanding of the nature and conditionality of some of the indicators that can be used. The main criticism of them is that they cannot integrate all the necessary energy and environmental dimensions. Appropriate

(credible, I add) indicators of durability, eco-design, repair, reuse and shared use at the macro-economic level, etc., are needed. It is noted that the development of the circular economy globally is still primarily focused on improving material aspects and largely downplays the role of renewable energy in driving circular processes. The social dimensions of the transition are also almost not taken into account. With this position of material focus, the current emphasis is more on recycling and recovery of materials. To support the claims, scientific publications of different authors are used appropriately and in depth. This is a good basis for further empirical analysis. I approve the detailed description of the indicators used as well as inclusion of some limitations of the study caused by the availability (or not) of appropriate indicators and the desire to include additional variables. This shows the good knowledge and realistic attitude of the PhD student towards the research and the results obtained.

The research carried out in the third chapter reveals the influence of various factors at the macroeconomic level on three key indicators for the circular economy: the degree of recycling, the degree of circular use of materials that are more commonly used and reflect the material dimension of the circular economy, and the share of the consumed energy from renewable sources, which reflects the energy aspect (and is not yet included in the European monitoring framework). It is noted that the degree of circularity and the consumption of renewable energy and the factors affecting them are less studied in the scientific literature. The three factors are addressed in three points of the third chapter originally with the same structure – data and methodology, analysis of results, discussion of results and conclusion. It is a clear approach empirical analysis that makes it easy to understand. As a result of the analysis and the derivation of common determining factors, clusters have been formed, characterizing certain models of the transition to a circular economy, which can be distinguished among the economies of the EU member states. Their points of intersection have been identified and based on their interaction, four models of transition to a circular economy in the EU have been derived.

The empirical research, in my opinion, was conducted correctly, clearly and described in detail such as procedure and results obtained. My analysis in the review could be extensive given the multifaceted and interesting results obtained. I will focus on two features of the applied toolkit that have more or less influence on the obtained results. The first one refers to the nature of multiple regression, according to which the weight and importance of the measured factors falls on the first and little is left for the others. And in the case with the greatest impact, three indicators stand out - GDP per capita (a small note - it is not according to PPP, but according to the standard of purchasing power (SPP), because it is related to a conditional currency for all EU countries, and not just one, as is the case with the US dollar), R&D spending as a share of GDP and resource productivity. In this direction is also the statement of the doctoral student that (I quote) "the results in both specifications - with fixed effects and by the method of the fully modified NMC show that the models with the smallest number of variables have almost the same explanatory power as the models with the largest number of variables'. The doctoral student understandably uses a larger number of variables with the desire for greater completeness and highlighting additional nuances in the investigated dependencies. The second feature is in the panel data analysis. In the panel, the data is combined and the so-called fallacy of aggregation, in which the reliance is placed that what

is true for the group must be true for the subgroup or individual, even when using fixed effects models. There are other caveats to panel data analysis.

**The conclusion** of the dissertation summarises the important conclusions reached by the individual chapters. Based on the results, relevant and research-based recommendations are given to the interested parties.

### **3. Evaluation of the scientific and practical results and contributions of the presented dissertation work**

The dissertation is a complete, complete and correct study on the circular economy in the EU. This is a strong contribution in so far as it attempts to partially overcome the fragmentation of knowledge on the subject of circular economy. Original and positive is the juxtaposition of the concept of sustainable development with the circular economy, the given definition and the focused attention on how the European transition monitoring framework can be improved. An important aspect is that sustainable energy and the circular economy are complementary. A special role is played by the study of key factors, the collective impact of which can significantly affect the transformation. The successful combination of tools used for this purpose deserves high praise, as regression and statistical tests were conducted, on the basis of which a cluster analysis was made.

I accept the specific and well-described contributions made by Reni Pancheva (5 in number) to the theory and practice in the field of the circular economy, and more specifically: a new definition of the circular economy was derived, which aims to facilitate its interpretation; introduction of appropriate energy, environmental and product indicators that could correct some of the gaps and assess the circular economy in the EU more fully; establishing, on the basis of a cluster analysis, four models of transition to a circular economy in the EU depending on the three investigated circular indicators and the common factors among them, etc.

The present study develops and enriches existing knowledge in the field of circular economy by analysing a new set of factors that potentially influence the degree of circular use of materials. The consistent analysis and purposefulness are impressive. The language is clear.

The study can be a useful tool for policy-makers, producers, consumers, researchers and other stakeholders in developing appropriate policies and means to promote the transition to a circular economy and in further research. I suggest that the PhD student consider publishing it as a monography.

I find the topic "Development of the circular economy in the European Union" to be a bit general sounding for a dissertation topic, which then addresses more specific questions that the paper is devoted to. The title could be changed to for example: "Transition to a circular economy in the European Union: development and factors" or something similar.

#### *Evaluation of publications related to the dissertation work*

On the topic of the dissertation, Reni Pancheva states 4 **scientific publications**, three of which are referenced and indexed in the SCOPUS database. The articles are in English, published in authoritative publications - two of them are in the journal "Economic Studies" of the Economics Research Institute at the BAS, one in the Yearbook of the Faculty of Economics and Business Administration of the University of St. Kliment Ohridski" and one in co-authorship - in a collection of reports from an international conference.

Individual results of the work on the dissertation were presented by the doctoral student at 4 **international conferences** during the period 2021-2024, which is a good opportunity to discuss one's own concepts and views with a qualified audience.

**The abstract of the Dissertation thesis** is 46 pages long. It was developed in accordance with the requirements for a dissertation work. It is well structured and reflects the main content, conclusions, scientific contributions, a list of the author's publications and their citations in scientific publications of other authors are indicated.

### **Questions:**

(1) The Green Deal, which is not mentioned in the dissertation, was given particular importance to EU documents and initiatives a few years ago. After that, her promotion seems to have died down. What does the PhD student think about this?

(2) The PhD candidate rightly mentions (and at times seems to justify) the conduct of policies by individual member states that (I quote) "continue to stick to their own priorities" different from that of the EU as a whole. The question is to what extent a centralized (unified) policy for the EU can turn out to be the best for the Union as a whole and for individual countries, or should some autonomy be given to individual countries.

### **CONCLUSION**

According to the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria (Article 5, Paragraph 3), I believe that the dissertation work on the topic "Development of the Circular Economy in the European Union" has been successfully developed. The presented materials and the quality of the dissertation fully meet the specific requirements of the Regulations for admission and training of doctoral students at SU "St. Kliment Ohridski".

I give a positive assessment of the research carried out in the dissertation work and confidently propose to the respected scientific jury to award the educational and scientific degree "Doctor" to Reni Ivanova Pancheva in Professional direction 3.8. Economics, PhD program: Economics and Management (Industry) at the Department "Economics and Management by Sectors", Faculty of Economics and Business Administration of Sofia University "St. Kliment Ohridski".

29 August 2024

Reviewer:



(Prof. Rositsa Rangelova Pavlova, D.Sc.)