

THE TRANSITION FROM LINEAR TO CIRCULAR ECONOMY (CONCEPT OF EFFICIENT WASTE MANAGEMENT)

Dr. sc. Miroslav Drljača¹

Abstract: *In producing products and providing services, natural material resources (raw materials) are used, beside other things. The level of development of technologies and the existing value systems influence the fact that such material resources are not always sufficiently exploited. Their better exploitation, or more efficient waste management, may bring economic and environmental benefits. This is important in circumstances of great demand for limited material resources. Better management of these resources in the liberal competitiveness market may be an advantage that makes a difference. Economy, since the primitive capital accumulation and industrial revolution, growing on the principle: “take, make, consume, discard” and presenting the so called “linear model” based on the assumption of boundlessness and easily available resources, must undergo serious transition. The process of transition from “linear” to “circular” economy is complex because it requires fulfilment of a series of assumptions: developed awareness, developed institutional framework, developed waste management infrastructure, knowledge and understanding, provision of necessary resources, continuity, scientific approach and a new view of the economic reality and future. The EU bureaucracy realized that the concept of “linear economy” endangers competitiveness of the EU. A value system has been accepted that starts from the position that a considerable progress in better material resource use is possible and that it may significantly contribute to competitiveness of the EU economy. It is therefore believed that moving from “linear” to the concept of “circular economy” is essential for realization of the program for successful exploitation of material resources in the framework of the Europe 2020 strategy. In this paper the author researches the transition process from “linear” to “circular” economy.*

Key words: *linear model, circular economy, waste management, the Europe 2020 strategy.*

JEL Classification: *Q53*

1. INTRODUCTION

Man as part of nature and nature as his original surroundings have been in constant interaction during evolution. Through this interaction humans ensured resources for life, reproduction, and thereby for their survival and development. By learning from nature and cumulating knowledge for generations, man has used material resources from the environment to an ever greater extent, and produced goods for his own use by applying various technologies created during the evolution. We may say that all objects, items and other things that surround us, originate in material resources from man's natural surroundings. One of the biggest discoveries man has made is that everything he needs may be produced using resources from that environment, provided he has mastered necessary technologies.

Through history, until very recently, resources have been believed to be unlimited. However, some resources are limited. A term “renewable” resources is often used, usually meaning solar energy, wind energy, water energy, etc. However, the term “renewable” is not entirely fitting. Namely, solar energy is emitted constantly, it does not get renewed. The same applies to wind energy. When we talk of water energy, it is renewable in proportion to renewal of water quantity in individual water courses.

Material resources drawn from nature, such as various minerals, are limited. Their use in production of goods for human use, beside consumption of the limited natural resources, has a

¹ Miroslav Drljača, Zračna luka Zagreb d.o.o., Zagreb, Hrvatska, E-mail: mdrljaca@zagreb-airport.hr

consequence in environmental aspects², some of which have adverse effects on the environment³. Availability and usability of natural resources for creation of new value may be extended by applying the concept of circular economy.

2. TRANSITION FROM THE LINEAR CONCEPT TO CIRCULAR ECONOMY

There are at least three important tendencies presenting the limits to growth: 1) earth as a source of food and not renewable material resources; 2) ability of the environment to absorb waste⁴ and various emissions as a negative environmental aspect of production processes and 3) the urban way of life characterized by consumerism⁵. Disregard of these limitations endangers survival of people on Earth in the long run. In the short term it causes a series of problems of economic, environmental and political nature.

2.1. Concept of linear economy

In lower industrialisation stages of the today developed countries of the West, the still dominant concept of linear economy did not have serious limitations. Raw materials were easily available and cheap, technologies were improved and optimized and the concept of linear economy was the model of growth. This growth manifested in production growth, employment growth, profit growth, standard of living growth, growth of cities, growth of demand for all kinds of goods. In fact it is a vicious circle, the movement of which was cyclically harmed by hyper production crisis.

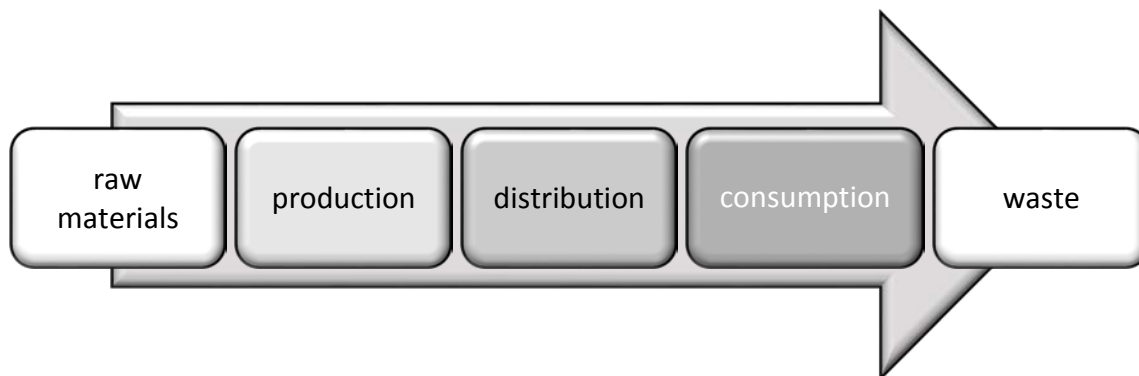


Figure 1. Phases of linear economy model

Source: Milan Krišto, „Kružna ekonomija za brži razvoj,“ Gospodarstvo i okoliš, Hrvatski poslovni savjet za održivi razvoj, Vol. 11, No. 41, Zagreb, 2015, p. 11.

Characteristic of the linear economy concept is that waste, as a side result of the production process, is discarded into the environment. The concept is based on the principle: “take, make, consume, discard” and it assumes boundlessness and easy availability of material resources (Figure 1).

² ISO 14001:2004 standard.

³ Ibid.

⁴ Waste means any substance or object which the holder discards or intends or is required to discard. Any other object or substance whose collection, transport and treatment are necessary for the purpose of protecting public interests is also considered as waste (the Act on Sustainable Waste Management, Official Gazette 94/13).

⁵ Cf. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers and Villiam W. Behrens III, *Granice rasta*, Stvarnost, Zagreb, 1974, pp. 163 – 164.

Table 1. Waste quantity in some EU and non EU countries in 2012

Country	Total waste (Tonne)	Waste structure (%)						
		Chemical & medical	Recyclable waste	Equipment	Animal & vegetal	Mixed ordinary	Common sludges	Mineral & solidified
EU 28	2.514.220.000	2,34	9,64	0,64	4,34	11,22	0,85	70,97
B&H	4.456.556	1,58	7,46	0,01	0,96	5,63	0,12	84,24
Monteneg.	385.507	3,17	2,58	0,64	0,37	0,32	0,00	92,92
Croatia	3.378.638	1,36	23,12	1,85	3,92	43,91	0,53	25,31
Macedon.	8.472.343	0,16	0,48	0,00	0,08	0,33	75,00	23,95
Slovenia	4.546.506	4,76	20,95	0,65	6,81	17,04	1,86	47,90
Serbia	55.002.574	0,12	0,49	0,01	0,33	0,32	0,00	98,73

Source: Own study based on EUROSTAT.

The majority of waste generated in the EU 28 in 2012 was mineral and solid waste, 70.97%, then general mixed waste, 11.22%, and the recyclable waste, 9.64%.

Among the analysed countries, Croatia has the biggest share of general mixed waste 43.91%, as well as mineral and solid waste 25.31%. A share of 23.12% of the total generated waste is suitable for recycling. The structure of total waste in Serbia is dominated by mineral and solid waste with 98.73%. Among the analysed countries the biggest share of recyclable waste is in Croatia 23.12% and Slovenia 20.95%, being more than double the average figures of the EU 28 that is 9.64%. Bosnia and Herzegovina has ca. 1 million tonnes more waste than Croatia, Macedonia has two times the quantity of Bosnia and Herzegovina and almost three times the quantity generated in Croatia, and two times the waste quantity in Slovenia. Serbia generates ca. 16 times more waste than Croatia, ca. 7 times more than Macedonia and ca. 14 times more than Bosnia and Herzegovina and Slovenia.

Table 2. Treatment of waste in some EU and non EU countries in 2012

Country	Total waste (Tonne)	Waste treatment structure (%)					
		Deposit onto or into land	Land treatment and release in water	Incineration /disposal	Incineration /energy recovery	Recovery other than energy recovery- Backfilling	Recovery other than energy recovery- Except backfilling
EU 28	138.320.000	42,28	6,03	1,58	4,39	9,28	36,44
Croatia	2.998.726	63,94	0,18	0,00	1,32	1,41	33,15
Macedonia	9.023.357	27,89	70,67	0,45	0,25	0,00	0,74
Slovenia	5.068.287	12,60	0,00	0,72	6,43	21,75	58,50
Serbia	55.022.643	98,36	0,11	0,00	0,09	0,00	1,44

Source: Own study based on EUROSTAT.

Approximately 42.28% of the total waste generated in 2012 in the EU 28 is disposed of on land surface or under the surface, 36.44% is used for other purposes excluding energy recovery and backfilling.

Incineration as a method of disposal is used for only 1.58% of the total EU 28 waste. In Croatia, 63.94% of the total waste quantity is discarded on the ground or under the ground, and in Serbia 98.35%. In Croatia, 33.15% is reused for other purposes than energy recovery and backfilling, and 1.44% in Serbia. Only 12.60% of waste in Slovenia is discarded on or under the ground surface. For energy recovery by waste incineration, Slovenia uses 6.43% of the waste, Croatia 1.32%, Serbia 0.09%, while the average of the EU 28 amounts to 4.39%. In Macedonia, the biggest share of waste, 70.67%, is discarded on the ground surface and in watercourses, and 98.56% is discarded on the ground surface and into watercourses or under the ground surface.

These data show differences in approach to waste management and indicate the conclusion that there is a significant unexploited reserve in the waste management in all analysed countries, and in the whole EU.

Such, relatively bad situation in waste management in the analysed countries, is a consequence of domination of the linear economy concept. However, this condition also presents a huge potential for leaving the linear economy concept.

The planet Earth is finite and has limitations. This means that an unlimited growth is not possible because the tendencies of world population increase and of industrial growth cause ever greater demand for material resources. Regardless of domination of the neoliberal concept in the global economy and „... neoliberal economic doctrine appearing in the economic theory in the last thirty years of the 20th century, as the answer and one of possible practical solutions of the then global economic stagnation following more than two decades of economic growth in the framework of Keynesian and Neo-Keynesian state capitalism and in the theory of the dominating neo-classical synthesis, ...“⁶, it may be stated that awareness of necessary transition and abandoning the liberal economy concept is getting stronger on the global level.

2.2. Transition of linear concept to circular economy

„Transition in the broader sense of the word means processes through which states and peoples try to achieve economic growth and development and to reach, in the sphere of social welfare, the developed world countries, generally the ones of North America and West Europe. Although the term is usually linked to the developing countries striving to realize the above mentioned goal, there is no reason why the transition as a phenomenon would refer exclusively to the underdeveloped world. Namely, rich states also try to continually achieve optimal conditions for social development and new, higher economic growth to the greatest possible extent, and thereby also a better quality, higher standard of living for their citizens. ... Here must be emphasized that some countries rejected transition in accordance with strict neoliberal rules, what led to interesting results, at the same time offering an alternative as a foundation for analysis and re-evaluation of neoliberal economic concept.“⁷

In searching for alternatives to strict rules of neoliberal economic concept, the need for faster abandonment of the neoliberal economic concept appears first. In searching for new solutions, the fact is ever more accepted that there are significant limitations in availability of valuable material resources as well as the fact that demands for environmental protection increase all the time, and that it is not possible to ignore these facts any more.

Transition regarded as an improvement process, presents abandonment of the linear economy concept on the one side, and on the other side it does not find a haven in a new concept until the last big economic, but also environmental crisis and climatic changes in 2008. At that time a new concept of the so called circular economy becomes more clearly visible. Circular economy does not represent exclusively an answer to economic crisis but requires a changed view of the social responsibility area, including sustainable development.

„The term *sustainable development* entered general terminology in the 80-ties of the 20th century in order to point at the link between development and environmental protection. ... It is defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. Sustainable development, environment quality and economic development became connected activities.“⁸

In explaining the term *circular economy* the meaning of the following word should be explained: Economy (*Greek: oikonomia, oikos*) household management, good husbandry, purposeful organization, efficient use of goods and power, economics, economic science, science of production organization under the principle: as great as possible success with as little as possible resources, achievement of goals with as little force as possible.⁹ It is also known as an economic system.

Further on, the meaning of the following word should be explained: Concept (*lat. conceptum, concipere*) conceive, understand, 1) plan, draft, sketch; 2) (*lat. conceptus*) term, ability to comprehend.¹⁰

⁶ Milovan Jovanović and Ivo Eškinja, „Neki aspekti neoliberalizma u svjetskom gospodarstvu,“ Zbornik Pravnog fakulteta Sveučilišta u Rijeci, Vol. 29, No. 2, Rijeka, 2008, pp. 941-958.

⁷ Ibid, p. 943.

⁸ Mladen Črnjar, *Ekonomika i politika zaštite okoliša*, Ekonomski fakultet Sveučilišta u Rijeci, Rijeka, 2002, p. 187.

⁹ Šime Anić, Nikola Klaić, Želimir Domović, *Rječnik stranih riječi*, Sani-Plus, Zagreb, 1998, p. 350.

¹⁰ Ibid, pp. 718-719.

Hence, it may be said that circular economy is a new revolutionary concept of the 21st century economy, presenting a good quality response to global environmental crisis and climatic changes. Circular economy is an essentially different approach to all economic processes, not only in the area of sustainable exploitation of material resources, but also in the area of social responsibility and more uniform development of economy. In this way the concept of linear economy is actually abandoned because it has become too expensive and unsustainable in the sense of increasing competitiveness in the long run.

The key assumption in transformation of linear to circular economy is a feedback circle that returns the collected and recycled waste into the production cycle as a valuable raw material. Depending on technological characteristics, a single type of waste may be recycled several times and reused in subsequent cycles of production processes.

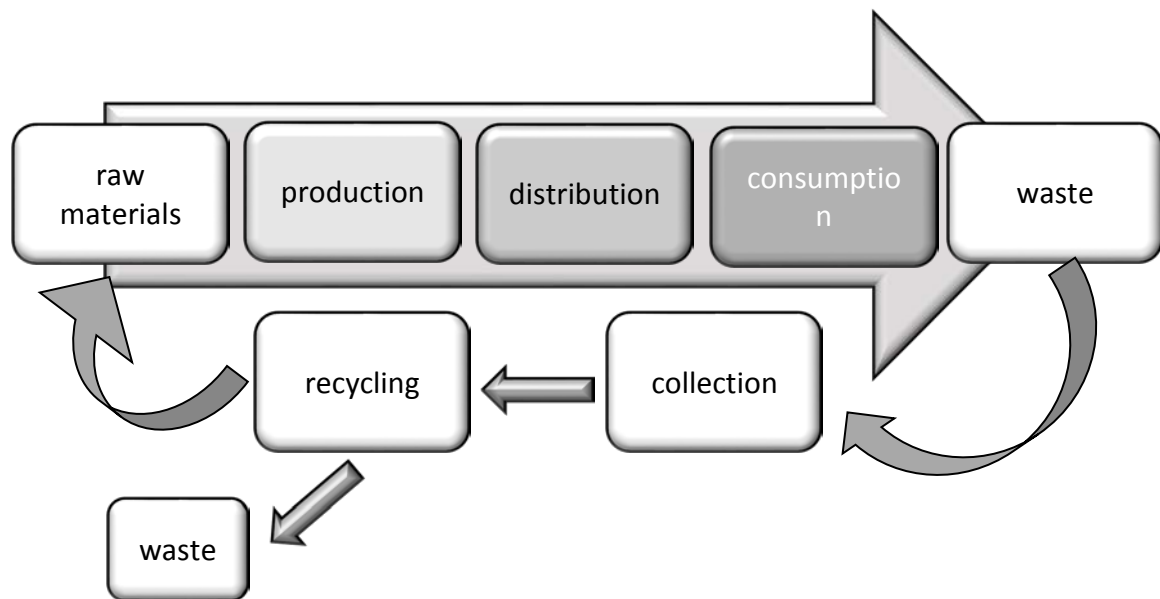


Figure 2. Feedback circle as an assumption for transforming linear to circular economy

Source: Own study.

The circular economy concept is based on collection and recycling of waste as an environmental aspect, which does not necessarily have an adverse impact on the environment any more, but is returned, through recycling, into the production process as a valuable material resource, i.e. raw material. Only a small amount of waste that may not be recycled is finally disposed of in an environmentally harmless way. Development of economy is based on this concept. The fundamental principle thereby is efficient use of material resources, waste collection, recycling and reuse in the production process.

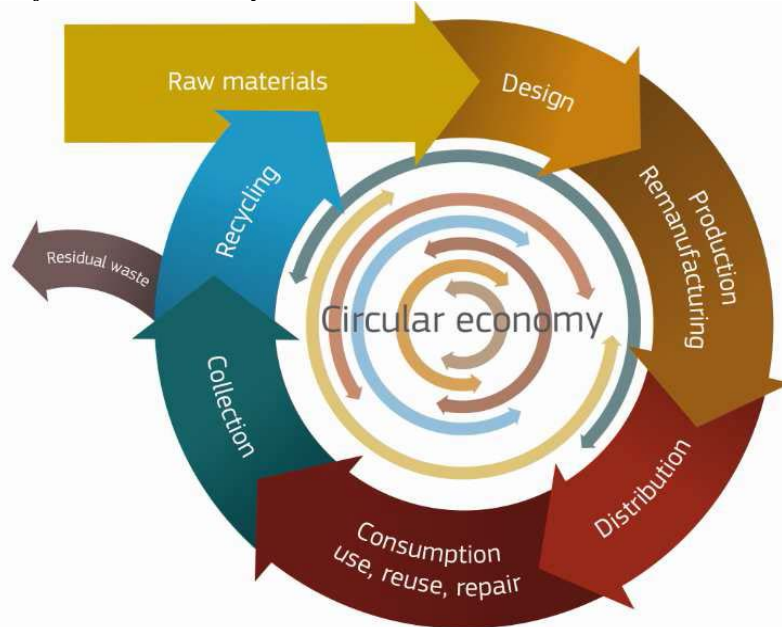
Circular economy follows the logic of circular movements in nature establishing the principle of waste reuse, including successful energy use. It is an approach that rationalises and enriches the relationship between production and consumption, since it returns the effects of consumption into the production process. By transferring non-hazardous waste as an output of a production process cycle into the next production process cycle, the waste ceases to be garbage polluting the environment and becomes a valuable material resource, i.e. raw material.¹¹ Production process continues in cycles with efficient use of material resources and protection of the environment. This means that in the circular economy system the added value of a product is kept longer in use, before it becomes waste. This happens at the end-of-life of a product when it continues to be used productively, as recycled waste, i.e. raw material, in the next cycle of the production process.

It should not be overlooked that some characteristics of linear economy remain present also in the circular economy. This primarily regards passing of raw material as a material resource through

¹¹ Cf. Zlatko Milanović, Sanja Radović and Vinko Vučić, *Otpad nije smeće*, Gospodarstvo i okoliš, Zagreb, 2002.

phases of production, distribution, consumption and waste generation. Linearity continues also in the phase of waste collection and recycling and re-inclusion in the new cycle of the production process. But, in the concept of circular economy, this linear flow becomes its integral part. Full understanding of the circular economy concept is possible if the view of the product is not limited solely to its useful life, but it takes the whole life cycle into account.

Figure 3. Phases of a circular economy model



Source: COM 398, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Towards a circular economy: A zero waste programme for Europe, Bruxelles, 25.9.2014, p. 5.

Circular economy is introduced as a new concept of waste management that emerged as one of reactions to economic and environmental crisis in 2008, relating to maximal exploitation of used material resources. The circular economy concept has become ever more present, even unavoidable, because it has been integrated in European regulations that have to be applied by all EU member and candidate states in such a way as to implement these regulations in their national institutional framework and to implement the concept in their national economies.

Abandonment of the linear economy concept and transition to the circular economy concept require changes of the value system:

- change of society organization;
- education;
- innovations in technology and other activities;
- creating corresponding material infrastructure;
- creating corresponding institutional framework;
- new design of products and business processes (production, procurement, management, etc.);
- preparing, implementing and developing new business and market models;
- developing waste management system;
- change in priorities and habits of consumers as well as development of new behaviour patterns;
- developing new methods for management of integrated systems;
- developing new financial products supporting the concept of circular economy;
- defining and communicating new policies.

3. EUROPE 2020 STRATEGY

EU decided to emerge stronger from the economic and financial crisis starting in 2008. The awareness prevailed that the economic reality runs faster than political, this being evident in manifestation of the global impact of the financial crisis. The fact was accepted that the increased economic interdependence also requires a political answer.¹² On the basis of such understanding the European Commission adopted the EUROPE 2020 Strategy in 2010.

As one of three basic development priorities of the EU ten-year development strategy (2010-2020) Europe 2020 proposes the following:

- sustainable growth, meaning promotion of more resource efficient economy, greener and more competitive;
- transition from, still dominant, linear to circular economy, an economic model that ensures sustainable management of material resources and extension of useful life of materials and products, and
- reduction of waste generation to the least possible level, not only waste generated in production processes, but systematically, during the entire life cycle of products and their components.

Implementation of effective use of resources is essential for transition to circular economy within the framework of the EUROPE 2020, strategy for smart and sustainable growth. Waste management policy contributes to this purpose in a way that supports reduction of waste generation by developing a functional waste management system, with the aim to use waste as a valuable material resource.

Increasing the linkage between economic growth, resource exploitation and its effects opens a possibility of continuous sustainable growth. Strengthening of efforts to increase resource productivity will run parallel to the existing targets of the EU policies such as carbon dioxide emission reduction, increase of energy efficiency, ensuring approach to raw materials with simultaneous reduction of environmental impacts and greenhouse gas emissions.

The EU should define where it wants to be in 2020. To this effect, the European Commission proposes the following main EU targets:

- 75 % of the population aged 20-64 should be employed;
- 3% of the EU's GDP should be invested in research and development;
- the "20/20/20" climatic-energy targets should be met (including up to 30% reduction of emissions if circumstances allow);¹³
- the share of school dropouts should be under 10 % and at least 40 % of the younger population should complete third level education;
- 20 million fewer people should be living below the poverty line.

These targets are interlinked and crucial for general success of the EU. In order to ensure that every member state adjusts the EUROPE 2020 strategy to its specific situation, the Commission proposes that the EU targets be translated into national targets.

The following priorities should present the foundation of the EUROPE 2020:

- *smart growth* – development of economy based on knowledge and innovation;
- *sustainable growth* – promoting greener, more competitive economy based on efficient use of resources;
- *inclusive growth* – fostering economy of high employment rate, with the result of economic, social and territorial cohesion.

These three priorities are mutually supplementing: they offer a vision of European social market economy for the 21st century.

¹² Cf. EUROPE 2020, European strategy for smart, sustainable and inclusive growth, European Commission, Bruxelles, 2010.

¹³ Reduce greenhouse gas emission for at least 20% compared with 1990 levels, i.e. for 30% if conditions allow; increase the share of renewable energy sources in the final energy consumption to 20%; and increase energy efficiency for 20%.

4. STRATEGY OF THE REPUBLIC OF CROATIA¹⁴

Waste management is based on respecting principles of environmental protection prescribed by the law regulating environmental protection and the *acquis communautaire* of the EU, principles of international environmental protection law and scientific knowledge, best global practices and professional codes, and particularly on the following principles:

- *the polluter-pays principle* – the waste producer, the previous waste holder or the current waste holder shall bear the costs of waste management measures and shall be financially responsible for the implementation of remediation measures to be taken due to damage caused or likely to be caused by waste;¹⁵
- *the principle of proximity* – waste shall be treated in the appropriate facility or installation nearest to its source, taking into account cost-effectiveness and environmental soundness;
- *the principle of self-sufficiency* – waste shall be managed in a self-sufficient manner and shall enable independent attainment of national level targets, taking into account the geographical circumstances or the need for specialised installations for special categories of waste;
- *the principle of traceability* – tracing waste back to its source by reference to the product, packaging, and the producer of that product, including possession of the waste and its treatment.

Waste management in the Republic of Croatia is governed by the Act on Sustainable Waste Management (O.G. 94/13). This Act defines measures for prevention or reduction of negative impacts of waste on human health and the environment in such a way as to reduce quantities of waste at its source and/or production, and systematizes waste management without application of procedures risky to human health and the environment, while exploiting valuable waste features.

Provisions of this Act define the waste management system, including the priority order in waste management, principles, targets and waste management methods, strategic and programme documents in waste management, authorities and responsibilities in waste management, locations and facilities for waste management, activities of waste management, transboundary movements of waste, waste management information system and the administrative and inspection supervision over waste management.

The producer of a product generating waste, i.e. the waste producer bears the costs of waste management measures for this waste. In order to prevent waste generation and implement waste management regulations and policies the following waste management priority order is applied:

- waste prevention;
- preparing for reuse;
- recycling;
- other recovery operations, e.g. energy recovery;
- waste disposal.

¹⁴ <http://www.mzoip.hr/hr/otpad/odrzivo-gospodarenje-otpadom.html>

¹⁵ The principle “polluter pays” is extended to include monitoring of costs for reduction of soil pollution and to damage compensation costs, after the Stockholm conference in 1972.

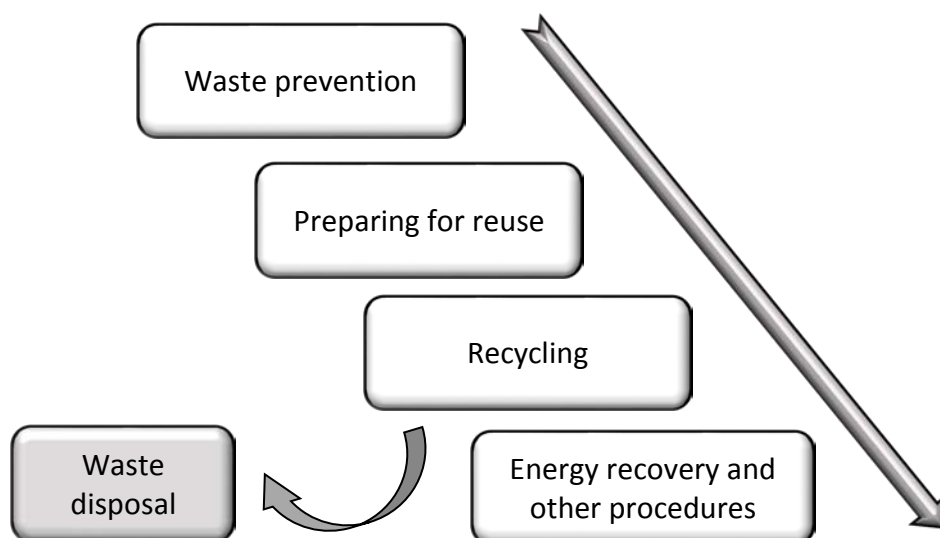


Figure 4. Priority order in waste management

Source: Own study based on the Act on Sustainable Waste Management (O.G. 94/13).

According to the waste management priority order, the first priority is prevention of waste generation, followed by preparing for reuse, then recycling and other recovery procedures, while the final waste disposal including waste disposal in landfills, is the least desirable waste management procedure.

Waste management is carried out in such a way as not to endanger health of humans nor lead to adverse environmental impacts, and particularly to avoid the following:

- risks of sea, water, soil and air pollution, and risks to biodiversity;
- nuisance caused by noise and/or odours;
- adverse impacts in areas of cultural, historical, aesthetic and natural significance, or on other assets of special interest;
- explosions or fires.

Waste management shall ensure that the waste remaining after treatment procedures and disposed of by landfilling, poses no threat to future generations.

The National strategy of environmental protection (O.G. 46/02) and the National Waste Management Plan for 2007-2015 (O.G. 85/07, 126/10, 31/11) state that unsuitable waste management is the biggest problem of environmental protection in Croatia.

5. CONCLUSION

It is estimated that improvement of material resource utilization in the entire value chain could significantly decrease the need for material exploitation for 17-24% until 2030¹⁶, and better use of resources could make savings in European industry amounting to 630 billion euros a year¹⁷. Results of researches directed to the needs of companies based on shaping a model at the product level show noteworthy possibilities of decreasing material costs for the EU industry, thanks to the concept of circular economy and the potential for increase in the EU GDP up to 3.9%¹⁸ by capturing new markets and products as well as value for companies.

¹⁶ Bernd Meyer, and others, „Macroeconomic modelling of sustainable development and the links between the economy and the environment“, Osnabrück, 2011.

¹⁷ *Guide to resource efficiency in manufacturing: Experiences from improving resource efficiency in manufacturing companies*, Europe INNOVA, 2012.

¹⁸ *Towards the Circular Economy: Economic and business rationale for an accelerated transition*, Ellen MacArthur Foundation, 2012.

The concept of circular economy certainly has some potential for realization of the EUROPE 2020 strategy. However, numerous assumptions must be fulfilled. An important one is that the institutional framework adopted by the EU should be accepted and integrated in the national institutional framework of each member and candidate state. Next, material infrastructure should be created at the national level as a precondition for implementation of the institutional framework stipulations. Inappropriate waste management is the biggest problem of environmental protection in Croatia.

Financial means must be provided for all this. The EU funds are high quality sources for these projects. Change of the value system is going to be most difficult, at the national level of each EU member state and candidate country.

Despite all difficulties, circular economy as a new concept may contribute to development of the EU as one of the richest parts of the world today, regardless of internal differences. The migrant crisis through which the EU member states and some candidate countries currently pass, also speaks in favour of this conclusion. This is only one process step in the process that has been running for a long time already, and this is the process of geopolitical rearrangements at the global level. Solving the problem at its source, for instance establishing peace, conflict resolution by negotiations, education, elimination of poverty and environmental protection, ensure smart, sustainable and inclusive growth.

SAŽETAK

TRANZICIJA LINEARNE U KRUŽNU EKONOMIJU (Koncept učinkovitog gospodarenja otpadom)

U proizvodnji proizvoda i pružanju usluga koriste se, pored ostalog i materijalni resursi (sirovine) iz prirode. Stupanj razvijenosti tehnologija kao i postojeći sustava vrednota, utječu na to da se vrijedni materijalni resursi ne iskorištavaju uvijek u dovoljnoj mjeri. Njihovo bolje iskorištavanje, odnosno učinkovitije upravljanje otpadom, može donijeti ekonomsku i ekološku korist. To je važno u uvjetima velike potražnje za ograničenim materijalnim resursima. Bolje upravljanje ovim resursima, na liberalnom tržištu konkurentnosti, može biti prednost koja čini razliku. Ekonomija koja je od prvobitne akumulacije kapitala i industrijske revolucije rasla na načelu: „uzmi, izradi, konzumiraj, baci“ i koja predstavlja tzv. „linearni model“ koji se temelji na pretpostavci neograničenosti i lakoj dostupnosti resursa, mora doživjeti ozbilju tranziciju. Proces tranzicije „linearne“ u „kružnu“ ekonomiju je složen jer zahtijeva ispunjenje niza pretpostavki: razvijenu svijest, razvijen institucionalni okvir, razvijenu infrastrukturu za upravljanje otpadom, znanje i informiranost, osiguravanje potrebnih resursa, kontinuitet, znanstveni pristup i novi pogled na ekonomsku stvarnost i budućnost. EU birokracija svatila je da koncept „linearne ekonomije“ ugrožava konkurentnost EU. Prihvaća se sustav vrednota koji polazi od stava da je značajniji napredak u boljem korištenju materijalnih resursa moguć i da može značajno doprinijeti konkurentnosti EU ekonomije. Stoga se smatra da je prelazak s „linearne“ na koncept „kružne ekonomije“ neophodan za ostvarenje programa uspješnog korištenja materijalnih resursa u okviru strategije Europa 2020. U ovom radu autor istražuje proces tranzicije „linearne“ u „kružnu“ ekonomiju.

Ključne riječi: linearni model, kružna ekonomija, gospodarenje otpadom, strategija Europa 2020.

BIBLIOGRAPHY

1. Anić, Š., Klaić, N. and Ž. Domović, (1998), *Rječnik stranih riječi* (Dictionary of Foreign Words), Zagreb, Sani-Plus.
2. COM 398, (25.9.2014) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Towards a circular economy: A zero waste programme for Europe, Bruxelles.
3. Čiček, J. and M. Drljača, (2014) „Ovisnost kvalitete života o implementaciji norme o društvenoj odgovornosti (Dependence of Quality of Living on Implementation of the Social Responsibility Standard)“, Zbornik radova 15. međunarodnog simpozija o kvaliteti, Zagreb. Hrvatsko društvo menadžera kvalitete,
4. EUROPE 2020, (2010) European strategy for smart, sustainable and inclusive growth, , Bruxelles, European Commission.

5. *Guide to resource efficiency in manufacturing: Experiences from improving resource efficiency in manufacturing companies*, (2012), Europe INNOVA.
6. <http://www.mzoip.hr/hr/otpad/odrzivo-gospodarenje-otpadom.html>
7. Jovanović, M. and I. Eškinja, (2008) „Neki aspekti neoliberalizma u svjetskom gospodarstvu (Some Aspects of Neo-liberalism in World Economy)“, Zbornik Pravnog fakulteta Sveučilišta u Rijeci, Vol. 29, No. 2, Rijeka.
8. Krišto, M., (2015), „Kružna ekonomija za brži razvoj (Circular Economy for Faster Development)“, *Gospodarstvo i okoliš*, Vol. 11, No. 41, Zagreb, Hrvatski poslovni savjet za održivi razvoj.
9. Meadows, H. Donella, Meadows, L. D., Randers, J. and W. W. Behrens III, (1974), *Granice rasta (The Limits to Growth)*, Zagreb, Stvarnost.
10. Meyer, B., and others, (2011), „Macroeconomic modelling of sustainable development and the links between the economy and the environment“, Osnabrück.
11. Milanović, Z., Radović, Sanja and V. Vučić, (2002), *Otpad nije smeće (Waste is not Garbage)*, Zagreb, Gospodarstvo i okoliš.
12. Waste Management Plan in the Republic of Croatia for 2007-2015 (O.G. 85/07, 126/10, 31/11).
13. National environmental protection strategy (O.G. 46/02).
14. Standard ISO 14001:2004, ISO 2004.
15. *Towards the Circular Economy: Economic and business rationale for an accelerated transition*, (2012), Ellen MacArthur Foundation.
16. Act on Sustainable Waste Management (O.G. 94/13).