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CIRCULAR ECONOMY AS AN ANTI-CRISIS METHOD FOR GLOBAL ECONOMY RECOVERY UNDER COVID-19: EMPLOYMENT AND TAX SHIFT EFFECT*

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Abstract

The proliferation of plastic waste and the pollution of the world's waterways before the Covid-19 pandemic have caused serious concern in an increasing part of the world's population. At the same time, politicians, companies and international organizations, such as the United Nations, urged action. Some national and local authorities have introduced taxes and bans on disposable plastic (although not all have met their obligations). Large companies have invested in more environmentally friendly packaging.

Keywords: COVID-19, circular economy, employment

1. Introduction

How much additional plastic waste was generated during the crisis? One of the most important lessons is ecological. The coronavirus pandemic has demonstrated nature's amazing ability to self-repair (GreenEcoNet, 2020). In Venice, in the absence of tourists and through quarantine, the canals suddenly became unprecedentedly clean and transparent, something the city's residents had never seen. Reusable packaging is a critical part of the solution for achieving a circular economy (Capello, 2020).

According to the Chinese Ministry of Ecology and Environment, at the height of the epidemic, hospitals in Wuhan produced more than 240 tons of waste per day, compared to the usual 40 tons. In China, the daily production of face masks rose to 116 million in

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February, which is 12 times more than the previous month. During the peak of the outbreak, hundreds of tons of discarded masks accumulated in public containers alone every day; it is impossible to say how much was thrown into household waste systems (Alkin, 2020).

United States Through the Covid-19 could accumulate an annual amount of medical waste in just two months. In the United States, waste collection has been stopped altogether in many places, including Miami-Dade and Los Angeles (Hew, 2020).

United Kingdom. In the, the number of so-called unauthorized landfills – illegal dumping – increased by 300% during the pandemic. In some countries, companies developing innovative methods for recycling and reusing plastic waste have reported a reduction in the amount of plastic coming through waste streams, suggesting that the amount of plastic that is growing is falling into landfills or the environment (Hew, 2020).

The COVID-19 pandemic has provided us all with challenges not faced for a generation. Yet the current moment in time also provides a historic opportunity for the EU and its Member States to show its global leadership in addressing one of the biggest challenges of our time (WHO, 2020).

Reconstruction of industry will be implemented at the expense of adaptive quarantine and additional anti-crisis measures by the government in Ukraine. Crisis time should be used to prepare the conditions for growth by saturating the sector with equipment for the transition to production from higher added value, development of industrial parks to attract investment, promoting the development of a circular economy.

In Ukraine Framework bill "On waste management" 2207-1d was accepted. While the primary concern for all of us during these times is the health and safety of our communities, COVID-19 should not become an excuse to pollute or roll back environmental policies.

The main objective of this study is to analyze the circular economy as an anti-crisis method for global economy recovery under COVID-19: employment and tax shift effect. The lack of progress in the area of environmental fiscal reform may be the result of a number of obstacles to the introduction of environmental taxation. In its review of tax reforms in Member States in 2015, the European Commission refers to the following three key barriers:

- the potentially regressive nature of environmental taxes and possible related problems with equity;
- potentially harmful impact on the competitiveness of the relevant sectors;
- administrative and executive costs to increase these taxes.

The Commission, however, proposes successful implementation strategies, namely transparency and early involvement of those affected by the tax, the gradual introduction of a tax according to a pre-announced schedule and the introduction of such tax measures as part of a broader policy package aimed at achieving a specific environmental and circular goal.

The European Commission's analysis also suggests that higher energy taxes (a form of environmental tax) offset by lower labor taxes may actually increase competitiveness. However, administrative and enforcement costs must be proportionate to the political and environmental objectives of the tax. Other studies also suggest that any potentially negative impact of environmental taxes can be reduced or addressed through careful design and implementation of tax adjustments (Matviychuk-Soskina et al., 2019).

Another factor limiting changes in relative tax levels is the high level of political attention that is generated by any changes in a country's tax system. This can complicate any change and slow down the pace of change (1). The political difficulties of modifying the fiscal system are reflected in a recent study by the European Commission, which assessed the EU's potential for fiscal reform in different policy acceptance scenarios in different Member States.

The lack of policies that would facilitate the transition of the tax base from labor to environmentally harmful goods and practices in recent years, as well as the lack of plans of the vast majority of Member States to implement these changes makes it unlikely to achieve the 2020 target.

$$TaxFmax=F\{\downarrow Ltax;\uparrow Rtax;\uparrow Ruse;\uparrow EJ\} \quad (1)$$

2. Results and discussion

In general, the greening of the economy through the analysis of indicators that characterize the circular economy is emulated using a comprehensive economic and mathematical modeling. Thus, the level of use of circular material and the level of employment as of 2017 established a direct weak positive relationship (r=0.17). It is expected that reuse and recycling will remain the least geographically concentrated with subsequent closed-loop recycling. With regard to occupations involved in the circular economy, the available data suggest that waste and recycling tend to require a relatively high share of low-paid occupations. Repair measures require a relatively average employment of mostly skilled workers.

Employment in the bioprocessing sector is likely to offer a very wide range of occupations with low to high qualification requirements, ranging from factory and agricultural development, growing and harvesting, transportation, distribution and storage of raw materials, plant design, deployment, maintenance and repair by higher qualification in the field of development, testing and marketing. All this together indicates the much-needed diversification of circular activities to ensure the maximum necessary communication.

Analyzing the interdependence between the level of vacancies and x_1 – the level of e-waste recycling, x_2 – the level of recycling of household waste, we can say with confidence that the highest value of the vacancy is provided at maximum values of *e*-waste recycling and recycling (Fig. 1A). But the most illustrative is Fig. 1(B), which shows the interaction between the level of use of circular material, the level of recycling of all waste, except for basic mineral waste and the level of vacancies. After all, at the highest values of the level of use of circular material, the level of processing of all waste, except for basic mineral waste, the maximum number of vacancies is provided. This fact proves the concept of the global circular economy – the introduction of which is accompanied by an increase in employment and jobs.

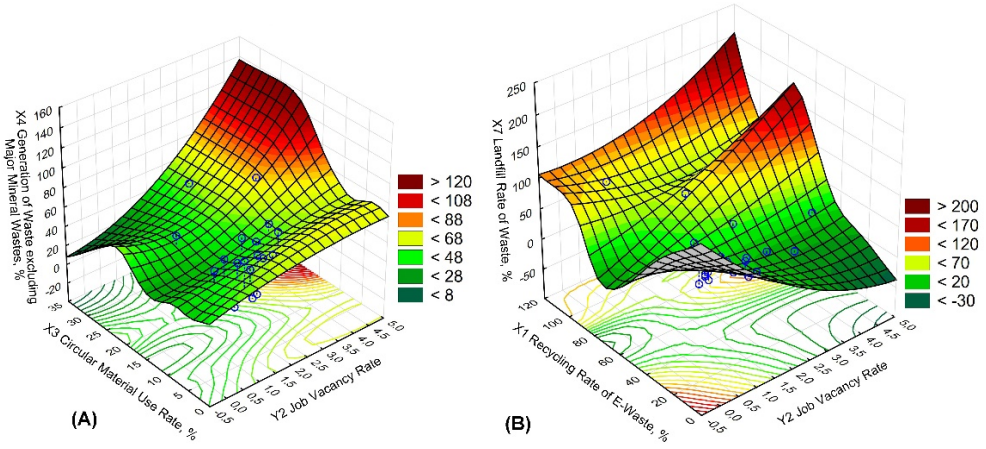

Fig. 1. Polyvariance assessment of inclusiveness and circularity: the relationship between the levels of vacancies, recycling of electronic waste, recycling of household waste

The relationship between the level of vacancies and the level of recycling of plastic and wood packaging is also high across the plane, and the maximum value at levels above the average recycling of wood packaging and the maximum value of processing of plastic packaging (Fig. 2). The plane on the graph is not homogeneous and reflects two peak points

at which the maximum level of jobs will be provided with the maximum reduction of landfills (i.e. recycling will take place), in particular the recycling of *e*-waste.

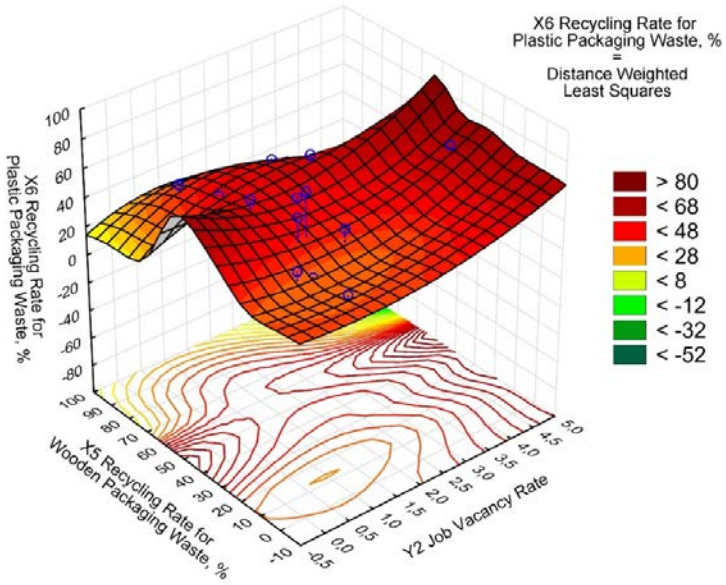

Fig. 2. The relationship between the level of vacancies and the level of recycling of various wastes

To establish the impact and assess the internal relationship between the characteristic indicators that reflect the state of the circular economy (level of *e*-waste recycling, level of household waste recycling, level of use of circular material, level of recycling of all waste except basic mineral waste, level of wood waste recycling , the level of landfill generation) according to Eurostat (Table 1), which most clearly reflects the above indicators, given their feasibility in accordance with the adopted and improved EU package for the implementation of the circular economy.

Table 1. Regression between the types of product processing and the level of employment

	b*	***Std. Err.***	***b***	***Std. Err.***	***t(18)***	***p-value***
Other factors not taken into account			60.08	27.67	2.17	0.04
Rate of electronic waste recycling	0.35	0.25	0.41867	0.30232	1.38487	0.183019
Rate of recycling waste	0.07	0.26	0.24882	0.90526	0.27486	0.786550
Rate of use of circular material	–0.28	0.23	–0.38353	0.31114	–1.23265	0.233564
Rate of recycling of all waste, except for basic mineral waste	–0.14	0.23	–0.12533	0.20384	–0.61485	0.546347
Rate of recycling of wooden packaging	–0.07	0.26	–0.09535	0.35857	–0.26593	0.793315

To understand whether such growth implies a general expansion of employment, in particular due to the diversification of the employment structure, we have reflected this in the context of extrapolating the variance of the employment rate across the regional dimension. It has been found that job creation in a growing circular economy can account for only a very small share of the existing labor supply in regions with high unemployment, so much less often this growth has had an impact on the local labor market. The growth of the circular

economy in its transformation period can create a wide range of employment opportunities that directly respond to the challenges in the following ways:

- regional differences in unemployment can be reduced in general due to the geographical expansion of opportunities (local and regional initiatives);
- professional mismatch can be reduced through new opportunities at all skill levels in newly modified value-added circular chains;
- the circular economy can also help compensate for the disappearance of mid-level occupations (according to vocational education).

The decline in circular jobs after 2008 is largely due to a significant decline in indirect circular jobs that support such projects. Such indirect circular jobs include employment in educational and governmental structures, institutions, and other service-related services that support the circular economy.

Today, about two-thirds of directly circular jobs are the main strategies of the circular economy. Thus, the stage of "preservation and expansion of what has already been done" has become a link that accounts for more than half of the directly circular jobs, which provide the main strategies. Jobs presented by the strategy of "application of digital technologies" within the framework of circular tasks are the fastest growing area and with high potential in the future. These jobs provide a digital infrastructure for smart cities (circular cities, which will be described in the next section), the effective application of key activities and areas of innovation in the circular economy in the development of business smart projects.

If we analyze the indicators of recovery of material values in recent years (levels of processing of various types of waste), the employment indicators in the field of processing reflect a less optimistic nature. While the amount of recycled waste increased between 2010 and 2014 by 27 million tons or 7%, which led to an increase in the level of recycling from 53% to 55% (Fig. 2.14). In 2013, 190,222 EU-28 employees worked in the field of waste recycling. By the end of 2014, the EU-28 employed only 2,500 more people in this field, reflecting a 1.3% increase over almost 2 years. These figures are particularly important in view of the industry in which they are created, as well as based on the expected growth of employment in the recycling sector. However, these indicators do not include people working in the informal recovery sector (not statistically reflected). According to the EU, unofficial recycling can employ up to one million people in the field of waste reuse, so Fig. 3 reflects the relationship between the level of landfill growth and the level of employment, and clearly reflects the average feedback (r=–0.35). Conversely, employment in waste management has decreased. During the period from 2000 to 2014, employment decreased by 63 thousand (yes, employment in wastewater management decreased during this time by 10%).

The circular economy has the potential to create jobs, which confirms the obtained correlation coefficient (r=0.48), which indicates the existence of a medium positive direct relationship (close to high) between the selected indicators and the level of employment, as reuse and recycling is a platform and a platform for more intensive and creative involvement of labor, including the informal sector, than just the disposal of waste and unused products (Fig. 4). Thus, the results are in line with the 2020 Strategy for smart, sustainable and comprehensive growth, which aims at 75% employment between the ages of 20 and 64 by 2020. A total of 17.6 million additional jobs are needed to achieve this goal. Thus, the lion's share will fall on the processing of plastic waste, especially packaging, because the results of correlation analysis showed the importance of the level of processing of plastic packaging (r=0.40). In addition, the European Commission has set a priority in the EU Action Plan for the Circular Economy, namely the treatment of plastic residues.

Thus, we can distinguish four different categories of employment in the circular economy, namely: waste, recycling and wholesale of waste; repair works of retail trade in second-hand goods; leasing and leasing (reflects the concept of sharing). These categories, according to the European Commission, will create more than 1 million new jobs in the EU-

28 by 2030, and with further expansion of circular activities it is possible to reach as many as 3 million jobs by 2030. However, these jobs are likely to be created in countries with high levels of employment in waste management, namely Germany, the United Kingdom, Italy, France and Spain. That half of these new jobs will be created in Germany and the UK alone, and that most European countries will benefit from the full implementation of inclusive circular involvement in job creation, but research and discussion on working conditions and pay are important in such optimistic forecasts (Fig. 4) is hard and sometimes dirty work that has largely disappeared from Northern and Western Europe with the transfer and production capacity to Asia. According to research, most workers are mostly migrants with a minimum wage. Similar conditions exist at a textile processing plant in the United Kingdom, where clothing is sorted by type and wear. Some clothes are intended for resale in different parts of the world, some – the material will be removed for industrial rags or fiber reclamation, in addition – most of the workers are women and migrants, mostly from Eastern Europe. Such conditions cause various diseases.

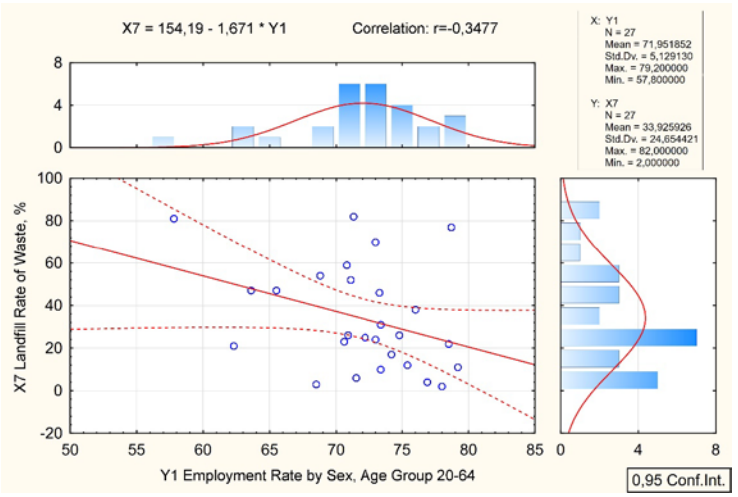

Fig. 3. The results of the correlation analysis between the level of employment and the level of landfill growth

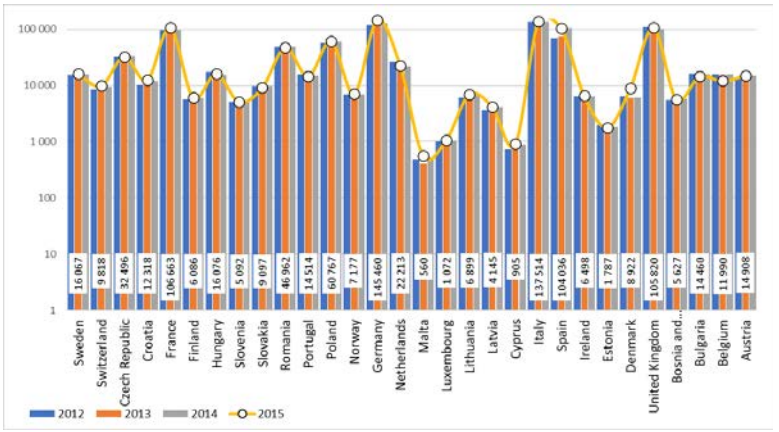

Fig. 4. Employment in the field of waste collection, treatment and disposal,and restoration of materials by EU countries

In addition, there is a significant amount of informal processing, not only in Eastern and Southern Europe, but also in Northern Europe, for example, in the processing of bottles in Germany and Denmark. Informal recyclers make a living by disposing of discarded items, streets, containers, and sometimes directly from generators. Then sell the collected materials to the following links of circular chains. Typically, these informal waste management activities are related to the "South" of the global economic arena (Ghisellini et al., 2016). For example, in Latin America alone, an estimated 4 million workers make a living by collecting, transporting, and sorting recyclable products. According to a UN study, it is estimated that 25% -50% of all waste recycled in Latin America and the Caribbean is recycled by unofficial "pickers". The contribution of the informal sector to processing is reflected in the European Circular Economy Plan. However, a number of studies have shown that unofficial processors in Europe kept many tons of waste in landfills (r=–0.35). Fig. 5. confirms that employment growth will decrease as landfill formation decreases, which in turn reflects the inclusive component of the global inclusive circular economy.

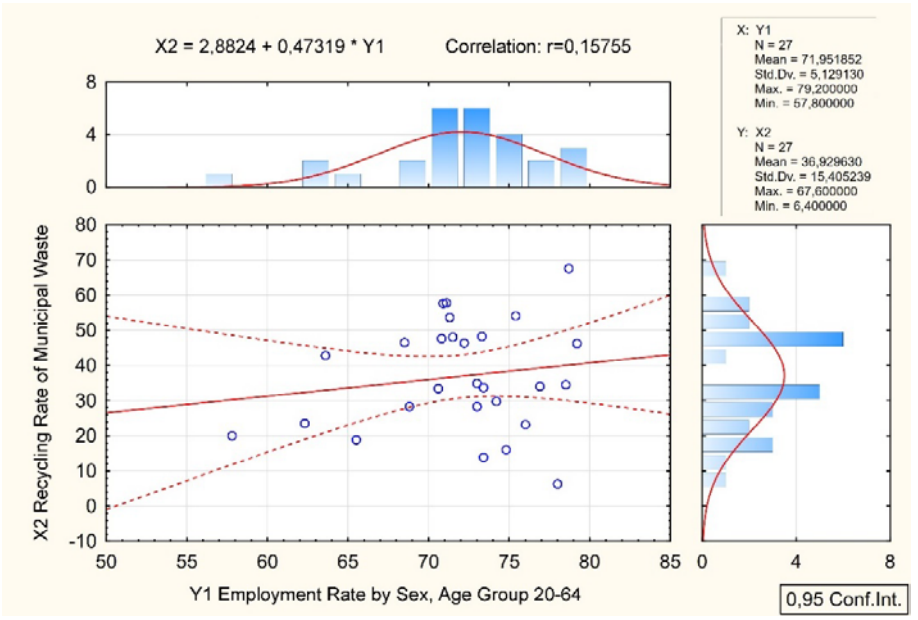

Fig. 5. The results of the correlation analysis between the level of employment and the level of household waste recycling

On the other hand, these informal processors make a significant contribution to the circular economy. For example, a recent WTO study found that a significant number of used beverage cans are collected in landfills, especially in countries such as Romania, Greece and Hungary (Geissdoerfer et al., 2017). According to the study, each individual as an informal worker gains an average of 1.6 kg of used cans per day. Sometimes the earnings of informal processors often exceed the minimum wage. But in parallel with the benefits, they are exposed to dangerous effects on health and safety, as they work without protective clothing. This informal processing is mainly carried out by vulnerable groups: migrants or refugees, often without official identity cards; and/or young or elderly people; and/or homeless. Therefore, taking into account such data, the low correlation coefficient between the studied indicators becomes absolutely obvious, for example, (Fig. 5) r=0.15 reflects a positive low relationship between the level of employment in the EU and the level of household waste recycling.

According to the results of the matrix of significant pairwise correlations of the levels of processing of different types of products and the level of employment (Table 2) the level of use of circular material and the level of growth of landfills and unused products shows r=0.28, which is positive low and close to average.

Table 2. Matrix of significant pairwise correlations of indicators of processing levels of different types of products and employment level

	Rate of electronic waste recycling	***Rate of recycling waste***	***Rate of use of circular material***	***Rate of recycling of all waste, except for basic mineral waste***	***Rate of recycling of wooden packaging***	***Rate of landfills***
Rate of electronic waste recycling	1					
Rate of recycling waste	0.19	1				
Rate of use of circular material	0.08	0.23	1			
Rate of recycling of all waste, except for basic mineral waste	-0.17	-0.17	-0.20	1		
Rate of recycling of wooden packaging	-0.26	-0.26	-0.05	-0.27	1	
Rate of landfills	**-0.44**	0.29	**0.28**	-0.09	**0.36**	1

Significant pairwise correlations between the indicators of recycling of wood products and packaging and the level of employment (Table 2) shows r=0.36, which is a positive average in terms of significance. The adopted EU Circular Plan for Economic Reform leads to a further reduction of landfills, which will increase waste incineration and recycling. This in turn will significantly change employment in the waste sector. Employment in the waste management sector is growing and is unevenly distributed among countries. Most jobs in the recycling sector are in Germany, the United Kingdom, Italy, France and Spain. It is assumed that the jobs created in the transition to a circular economy will be mainly useful to those countries where this process will take place (Fig. 4).

Thus, based on the above, we can conclude that the circular economy, along with the obvious advantages, reflects certain challenges for the country:

- poorly equipped working conditions (processing plants in Northern and Central Europe);
- use of illegal migrant labor;
- low wages;
- informal sector (informal employment), which is reflected in real statistics, and as a result of the results of the study (it is absolutely possible a higher real correlation coefficient between the studied values).

Maximum closing of the cycle in value chains implies the need to include inclusive approaches to addressing the issue of employment, which will require maximum integration of all parts of the value chain. If any of the five stages – production, consumption, waste and recycling, innovation or investment – are not included, the circle is broken and the paradigm shift may not take place. Each stage in the value chain requires the involvement of stakeholders, including public authorities, university and research centers, business, NGOs and citizens (Geng et al., 2019). Each type of stakeholder should ideally be involved in the strategy, providing an inclusive approach, which means increasing convergence of the circular economy concept (Genoff, 2017).

- Belgium → Regional Program for Circular Economy 2016 – 2020 → Local and Regional (Brussels); (is a pioneer of the circular economy at the national level);
- Denmark → Circular Economy Strategy → national level;
- Finland → Circular Economy Roadmap for Päijät-Häm → regional level; Finnish Road Map of the Circular Economy 2016-2025 → national level;
- France → Circular Economy Plan for Paris → local level;
- Germany → Program of sustainable development and use of natural resources → national level;
- Greece → Transition to a circular economy model of sustainable production and consumption structure → regional level;
- Italy → Model for Italy – Towards a circular economy;
- Luxembourg → National Waste and Resources Management Plan → national level;
- Norway → Oslo Sustainable and Circular Consumption Strategy → local level;
- Poland → Road map – transformation in the direction of the circular economy → national level;
- Portugal → Road map of the circular city of Oslo 2030 → local;
- Slovenia → Strategy of transition to circular economy in Maribor → local;
- Spain → Extremadura 2030. Strategy for a green and circular economy. Extremadura Government Action Plan; promotion of circular economies in Catalonia → local and regional level;
- Netherlands → Circular Hague – transition to a stable economy; Rotterdam and the circular economy; Road map of the circular economy of the North Netherlands local and regional level;
- Great Britain – Road map of London; Scotland's circular strategy; circular Glasgow; circular Peterborough → local level.

3. Conclusions

The goal of this study was to calculate the hypothesis was confirmed in the correlation-regression analysis, the relationship and relationship between the level of employment and the level of vacancies as dependent variables and the level of *e*-waste recycling, the level of household waste recycling, the level of use of circular material, the level of recycling waste, the level of processing of wooden packaging, the level of formation of landfills, the level of processing of plastic packaging. It is proved that as of 2017 for the sample of 25 countries r_2=0.48 (where y_1 is the employment rate). The importance and significance of the level of recycling of plastic packaging (r=0.40), the level of recycling of electronic waste (r=0.33) and the level of use of circular material (r=0.36) were proved. An indicative additional argument in proving this hypothesis is that r=–0.35 for the indicator that reflects landfills and landfills, ie with their growth, employment will decrease. In the dependence analysis, the level of vacancies and proposed independent variables – (r=0.39).

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