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Modeling the green supply chain in the context of sustainable development

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Abstract

Sustainable development (SD) requires companies to take into account both the social and environmental consequences within their activities. This paper presents research about green supply chain management and highlight the differences between green supply chain and traditional supply chain management. Then, the paper analyses the sources of the risk in green supply chain according to the SD. Sustainable development has gained much attention in recent years as a "challenge" for all businesses. Finally, paper makes a modeling of the green supply chain in the context of SD and presents an interface tool for risk assessment in the green supply chain.

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1. Introduction

Sustainable development requires companies to take into account both the social and environmental consequences within their operations and their daily activities. Sustainability is currently a common preoccupation on both national and international level. The deciding issue of sustainability is the opposition between the population's need to grow on one side and the planet's resources and the continuous degradation of the environment on the other side. Sustainable development requires companies to take into account both the social and environmental consequences within their operations and their daily activities. This implies, first of all, reducing the pollution of the environment,

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whilst in downstream this is also found within society welfare, and thus in social conditions. There are a series of rules and procedures imposed by the European Union, and every member state must consider the promulgated imperatives and considerations.

The paper emphasizes the implications of sustainable development, climate changes as well as the implications of the traditional supply chain and the green supply chain. Next a series of risk factors are presented, of which the greenhouse gases are a matter of importance as an analysis on European Union level and within Romania is presented. By taking the imbalances into account, the main risk is carbon dioxide (greenhouse gases) and in this matter the optimisation of the supply process is presented by considering the imperatives of sustainable development and the associated risks. Finally the architecture and modelling of the green supply chain within this context is presented and discussed. The paper ends with conclusions and further possible research extensions.

2. Sustainable development and climate change

The foundation of the requirements for sustainable development was set in 2000 by the European Commission. This Commission launched in April 2000 the tool of “triple basis line” on the request of measuring their value, having as subordinated issues:

- environment: the impact of the campaign activities on the environment broadly – natural resources usage, rejecting the entire nature, territory occupation;
- economic: collecting financial performances, their impact on the economic growth in their field of activity and obeying the ethical principles in business;
- social: the social consequences of the company as a whole and its representatives: employees, solicitors, clients, local community (European Commission, 2013).

Sustainability refers to the ability of being durable that persists with time. So, in (Shuo, Wei, 2013) “...The essence of sustainable development is creating environmental and social conditions for earth enduring system, so that can benefits mankind. It clearly indicates the absolute dependence of human on earth enduring system”. The sustainability development can be seen as an additional requirement in the development of organization processes and achieving the objectives of the enterprise (Ivascu et al., 2014; Moraru et al., 2010).

The concept of sustainable development leads to the analysis of the factors which contributed to the changes in the environment and in the health of the population due to polluting of the water, air, ground and others. These decisive factors are especially the greenhouse gases which release carbon dioxide and methane into the atmosphere. Greenhouse gases (GHG) are developed in the environment following natural processes and human activities. Water steam is the most frequent in the atmosphere. Due to human activities considerable other quantities of other GHG are released into the atmosphere, thereby increasing their atmospheric concentration – and thus intensifying the greenhouse gases and warming up the climate.

These greenhouse gases are released especially by:

- burning of fossil fuels (coal, rock oil, natural gases) to produce energy for transportation, industry and households (CO₂);
- agriculture and deforestation;
- storage of household waste and the lack of local and national waste management;
- the use of fluorinated industrial gases.

The main sources of carbon dioxide emissions are the combustion of the energetic sector, the emissions from road transport, non-industrial combustion plants and combustion in the manufacturing industry. Within literature studies (Srivastava, 2007; Bajdore et al., 2011; Hugos, 2011; Sarkis, 2011) one can observe that transportation is a polluting element for which actions to reduce the impact on the atmosphere have to be imposed. By analyzing the implications of sustainability one can observe that the development possibility on the sustainability axis does not exist without the actual support of technology. Technology is present in every activity, being an element which sustains and contributes to the optimum development of a company’s processes. This tool can be used to optimize

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