Sustainability and innovation in the Brazilian supply chain of green plastic based on renewable resource (ethanol from sugarcane)

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Abstract

The aim was to examine how innovation occurs in the Brazilian green plastic supply chain by substituting a renewable resource (ethanol from sugarcane) for a non-renewable one (naphtha), while focusing on the focal organizational and considering sustainability. A qualitative analysis, exploratory and descriptive case studies were both part of the project. With Braskem as the focal organization, there were thirteen interviews. For research, the diamond of complete invention was used. The characteristics of green plastic extrapolate the essence of technical advancement, according to the findings The product's sustainability is related to the use of renewable input (ethanol from sugar cane), illustrating the fact that carbon dioxide is absorbed from the environment during sugarcane production and remains fixed during the product's life cycle. In fact, an entire Brazilian sugarcane supply chain was used to replace a nonrenewable resource (naphtha). The production of biopolymers is justified by the finite nature of oil and its consequent increase in greenhouse gas emissions. Because of the climate benefits obtained from sugarcane production and the amount of available land for cultivation in Brazil, this development was possible. The focal organization was able to instigate innovation across their entire supply chain, deciding which upstream and downstream effects to deliver to consumers in the form of green plastic innovation. Carbon dioxide capture resulted in a reduction in greenhouse gas emissions. The key upstream factor that caused these outcomes is thought to be the Conduct Code for Braskem Ethanol Suppliers. The focal organization's key downstream effects are related to the environmental value indicated by this product. The focal organization recognized potential customers, and the IM greenTM label was developed for them, which can be called a significant downstream spillover.

Natural resource usage has been fundamental to economic growth throughout history, resulting in benefits such as a greater range of goods available for consumption. While industrialization has brought change and modernity to organizations and improved social well-being, it has also created significant social and environmental issues. The implications of these production and consumption trends have prompted society, especially private, public, and non-profit organizations, to step up their efforts to achieve sustainability. Since the 1970s, these implications have dominated discussions about sustainable development (SD), especially those focusing on global warming, greenhouse gas emissions, and ocean acidification. These environmental concerns, which have primarily been due to the burning of fossil fuels, have ignited interest in renewable energy sources (Abbasi and Abbasi, 2012; Hall et al., 2014).Renewable energy sources provide a viable alternative to fossil fuels, thus benefiting the environment. For example, the petrochemical industry substitutes the use of green plastic, which is the topic of the present research. In terms of sustainability, green plastic (green polyethylene) differs from conventional plastic in that it helps minimize greenhouse gas (GHG) emissions throughout the manufacturing process. Sugarcane cultivation, which is used to make green PE, also aids in carbon capture and sequestration, which helps to mitigate climate change. Green PE is the world's first certified renewable plastic, establishing the petrochemical industry as a leader in this area. Sustainable supply-chain management is another trend that has emerged from green development (SSCM). In general, SSCM includes aspects of market sustainability as well as supply-chain management (i.e. flow, collaboration, stakeholders, relationships, value, quality, and performance) (Ahi and Searcy, 2013; Diabat, 2014). These changes are particularly noticeable in Brazil, an emerging economy that has used technological innovation to place itself as a global leader in renewable energy and agriculture. In light of the arguments raised, the current study uses SSCM to examine the innovation process in the development of green plastic, a process that substitutes a non-renewable resource (naphtha) with a renewable resource (ethanol from sugarcane). Many previous studies have all established frameworks for studying SSCM, but each only gives a brief overview of the enterprise-led initiatives. The current study applies the

principle of SSCM to a particular situation: the manufacture of green plastic by a major petrochemical company in Brazil. Green polyethylene (PE), green polymer, biopolyethylene, biopolymer, polymer resin, or green resin is all terms for green plastic. The petrochemical sector is one of the most important components of the chemical industry, which is one of the most important industries in the world. Multinational, vertically integrated chemical companies make up the global plastic resins industry. Global demand for green products has prompted the chemical industry to produce innovative products. Bioplastics, also referred to as bio-based polymers or biodegradable polymers, are currently on the market (European Bioplastics, 2016). Sugarcane bioplastic development is possible in Brazil because of the country's climatic advantages and the amount of land available for this crop. In response to concerns about global warming and greenhouse gas emissions, renewable resources used as raw materials in the production of plastics have emerged as a viable alternative to fossil fuels and can help with carbon capture. The FO develops and improves biodegradable polymers made from renewable materials, the most notable of which is green plastic made from ethanol extracted from sugarcane. Sustainability is primarily accomplished in this case by the use of a renewable resource, which encourages a low-carbon economy From sugarcane cultivation to green polyethylene processing, each kilo of green polyethylene captured captures around 3.09 kilos of CO2 (according to the FO's life cycle assessment of green polyethylene), which is an estimate that takes into account CO2 gains and losses at all stages of the manufacturing method. A study of previous data on naphtha, a standard polyethylene, demonstrates the value of green plastic. During the cultivation of sugarcane, CO2 is captured from the atmosphere and stays fixed throughout the life cycle of green plastic products. The world leader in carbon isotope analysis performs dating testing of the goods across all lots at the FO to ensure that the green plastic generated is renewable (information gathered from a report by the FO)

Biography

Eugenio Avila Pedrozo is an associate professor and researcher at Federal University of Rio Grande do Sul (UFRGS), Brazil. His main interests include: sustainability, complexity (Morinian’s perspective), innovation, technology, BOP and, societal discussions linking individus, organizations, interorganizational and societal levels. He has special interest inter/transdisciplinarity analysis using multiples points of views.

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