

Flow Analysis on Products of Agriculture, Forestry, Fisheries Industry using Structural Path Analysis

Topic: Sustainable production and consumption I

Author: Yuko Oshita

Co-Authors: Yasunori Kikuchi

Agriculture, forestry, fisheries industry of Japan is facing many critical problems seeking solutions for them, e.g., aging of workers and free trade of the products. To build robust domestic-supply chains, we need innovation in consideration of process of agriculture, forestry, fisheries industry, social system and supply and demand structure. As well as main products (foods and wood material etc.), by-products (biomass) have become important products as biomass renewable resources, regarding agriculture, forestry, fisheries industry. This paper analyze flows of products of agriculture, forestry, fisheries industry and characterize present structure of them, then we propose to design robust supply chains by introduction of biomass conversion technology etc.

We apply technique of structural path analysis (Defourny and Thorbecke, 1984; Lenzen, 2002) to extract the flows of them. In this study, we analyze the flows of 6 products, rice, potatoes and sweet potatoes, vegetables, fruits, sugar crops, logs, and they cover 90% of their domestic total output.

From the results, it became clear that the most part of rice, potatoes and sweet potatoes, vegetables and fruits are supplied to final consumers directly (without processing) or via one step (sector). On the other hand, sugar crops and logs are supplied to final consumers via many steps and sectors. Flow diagrams of rice, vegetables and fruits are relatively simple, because transit points (sectors) of their supply chain are a few. However it is a noteworthy that rice supplied to livestock sector and vegetables. It is thought that by-product of rice, rice straw and chaff, are used by such sectors as fermentation feed and compost. Potatoes and sweet potatoes is used for not only food, but also industrial starch. Therefore the flow diagram is relatively complex and has many industrial sectors. Sugar crops has also relatively complex flow. The ratio of sugar which is supplied to household directly is 9.5% of total output of sugar crops and unexpectedly small. The most of them are supplied to eating and drinking place and food industry. By-products of sugar crops, bagasse and filter cake etc., also supplied to livestock sector and vegetables. Flow of logs is most complex, and their by-products are used by many agriculture and livestock sectors and power generation. Logs are supplied to final consumers via many transit points (sectors).

For building the robust and comprehensive supply chains, as well as main products or high value-added products, by-products and transit sectors in flow diagrams which became clear in this study are important as consideration factor of system design.

Reference

Defourny, J. and Thorbecke, E. (1984), *Economic Journal*, vol.94, no.373, pp.111-136.

Lenzen, M. (2002), *Journal of Cleaner Production*, vol.10, no.6, pp.545-572.