CEST 2023

18th International Conference on Environmental Science and Technology

Athens, Greece, 30 August to 2 September 2023

Competencies of the Young Generation Regarding the Circular Economy

KUPCZYK T.[1]

[1]General Tadeusz Kosciuszko Military University of Land Forces, Czajkowskiego 109, Wroclaw, Poland

*corresponding author: Teresa Kupczyk
e-mail: teresa.kupczyk@awl.edu.pl

Abstract The main objective of the research was to establish the competences possessed by the younger generation (according to self-assessment) regarding the circular economy. The diagnosis of competences required a survey, based on a proprietary questionnaire. Individuals for the study were selected at random. The sampling frame was a list from the database of the Military Complementary Headquarters, prepared for the purpose of classification for military service. In the end, 2234 people responded to the survey questions. The surveyed representatives of the younger generation have little competence in the circular economy and are aware of it. It turned out that the higher the representatives of the young generation rate their competence in the circular economy, the higher they have (according to the self-assessment) a willingness to travel abroad for work, have a greater willingness to work on a temporary basis, have greater digital competence, work and career are of higher value to them, care more about the environment, expect more mentor support at work and have higher leadership skills.

Keywords: competence, circular economy, young generation.

1. Introduction

Progressive environmental degradation, climate change, increased pollution and growing problems with access to depleting raw materials have led to a widespread global view that natural resources should be used more efficiently and sustainably (Cullen, 2017). Indeed, a development trajectory based on resource efficiency could reduce natural resource consumption (excluding water) by 28%, while reducing greenhouse gas emissions by 72% (de Wit, Hoogzaad, Ramkumar, Friedl, & Douma, 2018, pp. 6-12). Therefore, the concept of circular economy is being implemented, which is based on the principle of minimizing waste by reusing, remanufacturing and recycling products. Unfortunately the global economy is now only 7,2% circular. The extraction of global resources is increasing due to economic development in all parts of the world, making it important for people to think about reusing materials and moving towards a circular economy y (Fomina et al., 2018; Mishenin et al., 2018; Tetsman et al., 2017; Yevhen et al., 2018). Increasing material extraction between 2018 and 2023 has resulted in a decline in global circularity: from 9.1% in 2018 to 8.6% in 2020, and now to 7.2% in 2023. These data indicate that 92.8% of materials are wasted, lost or remain unavailable for reuse. (Circle Economy, 2023). A key role in the transition to a closed-loop economy can be played in organizations by representatives of the young generation, who are most likely to face the consequences of environmental devastation and lack of corporate sustainability in the future. However, there is a shortage of data indicating whether and what level of competence they have in the circular economy. Therefore, carrying out a study proved necessary. Their main objective was to analyze and diagnose the self-assessment of representatives of the young generation regarding their competence in the field of the closed loop economy, as well as its relationship with other competencies. The following research questions were formulated:

Q1. What level of competence does the young generation have (according to self-assessment) concerning the circular economy?

Q2. Are there significant correlations between the young generation's competences regarding the circular economy and their other competences?

2. Theoretical Background and Research theses

The circular economy is a system that is capable of reproducing in the life cycle of production and consumption waste that can then serve as primary raw materials or be reused in the production process (Galvão, de Nadae, Clemente, Chinen, Monteiro de Carvalho, 2018, s. 79). The transition to a more circular economy can bring many benefits korzyści (Tunn; Bocken, van den Hende, Schoormans, 2019; Shpak, Kuzmin; Melnyk, Ruda, Sroka 2020). It can, for example, increase competitiveness, stimulate innovation, boost economic growth and create jobs. In the European Union alone, 700 000 jobs could be created by 2030 (European Parliament, 2021). This is important for many countries, such as Poland, where only 10.2% of the resources used are reintroduced into the economy after use (The Circularity GAP Report Poland, 2023). This over-consumption may jeopardize the quality of life of Poland's young generation in the future and their chances of sustainable development. From this

perspective, more and more business entities in Poland are beginning to take action in these areas and join in the creation of the circular economy (Bukowski, Sapota and Szydło, 2021, p. 3).

Poland has the power to transform its economy: by nearly doubling its circularity (The Circularity GAP Report Poland, 2023). Moving away from linear forms of production most often leads to the development of new core competencies across the value chain, and ultimately to superior performance that reduces costs, improves efficiency, promotes brands, reduces risk, and develops new products (Dezi, Hysa, Calabrese, Mercuri, 2022).

Despite this, there are still numerous companies that see circular strategies as something that is not applicable to them or too costly and risky to implement (Cristoni, Tonelli, 2018). One reason for this approach is the lack of competence regarding the circular economy. Admittedly, this subject matter is constantly included in teaching at university, city and national level (Ellen MacArthur Foundation, 2021). An example of such an initiative is, for example, the Zero Waste Scotland programme (Zero Waste Scotland, 2023). However, the level of competence in this area, as well as the quantity and quality of training offered, is insufficient (Ellen MacArthur Foundation, 2021). This is particularly true for the younger generation, who need to acquire the necessary competences in order to engage in the circular economy. The international project "Cescy" identifies key competences of the younger generation that are relevant for the circular economy, such as leadership and working in teams, collaboration, critical thinking, systems thinking, design thinking (CESCY, 2022, 13-15).

However, the analysis of the above studies indicates that still the level of competence possessed, especially by the young generation, regarding the circular economy is unsatisfactory.

The author formulated the following theses:
T1. The level of possessed competencies of the young generation regarding the closed loop economy is not high.
T2. There are statistically significant relationships between the competencies of the young generation, regarding the closed loop economy, and other competencies.

3. Materials and methods

3.1. Sample and Data Collection

The sample group consisted of 2234 people, representing the young generation. Individuals for the study were selected at random from the database of the Military Complementary Headquarters, prepared for the purpose of classification for military service. 60% of the respondents were from medium-sized towns, 22% from rural areas, 11% from small towns and 6% from large cities.

3.2. Measures and Variables Definitions

It was decided to determine the level of competence possessed by the young generation based on self-assessment. The usefulness of self-assessment in the process of identifying qualities is indicated by numerous authors, according to which a person generally knows what qualities/competencies he possesses (Cattell, 1957; Costa & McCrae, 2008). The level of competence possessed by the young generation, particularly regarding the circular economy, was determined by self-assessment using a seven-point Likert scale from 1 to 7, where 1 - very low, 7 - very high. The research carried out required terminological arrangements for concepts such as young generation, competence and the circular economy. In the research, these were defined as follows:
- Young generation is Generation Z (born between 1990 and 1999) and Generation 2000+ (born since 2000).
- Competencies are motives, traits, self-concepts, attitudes or values, content knowledge, or cognitive or behavioral skills (Spencer, Spencer, 1993:4).
- The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible (European Parliament 2021).

3.3. Data analysis

Quantitative and qualitative research was conducted using a self-administered survey questionnaire. Relationships between variables were established using the Mann-Whitney U test, Kruskal-Wallis test, Spearman's linear correlation coefficient and Jonckheere-Terpstra trend test. A post hoc analysis was also performed using the Dunn test with Bonferroni correction. A value of 0.05 was used as the level of significance (indicated * $p<0.05$; ** $p<0.01$; *** $p<0.001$). A reliability check was undertaken for the scales in the questions from the survey questionnaire, which describe the consistency, reliability and reproducibility of the measurement results. The Cronbach's a-Cronbach's level for the questions diagnosing competences, concerning the circular economy, was 0.887, indicating high reliability of the scales used in the questionnaire. Calculations were performed, using the statistical programme R ver. 3.6.0.

4. Results

The young generation, according to the self-assessment, is not very competent regarding the circular economy. About a quarter of respondents (24%) rated these competencies as not very high, 22% as high, 17% as very high. The average level of these competencies on a scale of 1-7 was 4.55 (standard deviation 1.61). Based on the Spearman correlation coefficient, the following statistically significant correlations between variables were found.
It turned out that the higher the representatives of the younger generation rate their competence regarding the circular economy, the:
- they have a greater willingness to travel abroad for work ($p<0,001$, $r=0,35$);
- have a greater willingness to work temporarily ($p<0,001$, $r=0,34$);
- have greater digital competence ($p<0,001$, $r=0,31$);
- work ($p<0.001$, $r=0.30$) and career ($p<0.001$, $r=0.27$) are of higher value to them;
- they care more about the environment ($p<0.001$, $r=0.27$);
- are more likely to expect mentor support at work ($p<0.001$, $r=0.25$);
- have higher leadership skills ($p<0.001$, $r=0.22$).

These relationships are not strong, but they cannot be underestimated, especially in the context of the Fourth Industrial Revolution taking place.

4. Conclusions

The empirical exploration carried out indicates that the level of competence possessed by the young generation regarding the circular economy (according to self-assessment) is not high and they are aware of this. Therefore, more intensive efforts should be made to raise the level of these competencies in the process of education and their development in organizations. The identified statistically significant relationships between the variables indicate that the higher the representatives of the young generation rate their competencies in terms of the circular economy, the higher their willingness to travel abroad for work, the higher their willingness to work on a temporary basis, the higher their digital competence, the higher their work and career value, the more they care about the environment, the more they expect mentor support at work and have higher leadership skills. These correlations are not strong, but they cannot be underestimated. The main limitations of the presented study are due to the methodology adopted, based on a self-assessment of one's competence, which by definition is subjective. The results of the research carried out can be used in the management of the human resources of the younger generation, geared towards sustainability and a circular economy, particularly in terms of Economy 4.0.

References

Bukowski H., Sapota A.,Szydło J. (2021), Circular business opportunities in Poland. Prospects for Dutch entrepreneurs 2021. Netherlands Enterprise Agency, The Hague. https://www.rvo.nl/sites/default/files/2021/04/Circular-opportunities-in-Poland-2.pdf

Costa P. T., Jr., & McCrae R. R. (2008), The Revised NEO Personality Inventory (NEO-PI-R). In G. J. Boyle, G. Matthews, & D. H. Saklofske (Eds.), The SAGE handbook of personality theory and assessment, Vol. 2. Personality measurement and testing (pp. 179–198). Sage Publications, Inc. https://doi.org/10.4135/9781849200479.n9

Cattell R.B. (1957), Personality and motivation structure and measurement, World Book, Yonkers-on-Hudson.

Circle Economy (2023), The Circularity Gap Report 2023 (pp. 1-64, Rep.). Amsterdam: Circle Economy, https://www.circularity-gap.world/2023

Corr P. J., & Matthews, G. (Eds.). (2009), The Cambridge handbook of personality psychology. Cambridge University Press, https://doi.org/10.1017/CBO9780511596544

Cristoni N., Tonelli M. (2018), Perceptions of Firms Participating in a Circular Economy, *European Journal of Sustainable Development*, **7** (4), doi:10.14207/ejsd.2018.v7n4p105

Cullen J. (2017), Circular Economy: Theoretical Benchmark or Perpetual Motion Machine? *Journal of Industrial Ecology*, **21**, (3), 483-486.

De Wit, M., Hoogzaad J., Ramkumar S., Friedl H., I Douma A. (2018), The circularity gap report. An analysis of the circular state of the global economy. *Circle Economy. Shifting Paradigms*.

Dezi L., Hysa X., Calabrese M., Mercuri F. (2022), Open Total Quality Management in the Circular Economy age: a social enterprise perspective through the case of Patagonia, *Total Quality Management & Business Excellence*, DOI: 10.1080/14783363.2022.2051698

Dufourmont, J., & Goodwin Brown, E. (2020). Jobs & skills in the circular economy. State of Play and Future Pathways. Circle Economy, https://www.circle-economy.com/news/launch-ofthe-circular-jobs-initiative

Ellen MacArthur Foundation (2021). What is a Circular Economy? https://www.ellenmacarthurfoundation.org/circular-economy/concept

Ellen MacArthur Fundation (2021a), The circular economy in higher education, LRN-0026-09-21 C 15-10-21.pdf

European Parliament (2021), European Parliament resolution of 10 February 2021 on the New Circular Economy Action Plan (2020/2077(INI)), https://www.europarl.europa.eu/doceo/document/TA-9-2021-0040_EN.html

Fomina, A. V., Berduygina, O. N., & Shatsky, A. A. (2018). Industrial cooperation and its influence on sustainable economic growth. *Entrepreneurship and Sustainability Issues*, 5(3). doi: 10.9770/jesi.2018.5.3(4).

Galvão G.D.A., de Nadae J., Clemente D.H., Chinen G., Monteiro de Carvalho M. (2018), Circular Economy: Overview of Barriers, *Procedia CIRP*, Vol. **73**, 79-85.

Khazan O. (2022), My Personality Transplant. *The Atlantic*. 329, (2).

Mishenin, Y., Koblianska, I., Medvid, V., & Maistrenko, Y. (2018). Sustainable regional development policy formation: role of industrial ecology and logistics. *Entrepreneurship and Sustainability Issues*, 6(1). doi: 10.9770/jesi.2018. 6.1(20).

Shpak N., Kuzmin O., Melnyk O., Ruda M., Sroka W. (2020). Implementation of a Circular Economy in Ukraine: The Context of European Integration, *Resources*, **9** (8): 96, doi:10.3390/resources9080096. ISSN 2079-9276.

Sedikides C. (1993), Assessment, enhancement, and verification determinants of the self-evaluation process, *Journal of Personality and Social Psychology*, **65**(2), 317–338, https://doi.org/10.1037/0022-3514.65.2.317

Sedikides C., Strube M.J. (1997), Self-Evaluation: To Thine Own Self Be Good, To Thine Own Self Be Sure, To Thine Own Self Be True, and To Thine Own Self be Better, *Advances in Experimental Social Psychology,* **29,** 209-269, https://doi.org/10.1016/S0065-2601(08)60018-0

Spencer, L.M. Jr., Spencer, S.M. (1993), Competencies at work: Models for superior performance, John Wiley & Sons, New York.

The Circularity GAP Report Poland (2023), Amsterdam: Circle Economy, https://www.circularity-gap.world/poland

Tunn, V. S. C.; Bocken, N. M. P.; van den Hende, E. A.; Schoormans, J. P. L. (2019), Business models for sustainable consumption in the circular economy: An expert study, *Journal of Cleaner Production*, **212**, 324–333, doi:10.1016/j.jclepro.2018.11.290. ISSN 0959-6526. S2CID 158627557.

Yevhen, M., Koblianska, I., Medvin, V., & Maistrenko, Y. (2018). Sustainable regional development policy formation: role of industrial ecology and logistics. Entrepreneurship and Sustainability Issues, 6(1). doi: 10.9770/jesi.2018. 6.1(20).

Zero Waste Scotland (2023), Circular economy in education, https://www.zerowastescotland.org.uk/resources/circular-economy-education