

SOFIA UNIVERSITY ST. KLIMENT OHRIDSKI













XVII International Scientific Conference

WoodEMA 2024

GREEN DEAL INITIATIVES, SUSTAINABLE MANAGEMENT, MARKET DEMANDS, AND NEW PRODUCTION PERSPECTIVES IN THE FORESTRY-BASED SECTOR

Sofia, 15-17 May 2024

KNOWLEDGE AND PERCEPTION OF THE CIRCULAR ECONOMY WITHIN SLOVAK FOREST-BASED INDUSTRY AND COMPARISON OF CHOSEN INDICATORS IN SELECTED EU COUNTRIES

Marek Potkány, Petra Lesníková, Jarmila Schmidtová, Mária Osvaldová

Technical University in Zvolen, Slovakia

CONTENTS



Circular economy and other concepts

Sustainable development, green economy, bioeconomy, circular economy (CE) – and CE perception

2 Using methodology

Aim of paper, object, data, using statistic methods

03 F

Perception of CE concept

Findings of survey about perception of CE within forestbased industry in the Slovak Republic

04

Analysis of selected CE indicators

Description of selected indicators and results of set hypotheses

05 Conclusions

CIRCULAR ECONOMY AND OTHER CONCEPTS

For several years, terms such as sustainable development, circular economy (CE), bioeconomy or green economy have been used more often. These are related concepts, but their perception may be different.



Source: https://www.worldoverviewers.com/

Source: https://www.egu.eu/

Source: https://www.undp.org/

CIRCULAR ECONOMY AND OTHER CONCEPTS

According to WEF (White Paper, 2023) = \$4.5 trillion opportunity by 2030

Several researches were focused on the perception of CE

Goals of CE indicators is the providing of measurement that allow monitoring and evaluation of success and progress in the pursuit of CE objectives.

- only 27% of respondents know the given term
- a little over 60% of respondents pointed out that they had only heard about CE (Geme et al., 2023)
- respondents do not know the exact meaning of CE and ignorance prevails (Sijtsema et al., 2019)



Source: https://doi.org/10.3390/su15010333

AIM AND METHODOLOGY

The aim of the paper is (1) to evaluate the knowledge and perception of the concept of CE of interested groups in the sector of the forestry and timber complex in the Slovak Republic; and (2) to compare selected CE indicators in the V4 countries and in Bulgaria.



AIM AND METHODOLOGY

- Objects of the analysis: V4 countries and Bulgaria for the years 2011 to 2021
- H1: Countries with higher private investment and gross added value related to CE sectors achieve higher performance measured through GDP (in PPS)
- H2: Countries with higher performance measured through GDP (in PPS) achieve a higher circular material use rate.
- To consider how the value of one variable varies with the value of another variable simple regression and correlation analysis was applied. Regression coefficients of linear model $Y = b_0 + b_1 X$ were estimated using the method of least squares according to the given formulas:

$$b_1 = \frac{\sum XY - n\bar{X}\bar{Y}}{\sum X^2 - n\bar{X}^2} (1) \qquad b_0 = \bar{Y} - b\bar{X} (2)$$

• The Pearson's coefficient of correlation R defined as follows was used to assess the degree of association between two investigated quantitative variables: $R = \frac{\sum XY - n\overline{XY}}{\sum XY - n\overline{XY}}$ (3)

$$R = \frac{\sum XY - n\overline{XY}}{\sqrt{(\sum X^2 - n\overline{X^2})(\sum Y^2 - n\overline{Y^2})}}$$
(3)

Perception of the CE concept in the field of forest-based industry

- 130 respondents
- 68,50% men and 31,50% women
- 46-60 years old(38,50%) and 31-45 years old (33,10%)
- University educated respondents (86,20%)
- Wood-processing industry (32,31%)

Table 1. Comparison of knowledge of the CE term with other terms

I have heard the term and I know what it means					
	Circular	Sustainable	Bioeconomy		
	economy	economy development			
Agree	95 (73.1%)	102 (78.5%)	63 (48.5%)		
Partly agree	27 (20.8%)	26 (20.0%)	41 (31.5%)		
Do not agree	8 (6.2%)	2 (1.5%)	26 (20.0%)		

Analysis of selected CE indicators of the V4 countries and Bulgaria



Figure 1. Development of the indicator 1 (left) and indicator 2 (right) over the analysed years in the V4 countries and Bulgaria

Analysis of selected CE indicators of the V4 countries and Bulgaria

Table 2. Results of simple linear regression analysis – Indicator 1 versus GDP per capita

Country	Indicator	Mean ± St.Dev.	Ν	Intercept	Slope	t-test	p-level
BG -	Private investment	319.2±86.3	10	7 917.93	18.68	4.98	0.001
	GDP	13 880.0±1 854.0	10				
ск.	Private investment	431.9±66.7	10	16 148.16	11.07	3.82	0.005
SN	GDP	20 930.0±919.0	10				
CZ -	Private investment	678.6±175.7	10	14 284.55	15.81	12.87	0.000
	GDP	25 010.0±2 843.5	10				
HU -	Private investment	866.6±253.3	10	13 527.83	7.05	4.53	0.002
	GDP	19 640.0±2 105.7	10				
PL -	Private investment	3 075.9±940.6	10	13 100.81	2.08	4.50	0.002
	GDP	19 490.0±2 307.2					



Country	R	R ²
BG	0.87	76%
SK	0.80	65%
CZ	0.98	95%
HU	0.85	72%
PL	0.85	72%

Figure 2. Line chart – the relationship modelled by regression line between variables Private investment and gross added value related to CE sector and GDP per capita

Analysis of selected CE indicators of the V4 countries and Bulgaria

Country	Indicator	Mean±St.Dev.	Ν	Intercept	Slope	t-test	p-level
PC	GDP	14 560±2 183.4	10	1.27	0.00001	2.23	0.056
BG	Cir.mat. use rate	1.47±0.1	10				
ck	GDP	21 360±1 192.8	10	0.01	0.00005	3 63	0.007
	Cir.mat. use rate	2.02±0.1	10 0.91		0.00005	5.05	0.007
C7	GDP	25 850±2 962.5	10	2 / 1	-0.000005	-0.72	0.490
02	Cir.mat. use rate	2.29±0.1	10	2.41			
GDP		20 360±2 390.4	10	2 17	0.00004	1 57	0 155
110	Cir.mat. use rate	2.44±0.2	10	5.17	-0.00004	-1.57	0.155
DI	GDP	20 340±2 697.8	10	2.13	0.00002	4.83	0.001
ΓL	Cir.mat. use rate	2.61±0.1	10				

 Table 4. Results of simple linear regression analysis –GDP per capita and indicator 2



Country	R	R ²		
SK	0,79	62%		
PL	0,86	74%		

CONCLUSION



Perception of CE

More precise essence of CE concept is still absent

Indicators of CE

Countries with higher private investment achieve higher performance. Investments in tech, infrastructure and innovation in CE areas can led to more efficient use of resource etc.

Indicators of CE

5

Countries with higher GDP achieve a higher circular material use rate. It supports an increase in the share of material recycled and fed back into the economy



Limitations and future?

a larger sample of respondents, searching for the reasons for the observed consequences, expanding the analysis to more EU countries

THANKS FOR YOUR ATTENTION!



Department of Economics, Management and Business Department of Mathematics and Descriptive Geometry Faculty of Wood Sciences and Technology Technical University in Zvolen Ing. Petra Lesníková, PhD. lesnikova@tuzvo.sk

prof. Marek Potkány, PhD. Mgr. Jarmila Schmidtová, PhD. Ing. Mária Osvaldová potkany@tuzvo.sk schmidtova@tuzvo.sk osvaldovamaria @gmail.com