

LESS MATERIAL PROJECT¹

Material Efficiency vs. Material Productivity

by Sedat Alataş, 8 September 2022

What do we mean when we talk about efficiency or productivity in resource economics? Are they referring to the same thing or completely different concepts? If different, more specifically, how should we understand and interpret material efficiency and productivity? These three important questions are briefly addressed in this blog post.

Efficiency primarily refers to the ability to produce a given quantity of output while using fewer resources or inputs. Depending on their main function in production, the focus of inputs in efficiency assessments differs between sectors. For instance, a service company may prioritize labor efficiency since it is more likely to be labor intensive, but a steel production industry may prioritize energy or material efficiency because of either their substantial role in production process or environmental concerns. Therefore, in general, if the same amount of output is produced with fewer resources, no matter what the industry is, it is said to be efficient. On the other hand, if more inputs are utilized to produce the same output, it is considered to be less efficient.

Another concept that might sound similar to efficiency at first is productivity. Yet, productivity refers to an increase in production per unit of input. Therefore, no matter what the industry is, the main concern here is to achieve the highest output with the given resources or inputs. If the largest amount of desirable output is produced with the use of available inputs, it is considered to be productive.

As both efficiency and productivity are desirable, economic actors, such as companies, households, or governments, encourage efficiency and productivity to achieve many different objectives. Yet, they do not refer to the same meaning, as shown above. Although they are colloquially used as synonymous, this is not technically true. For example, assume that a company employs a certain amount of materials (resources) to produce 50 goods. If the main concern is productivity, this company should find some ways to increase the number of goods

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per material. In this regard, if the production of goods increases per material, the company becomes productive. On the other hand, if the main concern is efficiency, the company should try to produce 50 goods (the same amount) with less materials. Therefore, if materials utilized in the production process decrease to produce the same output, the company becomes efficient. In short, while efficiency is more about doing something with less, productivity is about something doing more per unit of input.

It is equally important to note that both efficiency and productivity are two terms that are closely related to each other. For example, climate mitigation requires designing and implementing some resource policies. In this regard, material efficiency is considered one of the most important mitigation options in terms of its potential contribution to net-zero and circular economy efforts. It is not only because material efficiency might reduce material use per output, but also because material efficiency leads to productivity gains by lowering costs and increasing production yields per unit of input, meaning that adopting both material efficiency and productivity strategies together might be able to provide many different benefits to many different stakeholders.

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