

Identifying Air Pollution Clusters within Asian Supply Chain Networks

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Asian countries use a large quantity of fossil fuels in the production of goods, generating substances that are a major cause of air pollution. The fine particulate matter (PM2.5) emitted by the production activities of China are a problem not only because of their adverse health impact within China but also because they give rise to cross-border pollution in neighboring countries. Regarding this air pollution problem, research aimed at developing emission inventories of air pollutants in the Asia region has been carried out in recent years (e.g., Ohara et al., 2007). However, the emission responsibility has not been clearly discussed in the context of life-cycle management and emission reduction policy. With this background, this paper proposes a new spectral clustering framework based on the supply chain network extending from final demand to producers and even considers cross-border pollution of other countries (e.g. Kagawa et al., 2013). Based on the environmentally-extended multi-regional Asian input-output table for 2005, we identified environmentally-important supply chain clusters with higher PM2.5 emissions and health impacts in the Asian countries. We found the following: (1) the supply chain clusters with the greatest impact on human health in the Asia countries are centered around agricultural clusters in China (e.g., Paddy, Other grain, and Food crops), (2) the transportation sector also plays a major role in air pollution, as a hub of supply chain clusters that generate relatively large impacts on human health. This paper concludes that the emission reduction measures in higher priority clusters centered around agriculture and transportation sector in China and South Korea are crucial in reducing human health impacts associated with supply chains in Asian countries.