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DEVELOPMENT OF ECO-PRODUCTION AND COMPETITIVENESS USING RECOVERY OF CABLE WASTE MATERIAL WITH SOCIAL IMPACTS

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Abstract

The paper deals with the use of resources produced from raw materials cooper and aluminum via recycling technologies. By means of SWOT analysis and the evaluations of the proposal, it has been found that implementation eco-productive recycling technologies has significant positive impact in environmental, technological, economical and social terms.

ATIK KABLO MATERYALLERİNİN GERİ KAZANIMI İLE EKO-ÜRETİM VE REKABET GÜCÜNÜN SOSYAL ETKİLERLE GELİŞTİRİLMESİ

Özetçe

Bu makale geri dönüşüm teknolojileri ile üretilen bakır ve aliminyum hammadelerinin kullanımı ile ilgilidir. Swot analizi uygulamaları ve öneri değerlendirmeleri ile eko-üretken geri, dönüşüm teknolojilerinin

uygulanmasının çevresel,teknolojik, ekonomik ve sosyal açıdan kaydadeğer pozitif etkileri olduğu belirlenmiştir.

Keywords: Cable waste, Recycling, Logistics Management, Recycling
Anahtar Kelimeler: atık kablo, lojistik yönetimi, geri dönüşüm

1. INTRODUCTION

The concept of sustainable development has become a well-known topic in the last two decades. The main causes were global environmental problems such as climate change, including acid rain, disruption of the ozone layer, desertification caused by global warming and excessive consumption caused the plundering of natural resources, rapid reduction of biodiversity. These fact have led not only environmentalist to seek for effective solution that would help the persistence of mankind, for instance through energy saving, environmental farming methods focusing on renewable natural resources. Metals make up almost 5% of municipal waste. They are largely recycled, thanks to the financial demand of production and the limitations of resources. Their production is very energy-intensive and their exploitation is very harmful to nature [1]. One of the basic options is reducing wastes by recycling technologies. Recycling of cable waste helps conserve primary resources, and thus preserves for the future. Also brings great energy savings, as compared with the energy consumption to obtain the metal from ore is efficient [2]. The industry dealing with recycling "saves" honey from e.g. of outdated production facilities, waste resulting from manufacturing processes, from cars, which are already served from discarded cables and etc . The material is first graded part may be used directly as an ingredient in the smelting furnace; the greater part is recast and further processed. Environmental marketing is the production of environmentally safe products, using recyclable energy-efficient technologies. To illustrate the importance of recycling waste in terms of cable material and energy savings: 1 kg of waste will save 142 kg of copper raw material and 80% of the energy for the production of raw materials and 1 kg of waste aluminum saves 95% energy compared to the production of primary raw materials and emissions of greenhouse gases are in the

recycling to 40-times lower [3]. This paper shows an example of positive effects of reusing and recycling materials from cable waste and e-waste with environmental, economic and social benefits although not all such waste is recycled.

2. STATE OF THE ART ANALYSIS AND PROBLEM DEFINITION

Recycling and reducing the wastes [4, 5, 6] are considered as the only methods to recover the wastes generated; however, the implementations still have much room for improvement [7, 8]. As we become more dependent on electronic products to make life more convenient, the stockpile of used, an obsolete product grows. Although used electronics represent less than two percent of the municipal solid waste stream, if we continue to replace old or outdated electronic equipment at our current rate that percentage will continue to grow. Computer monitors and older TV picture tubes contain an average of four pounds of lead and require special handling at the end of their lives. In addition to lead, electronics can contain chromium, cadmium, mercury, beryllium, nickel, zinc, and brominated flame retardants. When electronics are not disposed of or recycled properly, these toxic materials can present problems. Extending the life of your electronics or donating your most up-to-date and working electronics can save you money and saves valuable resources [9]. Safely recycling outdated electronics can promote the safe management of hazardous components and supports the recovery and reuse of valuable materials. Waste electrical and electronic equipment are the type of waste, which have in recent years a rising trend. Therefore, the disposal of such wastes is preferred and desirable [10]. Non-negligible is the fact that the waste is processed classically (figure. 1), land filling and incineration, which will offset the huge potential of materials that can be used as primary and save natural resources.

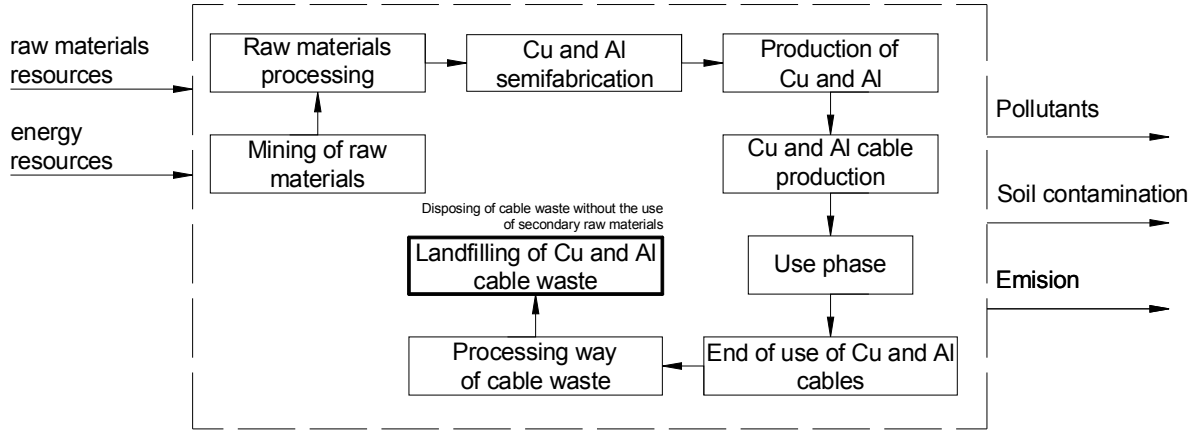

Figure 1. Current state of the art analysis

The fast growing waste stream of electronic and other complex consumer products is making the bulk recycling problem an important environmental protection issue as many of these products contain hazardous materials such as mercury and lead and naturally non-degradable materials such as various plastics. This stream of material also contains valuable components in significantly higher proportions than raw ore streams. Mechanical recycling is potentially a more environmentally benign method than other options such as chemical recycling and energy recycling because recycled materials can be reused without significant additional investment. Many traditional mineral processing methods, such as sink-float separation, froth flotation, electrostatic separation, are now being applied to plastics separation, which is a relatively new research area compared to metals separation. Currently, environmental approaches are considered one of the outcomes of the strategy [11]. Demonstration of environmental quality, the organization becomes existential necessity. New technologies and technological innovation in these devices is growing virtually exponentially. The industry produces huge quantities of new technology and using still newer technologies. This forces users to the rapid replacement of equipment, repair of individual ceases to be profitable, more efficient equipment is a modification for the new, more modern. All the devices, which will cease to perform its function, ending its life cycle become waste.

In today's world technology is constantly increasing production of waste (Figure 1). Waste electrical and electronic equipment are the type of waste, which has in recent years a rising trend. Such an increase in waste, in addition to containing ingredients classified as hazardous waste, raises concerns especially in terms of the environment. No negligible is the fact that subsequent to the landfill and incinerators lost material huge potential, which can be used to save both the primary natural resources. The challenge today is to systematically address the collection, separation, transport and recovery of waste electrical and electronic equipment that includes cable wastes. In particular, the terms of the current situation in society in terms of current and proposed legislation concerning the disposal of waste cable and e-waste in practice.

3. PROBLEM SOLUTION

By analyzing the current situation, it was found that the recovery of raw materials, particularly important commodity copper is deficient, and large quantities of this precious raw materials end up in landfill sites where the collection of waste in an unprocessed form. The issue of waste electrical and electronic equipment is a very current topic and from several angles: environmental, economic, legal and technology. The big challenge today is to systematically address the collection, separation, transport and recovery of waste electrical and electronic equipment [11]. New technologies and technological innovation in these devices is growing virtually exponentially. The industry produces huge quantities of new technology and using still newer technologies. This forces users to the rapid replacement of equipment, repair of individual ceases to be profitable, more efficient equipment is a modification for the new, more modern. All the devices that performed their function and end their life cycles [12] became waste. No negligible is the fact that subsequent to the landfill and incinerators lost huge potential material which can be used to save both the primary natural resources. Developing a functional system that would ensure the fulfillment of the obligations of the mandatory people with diverse interests and priorities and ensure the involvement of users and other entities involved in the collection and processing is very difficult [10, 13]. At present, away

from the understanding of recycling as a further re-use of waste and emphasizes the characteristics of recycling and to mitigate the burden of double aspect of the environment:

- On the inputs into the production system to conserve natural resources of raw materials and energy,
- On the outcomes of the production system reduces the amount of pollutants emitted into the environment.

Aspects operate either separately or simultaneously with the use of waste may not be limited to one or two manufacturing processes. For some the process is the importance of using secondary raw materials, in another it is important to protect the environment, sometimes both are important considerations. Recovery of waste materials from the cable and the majority of their valuable components - metals represent a significant industrial activity in particular economic and environmental reason. The problem of the classical treatment is specific to each waste as well as cable wastes threaten the environment. The composition of such waste precludes conventional treatment, which is a well-revised, but not an efficient use of metal, which is present in this type of waste in large quantities, as in natural resources.

Therefore, this method of recovery (recycling) of waste takes precedence over energy recovery [14]. This method of waste disposal is one of the most important economic instruments, the recovery of waste. Therefore, the aim of this paper is application and use of best available technology in processing of waste cable and effectively uses the materials that can be brought back into production use. The big benefit is this method of treatment is to shorten the cable waste logistics chain using separated components, reducing overall emissions and minimization of negative externalities and their effects on the environment [1, 15]. In Table 1 shows the total analysis of external and internal factors of project stage in recovery of cable waste materials.

Table 1:SWOT analysis

Strengths (Internal factors)	**Weaknesses** (Internal factors)
- good infrastructure, availability and freight rail - technology does not pollute the environment - building the infrastructure - technology will be located in fully renovated hall - growing customer base - employee loyalty - concentration of the fastest growing segment of the market - strongly preferred product - innovation capability - best available technology - above average profitability - high unemployment - the willingness of people to work and retrain - a good position on the Market - diversification of suppliers of cable waste - stable cable customers processed waste - interest in other businesses on the resulting products (copper, aluminum, plastics) - practical initiatives to promote waste minimization and recovery - high production of waste in the Region - Industrial Development - stability of business in the region - high product quality - a permanent customer	- low percentage of the population in higher education - high proportion of unemployed in total unemployment - slow introduction of separate collection - long process of assessment by the governing body - lackluster revenue growth - lack of financial resources
Opportunities (External factors)	Threats (External factors)
- improving the availability of capital, capital strengthening of regional entities and - processing of waste generated and economic factions - transforming waste into tradable - creation of new jobs for marginalized groups - strengthening the region - promote initiatives to minimize waste production and recovery - Increase environmental awareness in the region - reduction of waste by introducing new technology - development of logistics in the region - cooperation with academia - fast market growth - new markets	- non-compliance to the governing body - poor financial discipline on the part of the contracting authority - cheaper technology - entry of competitors with lower costs - new regulatory state

The purpose of this analysis is to assess the internal assumptions of the project to attain the purchase of technology for processing cable waste and

analyzed external opportunities and constraints determined by the current environment. According to the SWOT analysis, this specified the opportunities, which represent benefits of company. These are of great benefit to a company relative to the surrounding businesses in the region and monitor the demographic, economic, technological, political, legislative and social factors. In terms of attractiveness and a high probability of success is the biggest growing market opportunity in region. Compared to several threats are more opportunities which mean they are created ideal conditions for the development of eco-production in a district which will ultimately lead to purchase the latest available technology for processing waste cable. However, it goes without saying that a company representatives, belonging to a very experienced, do not become potential threats to the passive, but pre-preparation steps to eliminate them.

4. PROCESS OF RECYCLING

The current European conditions are posed to the great emphasis on the quality of production processes, with minimal impact on the environment, connected with low raw material and energy consumption

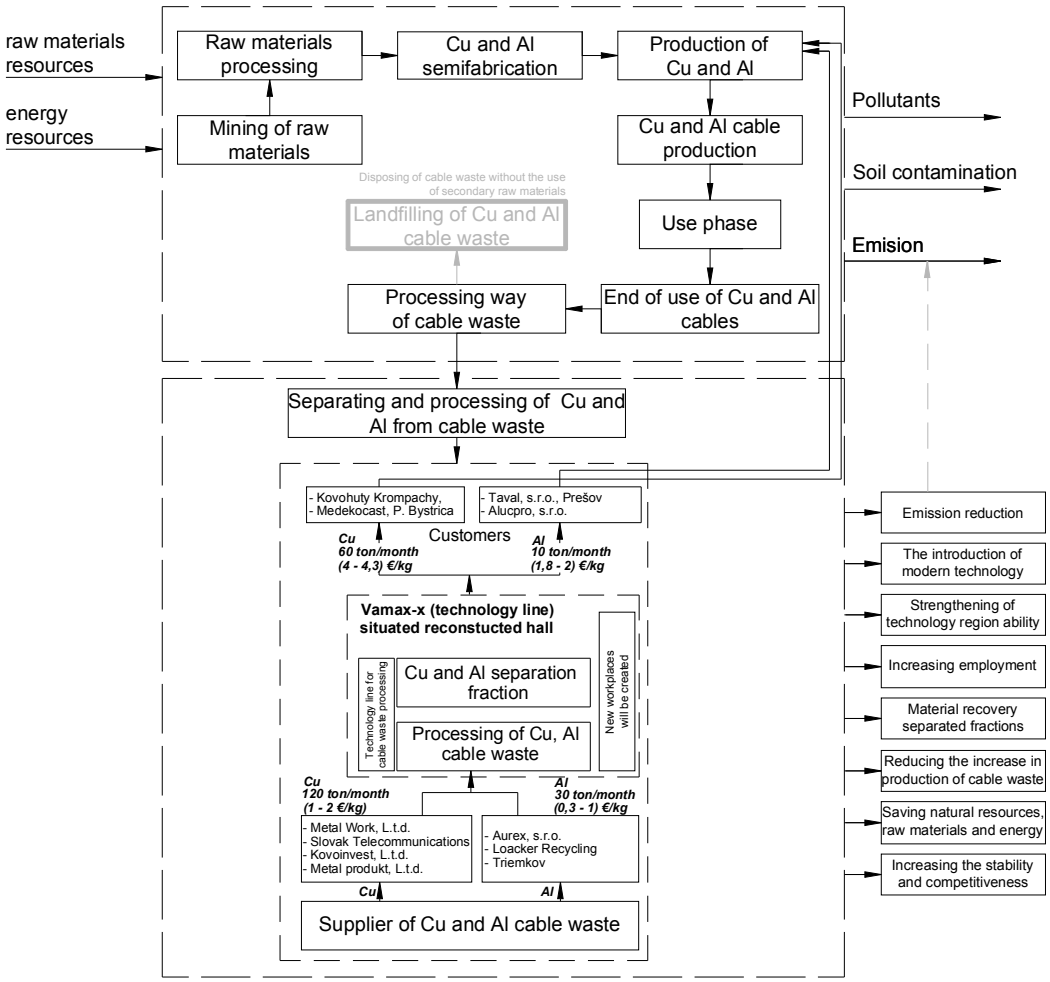

Figure 2. Life cycle of aluminium and cooper separated from cable waste and its impacts

Competition and scientific and technological progress makes the deployment of such technologies to meet the demanding requirements of modern production in particular in the field of automation in terms of economic, environmental and energy efficiency. These technologies include systems based on the processing of waste. These systems are a component

of the technical infrastructure with a significant impact on the environment. The increase in production of electrical and electronic equipment and a short length of their life compels the company to seek new technologies for their recycling of organic and not harmful substances, the environment. Company is focused on the issue of trends in technology processing waste electrical and electronic equipment, development of the negative impact of production and consumption on the environment, a comprehensive line of processing, electrical and economic recovery [3]. Compared with the liquidation of cable waste is possible to save natural resources, energy, reducing waste. Studies have shown that recycling materials can save 3 - 5 times more energy than can be obtained by burning. In the scheme illustrated chart production logistics chain Cu and Al cables and use of these commodities. As seen from the figure 2, the recycling of copper and aluminum cable wastes using the latest available technology it is possible to evaluate the material valuable commodity.

This technology is performed by cable cutting and shredding, accomplished by copper separation from plastics by water washing means. Our company recycles up to 150 tons of cable waste per month. We process all kinds of cables, starting from thinnest computer, automobile wires, to thickest power and high-voltage cables. Waste is a challenge faced throughout the industrial and domestic worlds. The use of compound materials by the machine, electronic and packaging industries is widespread and waste products are inevitable. The simple disposal of these waste compounds is wasteful and can be hazardous. Until recently, the separation of the compounds into basic materials through chemical or thermal processes has been very costly and damaging to the environment. As a result, most of these compound materials have been dumped or burned rather than recycled. The result of technology process is a farsighted solution to these problems offering separation of the various compound materials into their individual components. The process provides a highly cost effective route to recycle materials making a major contribution to raw material costs and keeping well in line with new, stricter regulations. The process is based on an environmental-friendly, dry, mechanical process. This process has three basic stages. Workers remove the recyclable cables, wires and these materials are all sorted for individual commodity sales.

Once they are separated into different categories, they are sent to the crusher/shredder and shredded into small pieces. The recycling materials enter the crusher; they are dropped into a rotating hammer mill. The hammers hit the recycling material and implode into pieces of wire and metal. A magnet pulls metal from the mix, and a screen is used to sift the glass to produce the desired size. Metals are separately discharged from the bottom of the system into commodity containers for shipment. Different from the traditional burning method, waste wire and cable recycling production line uses machines such as belt conveying, magnetic iron separator, helix loader, vibrating separator and other manufacturing processes to achieve the recycling purpose. Other enviro-socio-economic benefits in the context of sustainable development are listed briefly below:

- support for closed cycles of production and consumption,
- minimization of raw material and energy inputs,
- maintaining the possibility to use existing resources for future generations,
- the revival of traditional activities with careful use of modern technologies,
- increase industrial activity in the district with very low turnover
- increasing employment in the district with high level of unemployment,
- recovery primary natural resources,
- increased use of separate components of waste copper cable and aluminum,
- introduction of modern technologies in production and in services,
- increase employment of marginal communities,
- strengthen the technological capabilities of the region,
- increase stability and competitiveness in the region,
- practical application and comprehensive efforts to create a society based on principles of sustainable development,
- significant reduction in organic load,
- materially enhance component cable separately collected waste,
- reduce the amount of land filled waste and the proportion of municipal waste disposal by dumping,
- reduction of unemployment of people from marginal communities,
- increasing the number of self-employed people from marginal communities in the region,
- retraining and increasing employment and employability.

5. CONCLUSION

Recycling plays an important role in environmental protection, particularly for electronic products. Used electronic equipment is a fast-growing component of the nation's waste stream. Past activities have reached significant measurable results and revealed that not only of other job opportunities but also for processing waste of cable whose total share in the waste and "E-waste" is increasing. When processing the waste of cables are also evaluating the use of a by-product - plastic. The challenge will be to increase the diversification of imports of cable waste, where ambition is full capacity utilization of technological lines, therefore the continuous operation of the three changes. Major supplier of cable waste will be Slovak telecommunications. The main suppliers of cable waste will therefore Slovak telecommunications. After processing the waste of cable customers separated metallic fraction. Expected situation in general after a recovery operation, and equipment can be summarized as follows: increase the competitiveness of existing enterprises by introducing innovative and advanced technologies, to create an environment for increasing the innovation potential of enterprises in industry and services and to develop of eco-production as a necessity for the preparation of sustainable development in the industry. The system will ensure the fulfillment of the obligations of the mandatory people with diverse interests and priorities and ensure the involvement of users in the collection of cable waste and to participate in the re-processing and further use of cable waste with emphasis on the characteristic sign recycling - double the environmental impact mitigation on the inputs into the production system which is to conserve natural resources of raw materials and energy, and on the outputs of the production system which reduces the amount of pollutants emitted into the environment. These aspects of operating in this case as a significant interaction because of the use of secondary raw materials (metal), shortening the chain of processes, which vary for different waste products and materials, and in this case is important to protect the environment.

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