

# Sectors damaging the environment are not drivers of the economic growth

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Credit: Tuomas Mattila

"You could decrease environmental impact without hindering economic

growth. These are two different subsystems", says Tuomas Mattila in his doctoral thesis. Tuomas Mattila works as a researcher at the Finnish Environment Institute (SYKE).

What are the environmental impacts of constructing a kilometre of road? Between which sectors is a price of EUR 1,000 paid for a piece of wooden furniture actually divided? Such questions can be answered applying the calculation method presented by Tuomas Mattila in his doctoral thesis for Aalto University School of Science.

The calculations in the Aalto University thesis in systems and operations research show that the ecological footprint of the Finnish economy mainly comes from the primary production of wood, energy, crops and fish, whereas highest value added is produced by sale of apartments, profit of retail trade and public services.

"It was surprising to note that the [gross domestic product](#) and ecological footprint are caused by different parts of the economy. It is often thought that reducing environmental impacts would strain the economy," Tuomas Mattila says.

The study applied environmentally extended input-output (EEIO) models, which combine consumption, production and environmental impacts into a transparent system of equations. The study identified the most important [economic interactions](#) out of a set of 23,000 model parameters in the Finnish input-output tables. The model was used to examine where the gross domestic product comes from and which sectors cause environmental impact and biodiversity loss. At the same time, it was established which sectors produce value added.

## **Assessment of environmental impacts**

In the study, environmental impacts were assessed using the latest impact

assessment methods of [life cycle assessment](#) (LCA) which allow the examination of methods and raw materials needed to manufacture a product.

Similar environmentally extended input-output models combined with life cycle impact assessment methods have been used to calculate carbon footprints and [greenhouse gas](#) emissions of products and services. The doctoral thesis broadened the scope of previous analyses by focusing on new environmental impacts: biodiversity loss, land use and ecotoxicity.

The calculation method allows a detailed analysis to find the most important production chains for each type of impact. For example, raw wood's journey through sawmills and wood product manufactories to a new apartment is a production chain that proved to have a significant [ecological footprint](#).

## **Only a few production paths contribute to greenhouse gas emissions**

Another surprising observation was that out of tens of thousands of different production paths, only a handful had very significant environmental impacts.

For example, with respect to greenhouse gas emissions, only 0.3 per cent of the variables examined were relevant.

As this result surprised the researchers, the method was tested by trying to predict Finland's greenhouse gas emissions in 2005 from year 2002 data only updating the 60 most important components of the 23,000 model parameters. The simple model predicted the 2005 emission level with high accuracy. This result also surprised the peer reviewers of the paper, but the calculations were found to be correct.

The observation made by the researchers is good news for minimising environmental impacts. When solving the environmental problems of the global economy, it is a good idea to focus on only a few of the most important questions.

## **Global calculation model under development**

The calculation model used in the study was applied to Finland, but a similar global model is already under development. The Finnish Environment Institute will use it in an EU project on the global effects of the smartphone business. The study will examine which part of the value added is produced in developing countries, which in developed countries and where the work is carried out.

The results of the doctoral theses support the view that Finland has undergone a transition from industrial society to a service society. The researchers also found the low contribution by industry to GDP surprising. For example, the forest industry only contributed a few per cent to GDP.

The results of the study raise the question: Is gross domestic product a good measure of well-being if its increase derives from the fact that flats are resold at a higher price?

Provided by Finnish Environment Institute

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