Exploiting global buyer-supplier networks to improve supply chain due diligence

T. Mizuno[1], T. Ohnishi[2], T. Watanabe[2]

[1]National Institute of Informatics

[2]The University of Tokyo

 What are the responsibilities of multinational corporations amid economic globalization in dealing with environmental degradation, widespread poverty, refugee displacement, racial discrimination, terrorism, regional conflicts, and other global challenges? Certainly one initiative that would nudge the world in the right direction would be for companies to assume greater responsibility for the environment and human rights issues by improving the transparency of entire supply chains from a global perspective. However, since the global supply chain has this feature of small-world connectedness [1], it is exceedingly difficult to check every supplier and client upstream from each firm. In this paper we propose a scheme that markedly improves transparency by exploiting this network structure.

In global supply-chain, companies group themselves into communities that might be called cartels or associations, and companies are most closely associated with other companies in the same community. Small world connectedness or globalization is brought about by a relatively small number of companies that act as intermediaries between communities [2]. We will employ negative information about a company that is widely covered by the global mediaa company is reported to employ child labor, for example. We will statistically prove situations in which companies sullied with adverse information are concentrated in certain communities making up the global supply chain. In other words, if the mediating company between communities is able to check that no products from the discredited company have found their way into the market, then the mediating company would be in a position to prove transparency of a vast number of products from a vast number of downstream companies. There are very few of these mediating companies. We will evaluate increased transparency of the supply chain by pinpointing companies that mediate with communities harboring companies with adverse information using the connectivity and path length between companies in the global supply chain, and offer policy proposals for dealing with supply chain risk. We will provide some examples of the proposed scheme. First, it will be illustrated how the scheme might work for dealing with the conflict mineral crisis in the Democratic Republic of Congo. Next, we will also show how this approach could be applied to identify goods produced by companies exploiting slave labor or other labor issues.

[l] T. Mizuno, T. Ohnis, Soc. Inf. **8852**, 334 (2015).

[2] T. Mizuno, T. Ohnis, EPJ Data Science **5**, 2 (2016).