Integrirano upravljanje otpadom u skladu sa „ISO 31000“ standardima za upravljanje rizicima i „Nacionalnom strategijom održivog razvoja“ u Republici Srbiji

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Apstrakt: U današnjoj eri globalizacije i svih prisutnih rizika od klimatskih promena neizbežni su promenom i preusmeravanjem koncepta globalne ekonomije. Visoko razvijene zemlje poput SAD-a, Japana, Nemačke i Holandije usvojile su strategije za primenu kružne ekonomije, dok druge poput Velike Britanije, Švedske, Kine i Brazila realizuju prelazne pojedinačne programe i projekte koji vode ka uspostavljanju kružne ekonomije. Sledeći taj trend, nesumnjivo je da je Republici Srbiji, njenom bližem balkanskom okruženju, potrebna nova verzija razvoja zasnovana na projektima „pametnih“ gradova, praćena reindustrijalizacijom i smanjenjem zagađenja, održivom potrošnjom zasnovanom na domaćoj ekonomiji i jačanjem opšta svest o društvenoj odgovornosti i potrebi za uključivanjem ranjivih grupa stanovništva.

Ključne reči: upravljanje otpadom, upravljanje rizicima, Republika Srbija

Integrated waste management in accordance with the „ISO 31000“ risk management standard and „National sustainable development strategy “ in the Republic of Serbia

Abstract: In today's era of globalization and all-present risks from climate changes is inevitable by change and redirection of concept of global economy. Highly developed countries such as USA, Japan, Germany and Netherlands have adopted strategies for implementation of circular economy, while others such as Great Britain, Sweden, China and Brazil are realizing transitional individual programs and projects that lead towards establishment of circular economy. Following that trend, it is without doubt that Republic of Serbia, its closer Balkan environment, is needed new version of development based on projects of “smart” cities, followed by reindustrialization and reduction of pollution, sustainable consumption based on domestic economy and strengthening of general awareness on social responsibility and need for inclusion of vulnerable groups of population.

Keywords: waste management; risk management; Republic of Serbia

1. Introduction

In today's age of globalization and all-present risks from climate changes is unavoidable by change and redirection of concept of global economy. Highly developed countries such as USA, Japan, Germany and Netherlands have adopted strategies for implementation of circular economy (OSCE), while others such as Great Britain, Sweden, China and Brazil are realizing transitional individual programs and projects that lead towards establishment of circular economy. Following that trend, it is without doubt that Republic of Serbia, its closer Balkan environment, is needed new version of development based on projects of “smart” cities, followed by reindustrialization and reduction of pollution, sustainable consumption based on domestic economy and strengthening of general awareness on social responsibility and need for inclusion of vulnerable groups of population.

Republic of Serbia has adopted National Sustainable Development Strategy as one of the most important development documents for establishment of new vision of its development. In accordance with document of the United Nations from 2012, adopted on the Conference “RIO+20” (Sustainable development), guidelines through National Strategy of Republic of Serbia are given for further action in the field of sustainable development. With this document is recommended to national authorities to approach to sustainable growth and new alternative strategies through green economy, by its capacities.

Development of Circular economy, as instrument for realization of sustainable development objectives, is followed by different risks that can lead to slowing down or failure of the project. Those risks can be divided into those that appear in the waste construction process for recycling, up to those which follow process of its exploitation. These risks have harmful effect on lives and health of people, economy and broader social community. All of them have in common financial risks for which we can say that follow both phases (construction and exploitation).

As we can observe risk management as integrated process of identification, analysis, evaluation and risk control, so waste management can be observed integrated as process of preventive production, exploitation and processing of waste. Synergy of these two processes creates effective system of Circular Economy, as project of future and sustainable development of social community. Circular economy closes the entire circle “product-waste-product” and means long-term investment in raw and energetic efficiency, with reduction of harmful emissions, change of fossil fuels by renewable sources and production and trade by sustainable products with objective of effective waste management.

According to the report by the Agency for Protection of Live Environment (SEPA) on waste management in the period of 2011-2017, it was generated 2.15 million tons of waste in total, out of which municipality public-utility companies collected 1.80 million tons or 83,7%. Average daily amount of waste storage on landfill per capita was 0.84 kg, and annual 0.30 tons. These data do not include around 20% of generated waste which ends up on wild dumps. In EU, out of average 487 kg of waste, 480 kg are processed in some way – in 2017, in average 30% of waste has been recycled, 17% composed, 28% burned out of which the biggest part was used for obtaining energy and 24% of waste is storage on landfill.

In Serbia, from produced 306 kilograms of waste per capita, only 257 kg has been treated, out of which even 256 kg ended up on the landfills, and one kilogram per person is used for obtaining secondary raw materials. Reviewing these devastating data, recommendations have been given to representatives of industry and local community in order to, in line with its capacities, adopt and apply models of sustainable production and sustainable consumption. Step in the right direction could be announced project for establishment of primary waste selection in fourth regions (Uzice, Pancevo, Pirot and Sremska Mitrovica) during 2019 and 2020, funded from the EU funds. For planned plant in Vinca in the future is expected to be part of solution for waste which is not possible to recycle, to be more precise, waste that stays after recycling and waste that cannot be treated by operations of re-use. For such waste, incineration in a plant for the production of electricity and heat from waste is envisaged

Figure 1. Waste incinerator

Source: Barcelona.com

Other facilities in Serbia can be part of this solution as well, which is why Fiscal Council consider that in the construction of a plant for mechanical-biological treatment (MBT) and production of fuel from waste (solid recovered fuel SRF and refuse derived fuel RDF) in Novi Sad and Nis should invest total of around 30 million of EUR. It is expected that these capacities will enable that in Belgrade (Vinca) burns (and gains energy from) around 340.000 tons of waste and in Novi Sad and Nisu mechanical-biological treats around 200.000 tons of waste and products fuel. Fiscal Committee considers that plant in Belgrade can start with work around 2025 and other two around 2030 bearing in mind that its implementation has not begun yet.

With sustainable development strategy of Republic of Serbia (Vlada Republike Srbije) are defined development policies that foster effective development while there is prediction that realization of projects of “smart cities” improve new investments and open new green work places. By this approach, life standard and satisfaction of Serbian citizens is improved.

2. Waste management in the service of “Sustainable development” and “Circular economy”

When we are talking about sustainable development, we have to make a parallel with the term “Circular economy” as model of future development of local communities. All-present globalizations contribute to the fact that today developed European countries are going far away from the model of linear economy based on the principle “make-use-postpone”. This model in Republic of Serbia has been used during expansive economy growth, when use of resources was uncontrolled, energy use by product high, while pressure on living environment was not measured. This way, big amounts of waste have been created which have been inadequately treated and postponed. Difficult decisions and investments in the living environment have been moved for some other times, while pressure on living environment has grown with big amounts of historical waste that stayed in local communities and companies which went bankrupt. As consequence of long-term business based on the linear economy Serbia today has more than 3.500 wild dumps while on the annual level material with value of 50 million of EUR is disposed on more than 150 unsanitary landfills.

Figure 2. Linear and Circular economy

Slika 1- Uporedni prikaz modela linearne i cirkularne ekonomije
 (sustainable brands barcelona.com)

Source: Barcelona.com

Close future brings us growth of resource prices, growth of energy expenses, growth of population needs and migration towards cities, but especially it brings setbacks in the climate environment which

on the Western Balkan represents area of middle-high risk. Circular economy offers new model „product-waste-semi product “. The main source of economic growth is the higher reuse of materials from products that ended its „life cycle “and less use of new resources. It is necessary to strengthen awareness of citizens in order for them to start thinking about how product is designed, how much is it recyclable and how much is friendly for the environment.

Products are designed so it can be reused, divide, fix or recycle. Accordingly, in production renewable sources of energy are used. Assessment are that with introduction of circular economy in Serbia there will be 30.000 new job places opened and which will enhance competitiveness of the economy by which Serbia could become regional leader in development and investments.

Circular economy implies to re-question our relation towards natural resources. Recycle is process of extraction materials from waste and its re-use in the same or similar purposes. Process includes collection, extraction, processing and making new products from used materials. It is important to sort waste according to its type since many waste materials can use again if they are collected separately. All that can be used again without throwing it away present recycle with whom following objectives are achieved:

- Savings of raw resources (all materials are from natural origin and can be found in the nature in the limited amounts);
- Energy savings (there is no spending of energy in the primary processes, as well as not in the transport following those processes, while with combustion of non-used materials additional energy is received);
- Protection of living environment (waste materials degrade living environment, while with recycle living environment is protected);
- Opening of green working places (processes in recycle and eco product design require knowledge and work which creates needs for new working places).

In a manner of possibilities of re-use materials can be:

- Recyclable: can be used again with return to the production process;
- Non-recyclable: they cannot be returned to the production process; are used for getting energy by burning or are storage on the ecologically safe way.

Almost all materials can be recycled: paper, plastics, glass, aluminum, copper, iron, ceramics, electronic and electrical waste. Serbia today is successfully implementing process of packaging waste and special waste streams, recycle total amounts of generated tires and batteries and in packaging waste are achieved predicted National goals (SEPA, 2015).

Risks of uncontrolled storage of dangerous waste on communal or sanitary landfills can lead to different harmful effect on the health of population and living environment.

Unprocessed dangerous waste cannot be storage together with communal waste. If unprocessed dangerous waste is collected and storage with communal waste, especially on the locations which are not predicted for that, threat on population's health is increased multiple times.

Risks of uncontrolled storage of dangerous waste are:

- Seepage water into ground water or rivers,
- Contaminated circumferential waters (from the surfaces – land and water intakes),
- Uncontrolled fires,
- Migration of gas into land and air,
- Waste slippage,
- Insects and rodents,
- Dust and stench.

Bad technology of waste storage leads to risk:

- Damage to health – workers, population and collectors,
- Damage to flora,
- Explosions and fires.

Also, there are some risk phases on which attention should be drawn while organization of dangerous waste storage:

- Choice of location,
- Choice of forms for landfill design,
- Construction and object management,
- Control of landfill functioning,
- Monitoring and insurance of object while closing it.

All mentioned phases should be organized so that protection of living environment is secured: groundwater and surface water, health of population, flora and fauna, air quality, securing while working on the landfill, exclude negative impact on the food chain etc. time of transfer should be as short as possible, that there are protection measures in case of leak or fire and to define concrete type and amount of waste which will storage there. Form on which landfill will be designed depends of: type and amount of dangerous material that needs to be storage, planned length of landfill use, in its working shape, topography of field and characterizes of land on which landfill is located, climate characteristics of area, presence of ground water on the chosen location as well as possible impact on natural environment etc.

Based on the long-year experience of Germany in introduction of circular economy, 5 phases⁴ have been defined in the process of improvement of the waste management system:

- Phase 1 – waste storage on uncontrolled landfills.
- Phase 2 – Reliable waste collection and improvement of landfills.
- Phase 3 – introduction of separate waste collection and its sorting.
- Phase 4 – improvement of recycle industry.
- Phase 5 – circular economy – waste as material and energetic resource.

Figure 3. Linear and Circular economy

Source: German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2016

With aim of establishment of integrated risk management on the waste management systems, it is necessary to take into consideration elements such as law regulations, social factors, available technologies, financial aspects and conditions on the market.

Figure 3. Waste management cycle

Source: German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2016

Integration of waste management with risk management in production and product consumption present measures that are support to the regulation of waste management hierarchy, especially to prevention of waste creation and risk prevention in waste management. A number of measures is prescribed in the framework of strategic documents as well as number of independent measures that represent significant support to prevention of waste creation. Those measures concern design, production and consumption of products. Objective of these measures is impact on reduction of waste creation in the early phase of product production through lengthening of living cycle of product, reduction of dangerous materials within as well as through enabling “easier return” of product into life cycle after it becomes waste. Prevention principle presents one of the most significant pillars of circular economy and sustainable development at all.

Synergy of integrated waste management with integrated risk management helps us to see main problem in establishment of sustainable system and to give answers on question of how they can be overcome. Choice and control of sustainable development initiator and integrated waste management, as well as application of multi-criteria analysis in this process requires good knowledge on principles of sustainable development, as well as areas of waste management. Initiators and its indicators are needed to be directly harmonized and checked. During choice of initiation, comparison of ecological, technical and investment factors is conducted. Generally, conducted activities should help in review of real condition in waste management in Republic of Serbia and broader, as well as to present model for integrated waste management system (Nikolić, 2012).

With new politics new priorities in waste management hierarchy are introduced, so called preparation for re-use. This priority supports number of independent measures which organizations included in waste management have to take and which concern introduction and strengthening of reparation product system. Preparation for re-use means return of products or part of products that became waste into life cycle with minimal investment. In practice number of independent measures has been introduced which relate to the improvement of volume and quality of recycle through establishment of separate waste storage system as well as number of measures that have to be elaborated in more detailed manner with strategic documents and which are related to the reduction of storage of biodegradable waste on landfills by encouragement of composing and anaerobic digestion. Term of “nusproducts” has been introduced as well as “end of waste status” which means return of materials into production, or to be more precise, return of waste into life cycle.

3. Risk management according to the standard ISO 31000

Risk is inevitable part of every organization’s business which is why it is part of quality management system (International standard ISO 9001). Risk reduction presents true challenge for organization. Way on which organization is facing with this challenge can be the key for its success. Without any doubt, best results show those organizations which manage to threats for business, challenges, transform into chances and possibilities for business improvement and conquering new markets. When risks are identified in a real way, it is possible to take activities for damage mitigation if potential risk appears and ISO standards have big benefits for organizations which implemented them. International standard ISO 31000 (iso.org) helps organization to develop risk management strategy which will help them in effective identification and risk reduction and will help them in achievement of organization objectives. This international standard for risk management ensured guidelines and principles in identification, analysis and risk assessments. It refers to the biggest number of business activities that include

planning, management operations and communication processes. Objective of ISO 31000 standards is development of risk management culture by which management, employees as well as other interest parties become aware of the significance of monitoring and risk management.

Theoretically, risk management includes its four basic elements: identification, analysis, validation and control, financing. Risk identification gives us answers on core questions: What are potential risks? How to they become? What consequences do they have? Where and on which location do they occur? In order to do correct risk identification, we have to conduct start survey forms, using survey tools, questionnaires, observations as well as overview of current practice in relation to the existing policies, procedures, appeal and forms for reporting on incidents or accidents.

When risks are identified, it is necessary to analyze them in order to determine: How often can they occur? How much could it cost? How dangerous consequences could be? With risk analysis we define possibilities of risky events and its impact on population, economic and social-political community, on its local and national – transboundary plan. With establishment of risk matrix, we give quantitative and qualitative parameters of risk impact values.

When risks are identified and analyzed, it is necessary to consider how they are valued and controlled. Questions arise that seek for answers: How risks can be eliminated? How risks can be dodged? How possibility for its appearance can be mitigated? How its expenses can be reduced?

Risk financing: even when practical measures with aim of elimination are undertaken or with aim of risk reduction, there is always some risk percentage that remains with which should be faced and take control over. Organizations then have to consider how to finance risk management.

Risk management creates value for organization not only by helping organization to identify potential dangers for business but also by enabling recognition of potential possibilities. ISO 3100 stands enables identification and control of risks that can jeopardize achievement of primary and key goals of each organization. Introduction of ISO 3100 standard helps:

- To formulate and correctly apply strategies and solutions for improvement and protection of organization needs;
- To establish effective risk assessment to balance economic gain in relation to uncertainty and losses.

Standard ISO 3100 is intended for organizations of all types and sizes which face with internal and external factors as well as impacts which lead them to uncertainty regarding achievement of set objectives. Therefore, it can be applying in small and big organizations, in private and public sector, all kind of associations. It is not intended for one specific field of work, rather its use is possible in one industrial areas and business sectors. Most of organization manages with risks in specific measure, but by introduce of ISO 3100 standard specific principles are established that have to be respected in order to have effective risk management.

Categories which receive benefits from implementation of risk management system are:

- Responsible for development of policies on risk management system,
- Responsible for risk insurance and effective management,
- Responsible for informational security,
- Project managers (risk management on the project),
- Managers of business finances.

There are numerous advantages of systematic approach to risk management in the company, some of the most significant are:

1. Higher possibility for achievement of goals.
2. Encouragement of proactive management.
3. Rising awareness on the need of identification and risk management on the level of all organization.
4. Improvement of opportunities and threats identification.
5. Improvement of relevant legal and regulatory demands.
6. Improvement of control.
7. Improvement of operational effectiveness.

8. Improvement of prevention of losses and incidents management.
9. Improvement of operative effectiveness.
10. Establishment of reliable ground for decision making and planning.
11. Reduction of costs through correct risk management.
12. Increase of trust with interest parties.

Standard ISO 3100 has 3 main chapters connected with the synergy of interaction and those are: principles, framework and processes.

II. Principles – maintenance of dynamic and continued improvement of risk management system which considers different human and cultural factors.

III. Framework – higher management leads proactive integration of risk management on all levels of the organization.

III. Processes – open communication and reporting on risks that are identified, analyzed and evaluated continuously.

In order for organization to have effective business, it has to accept and act according to specific principles. There are 11 principles of risk management in line with the ISO 31000 standard:

1. Risk management established and maintains value.
2. Risk management is integrated part of all organizational processes.
3. Risk management is part of decision making.
4. Risk management explicitly addresses uncertainty.
5. Risk management is systematic, structural and on time.
6. Risk management is based on the best available information.
7. Risk management is customized.
8. Risk management takes into consideration human and cultural factors.
9. Risk management is transparent and inclusive.
10. Risk management is dynamic, interactive and reacts to changes.
11. Risk management enables continuously improvement of organization.

Success of risk management depends on effectiveness of management framework:

- It helps in effective risk management through application of risk management processes.
- Ensured adequate reporting on risk information which come from risk management process.
- Ensures that this information is used as ground for decision making and responsibility on all relevant organization levels.

We can conclude that framework of standard ISO 3100 grounds on Demingo's PDCA cycle while main element of framework is:

Plan – Design of framework for risk management – in this part of total process of risk management is approached towards definition of context, risk assessment, planning of risk treatment and acceptance of the remaining risk.

Implementation – implementation of structure and program for risk management; Check-Monitoring and overview – continued supervision of structure and effectiveness of management system.

Act – Constant improvement – maintenance and improvement of risk management process.

Risk management process, according to the ISO 3100 includes:

1. Communication and consulting – with all interest parties are necessary in all phases of the risk management process. ISO 3100 standard suggests formation of team, development of communication plan, secure information in risk identification, defining timeframes for deadlines and resources, defining of specific context etc.
2. Determination of context – determination of model elements that define basic parameters of risk management and secure areas of application and criteria for remaining process.
3. Risk identification – includes: where, when, how and why events could postpone, mitigate, prevent or rise achievement of goals.

4. Risk analysis – includes establishment of connection between possibility that some danger will occur and seriousness of consequences that could occur with that opportunity.

Objective of risk analysis is to:

- Separate acceptable from non-acceptable risks.
- Predict volume of consequences.
- Ensure measure that will help with handling risks and its solution.

Risk analysis can be quantitative and qualitative.

- Quantitative risk analysis aims to with use of methods and techniques in analysis of identified risky events determine impacts and consequences that specific risky events can have on the organization objectives. This analysis offers data on possibilities of repeat and size of impact of risky events.
- Qualitative risk analysis uses different quantitative methods in determination of risky events and its impact on organization objectives. Qualitative risk analysis enables determination of priority risks list.

Risk evaluation – sets up comparison of assessed risk levels with previously determined criteria and considers balance between potential benefits and unfavorable results. Risk evaluation depends on: ways of thinking, nature of results and forms of result interpretation.

Risk treatment – present creation and application of specific strategies and plans for increase of potential benefits and reduction of potential costs.

Monitoring and re-questioning – activities in the process of risk management have to be followed and documented, it is necessary to follow effectiveness of all risk management steps. Recording ensure base for improvement of methods and process.

All components of standard ISO 31000, principles, frameworks and processes reciprocally are connected and it is necessary to observe them in that manner. Risk management by recommendations of ISO 31000 standard offers bigger chances for realization of planned objectives with fewer losses. Risk acceptance in accordance with structured approach towards risk management means use of processes that help in identification and minimization of risks and at the same time, possibility to focus on key competences.

4. Conclusion

Effectiveness of every system is achieved through integration and synergy of its processes and sub-systems. Integrated waste management represents one of the pillars of sustainable development and circular economy of developed social community, which our Society aspired. Strong control of process of production, exploitation and correct storage of its waste to process of recycle or final destroy in line with principles of Circular economy, present scientific challenge today. This integrated process cannot be seen without framework of integrated risk management process that occurs in all levels of waste management.

These risks constantly threaten to health of people and living environment so its management have to consider very responsively. In order to conduct this process correctly from its beginning until its end, it is necessarily to follow rules, principles and procedures in accordance with international standard for risk management ISO 31000. This international standard helps us to define methodological and terminological framework for risk management, its reduction on acceptance level.

Waste management on the platform of sustainable development and circular economy of social community includes preventive control of creation of product, its consumption and its final storage or recycle with aim of going back to the beginning of this cycle or even to the final destroy with production of heat of electric energy. Risk management presents integrate cycle of its identification, analysis, validation and financial control of established corrective measures. With comparison of this two integrated processes we see that there are similarities in preventive approach in both directions, which achieves towards even bigger effectiveness in achievement of goals of sustainable return and circular economy.

Literature

1. Josimović B., Ilić M., Filipović D.(2009)“*Planiranje upravljanja komunalnim otpadom*”
2. Mitrović S., Radosavljević I., Veselinov I. (2017)“*Cirkularna ekonomija – kružno kretanje materije i energije*”, www.osce.org
3. Modern Waste Goals and Paths – Germanys’ expertise for an advanced circular economy, Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, 2016
4. Nikolić M. (2012) “*Uporedna analiza izabranih pokretača integrisanog sistema upravljanja otpadom na bazi pokazatelja u opštinama u Srbiji*”
5. Serdarević A. (2016) “*Upravljanje čvrstim otpadom*”
6. <https://sustainabledevelopment.un.org/rio20> (date of accession 20.06.2020)
7. <http://www.gs.gov.rs/lat/strategije-vs.html> (date of accession 22.06.2020)
8. <http://www.sepa.gov.rs/download/Otpad/Ambalaza2015.pdf>, (date of accession 24.06.)
9. <http://www.iso.org> (date of accession 25.06.2020)