Scenarios for Industrial Decision Making

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The activity of science is mainly about generating understanding with the aim to predict observations.[1] The formulation of the acquired knowledge in mathematical constructs makes this possible. Over the last three decades digitalisation has enabled sorting out big data sets, their fast analysis, and the simulation of possible scenarios with a predictive outcome. In addition, the requirement of causality has become less important in favour of relations that predict a certain verified reality. Business on the other hand is an economic activity still and mostly based on and driven by 19th century theory including pseudo-science mathematics complemented with after the fact explanations of failures.[2], [3] Therefore it is timely that businesses benefit from and make use of the available scientific knowledge and digitalisation tools, without getting into the fallacy that much more data supports better decision making.

For many companies, achieving the objective of a sustainable operation in a carbon neutral economy by 2050 as outlined in the European Green Deal [4] requires business decision support systems that are capable of handling not only economic but equally environmental and societal aspects of doing business. This system thinking approach will be essential to progress for meaningful decision making, but equally implies being able to deal with complex adaptive systems. Several scenarios can be considered for modelling and implementing such support systems in which the complexity depends on the operation level desired. Companies typically produce products and are integrated in a value chain, which in turn is part of a multi-value-chain network that make up a socio-economic fabric that functions within the constraints of the environment and the ecological system. Therefore, depending on the scope and ambition of the company, systems can be developed to consider the life cycle thinking, i.e., a triple P [5]– people, profit, planet – support system, at the product level, product portfolio level, value chain level, and the value chain as part of the multi-value-chain network level. In essence a hierarchy of systems can be envisaged. The implied modelling includes multi-objective optimizations [6] in combination with big data analysis on potential customers or markets and all tailored to an important business model objective. As an example, at a product level this objective could be the ecological footprint minimization of a product with an economically viable cost. In addition, the technological feasibility for the product's ecodesign options can be included.[7]

In brief, industrial business decision making can be upgraded by considering a system approach, which combines economic, environmental and societal knowledge. By taking advantage of the scientific modelling principles, the latest digital algorithms for data analysis, and digital infrastructure far more realistic actionable scenarios can be developed to set companies on track towards a sustainable future. Such business decision support systems then guide companies to become more effective in finding resolutions for coping with an ever more complex business environment.

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