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# Assessing farm sustainability with value oriented methods

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**Abstract**—Agricultural policy makers aim to combine strong economic performance with a sustainable use of natural resources. An important step is to move from trying to define sustainability towards developing concrete tools for measuring and promoting achievements in sustainability. Hence, sustainability assessment is inevitably based on strong simplifications both of the theoretical paradigm and of the characteristics of systems of concern. The most known approaches to assess sustainability performance are burden orientated: they assess the costs or potential harm of resource use. These burden-oriented approaches focus on the level of environmental impacts caused by an economic activity compared to another set of environmental impacts, while value-oriented impact assessment analyses how much value has been created with this set of environmental impacts as compared with the use of these resources by other companies. In this paper, an outline of the possibilities and limitations of value-oriented methods to assess farm sustainability will be discussed.

**Keywords**—sustainability assessment, agriculture, value oriented

## I. INTRODUCTION

A major objective of the European agricultural policy is to have a sustainable and efficient farming sector, which uses safe and environmental-friendly production methods and provides quality products that meet consumers' demands. To meet with the challenges of sustainability, an approach for integrated assessment of farms is necessary that can provide good guidance for decision and policy making. The most known approaches to assess sustainability performance are burden orientated: they assess the costs or potential harm of resource use. Examples on firm level are Life Cycle Analysis (LCA), Eco-Efficiency and the Global Reporting Initiative (GRI). These burden-oriented approaches focus on the level of environmental impacts caused by an economic activity compared to another set of environmental impacts (how resources should be substituted by each other), while value-oriented impact assessment analyses how much value has been created with this set of environmental impacts as compared with the use

of these resources by other companies (where resources should be optimally allocated). An example of a value oriented approach is the sustainable value approach, developed by Figge & Hahn [1,2]. This approach measures firm contributions to sustainability, based on the assessment of opportunity costs of using economic, social and ecological resources. This approach has been developed outside the agricultural sector and already applied to major companies (e.g. BMW, Shell). Recently the approach has also been tested and used for the agricultural sector. This paper wants to share these experiences and to discuss in how far this methodology opens new perspectives for assessing farm sustainability. First, we will give a short overview of the general concern for sustainable development and the definitions of sustainability. Finally, we will discuss the assessment of farm sustainability with the focus on value oriented methods.

## II. CONCERN FOR SUSTAINABLE DEVELOPMENT

*“Hurtling into the future, without any brakes and in conditions of zero visibility accurately describes my concerns and those of many people, I know.”*

This quote of John Peet [3] expresses his concern for sustainable development and as he mentioned many people share his concern. As early as 1966, Kenneth Boulding describes the transition from a cowboy economy without limits to a spaceman economy, without unlimited reserves. Boulding [4] states that we have to minimize the throughput of material in the economy and to try to produce as efficiently as possible. Closely related to Boulding's space ship image is the steady state economy by Herman Daly. A steady state economy is defined by constant stocks of physical wealth and a constant population, each maintained at some chosen, desirable level by a low rate of throughput [5]. An economy may be functioning very efficiently very efficiently

from the point of production in isolation, but this may be beyond the capacity of the environment [6].

In a nutshell one can say that the concern for sustainability derives from an ethical concern for future generations [7]. It is clear that the concern for a sustainable development (including environmental concern) is obvious and even natural<sup>1</sup>. However, it will be an enormous challenge to detect and respond in time to any potential threat to sustainability [11].

### III. DEFINITIONS OF SUSTAINABILITY

As in each text about sustainable development, we will start with the most known definition of sustainable development:

*“Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs” [12]*

This definition can be seen as the standard definition when judged by its widespread use and frequency of citation [13]. Although this Brundlandt definition captures the essence of sustainable development, it is hard to use in economic analysis because of the difficulty of the concept of need [11]. One finds a variety of definitions, meanings and interpretations [7]. Hence, it is clear that there is no universally agreed definition of the concepts of sustainability. As a consequence, some scholars forecast that the notion of sustainable development will remain fuzzy, elusive and contestable [14,8,15]. On the other hand, Bell and Morse [16] argue that the flexibility of the meaning of sustainability can be a great strength in a diverse world. In fact, sustainable development draws much of its resonance, power, and creativity from its very ambiguity [13]. An important aspect of the application of sustainability is the emphasis on multidimensionality (economic, social and environmental issues). Furthermore, sustainability can be recognized on multiple layers ranging from supra-national (e.g. world, E.U.-level), national, sectoral and firm level [17]. Hence, the achievement of sustainability requires an effective integration of multiple levels and systems that are nested in space

and time [18,19]. Finally, sustainability can be described as a dynamic process of sustainable quality improvement [20]. In this context, one is transforming a system that was previously unsustainable into one that is at least relatively sustainable [21]. Examples are approaches that see the way towards sustainability as a step or stage process (e.g. [22, 23, 24]) or as a transition process (e.g. [25]).

To summarize, we often find one or several of the following concepts in the description of the numerous notions of sustainability: (i) natural resources are finite and there are limits to the carrying capacity of the Earth's ecosystem, (ii) economic, environmental and social goals must be pursued within these limits, (iii) there is a need for inter- and intragenerational equity [26].

### IV. ASSESSING FARM SUSTAINABILITY

It is necessary to move from trying to define and describe sustainability towards developing concrete tools for promoting and measuring achievements [27]. In other words, to make sustainability a reality, we must measure where we are now and how far we need to go [28]. Moreover, indicators of sustainable development need to be developed to provide a solid basis for decision making at all levels [29].

Indicators of sustainability must be realistic in what they seek to accomplish, and what they can say about the paths we are on [30]. We also need to consider which trajectories are equitable, economically and ecologically desirable and achievable [31]. Hence the measurement of sustainability is a daunting task. In fact, the search for reliable indicators has gone on and will go on for decades [32]. Sustainability indicators serve as performance indicators in the sense of saying to us that things are getting better or that things are getting worse [33]. A sustainability indicator has to encapsulate the essential characteristics of social, economic and environmental progress. There has been an explosion of activity to develop sustainable development indicators, in order to determine whether sustainable development was actually being achieved.

Most approaches use a burden-oriented logic by concentrating on different environmental (and

<sup>1</sup> Note that not everyone is convinced of the usefulness of the sustainable development concept. Well known fierce opponents are Wilfred Beckerman [8,9] and Bjorn Lomborg [10].

social) impacts in order to measure the overall damage (the burden) caused by economic activity (e.g., [34, 35]). Burden-orientated approaches focus on the relative harmfulness of environmental and social impacts. In other words, burden-value orientated analyze how resources should be substituted by each other by assessing the combination of environmental impacts compared to another set of environmental impacts [35].

Value-orientated approaches integrate economic, environmental and social aspects with respect to their opportunity costs, and analyze how much value is foregone when a bundle of resources is used. In other words, the value-orientated approach proposes where resources should be allocated; it addresses the question how much value would have been created with this set of resources if they had been used by more sustainable efficient firms (real companies or not) [35].

Figge and Hahn [35] state that value- and burden-oriented impact assessments are necessarily complementary and both need to be considered to arrive at an optimal allocation of resources.

The sustainable value approach, developed by Figge and Hahn [1,2] is a value-orientated approach that can be seen as an improved eco-efficiency measure. The sustainable value approach is suitable to assess farm sustainability [37]. It may cover the use of economic, environmental and social resources in the farming sector and thus integrate economic, ecological and social challenges. The sustainable value approach is extremely suitable to support decision makers in their selection of good resource users and thus to target this group. Policy makers can then decide to reward good performers or decide to help bad performers to improve their sustainable resource use. Besides, an interesting way is to use good performing farms as examples for the sector as a whole. Sustainable farms may be used as a mirror for future farms. Therefore, it is essential to develop and use methods to identify sustainable farms. The approach could help decision makers to identify farms that best suit policy objectives. It also provides information to what extent resource use can be improved conditional on the current technology.

## V. CONCLUSIONS

Considering value oriented methods to assess sustainability, several recommendations for future research can be formulated. More empirical applications using data from all relevant resources can be useful to describe the sustainability performance of companies. Other environmental and social resources such as air and soil quality, as well as the quality of life should be considered. Contributions of farming to society such as contributions to biodiversity or landscape creation should also be incorporated into the calculation of the sustainable value of farms. So far, the relevant agricultural resources used in [37] were based on literature and the availability of data. But with the increased collection of data on several environmental and social aspects (e.g., CO<sub>2</sub> contribution, animal welfare) the scope for further research will certainly become wider.

In current applications, only an intra-sector comparison has been made, showing only the potential for improvements within a given activity. This implies that the agricultural sector remains constant and that dynamics are not taken into account.

Comparing the sustainability performance of farms of different agricultural sectors would be a very interesting and challenging topic. Another interesting topic is the analysis of the sustainable performance up or down the value chain. Furthermore, to strengthen the strong sustainability approach, the value oriented methods can be redefined by introducing carrying capacity constraints. Further, a further examination of the benchmark technology in value oriented methods is necessary.

Besides further improvements and further use of value oriented methods, empirical applications using other approaches (burden oriented) are also needed. A diverse use of methodologies to assess sustainability fits with the definitional diversity of sustainability.

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