

A dynamic Leontief model with remanufacturing and consumption

Adél Floriska¹
Imre Dobos²

¹ Institute Mathematics and Informatics, Szent István University, H-2100 Gödöllő, Páter Károly u.1, Hungary, E-mail: afloriska@mszi.gau.hu

² Department of Business Economics, Budapest University of Economics and Public Administration, H-1053 Budapest, Veres Pálné u. 36, Hungary, imre.dobos@bkae.hu

Abstract.

Over the last century the national economies have faced a large increase in industrialization and urbanization, involving a growing amount of waste materials discharged to environment. The solid waste disposal problem, the decreasing of landfill sites as well as the scarcity of natural resources which provides raw material and energy for production do create a larger demand for remanufacturing and reuse. From an eco-efficiency point of view remanufacturing has two major effects:

On the one hand reduces the exploitation of natural resources that is resource conservation effect. On the other hand by recovering and reintroducing materials or reused components which can serve in the producing new goods into the economic system, the waste disposal load can be reduced that is waste reduction effect.

The aim of this paper is to investigate of the impact of remanufacturing in the economy. In static context this phenomenon was analyzed in the literature. This paper try to generalize the classical dynamic input-output model with the mentioned activity. We investigate how the remanufacturing extends the availability of non-renewable natural resources for the next generations in this inter-industry framework. We first formulate the problem that is to be examined and next we establish some properties of the model. We examine the balanced growth path of the extended model and compare the results to the classical Leontief model. We try to answer the question, whether the remanufacturing/reuse increases the growth possibility of an economy. By this evaluation we analyze a possible sustainable development of the economy on the basis of the product recovery management of industries.

Keywords: Remanufacturing, Reuse, Input-output model, Leontief model, Sustainable Development, Balanced Growth Path, Product Recovery Management