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The innovator role of technologies in waste management towards the sustainable development

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Abstract

The paper "The innovator role of technologies in waste management towards the sustainable development" presents the most significant IT technologies that have contributed to the identification and implementation of new forms of economic and social development that takes into account the evaluation of the environmental impact of products throughout their life cycle. Technologies such as decision support systems (DSS), remote sensing and geographical information systems (GIS), online web services, virtualization and cloud computing are analyzed in terms of the innovator role and of the impact on the sustainable development of society.

The concept of sustainable development is summarized in the paper along with the main stages of action at EU level and in Romania. This paper focuses on the issue of the waste management and the role of IT to support management activities. In the context of the sustainable waste prediction is of great interest to the companies involved in the entire chain of waste management, to the local government in order to assess the costs and establishing the budgets.

Keywords: sustainable development, waste management, recycling, green IT, recycling society, cloud computing;

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1. Introduction

One can note that, on the European Union (EU) agenda, frequent discussions took place in the last few years regarding means identification to reduce the industrial activity impact on the environment. We have to change the manufacturing methods and to decrease the use of goods with adversely effect on the environment and implicitly on the life on Earth.

If the EU's concerns have as objective the environmental problems, in the background is aimed to diminish the impact of declining resources on the economic growth in Europe.

The results of the EU's concerns is to identify new forms of economic and social development which take into account the evaluation of products environmental impact throughout their entire life cycle, the development of environmental policies in accordance with a healthy and sustainable development.

Effects of these guidelines are visible in the decision-making process at all socio-economic activities levels. These effects are reflected in the IT field, creating new directions for the development of information and communication technologies. Thus, a new direction in informatics appears as g*reen informatics / eco-friendly informatics*. The term is relatively new and is taken from the British/American literature (Green IT - at Anglo-Saxons) and reflects the change of paradigm that already took place. In the French culture, this current is reflected by *l'informatique écologique*. Further in this study the term of *Green IT* is utilized.

Green IT is the result of measures and initiatives implemented on information and communications technologies (ICTs) so as they become *eco-friendly*. Appling Green IT in the entire design chain of processes and ICT equipment for the end-user, one can take into account the principles of environmental protection, energy conservation and sustainable development.

The new insight into ICT is trying to reduce the harmful effects of information society development. It has been found that the computerized systems of the existing world data-centers, due to their operating conditions, are the main cause for producing a more greenhouse gas than all the aircrafts from airlines around the world, Simon Pierre Mpeck Makon, 2013. This effect is aggregated with that of annual production of tens of millions of tons of electrical and electronic equipment waste. Its rigorous management has become a necessity for the sustainable development.

In this context, the role of the innovative IT technologies, such as: cloud computing, virtualization, decision aid information systems (DAIS), remote sensing and geographical information systems (GIS), web services online[†], integrated technologies CAD-CAM-CAE[‡] enabling life-cycle analysis of components of a product before using and placing it on the market, it is essential and this issue being treated in this work.

2. Sustainable Development

The sustainable development ensures the balance between the economic progress and natural resources consumed without endangering the natural balance of the planet. The challenge is to meet the present needs of the humanity without compromising its future development, its future generations, the means and the necessary resources to meet the actual and future needs.

The concept of sustainable development aims to combat the massive eco- industrial exploitation effects, being the only solution to keep within acceptable limits the environment quality. This concept was presented for the first time in1992 at the states and governments levels, at the World Summit in Rio de Janeiro (United Nations Conference on Environment and Development). A plan of action called "Agenda 21" was drawn up. As it was initially defined, "Agenda 21" meant to be an action program for the 21st century toward the sustainable development. The program has been adopted by the signatory States of the Rio Declaration in June 1992.

Meanwhile, the sustainable development has expanded on the quality of life gaining conscious socio-political aspects: protection and enhancement of the cultural and natural heritage, insurance of the safety and security of

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[†] For dematerializing certain processes through the services offered by computer networks (telecomputing and telepresence).
[‡] Computer Aided Design (CAD), Computer Aided Engineering (CAE) and Computer Aided Manufacturing (CAM)