



Achieving due diligence in the supply chain - how statistics can help

Oscar Lemmers – Statistics Netherlands – o.lemmers@cbs.nl

Abstract

Several countries and the European Union are developing legislation about due diligence from firms in their supply chain. Individual firms will be responsible for good environmental practices and good working conditions in their entire supply chain. The aim of this text is to shed light on relevant activities in the statistical community. These can help policy makers and individual firms to identify possible risks for people and planet in supply chains.

Input-output analysis on a multi-region input-output table already yield first insights. For example, the employment, value added and emissions in the Dutch metal industry related to the German car manufacturing. And whether this is one, two or more steps away from the industry under concern. This is useful for industry policies.

However, SMEs have a different input-output pattern than large enterprises, hence one cannot use this approach for SME policies. Extended input-output tables, where an industry is split into an SME part and a large enterprise part, allow for supply chain analysis for the average SME in a given industry in a given country. This is useful for SME policies.

This does not help an individual firm, that might be very different from the average firm. Yet an input-output analysis based on its specific inputs from specific countries will shed light on possible vulnerabilities. Combining this with the previous approach allows for benchmarking to the average firm of same type and industry.

Note that this approach only yields general insights and cannot function as a complete analysis of the detailed supply chain of an individual firm. However, it is a very cost-effective approach that gives some pointers where to start.

Key words: sustainable development, supply chain, input-output analysis, SME

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Introduction

The [European Parliament](#) voted to request the European Commission to develop legislation that requires due diligence from firms in their supply chain. Individual firms will be responsible for good environmental practices and good working conditions in their entire supply chain. The German government already agreed on a [Due Diligence Act](#). Four Dutch political parties proposed [legislation](#) that obliges Dutch firms to prevent human rights violations and environmental damage in their supply chains. These initiatives contribute to the [Sustainable Development Goals](#) that the United Nations have drawn up to achieve a better and more sustainable future for all.

Statistics help to identify risks in supply chains

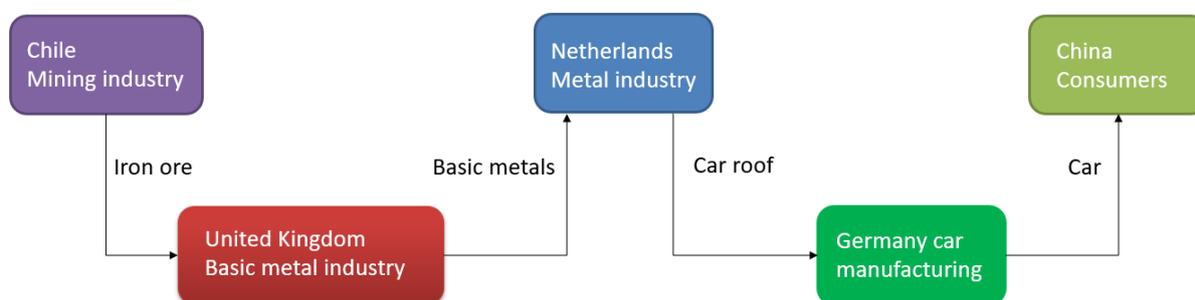
The aim of this text is to shed (a very non-exhaustive) light on some relevant activities in the statistical community. These can help policy makers and individual firms to identify risks for people and planet in supply chains. It is already possible for firms in many countries to obtain a first impression of the impact of their industry in the entire supply chain. Namely, in terms of value added, employment and emissions, by industry by country. For example, the employment in the Dutch metal industry related to the German car manufacturing.

First, a small introduction.

Problem: supply chains consist of many links

During the last decades, production has been fragmented more and more. For example, a Chilean mining firm supplies iron ore to the British metal industry that creates basic metals. These are subsequently used by a Dutch firm that uses them to make car roofs that are subsequently being used by German car manufacturers to produce cars for China. The German car manufacturer sources directly from the Netherlands, but indirectly it sources from the United Kingdom and Chile as well.

A possible supply chain



Thus, it might not enough to track only the direct supplier abroad and ensure that it adheres to environmental and labour standards. It is necessary to know about large suppliers several steps away: in which industries in which countries are they located and how is the situation there? That extra information is actionable intelligence.

Monitoring your whole supply chain in detail takes many resources

Some large multinationals already monitor their whole supply chain, e.g., in the aviation industry, but not all firms do. Disentangling in detail a complete supply chain that is spread among many countries and industries takes a lot of time and resources. Yet it is the only way to achieve 100% certainty about the complete supply chain of an individual firm. The great majority of enterprises has not yet mapped its supply chain in detail. And for small and medium sized enterprises (SMEs) that are willing to engage in due diligence, this might be too expensive and too cumbersome. [Estimates for the proposed Dutch law](#) about due diligence are that it would concern 1500 enterprises, it would lead to yearly costs of 17-500 million euro and one-off costs of 4-250 million euro. [Estimates of Statistics Netherlands](#) show that the number of enterprises involved is probably at least twice as high.

Statistical approach - less detail but also less resources

It should be noted that the approaches below concern the firm with an “average” supply chain. The advantage of a more general approach is that it still provides ideas where to start, where the most sensitive spots might be located. This could lead to a first general risk assessment and a corresponding proportionate approach, requiring less time and resources. The disadvantage is that this approach provides information about the average firm – which does not exist.

A first general view at industry level

Research projects such as [WIOD](#), [Exiobase](#), [GTAP](#) and [Eora](#) were connected with and led to institutionalised statistical projects such as [TiVA](#) (OECD and WTO) and [FIGARO](#) (Eurostat). These are now commonly used to map "the genome of international trade" (Gurría). The methodology first compiles and then uses inter-country input-output tables (ICIOTs), that describe the relations between different industries in different countries. For example, how much the mining industry in Chile supplies to the basic metal industry in the United Kingdom, how much this supplies to the metal industry in the Netherlands, supplies of the Dutch metal industry to German car manufacturers and sales of the German car manufacturers to China. It shows the interdependencies between individual countries and industries. It is wonderful work that creates information about many countries at the same time, with comparable methods. The information has become a public good, both the [underlying data](#) and the [indicators](#) derived from it. Furthermore, it is a time series that is not a one-off project but will be continuously updated to reflect changing supply chains. This information can be used, now and in the future, to get a first general view of the supply chain of e.g., the German car manufacturers. They can see which countries and industries are involved and to what extent. This is useful for industry policies.

Why it does not really work for SMEs

However, it is known that supply chains of SMEs substantially differ from the industry average. They use less imports and rely more on the domestic market. Furthermore, they source more from countries nearby. Hence it would be advisable not to use the industry average, let alone using the detailed analysis of an individual multinational in the same industry. Still, SMEs might like to set steps towards due diligence in their supply chains. Policy makers who want to support this with general industry policies should realise that one size – that of the average firm - does not fit all.

Information for SMEs at industry level

One can extend the methodology that led to information at industry level with information about different types of firms. For example, with ownership (foreign-owned or domestic-owned, e.g., [Cadestin et al.](#)), with size class (e.g., [Chong et al.](#)) or exporting status (e.g., [Michel and Hambÿe](#)). The results would e.g., show how much the large mining industry in Chile supplies to SMEs in the

British metal industry, how much these supply to SMEs in the Dutch metal industry and how much these supply to large German car manufacturers. Our [OECD expert group on extended supply use tables](#) is currently developing a handbook describing the necessary data and methodology that will enable countries to participate in such initiatives. They can follow the footsteps of the Nordic countries who already did so in the past in [several projects](#) with the OECD. This is valuable for industry policies for SMEs and for SME policies.

From profit...

At the moment publications mainly focus on the value added and where in the world it is generated in the supply chain – profits and wages. For example, how much the mining industry in Chile earns due to supplying in the value chain of the German car manufacturers. The OECD already has [standard tables at its website](#) that provide this information. There is also work about environmental and labour aspects.

To planet...

The environmental work shows, among others, how much [greenhouse gas](#) is emitted and how much raw materials are used in each step of the supply chain of an industry, everywhere in the world. Hoekstra et al. used the underlying information to show that moving production from high-wage countries to low-wage countries during 1995-2007 had [adverse effects on worldwide CO₂ emissions](#). It led to 500 Mt less CO₂ emissions in high-wage countries but 1500 Mt more CO₂ emissions in low-wage countries.

To people

The work on labour does not only show how many [jobs are generated in each step of the supply chain](#) of an industry, but also yields information about labour by gender or education. Furthermore, there is [work about slave labour, child labour and forced labour](#) (Alsamawi et al.) in supply chains. Zafrilla Rodríguez et al. show the [social footprint](#) of U.S. Multinationals' Foreign Affiliates – the working conditions in their supply chains. It should be noted that these are some of the first studies and that a complete view is not yet in sight.

The supply chain of the non-average firm

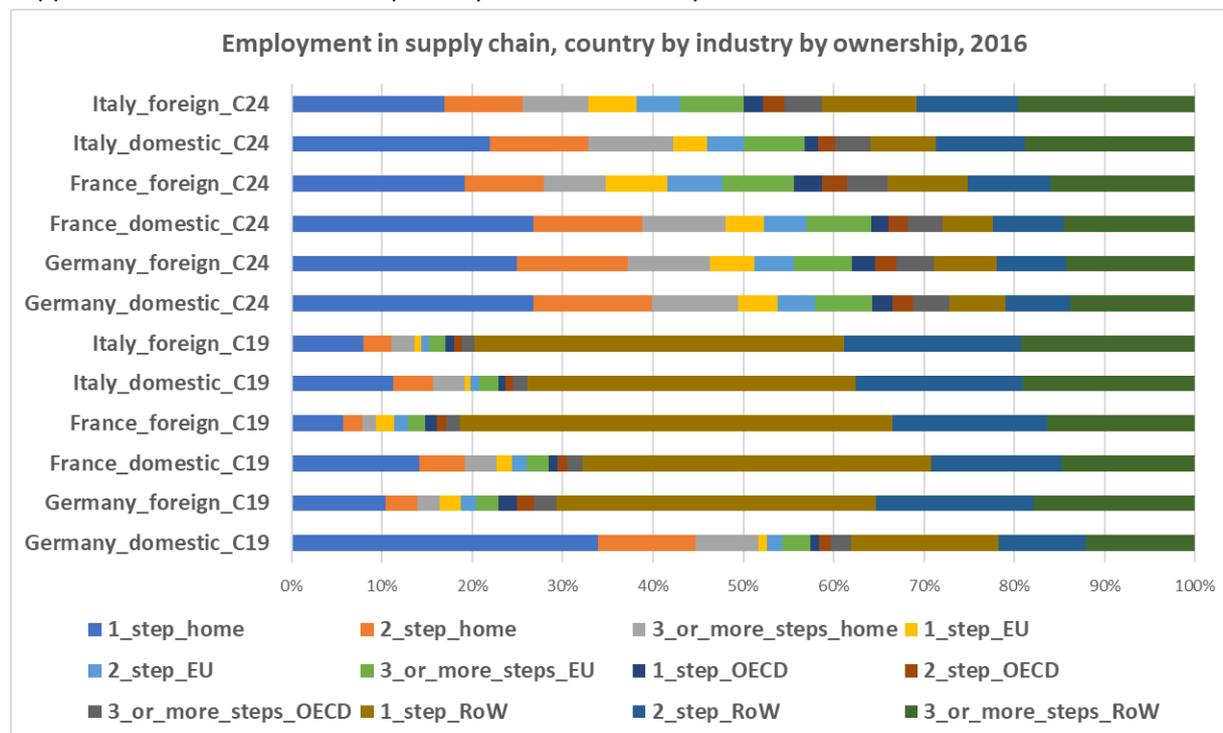
An individual firm might realise that it has a supply chain that is completely different from the supply chain of the average firm in its industry. Merging the individual source/import pattern with the right statistical information will yield better – yet still crude – estimates for the social and environmental footprint of this particular firm. This allows for benchmarking against the average firm of this type in the same industry.

Insights that can be derived

Using this type of techniques, one can estimate indicators such as value added, employment and emissions in a given country and industry that are related to another industry in another country. It is possible to single out industries and countries that are at low or high risk. Using standard input-output techniques also allows to estimate the distance to an industry in the supply chain. If it is many steps away in the production process, it might not be feasible for the lead firm to monitor it and improve conditions. The indicators enable to set up a prioritisation strategy and to take proportional actions.

Example

The graph below shows how employment in the supply chain of an industry is distributed among the home country, European Union, OECD (excluding EU) and Rest of World (RoW). It is shown for the 3 largest economies in the EU, namely Germany, France and Italy, for manufacture of coke and refined petroleum products (C19) and manufacture of basic metals (C24). In each country, the industry is split into a domestically owned part and a foreign owned part. In the supply chain there is a distinction between direct suppliers (1 step away from the industry), suppliers of suppliers (2 steps away) and suppliers who are 3 or more steps away from the industry.



Source: author’s calculations based on AMNE and Exiobase.

There are obvious differences in the supply chain of an industry depending on ownership. For example, domestically owned manufacturers of coke and refined petroleum products in Germany rely far more on domestic inputs than foreign owned manufacturers; 34 percent of employment in their supply chain is in the home country one step away. But in the supply chain of the foreign owned firms 35 percent of employment in the supply chain is one step away in countries outside the EU and the OECD. This indicates that activities of foreign and domestically owned firms are very different. In short: the ownership dimension matters; considering only the industry is not enough.

Continuous progress - yet still much to do

Concluding, mapping the supply chain of an individual firm takes much time and resources. However, there is already quite some statistical information about supply chains available that can help an industry or a firm to set its first steps to achieve due diligence in its supply chain. For example, the 2021 update of TiVA for reporting year 2018 which will contain 45 industries and 64 countries. Knowledge about value added is more easily available than information about environmental issues and working conditions. The current standard approach is to map supply chains at industry level, although multinationals and SMEs in the same industry have very different supply chains. Our OECD expert group on extended supply use tables works on methodology to distinguish separate supply chains for different types of firms. What is desirable, is statistical information about greenhouse emissions, material use, working conditions etc. at each industry in each country separately.