

Circular Economy in Developed and Developing Countries

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Circular Economy in Developed and Developing Countries: Perspective, Methods and Examples

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Contents

| | |
|----------------------------|-------------|
| List of Figures and Tables | <i>ix</i> |
| Preface | <i>xvii</i> |
| List of Contributors | <i>xix</i> |

Part I: The Conceptual Provisions of the Circular Economy and Its Essential Differences from the Linear Model of Economic Development

| | |
|---|-----------|
| Chapter 1 Criticism of the Linear Model of Economic Development and Its Opposition to the Model of the Circular Economy <i>Larisa A. Ilyina, Yuliya A. Panteleeva, Vladimir S. Tikhonov and Olga A. Babordina</i> | <i>3</i> |
| Chapter 2 Principles and Priorities of the Circular Economy <i>Elena G. Popkova</i> | <i>11</i> |
| Chapter 3 The Conceptual Model of Reproduction in the Circular Economy <i>Aleksei V. Bogoviz</i> | <i>21</i> |

Part II: Anti-crisis Potential of the Circular Economy

| | |
|---|-----------|
| Chapter 4 The Role and Value of the Circular Economy in Prevention and Overcoming of Economic Crises <i>Vladimir S. Osipov, Natalia A. Rykhtikova, Sergei V. Shkodinsky, Tatiana B. Fonina and Tamara T. Tsatkhlanova</i> | <i>31</i> |
| Chapter 5 Balance of Economic and Ecological Interests in the Conditions of the Circular Economy <i>Yury L. Talismanov, Inga V. Nikulkina, Elzata V. Erdnieva, Marina V. Karp and Elena I. Larionova</i> | <i>39</i> |

Chapter 6 Scientific and Methodological Approach to Systemic Analysis of the Circular Economy from the Positions of Interested Parties

Zhanna V. Gornostaeva, Ekaterina S. Alekhina, Natalia G. Tregulova and Yulia S. Chernysheva 47

Part III: Circular Economy: Methodology of Measuring and Practice of Management

Chapter 7 Methodology of Criterial Evaluation of the Progress of Economic Systems in the Circular Economy Formation

Larisa A. Ilyina, Dmitry L. Skipin, Lilia V. Ermolina and Tatyana N. Kochetova 59

Chapter 8 Methodological Foundations of Measuring the Effectiveness of Implementation of the Circular Economy in the Economic Systems' Practice

Lubov I. Vanchukhina, Tatyana B. Leybert, Elvira A. Khalikova, Yuliya R. Rudneva and Olga G. Kantor 67

Chapter 9 System of the Indicators for Analyzing State Managerial Initiatives in the Sphere of the Circular Economy

Igor V. Chistov, Svetlana G. Bychkova, Tatyana V. Romantsova, Sergey E. Zakutnev and Igor V. Bulava 87

Part IV: Creation of the Circular Economy in Developed and Developing Countries: A Case Study

Chapter 10 Ecological Standards and Their Role in Building the Circular Economy in the United States and Canada

Ekaterina A. Orlova, Natalia B. Ershova, Viktor I. Dobrosotskiy and Bogdan S. Vasyakin 97

Chapter 11 The Culture of Responsible Production and Consumption as a Foundation of the Circular Economy in Countries of Western Europe

Natalia G. Vovchenko, Tatiana V. Epifanova, Elena Y. Zolochevskaya and Svetlana A. Litvinova 105

Chapter 12 The Circular Economy in Industrial Countries of Asia as a Method of Reducing Ecological Costs of Economic Growth

Svetlana V. Lobova, Aleksandr N. Abramov, Galina N. Semenova, Viktor I. Dobrosotskiy and Zhanna M. Korzovatykh 113

| | |
|--|-----|
| Chapter 13 Recycling as a Manifestation of the Circular Economy in Developing Countries | |
| <i>Aleksei V. Bogoviz, Svetlana V. Lobova and Alexander A. Alekseev</i> | 121 |
| Chapter 14 Strategic Planning of Urban Mining Material Flows as an Element of Circular Economy | |
| <i>Svetlana B. Globa, Viktoria V. Arnold and Mikhail A. Ashkerov</i> | 129 |
| Part V: The Practice of Building the Circular Economy in Modern Russia | |
| Chapter 15 Barriers on the Path of Building the Circular Economy in Modern Russia: Social Versus Financial | |
| <i>Aleksei V. Bogoviz, Inna N. Rykova, Leonid F. Malinovskii, Anna A. Skomoroshchenko and Irina S. Ferova</i> | 139 |
| Chapter 16 Successful Manifestations of the Circular Economy in Modern Russia | |
| <i>Aleksei V. Bogoviz, Oksana A. Revzon, Valentina V. Poliakova, Sonja L. Sumbatyan and Nadezhda G. Morozova</i> | 149 |
| Chapter 17 Creation of the Circular Economy in Russia as a Means of Acceleration Transition to the Market Path of Development | |
| <i>Larisa A. Ilyina, Marina P. Garanina, Tatiana A. Ilyina and Olga P. Maslova</i> | 157 |
| Part VI: Future Perspectives of Development of the Circular Economy | |
| Chapter 18 The Problem of Unequal Implementation of the Initiatives in the Sphere of Building the Circular Economy in the Modern Global Economic System | |
| <i>Taisiia I. Krishtaleva, Ljudmila I. Chistohodova, Anna V. Bodiako, Svetlana V. Ponomareva and Tatiana P. Satsuk</i> | 167 |
| Chapter 19 Opportunities for Overcoming the Structural Disproportions and Maximizing the Global Progress in Creation of the Circular Economy | |
| <i>Larisa V. Popova, Alexander V. Malofeev, Aleksandr V. Nemchenko and Larisa A. Melikhova</i> | 175 |

| | |
|--|-----|
| Chapter 20 Scenarios of Development of the Global Circular Economy: Ecological Crises Versus Economic Crises <i>Ekaterina M. Egorova, Nadezhda V. Chernovanova, Elena V. Yagupova and Elena A. Dynnikova</i> | 185 |
|--|-----|

Part VII: Recommendations for Managing the Process of Formation and Development of the Circular Economy

| | |
|--|-----|
| Chapter 21 A Perspective Algorithm of State Management of the Process of Formation and Innovative Development of the Circular Economy in Developing Countries <i>Larisa A. Ilyina, Vladimir S. Tikhonov, Anton N. Sunteev and Lyudmila D. Orlova</i> | 197 |
|--|-----|

| | |
|--|-----|
| Chapter 22 Reengineering of the Process of Attribution of General Shop Expenditures to Products' Cost at a Machine-building Company <i>Igor E. Mizikovsky, Viktor P. Kuznetsov, Ekaterina P. Garina, Elena V. Romanovskaya and Nataliya S. Andryashina</i> | 207 |
|--|-----|

| | |
|---|-----|
| Chapter 23 Development of Internal Corporate Control in the Conditions of Tax Monitoring <i>Lubov I. Vanchukhina, Nelly N. Galeeva, Yulia R. Rudneva, Anastasia M. Rogacheva and Tamara P. Shamoina</i> | 215 |
|---|-----|

| | |
|---|-----|
| Chapter 24 Opposition and Cooperation of Developed and Developing Countries During Formation of the Global Circular Economy <i>Elena Popkova and Aleksei V. Bogoviz</i> | 231 |
|---|-----|

| | |
|-------|-----|
| Index | 233 |
|-------|-----|

List of Figures and Tables

Chapter 1

| | | |
|----------|---|---|
| Fig. 1. | Top 10 Countries of the World in 2019 by Population and Waste. | 5 |
| Fig. 2. | Cross Correlation of the Indicators of Linear and Circular Development and Economic Growth with Happiness Index in Top 10 Countries by Population and Waste (2019). | 5 |
| Table 1. | Statistics of the Circular Economy and Economic Growth in Top 10 Countries of the World in 2019 by Population and Waste. | 6 |
| Fig. 3. | Cross Correlation of the Indicators of Energy Efficiency with the Rate of Economic Growth in Top 10 Countries by Population and Waste (2019). | 7 |
| Fig. 4. | The Basic Conceptual Model of the Circular Economy. | 8 |

Chapter 2

| | | |
|----------|---|----|
| Table 1. | Statistics of the Circular Economy and Its Potential Factors in Countries of G7 and BRICS in 2020. | 13 |
| Fig. 1. | Consumption of Renewable Energy and Rent of Natural Resources in Countries of G7 and BRICS in 2020. | 14 |
| Table 2. | Results of Dispersion, Correlation, and Regression Analysis. | 15 |
| Fig. 2. | The Institutional Model of the Circular Economy in Developed Countries (by the Example of Countries of G7). | 16 |
| Fig. 3. | The Institutional Model of the Circular Economy in Developing Countries (by the Example of Countries of BRICS). | 16 |

Chapter 3

| | | |
|---------|---|----|
| Fig. 1. | Production Waste and State of Environment (the Lower the Indices' Values, the Better) in Developed and Developing Countries in 2020. | 23 |
| Fig. 2. | Share of Renewable Energy (the Higher the Better) and Share of Resources and Metals in the Structure of Industrial Export (the Lower the Better) in Developed and Developing Countries in 2020. | 23 |
| Fig. 3. | Expert Evaluation of the Export of Used Cars (Sharing Economy) in Developed and Developing Countries in 2020. | 24 |

| | | |
|---------|--|----|
| Fig. 4. | GDP in Developed and Developing Countries in 2020, USD Billion. | 24 |
| Fig. 5. | Correlation Indicators of the Circular Economy with GDP (by Module, the Higher the Better) in Developed and Developing Countries in 2020, %. | 25 |
| Fig. 6. | The Conceptual Model of Reproduction of Global Product in the Conditions of the Circular Economy. | 26 |

Chapter 4

| | | |
|----------|---|----|
| Table 1. | Rate of Economic Growth and the Green Economy Index in Developed and Developing Countries in 2013–2020. | 33 |
| Fig. 1. | Cyclicity of Economy in Developed and Developing Countries. | 34 |
| Fig. 2. | Regression Curves of the Influence of Circularity of Economy on Its Cyclicity in Developed Countries. | 35 |
| Fig. 3. | Regression Curves of the Influence of Circularity of Economy on Its Cyclicity in Developing Countries. | 35 |

Chapter 5

| | | |
|----------|--|----|
| Fig. 1. | Cross Correlation of Economic and Ecological Sustainable Development Goals in Developed and Developing Countries in 2020, %. | 41 |
| Table 1. | Statistics on the Implementation of Economic and Ecological Sustainable Development Goals in Developed and Developing Countries in 2020. | 42 |
| Table 2. | Qualitative Treatment of the Ratio of the Economic and Ecological Interests in the Conditions of the Circular Economy. | 43 |
| Fig. 2. | The Structural and Logical Scheme of the Balance of Economic and Ecological Interests in the Conditions of the Circular Economy. | 44 |

Chapter 6

| | | |
|----------|--|----|
| Fig. 1. | Dynamics of Sustainable Development Index in Developed and Developing Countries in 2018–2020, Points 1–100. | 49 |
| Table 1. | Statistics of the Indicators of Attractiveness of the Circular Economy for Government in Developed and Developing Countries in 2018–2020. | 50 |
| Table 2. | Statistics of the Indicators of Attractiveness of the Circular Economy for Population and Business in Developed and Developing Countries in 2018–2020. | 51 |
| Table 3. | Systemic Analysis of Attractiveness of the Circular Economy from the Positions of Concerned Parties in Developed and Developing Countries in 2020. | 52 |

| | |
|---|----|
| Fig. 2. The Integral Index of Systemic Attractiveness of the Circular Economy and Its Components in Developed and Developing Countries in 2020. | 53 |
|---|----|

Chapter 7

| | |
|---|----|
| Table 1. Indicators of the Circular Economy in Countries of G7 and BRICS in 2020. | 62 |
| Table 2. Criterial Evaluation of the Progress of Developed and Developing Countries in Formation of the Circular Economy in 2020. | 63 |
| Fig. 1. The Triad of the Progress of Developed and Developing Countries in Formation of the Circular Economy in 2020. | 64 |
| Fig. 2. The Index of Three-dimensional Progress of Developed and Developing Countries in the Formation of the Circular Economy in 2020. | 64 |

Chapter 8

| | |
|---|----|
| Table 1. The System of Indicators for Evaluation of Effectiveness of the Circular Economy Implementation. | 71 |
| Table 2. Specific Features of an Economic System of the Innovative Type of Development. | 77 |
| Fig. 1. Graph of Harrington's Function and Its Derivative. | 79 |
| Table 3. Standard Values in the Desirability Scale. | 79 |
| Fig. 2. Types of Membership Functions. | 81 |
| Fig. 3. Methods of Identification of the Indicators Within the Metric Analysis. | 82 |
| Fig. 4. Geometric Interpretation of Integral Indicator (9). | 83 |

Chapter 9

| | |
|--|----|
| Table 1. The System of the Indicators for Analyzing State Managerial Initiatives in the Sphere of the Circular Economy. | 89 |
| Fig. 1. The Model of State Management of Development of the Circular Economy in the Modern Economic Conditions. | 90 |
| Table 2. Selection of Statistical Data for Analyzing the State Managerial Initiatives in the Sphere of the Circular Economy in Developed and Developing Countries in 2020. | 91 |
| Fig. 2. Results of the Analysis of State Managerial Initiatives in the Sphere of the Circular Economy in Developed and Developing Countries in 2020. | 92 |

Chapter 10

| | |
|--|-----|
| Table 1. Statistics of Institutional Provision of State Regulation, Waste, and Climate Change in the United States and Canada in 2012–2020. | 99 |
| Fig. 1. The Competitiveness Polygon of Institutional Provision of Government Regulation in the United States and Canada in 2020. | 100 |
| Fig. 2. Regression Curves of Dependence of Waste on Institutional Provision of Government Regulation in the United States and Canada in 2012–2020. | 101 |
| Fig. 3. The Mechanism of Building the Circular Economy in the United States and Canada and the Role of Ecological Standards in It. | 101 |

Chapter 11

| | |
|---|-----|
| Fig. 1. The Circular Profile of Economies of the Western European Countries in 2020, % of the Maximum Possible Value. | 107 |
| Table 1. The Mechanism of Building the Circular Economy in the United States and Canada and the Role of Ecological Standards in It. | 108 |
| Fig. 2. Correlation of the Indicators of the Circular Economy and Its Potential Factors in Countries of Western Europe in 2020, %. | 109 |
| Fig. 3. The Model of the Circular Economy in Countries of Western Europe. | 110 |

Chapter 12

| | |
|---|-----|
| Fig. 1. The Circular Profile of the Industrialized Countries of Asia, %. | 115 |
| Table 1. Statistics of the Circular Economy, Economic Growth, and Innovations in Industrialized Countries of Asia in 2020. | 116 |
| Fig. 2. Correlation of the Rate of Economic Growth and Potential Ecological Costs in the Industrialized Countries of Asia in 2020, %. | 117 |
| Fig. 3. Correlation of the Innovations Index and Potential Ecological Costs in the Industrialized Countries of Asia in 2020, %. | 117 |
| Fig. 4. Model of the Circular Economy in the Industrial Countries of Asia as a Method Reduction of the Ecological Costs of Economic Growth. | 118 |

Chapter 13

| | |
|---|-----|
| Table 1. Statistics of Circular Economies in Developing Countries by the Example of Developing Countries of the OECD in 2020. | 123 |
| Fig. 1. The Circular Profile of Developing Countries by the Example of Developing Countries of the OECD in 2020, %. | 124 |

| | | |
|---------|--|-----|
| Fig. 2. | Correlation of the Ecological and Non-ecological Factors with Green Economy Index, Which Reflects Their Contribution into Creation of the Circular Economy in Developing Countries, by the Example of Developing Countries of the OECD in 2020, %. | 124 |
| Fig. 3. | The Model of Development of the Circular Economy in Developing Countries Based on Recycling. | 125 |

Chapter 15

| | | |
|----------|--|-----|
| Table 1. | Statistics of the Circular Economy in Russia in 2010–2020. | 141 |
| Table 2. | The Financial and Social Factors of the Circular Economy in Russia in 2010–2020. | 142 |
| Fig. 1. | Average Correlation of Financial and Social Factors with the Indicators of the Circular Economy in Russia in 2010–2020, %. | 143 |
| Table 3. | Correlation of the Financial and Social Factors with the Indicators of the Circular Economy in Russia in 2010–2020, %. | 144 |
| Table 4. | Factor Analysis of the Circular Economy in Russia Based on the Game Approach (Methodology of the Theory of Games). | 145 |

Chapter 16

| | | |
|----------|---|-----|
| Table 1. | The Financial and Ecological Indicators of the Largest Russian Transnational Corporations from the “Global 500” Ranking (as of Early 2020). | 151 |
| Fig. 1. | The Model of Institutional Organization of the Circular Economy in Modern Russia. | 154 |

Chapter 17

| | | |
|----------|--|-----|
| Table 1. | Indicators of the Circular Economy and Market Relations in Russia in 2019–2020 and the Forecast for 2021–2024, Points 1–100. | 159 |
| Fig. 1. | Cross Correlation of Green Economy Index with the Indicators of Market Relations in Russia in 2019–2024, %. | 160 |
| Table 2. | Qualitative Treatment of Contribution of the Circular Economy into Formation of Market Relations in Russia. | 161 |
| Fig. 2. | The Concept of Well-balanced Development of the Circular Economy in Russia for Quick Transition to the Market Path of Development. | 162 |

Chapter 18

| | | |
|----------|---|-----|
| Table 1. | Statistics of the Circular Economy in Countries of G7 and BRICS in 2020. | 170 |
| Fig. 1. | Analysis of Variation of Implementing the Initiatives in the Sphere of Building the Circular Economy in Developed Countries (G7) in 2020. | 171 |

| | | |
|---------|---|-----|
| Fig. 2. | Analysis of Variation of Implementing the Initiatives in the Sphere of Building the Circular Economy in Developing Countries (BRICS) in 2020. | 171 |
| Fig. 3. | Analysis of Variation of Implementing the Initiatives in the Sphere of Building the Circular Economy in the Global Economic System in 2020. | 172 |

Chapter 19

| | | |
|----------|---|-----|
| Table 1. | Statistics of Factors of the Circular Economy in View of the Categories of Countries in 2020. | 178 |
| Table 2. | Statistics of the Circular Economy and Its Factors in View of the Categories of Countries in 2020. | 179 |
| Fig. 1. | Cross Correlation of the Circular Economy and the Indicators of the Level of Liberalization of Business in Developed and Developing Countries in 2020, %. | 180 |
| Fig. 2. | Cross Correlation of the Circular Economy with the Indicators of Scientific and Technological Progress in Developed and Developing Countries in 2020, % | 180 |
| Fig. 3. | Cross Correlation of the Circular Economy with the Indicators of Socio-cultural Environment in Developed and Developing Countries in 2020, %. | 181 |
| Fig. 4. | Cross Correlation of the Circular Economy with the Indicators of Openness of the Economic System in Developed and Developing Countries in 2020, % | 181 |
| Fig. 5. | Cross Correlation of the Circular Economy with the Indicators of Infrastructural Provision in Developed and Developing Countries in 2020, % | 181 |

Chapter 20

| | | |
|----------|---|-----|
| Table 1. | Statistics of the Circular Economy and Economic Growth in Developed and Developing Countries in 2020. | 187 |
| Fig. 1. | Regression Curve That Reflects Dependence $a = F(b)$, $a = F(d)$, and $a = F(c)$. | 188 |
| Fig. 2. | Regression Curve That Reflects Dependence $b = F(a)$, $b = F(d)$, and $b = F(c)$. | 188 |
| Fig. 3. | Regression Curve That Reflects Dependence $c = F(d)$, $c = F(b)$, and $c = F(a)$. | 189 |
| Fig. 4. | Regression Curve That Reflects Dependence $d = F(c)$, $d = F(b)$, and $d = F(a)$. | 189 |
| Table 2. | Scenarios of Development of the Global Circular Economy Until 2024. | 190 |

Chapter 21

| | |
|---|-----|
| Table 1. Statistics of the Circular Economy in Countries of BRICS in 2020. | 200 |
| Table 2. Statistics of the Key Factors of the Circular Economy in Countries of BRICS in 2020. | 201 |
| Fig. 1. Polygon of Competitiveness of the Circular Practices that are Implemented in Countries of BRICS in 2020. | 201 |
| Table 3. Cross Correlation of Circular Practices and the Key Factors That Influence Them in Countries of BRICS in 2020. | 202 |
| Fig. 2. The Perspective Algorithm of State Management of the Process of Formation and Innovative Development of the Circular Economy in Developing Countries. | 203 |

Chapter 22

| | |
|--|-----|
| Table 1. Distribution of General Shop Expenditures Between Orders in March 2018 for Company X (RUB). | 210 |
| Table 2. Distribution of Expenditures for Facility Services in March 2018 Between Orders for Company X. | 211 |
| Table 3. Distribution of Amortization of Production Equipment in March 2018 Between the Orders for Company X. | 211 |
| Table 4. Distribution of Expenditures for Labor Safety, Including Overalls, etc. in March 2018, Between Orders for Company X. | 212 |
| Table 5. Distribution of Expenditures for Administrative and Managerial Work and Other Processes in March 2018 Between Orders for Company X. | 212 |
| Table 6. Distribution of General Shop Expenditures Between Orders in March 2018 for Company X (RUB). | 212 |
| Table 7. Results SWOT Analysis of Usage of “Activity Based Costing” Models in the Accounting Practice of a Machine-building Company. | 213 |

Chapter 23

| | |
|--|-----|
| Fig. 1. Results of the Experience of Implementing Expanded Information Interaction Within the Pilot Project. | 217 |
| Table 1. Risks of Application of Tax Monitoring. | 218 |
| Fig. 2. Form of Documenting of the Control Procedure. | 220 |
| Table 2. Form 1 “Conducted Control Procedures.” | 221 |
| Table 3. Form “Results of Conducting the Control Procedures.” | 222 |
| Table 4. Form 3. “Matrix of Risks and Control Procedures.” | 222 |
| Fig. 3. Interpretation of the COSO Model. | 222 |
| Fig. 4. Mechanism of Evaluation of the SIC. | 225 |
| Fig. 5. Form of Accounting for Evaluation of the SIC. | 226 |

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Preface

The Circular Economy as a New Modern Challenge for Developed and Developing Countries

At the beginning of the twenty-first century, the global society finally realized the importance of the problem of climate change and legally adopted the necessity for solving it through building the circular economy. This was reflected in Sustainable Development Goals, adopted by the UN in 2015. However, as a result of the practical implementation of Sustainable Development Goals in the first five years, very limited results are observed in 2020; also, we could see the vivid and increasing disproportions in the global circular economy, caused by domination of the circular practices in developed countries and preservation of the signs of the linear approach to economic activities in developing countries.

Thus, it is necessary to study the general regularities and specific features of building the circular economy in developed and developing countries, which have different conditions for implementing the ecological initiatives, different approaches to environment protection, and different effectiveness of the mechanisms of market self-regulation and state management of the process of implementation and institutionalization of the circular practices of economic activities.

This book studies the existing and formulates new conceptual provisions of the circular economy and its essential differences from the linear model of economic development. The anti-crisis potential of the circular economy and its differences in developed and developing countries are determined. A methodology of measuring and managing the modern circular economy in developed and developing countries is developed.

The authors perform an international case study of the latest tendencies, barriers, and perspectives of building the circular economy in developed and developing countries, determine specific features and regularities of building the circular economy in developed and developing countries, study and analyze the practice of building the circular economy in modern Russia, substantiate future perspectives of development of the circular economy, and offer complex recommendations for managing the process of formation and development of the circular economy in developed and developing countries.

The purpose of this book is to show integrity of the global environment, in which developed and developing countries implement their circular practices, to substantiate close interconnection between these categories of countries, to determine the level of similarity and the scale of their differences during formation of the circular economy, and to offer scientific recommendations that would be adapted to their specifics.

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Part I

**The Conceptual Provisions of the Circular
Economy and Its Essential Differences
from the Linear Model of Economic
Development**

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Chapter 1

Criticism of the Linear Model of Economic Development and its Opposition to the Model of the Circular Economy

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JEL Codes: D91; E01; F42; F43; F64; Q01; Q15; Q56; Q57; O13; O41;
O43; O44; O47

1. Introduction

In the modern global economy, the interests of economic growth contradict the interests of environment protection more and more. Ecological costs are at the brink of advantages from economic growth or even exceed them, and the signs of climate change could be seen everywhere. The importance of this contradiction was reflected in the adopted sustainable development goals, in which the main attention is paid to environment protection.

The ideas of sustainable development are embodied in the model of the circular economy, which allows decreasing the ecological costs of production and consumption, thus overcoming the contradiction of economic growth and environment protection. Despite the long and thorough scientific elaboration and a large theoretical and methodological basis, the model of the circular economy is not widely used. An argument in favor of refusal from it – for preserving the traditional, linear model of economic development – is the uncertainty of the investment component of circular projects.

Firstly, the clear influence of the state of environment on population's level of happiness has not been scientifically proved. As social advantages cannot be forecasted precisely, circular project is not too attractive for the state, which prefers

the projects with more profits for society. The long-term character of investments in circular projects and lack of transparency of the perspectives of their return – caused by the fact that the circular economy generates not economic but public benefits – hinders the inflow of private capital. Without financial support, circular projects – like any others – cannot be realized.

Secondly, under the pressure of philosophy of consumer society, there formed an official (proclaimed and acknowledged by the state) belief that economic growth defines population's happiness. Business's aggressive marketing confirms this idea. Though there are no scientific proofs of that, the state does not require them, showing loyalty to business, which lobbies its own interests. As the circular economy is associated with limited economic growth, it is treated negatively.

Thirdly, there is a popular idea – without any scientific substantiation – that increased resource efficiency limits the possibilities of production and consumption and reduces economic growth, raising the quality of life, shared by all economic subjects – state, business, and society. A logical result of this idea, which is treated as risk, is measures of risk management, aimed at restraining the circular economy and preventing its development.

The purpose of this chapter is to scientifically verify the existing argument in favor of the linear model of economic development and to overcome the uncertainty regarding the model of the circular economy.

2. Materials and Method

The general issues of economic growth and development, based on the linear model, are studied in the works, such as [Ermolina and Ilyina \(2017\)](#), [Ilyina and Brazhnikov \(2016\)](#), [Ilyina, Brazhnikov, and Khorina \(2017\)](#), [Ilyina, Ermolina, and Sunteev \(2018\)](#), [Popkova \(2018\)](#), [Popkova and Alferova \(2019\)](#), [Popkova and Sukhodolov \(2017\)](#), [Ragulina \(2019\)](#), [Ragulina, Alekseev, Strizhkina, and Tumanov \(2019a\)](#), [Ragulina, Semenova, Avkopashvili, Dmitrieva, and Cherepukhin \(2019b\)](#), [Sergi \(2003, 2019\)](#), [Sergi, Popkova, Borzenko, and Przhedetskaya \(2019\)](#), and [Sergi, Popkova, Sozinova, and Fetisova \(2019\)](#). Certain conceptual settings and methodological recommendations for organizing the model of the circular economy are given in the works, such as [Batista, Gong, Pereira, Jia, and Bittar \(2019\)](#), [Blomsma et al. \(2019\)](#), [Franco \(2019\)](#), [Frolov, Popkova, Strekalova, and Marushchak \(2017\)](#), [Inshakov, Bogachkova, and Popkova \(2019\)](#), [Petrenko, Pritvorova, and Dzhazykbaeva \(2018\)](#), [Popkova, Poluyufta, Beshanova, Popova, and Kolesnikova \(2017\)](#), [Sergi, Popkova, Borzenko, and Przhedetskaya \(2019a\)](#), [Shakhovskaya, Petrenko, Dzhindzholia, and Timonina \(2018\)](#), [Termeer and Metz \(2019\)](#), and [Zhang et al. \(2019\)](#).

The overview performed on the existing literature sources showed that they do not provide a sufficient scientific basis for clear opposition of the linear and the circular economy or a comprehensive idea of the model of the circular economy. The authors use the method of comparative and correlation analysis of statistical data for filling this gap in the system of scientific knowledge. The research objects are top 10 countries from G20, which had the highest number of population and the largest volume of economy's waste in 2019 ([Fig. 1](#)).

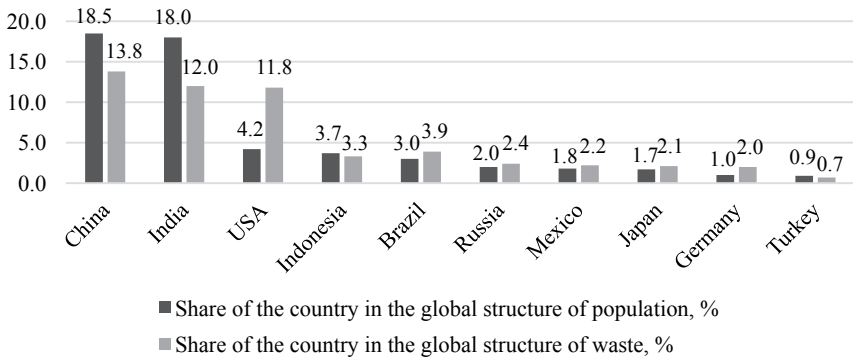


Fig. 1. Top 10 Countries of the World in 2019 by Population and Waste. Source: Compiled by the authors based on Verisk Maplecroft (2019).

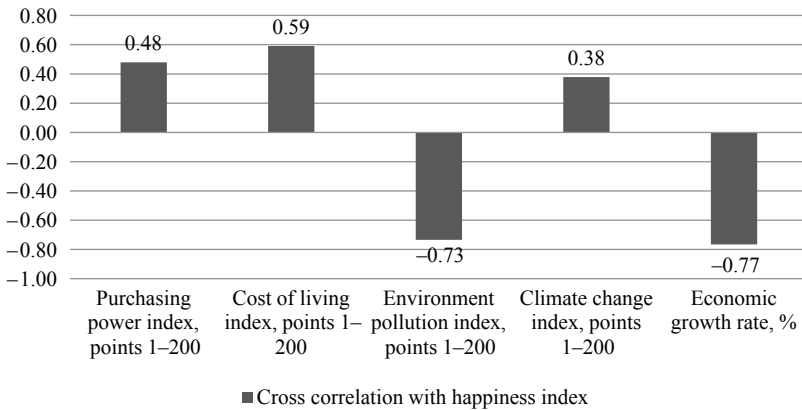


Fig. 2. Cross Correlation of the Indicators of Linear and Circular Development and Economic Growth with Happiness Index in Top 10 Countries by Population and Waste (2019). Source: Calculated and built by the authors.

As shown in Fig. 1, the number of population does not always define the volume of economy’s waste. This contradiction is most vivid in the United States; it accounts for 4.2% of the world population, with 11.8% in the global volume of waste. The selection of statistical data that are used during the research is shown in Table 1.

3. Results

Cross correlation of the indicators of linear and circular development and economic growth with the happiness index in top 10 countries of the world in 2019 by population and waste is shown in Fig. 2.

As shown in Fig. 2, the economic indicators show moderate connection with the happiness index. Cross correlation of the index of population’s purchasing

Table 1. Statistics of the Circular Economy and Economic Growth in Top 10 Countries of the World in 2019 by Population and Waste.

| Country | Index of Population's Purchasing Power, Points 1–200 | Cost of Living Index, Points 1–200 | Environment Pollution Index, Points 1–200 | Climate Change Index, Points 1–200 | Happiness Index, Points 0–10 | Rate of Economic Growth, % | Consumption of Electric Energy, kWh per Capita | Production of Renewable Energy, % | Alternative and Nuclear Energy, % of Total Usage of Energy |
|---------------|--|------------------------------------|---|------------------------------------|------------------------------|----------------------------|--|-----------------------------------|--|
| China | 63.93 | 40.54 | 81.24 | 78.91 | 5.191 | 6.6 | 3,927 | 23.93 | 5.1 |
| India | 61.73 | 25.14 | 75.55 | 65.77 | 4.015 | 7.0 | 805 | 15.34 | 2.7 |
| United States | 119.10 | 70.95 | 35.76 | 76.75 | 6.892 | 2.9 | 12,994 | 13.23 | 11.9 |
| Indonesia | 31.01 | 36.86 | 64.39 | 63.76 | 5.192 | 5.2 | 812 | 10.65 | 0.8 |
| Brazil | 36.31 | 42.64 | 56.10 | 94.25 | 6.3 | 1.1 | 2,620 | 73.97 | 10.8 |
| Russia | 43.69 | 38.59 | 63.49 | 42.82 | 5.648 | 2.3 | 6,603 | 15.86 | 8.2 |
| Mexico | 47.05 | 34.29 | 66.88 | 87.55 | 6.595 | 2.0 | 2,157 | 15.39 | 3.5 |
| Japan | 97.57 | 85.52 | 36.78 | 85.29 | 5.886 | 0.8 | 7,820 | 15.98 | 3.1 |
| Germany | 111.99 | 66.57 | 28.42 | 82.80 | 6.985 | 1.4 | 7,035 | 29.23 | 12.9 |
| Turkey | 44.44 | 35.66 | 68.63 | 93.26 | 5.373 | 2.6 | 2,847 | 31.96 | 6.7 |

Source: Compiled by the authors based on Helliwell, Layard, and Sachs (2019), Numbeo (2019), and World Bank (2019).

power and the happiness index equals 0.48, and of the cost of living index equals 0.59. The indicator of circular development – environment pollution index – showed much higher connection with the happiness index: -0.73 . It should be noted that another indicator of circular development – index of climate change – showed moderate connection with the happiness index -0.38 .

This shows that ecological factors have stronger influence on the levels of happiness of population than economic factors. However, the influence of ecological factors is too differentiated, as they are felt by the society to a different extent. For example, production waste is seen in the growing number of dumps, and climate change is less vivid. Rate of economic growth showed negative cross correlation with the happiness index (-0.77). This means that economic growth is connected to population’s happiness level, but in the reverse way – the higher the rate of economic growth, the lower the level of happiness.

Cross correlation of the indicators of energy efficiency with the rate of economic growth in top 10 countries by population and waste (2019) is shown in Fig. 3.

As shown in Fig. 3, the indicators of energy efficiency have negative cross correlation with the rate of economic growth, which constitutes -0.42 for electric energy consumption per capita; -0.36 for production of renewable energy; and -0.50 for alternative and nuclear energy. This means that certain manifestations of the circular economy – in particular, optimization of production and consumption of energy – restrain economic growth, at least within the current technological mode and the current organizational and managerial approach.

The basic conceptual model of the circular economy is shown in Fig. 4.

As shown in Fig. 4, the specific feature of the circular economy is observing the “3R” principle. According to this principle, the structure of resources is dominated by renewable (alternative) resources. Production reduces resource intensity

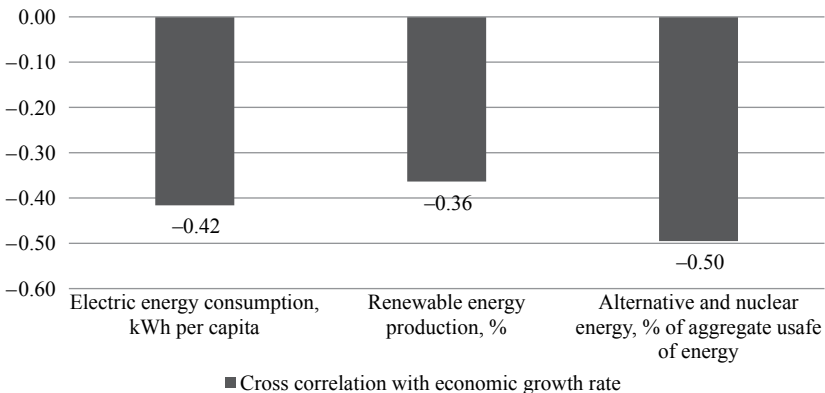


Fig. 3. Cross Correlation of the Indicators of Energy Efficiency with the Rate of Economic Growth in Top 10 Countries by Population and Waste (2019). Source: Calculated and built by the authors.

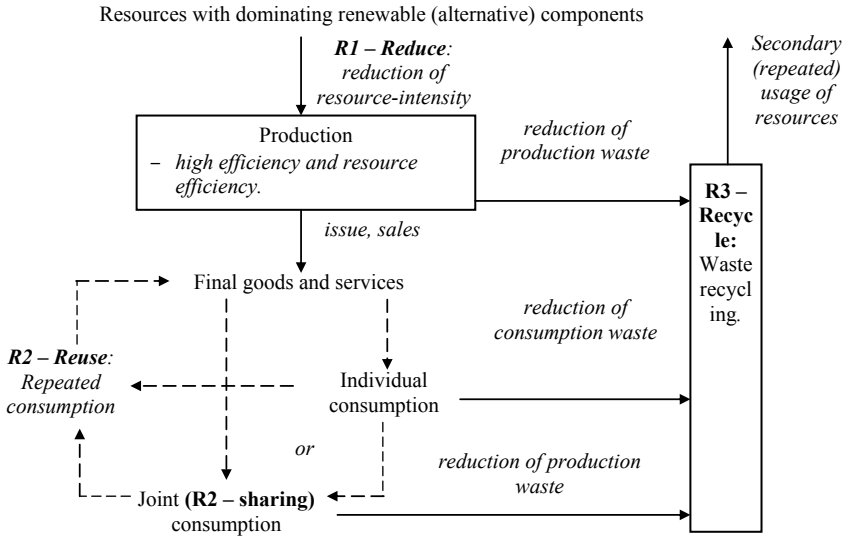


Fig. 4. The Basic Conceptual Model of the Circular Economy.

Source: Developed and compiled by the authors.

(R1) and showed higher efficiency and resource efficiency. Final goods and services are consumed individually, then jointly (R2), and then repeatedly (R2) – in Fig. 4 the alternative character of the variants of consumption is shown by dotted lines. Waste of production and consumption is reduced and recycled (R3), and it is sent to production again.

4. Conclusion

It is substantiated that the existing arguments in favor of the linear model of economic development are not persuasive and justified – from the scientific point of view; on the contrary, this model does not stand scientific criticism. High rate of economic growth contradicts public interests, and economic factors (population’s purchasing power and cost of living) have small influence on the level of happiness in society.

The circular economy is more preferable; for environment protection, the reduction of ecological costs of production and consumption is manifested along the whole cyclic chain of added value. Ecological factors – in particular, reduction of production waste – largely stimulate the increase in the level of happiness in society. However, the measures of increasing the energy efficiency lead to the limitation of economic growth. This could be caused by insufficient scientific elaboration and incomplete implementation of scientific and technological progress in this process – this problem should be solved in further studies.