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Sustainability in the prospective scenarios methods: A case study of scenarios for biodiesel industry in Brazil, for 2030

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ABSTRACT

In order to build prospective scenarios for biodiesel industry in Brazil, with a sustainable perspective, it was necessary to develop a cross-disciplinary work to include Sachs' dimensions of sustainability into the scenarios method. This meant linking concepts from different disciplines, without transforming it in a new discipline. In order to support the proposition for the new method, a study case is presented, the framework for the biodiesel scenarios in Brazil, by 2030. An in-depth interview was used to test the proposition of having the sustainability dimensions as driving forces. The result was the identification of a critical uncertainty composed of various aspects related the response to climate change and environmental conservation. The scenario storylines that were developed based on the critical uncertainties showed that sustainable options for the future are possible if the mental maps are enlarged to see beyond the business as usual.

The results show that the scenarios storylines go through social, environmental and economic aspects, supported by other aspects like the territorial and political. Also it showed that sustainable options are possible if the mental maps are enlarged to see beyond the business as usual.

1. Introduction

The methods and techniques to plan for the future are called Scenario Planning, Development Scenario, Forecasting, and Foresight or more generally, Future Studies. Scenarios are the products of Future Studies whilst they are the stories that represent the future. So far, planning for future or not, as human beings, the world today is not sustainable: natural resources have been depleted over the past two centuries. Moreover, about 795 million people are undernourished (FAO, IFAD, & WFP, 2015), 780 million people do not have access to clean water and almost 2.5 billion do not have access to adequate sanitation (UNWATER, 2013). Therefore, it is apparent that the plans for the future needs to be modified to reinforce the commitment with the future generations, and to show more balance between economic, social and environmental perspectives. However, Futures Studies is a body of knowledge that does not have an established theoretical and scientific structure (Bishop, Hines, &

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Collins, 2007; Bradfield, Wright, Burt, Cairns, & Van der Heijden, 2005; Wilkinson, 2009). There have been some valuable reviews organizing and structuring the techniques and the methods[1] (Amer, Daim, & Jetter, 2013; Bishop et al., 2007; Bradfield et al., 2005; Börjeson et al., 2006; Varum & Melo, 2010), which have made good progress, but there are aspects that remain to addressed, some of which will be elaborated upon in the upcoming paragraphs.

One important aspect of the Future Studies is the development of the images that represent the future. It would be necessary to discuss how the future images are structured, how paths to social change are proposed in these images, and proceeding to a closer examination of the meaning of the time (Inayatullah, S., 1993). The motivation of this work is to analyse these methods of producing images, and the aim to enlarge the framework of these images, including the sustainable dimensions of Sachs (Sachs, 2002).

The methodology is to establish a cross-disciplinary work (Kochelmans, 1979), linking concepts from different disciplines. Having a conceptual base, it will be possible to propose a sustainable perspective to be added on the methods used to produce images. Then, a case study is presented to test the new scenarios framework; that being scenarios for the biodiesel industry in Brazil, with the horizon until 2030.

It is quite common that energy scenarios often have economic growth and technological advances as frameworks for the future images. However, new approaches are already being used. World Energy Council produced the World Energy Scenarios for 2050, with a sustainable approach, to address the energy trilemma[2] of achieving environmental sustainability, energy security and energy equity. The group of five variables were economics and finances and trade; resource availability; energy systems and technologies; consumer behaviour and acceptance; and government policies (WEC, 2013).

The same method was use for design New Zealand Energy Scenarios (WEC, 2015). Also based on energy trilemma, National Grid in UK proposed a new approach for the UK Energy Scenarios. They choose as base of the scenarios, Prosperity (counting the factors economic, political, technological, social and environmental) and Green ambition (Nationalgrid, 2015). Mont et al. present normative scenarios for new European Lifestyles models, in order to provide sustainable visions of lifestyles and consumption patterns in Europe for 2050. The driving forces were Technology and Social aspects (Mont, Neuvonen, & Lähteenoja, 2014).

Thus, some advances have been made to use variables different from the traditional STEEP—social, economic, environment and politics. However, a formal structure has not been proposed to include the sustainability dimensions of Sachs (2002). The contribution of this work is to provide a theoretical base to enlarge the usual framework that is utilised as driving forces and critical uncertainties. It is done by linking knowledges to better understand images construction process; and making a proposal for the addition of new dimensions as frameworks for images, thereby exiting the economic growth paradigm. In order to reinforce the proposition, a case study of biodiesel in Brazil is shown. The key assumption is that by modifying the methods, the outputs can be images of the future that are more sustainable. This is valid for the methods that produce normative and exploratory scenarios, because they focus on desirable future situations and how they can be achieved (Börjeson et al., 2006; Durance & Godet, 2010). Also because normative scenarios are expressions of human values (Durance & Godet, 2010) on which it is assumed that it is possible and necessary to interfere in the future in order to have a more sustainable world.

The results of the work are: a method to develop scenarios with dimensions of sustainability and the case study of scenarios for the Brazilian biodiesel industry having sustainability aspects in the driving forces.

2. Methodology

The analysis was made based on Bishop's classification (Bishop et al., 2007) for scenario methods. Even though other classifications are mentioned eventually in the present work, it is important to clarify outright the methodological choice made. Consequently, this means that the final proposition of this work may not be applied to other classifications.

Bishop (Bishop et al., 2007) classified the methods and techniques of producing scenarios in eight groups (Fig. 1). The most used techniques are in as "dimensions of uncertainty" that includes the Intuitive Logics and "La prospective" methods (Amer et al., 2013; Bradfield et al., 2005). The interest in those methods is justified because the dimensions of uncertainty are used to analysed the macro-environment (Pillkahn, 2008), and they are the bases of the pictures drawn as images of the future, i.e. scenarios. The assumption is: by modifying those dimensions, the images of the future they produced can be modified. The Fig. 1 points out the object of this work, according to Bishop's classification.

It was necessary to carry out a cross-disciplinary work (Kochelmans, 1979) in the sense of employing insights, methods, techniques or concepts from different disciplines to solve a problem without integrating them in a new discipline. There are three linking points essential for connecting the concepts and building the conceptual framework to develop the images of the future.

The first point of linkage is the assumption that the scenarios methods reproduced the classical economic model. This is supported essentially by the most common image used in scenarios studies are *business as usual.* Therefore the critiques to the economic model can justify the need to change the way people and institutions think and plan about the future.

[1] Even though methods and techniques have different meanings, in scenario literature, they are used interchangeably. Thus, in this work, they are assumed as the same.

[2] Energy trilemma derives from the triple bottom line of sustainability: economically feasible, socially just and environmentally correct.