

Environmental and social footprint analysis considering the production activities of the informal sector: the case of manufacturing industries of India

Topic: Input-Output Analysis: Sustainable Production and Consumption Policies - VI

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The informal sector is a set of activities that are imperfectly regulated by the governments, and it is hardly accounted on official statistics. In emerging and developing countries, such unofficial economic activities generate one-third of the total gross domestic product (GDP), hence the informal sector is the vital for supply chains in the regions. On the other hand, many study have demonstrated that the higher informality of economies have negative impacts on environment (e.g., carbon emission, air pollutant emissions) and welfare of people (e.g., poverty, poor working conditions). Although there are many studies that calculated environmental or social footprint, due to the lack of an input-output table, there are few studies focused on the contribution of the informal sector. This study is the first attempt to construct an extended input-output table that distinguishes the formal sector and the informal sector to explore how the informal sector contributes environmental and social footprint of the country. This study focuses on the informal sector of 25 manufacturing industries of India as a case study. Given the lack of regulations or supports targeting the informal sector, it is important to identify the contribution of the informal sector in environmental or labor footprint to understand how much of the emissions or employments can be covered by existing measures and which industry should be prioritized to introduce a policy targeting the informal sector.

India has the largest informal economy among emerging and developing countries, where the informal sector generates half of the GDP and 90% of employment. To compensate for the exclusion of the informal sector from existing official statistics, the Indian statistical office has conducted several surveys specific to the informal sector. Based on the results of these surveys, India's input output table implicitly includes informal production activities in the sense that formal and informal production activities belonging to a specific industry are not distinguished explicitly, and these activities are aggregated into a specific sector. Therefore, it is necessary to distinguish between these two.

The data for estimating the input output table are followings. First, for estimating the input coefficient matrix specific to formal and informal sectors, informal sector's output and value added in national account of India was used. Second, for calculating the energy consumption of the informal sector, this study used the estimated value of the energy consumption of the informal sector in the previous studies. Third, for estimating the number of workers in the informal sector, this study used unit level data of Periodic Labor Force Survey. This survey also provides the characteristics of employment in the formal and the informal sectors such as education level, income, working condition of workers (e.g., whether to have a contract, paid leave, compensation for unemployment). The indicators for estimating the table showed the informal sector has a smaller intermediate input due to the higher value added ratio to its output. I also found the informal sector tends to have a higher energy intensity than the formal sector due to the higher dependency on coal. Regarding the labor, the share of employment in the informal sector accounts for 74% in rural area, 63% in urban area, and the share of worker in the lowest level of education (i.e., not literate) was much higher in the informal sector. The result on the footprint analysis showed the informal sector in several industries significantly contributed to the national carbon footprint and labor footprint of India. Specifically, in the supply chain of construction, which drives the largest CO₂ emissions in India, the informal sector contributed about 15% of the carbon footprint. Considering the workers and owners of the informal sector are in a dire situation, it is crucial to involve their formal suppliers to address the environmental and social issues of the informal sector.