

The Meaning of Criticality of Resources from a Business Perspective

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Natural resources, such as raw materials and energy, are the foundation of our society. However, most resources are not unlimited. The decreasing resource deposits in nature are often faced with a rapidly increasing demand. Other resources are scarce because their today's economically or technologically extractable reserves are running out. The allocations of essential resource deposits among a few countries enhance the problem. Many future technologies are dependent on raw materials, which are already scarce or threatened to become scarce. Consequently, resource efficiency is increasingly becoming the focus of public discussion.

The scarcer and the more important the particular resource is, the more urgent is its efficient use. To take this aspect into account, resources are often assessed in terms of their criticality. There already exist several studies that consider various aspects of criticality. Frequently they are politically motivated and focus on supply risk and vulnerability of certain economies such as EU or Germany. Although many approaches have several similarities in terms of considered criticality criteria, there are also differences. A consistent, generally accepted approach is still missing.

Even from a business perspective, the criticality of resources plays an increasingly important role. High volatile raw materials prices and supply bottlenecks can have far-reaching consequences for the company itself. However, it is often unclear when a resource should be considered as critical and how this criticality can be reduced. In previous studies the company-specific aspects seem not to be taken into account sufficiently. This paper therefore should answer the question when a resource is to be regarded as critical for a company and how a corresponding assessment method should look like.

For this purpose, first a definition of resource efficiency and its relation to criticality is given. Furthermore existing assessment methods for criticality are presented in an overview and are compared in terms of their similarities and differences. Based on these foundations, the issue of criticality is investigated from a company's perspective. Therefore, the mechanisms, that influence the criticality of a resource for a company, are systematically compiled and classified. These mechanisms are compared with the existing assessment methods. A detailed analysis shows which aspects are already covered by previous approaches and what other company-specific aspects have to be included in an evaluation approach to cover the company's perspective adequately. Finally, possible indicators for the evaluation are discussed.

The analyses show that previous studies are not adequate to assess how critical a resource is for a particular company. On the one hand, company-specific mechanisms remain partially disregarded. On the other hand, existing approaches are often characterized by a purely raw material-based point of view. This disregards the fact that companies rarely use only raw materials. Mostly semi-finished products, components, etc. are converted or processed. At these later points in the value chain there are additional mechanisms which influence the criticality and which should be taken into account when assessing a resource's criticality for a company. It is therefore an extended approach needed to assess criticality from a company's point of view.