

Education and training of personnel in the field of waste management in PUC "Mediana" Nis

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Abstract

The sector of human resources management of the Company requires an approach that corresponds to the number and structure of employees. Human resource management policy requires long-term technological and financial investments, which results in increased competitiveness. On the other hand, the structure of the company's employees enables a significant degree of efficiency increase and finding measures to improve the company's operations, through education and training. The main goal of the work is the identification and analysis of the existing practice of waste management through the employees of the company, but also the selection of a new sustainable technology for converting waste into energy using Plasma technology. The paper is based on the research of a sample of 132 out of a total of 1073 employees in the Company.

Keywords: *employee education, waste-to-energy, electricity*

1. Introduction

The goal of employee education is to improve the company's activities through the primary selection of hazardous and non-hazardous packaging and other municipal waste, in accordance with the needs of future waste treatment for energy production. Collection, transport and disposal of municipal waste at the Niš landfill; mechanical preparation of non-hazardous waste for further transport and delivery of waste to authorized operators for reuse or recycling. It represents not only the legal but also the social responsibility of the company. It should also be noted that training should be institutionalized and an integral part of the company statute (Slavković, 2019).

2. Methodology

The research was conducted as applied research, using different research methods and techniques (survey, scaling, testing, interviewing). Descriptive method in research education is a set of scientific procedures that describe phenomena in upbringing and education (Aleksić and Kudumović, 2021).

The process begins with data collection with a Survey (consisting of data and metadata), which are standardized for this purpose. The process of filling gaps in the source data is shown in Figure 1.

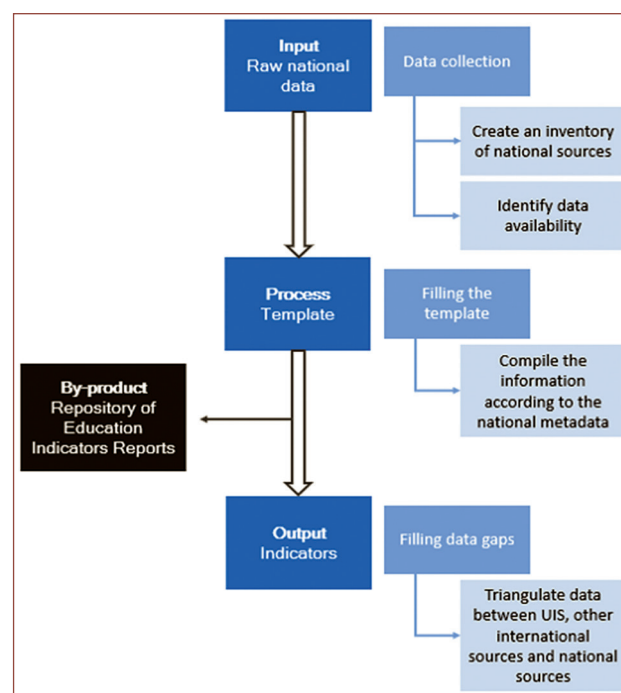


Figure 1. The process of filling the gaps in the source data (Temperley et al., (2018))

3. Results and discussion

A person responsible for waste management in the company on the basis of the objectives and development strategy of the company prepares Waste Management Employee Training Program. Employee Training Program consists of theo-

retical and practical parts of the training (Cim a group, 2019).

protection measures; Measures to protect the environment and human health.

3.1. The theoretical part employee training

The theoretical part includes an oral presentation, which consists of the following areas:

- Application of legal regulations and SRPS ISO standard 14001:2015
- Instructions for handling waste material in Regiment “Mediana” Niš KR-C-013;
- Management of secondary raw materials IOP-A-003;
- Types of waste, with a proposal for their treatment in PUK “Mediana” Niš shown in table 1.

3.2. The practical part of the training

The practical part includes a demonstration of handling secondary raw materials in accordance with the needs of future waste treatment. Accident

3.3. A test for checking knowledge

The test consists of 15 questions (multiple choice/yes/no) to check their waste management knowledge.

The employee has successfully completed the training if they handle waste adequately and correctly answer 80% of the test questions (10 correct answers). If an employee fails, they are trained and tested again in a month. Waste management training, which arises during the work process of PUC “Mediana” Niš, is carried out in the following cases: upon admission to employment • change of workplace • company management. Employee training takes place in Serbian language and is adapted to the capabilities of people with disabilities. Supervision of employees is carried out periodically, or no later than once in four years for different workplaces.

Table 1. Waste types in PUC “Mediana” Nis

Waste types	Waste types	Treatment
Special waste streams	Waste packaging from hazardous substances	recycling / waste- to- energy
	Waste used oil	recycling / waste- to- energy
	Waste cloths absorbers	recycling / waste- to- energy
	Waste accumulators	recycling / waste- to- energy
	Waste oil filters	recycling / waste- to- energy
	Waste oil hoses	recycling / waste- to- energy
	Waste grease and oil sludge separators	recycling / waste- to- energy
	Waste from fuel oil boiler rooms	recycling / waste- to- energy
	Waste from fluorescent tubes	recycling / waste- to- energy
	Electrical and electronic waste	recycling / waste- to- energy
	Waste from perchloroethylene	recycling / waste- to- energy
	Waste tires	recycling / waste- to- energy
	Waste filters of air	recycling / waste- to- energy
	Textile waste	recycling / waste- to- energy
Metal waste	Waste ferrous metals	recycling / waste- to- energy
Metal waste	Waste non-ferrous metals	recycling / waste- to- energy
Packaging waste	Packaging waste	recycling / waste- to- energy
Municipal/ commercial waste	Municipal/commercial waste	Dispose of waste in landfills

The lecture is 45-minute long.

“TEST

Read questions carefully. Choose and circle one letter. Only one answer is correct.

Enter personal information in block letters

To pass the test, you need ten correct answers

Name, father’s name, surname and PIN: _____

Workplace: _____

Department: _____

Date: _____

1. Waste is ?

- a) Any substance or object that the holder discards, intends to discard or is obliged to discard;
- b) Any substance

2. Types of waste depending on the dangerous characteristics that affect human health and the environment in PUK “Medijana”:

- a) Non-hazardous waste, hazardous waste and inert waste;
- b) Hazardous waste;
- c) Non-hazardous waste

3. Non-hazardous waste is:

- a) Waste that does not have the characteristics of hazardous waste
- b) Waste that has the characteristics of hazardous waste

4. Hazardous waste is:

- a) Any substance that has at least one of the dangerous characteristics: explosiveness, flammability, etc
- b) Waste that does not contain hazardous substances

5. Inert waste is:

- a) Waste that is not subject to physical, chemical or biological changes
- b) Waste that is subject to physical, chemical or biological changes

6. Municipal waste is?

- a) Communal waste includes waste from households (household waste), as well as other waste that is similar in composition to household waste
- b) Municipal waste is not household waste

7. Commercial waste is?

- a) Commercial waste is waste generated in companies, institutions and other institutions, except household and industrial waste
- b) Commercial waste is not waste generated in companies, institutions and other institutions

8. Industrial waste is:

- a) Waste from industry or from the location where the industry is located, except for waste from mines and quarries
- b) Non-industrial waste

9. Biodegradable waste is?

- a) Waste suitable for anaerobic or aerobic decomposition, such as food and garden waste, paper and cardboard
- b) Waste that is not suitable for anaerobic or aerobic decomposition

10. Packaging waste is:

- a) Packaging waste is any packaging or packaging material that cannot be used for its original purpose, except for the rest in the production process
- b) Packaging waste is not any packaging or packaging material

11. Packaging waste includes:

- a) Paper and cardboard packaging, metal packaging, plastic packaging, wooden packaging, glass packaging, textile packaging
- b) Metals

12. Who is responsible for waste selection:

- a) All employees
- b) Communal workers

13. Is the primary selection of waste in PUK “Medijana” clearly and visibly marked?

- a) yes b) no

14. Waste treatment methods:

- a) Reuse of waste for the same or another purpose - waste recycling; thermal treatment - obtaining energy from waste, burning/or co-incineration (pyrolysis, gasification, Plasma technology); biological treatment - anaerobic (biogas production) and aerobic digestion (compost production) digestion, chemical waste treatment; waste disposal
- b) mechanical preparation of waste for further transport

15. Waste treatment for the city of Nis is:

- a) Treatment of non-hazardous waste by sorting; mechanical preparation of non-hazardous waste for further transport; disposal of municipal waste at the city landfill
- b) obtaining energy from waste by Plasma gasification

According to the results, the candidate has
a) *PASSED* b) *FAILED*” (Mediana, 2022)

3.4. Personal education

Personnel education /training is implemented as follows:

1. at the level of the organizational unit (OU)
2. at the Company level
3. external training.

Training activities for organizational unit (OU) level given are in Table 2 (Cim a group, 2019).

Internal lecturers can be those employees with an appropriate professional qualification and certificate as internal verifiers. Otherwise, external lecturers are hired.

4. Results

The structure and number of employees trained in waste management is given in graph 1. Chart 1. Structure and number of employees trained in waste management. The results of the training show that all participants completed the training with exceptional success.

Internal lecturers can be those employed with appropriate professional training and certification as internal verifiers. If there is no suitable staff, external lecturers are hired.

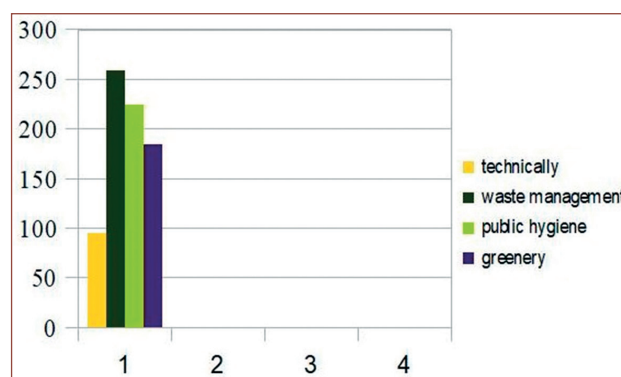


Chart 1. The structure of employees educated in waste management

5. Conclusion

Environmental analysis includes a detailed examination of each aspect of the business due to its impact on the environment. To make this analysis objective, an external company is engaged. The next step is for managers to create a program for the long-term settlement of the living environment (Jelenkovic and Lj., 2012).

Social corporate responsibility requires that companies strive for the optimization of transport and the sustainable choice of treatment for obtaining energy from waste, as well as the remediation of all sources of environmental pollution.

Personnel training must be a constant measure to continually improve the knowledge and skills of the employees, as well as to adjust the level of information, due to which all employees are

Table 2. Organizational unit level (OU) training

activity description	stakeholder
the training program	General supervisor for waste management
supporting documents / training records: <ul style="list-style-type: none"> • instructions, waste management training records • a test to check the learning progress, etc. 	
the training is carried out according to the following activities: <ul style="list-style-type: none"> •employee's training records, •dynamic training plan 	
success assessment	
data entry after the training	
records in the work process: <ul style="list-style-type: none"> • register of training programs, •questionnaire for assessing the effects of education / training in work, •evidence chart of employee training, • questionnaire for checking knowledge progress 	

obliged to undergo waste management training to carry out their tasks efficiently.

Information and communication technologies (ICTs) must be harnessed to strengthen education systems, knowledge dissemination, information access, quality and effective learning, and more effective service provision.

The thematic indicator set will serve to chart global progress on education and monitor the SDG 4 education targets more comprehensively across countries, allowing the possibility to identify challenges regarding concepts of the targets that are not reflected well by the global indicators (UNESCO, 2016).

Based on the above, as for PUC “Mediana” Niš, the following conclusions are reached:

- trained employees demonstrate knowledge and understanding of the fundamental concepts of waste management in the Company;
- waste management in PUC “Mediana” Niš requires cooperation and interaction at all levels of the Company;
- management and environment are aligned with the requirements of the SRPS ISO 14001:2015 standard and the relevant legislation,
- all employees demonstrate environmental awareness and a high level of training in human resources management and waste management.

Acknowledgement

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