



Marketing

Eco-innovation and technological cooperation in cassava processing companies: structural equation modeling

*Eco-inovação e cooperação tecnológica em indústrias processadoras de mandioca: modelagem de equações estruturais*

*Eco-innovación y cooperación tecnológica en industrias de procesamiento de yuca: modelos de ecuaciones estructurales*

Eliana Cunico<sup>a,\*</sup>, Claudia Brito Silva Cirani<sup>b</sup>, Evandro Luiz Lopes<sup>b,c</sup>, Charbel José Chiapetta Jabbour<sup>d</sup>

<sup>a</sup> Faculdade Sul Brasil, Toledo, PR, Brazil

<sup>b</sup> Universidade Nove de Julho, São Paulo, SP, Brazil

<sup>c</sup> Universidade Federal de São Paulo, Osasco, SP, Brazil

<sup>d</sup> University of Stirling, Stirling Management School, Scotland, UK

Received 6 October 2015; accepted 27 June 2016

**Abstract**

The generation of wealth, sustained by productive activities of agro-industries, leads to the production of wastes and uses natural resources, interfering in the environmental pillar of sustainability. The purpose of this study is to investigate whether cassava processing companies generate eco-innovations by means of technological cooperation, and the degree of participation of agents in these interactions. The quantitative method used the structural equation modeling for data analyses. The results indicated a relationship between technological cooperation and the generation of eco-innovation. The model developed showed the significance between variables and exposed the main aspects that generate eco-innovation from technological cooperation. A cooperation process allows a reduction in the burning of fossil fuels, reducing the emission of methane gas, which aggravates the greenhouse effect, also reducing odor, and ultimately, providing financial gains to agribusiness.

© 2016 Departamento de Administração, Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo – FEA/USP.

Published by Elsevier Editora Ltda. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

**Keywords:** Structural equation modeling; Agro-industry; Cleaner production; Technological cooperation

**Resumo**

A geração de riqueza, sustentada pelas atividades produtivas das agroindústrias, leva à produção de resíduos e utiliza os recursos naturais, interferindo no pilar ambiental da sustentabilidade. O objetivo deste estudo é investigar se as empresas processadoras de mandioca geramecoinovações por meio de cooperação tecnológica e o grau de participação dos agentes nessas interações. O método quantitativo, utilizou-se da Modelagem de Equações Estruturais para análise de dados. Os resultados indicaram uma relação entre a cooperação tecnológica e a geração de ecoinovação. O modelo desenvolvido mostrou a significância entre variáveis e expôs os principais aspectos que promovem a ecoinovação a partir da cooperação.

\* Corresponding author at: Avenida Ministro Cirne Lima, 2565, 85.903-590 Toledo, PR, Brazil.

E-mail: [eliana.cunico@fasul.edu.br](mailto:eliana.cunico@fasul.edu.br) (E. Cunico).

Peer Review under the responsibility of Departamento de Administração, Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo – FEA/USP.

<http://dx.doi.org/10.1016/j.rausp.2016.09.006>

0080-2107/© 2016 Departamento de Administração, Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo – FEA/USP. Published by Elsevier Editora Ltda. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

O projeto de cooperação permitiu a redução na queima de combustíveis fósseis, a redução na emissão de gás metano que agrava o efeito estufa, a redução do odor e, finalmente, proporcionou ganhos financeiros para o agronegócio.

© 2016 Departamento de Administração, Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo – FEA/USP. Publicado por Elsevier Editora Ltda. Este é um artigo Open Access sob uma licença CC BY (<http://creativecommons.org/licenses/by/4.0/>).

*Palavras-chave:* Modelagem de Equações Estruturais; Agroindústrias; Produção limpa; Cooperação tecnológica

## Resumen

La generación de riqueza, oriunda de las actividades productivas de la agroindustria, conduce a la producción de residuos y el uso de los recursos naturales, lo que interfiere con el pilar medioambiental de la sostenibilidad. El objetivo en este estudio es investigar si las empresas procesadoras de yuca producen eco-innovaciones por medio de la cooperación tecnológica y el grado de participación de los agentes en estas interacciones. Se utilizó el método cuantitativo, por medio de modelos de ecuaciones estructurales, para el análisis de datos. Los resultados indicaron una relación entre la cooperación tecnológica y la creación de eco-innovación. El modelo desarrollado mostró significancia entre variables y delineó los principales aspectos que promueven la eco-innovación a partir de la cooperación. El proyecto de cooperación permite la reducción de la quema de combustibles fósiles; la reducción en la emisión de gas metano que agrava el efecto invernadero; la reducción del olor y, finalmente, proporciona ganancias financieras para la agroindustria.

© 2016 Departamento de Administração, Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo – FEA/USP. Publicado por Elsevier Editora Ltda. Este es un artículo Open Access bajo la licencia CC BY (<http://creativecommons.org/licenses/by/4.0/>).

*Palabras clave:* Modelos de ecuaciones estructurales; Agroindustria; Producción limpia; Cooperación tecnológica

## Introduction

The decrease in the life cycle of products increased the range and speed of changes in the portfolio of goods and services offered to consumers. Thus, production processes also underwent changes and innovation became an influential factor in the pace of these changes. The minimum requirement for a change of a product or process to be considered an innovation concerns the recognition of this requirement as a novelty. For the novelty to be considered innovative, significant changes in the product or process should be made in relation to the product and process currently practiced in the market (OCDE, 2005).

In addition to production and consumption changes, there is a continuous concern with sustainability. In the environmental aspects, efforts are made to avoid or mitigate negative impacts without hindering economic development using new technologies, from eco-innovations. The term “eco-innovation” appears in the Brazilian literature in different ways, for example, “eco innovation”, “eco-innovation”, “environmental innovation” and “ecoinnovation”. In this study, the term “eco-innovation” was adopted as a standard. The book of Fussler and James (1996) pioneered the concept of eco-innovation. The theme reappears in a study of James (1997), where it is defined as the eco-innovation ability to innovate in products and services without causing environmental impact and damage. Based on this concept, companies began to seek competitive advantages and add value to new forms of cleaner production.

Faced with proposals for sustainability, Lozano (2008, p. 1839) affirms the importance of sustainable development, “Sustainable Development involves the simultaneous pursuit of economic prosperity, environmental quality, and social equity”. Given these interests comes technology cooperation.

The phenomenon of cooperation is organized through the National Innovation Systems (NIS) to ensure that each agent

assumes its role with the common objective geared for economic development from innovations (Baerz et al., 2011). The strategies adopted by companies in the search for innovations have undergone significant changes in recent years generating new perspectives to conventional management models (Bueno & Balestrin, 2012). Therefore, technological cooperation becomes one way to develop innovations (Baerz, Abbasnejad, Rostamy, & Azar, 2009).

The objective of this research is to investigate whether agro-industries generate eco-innovations through technological cooperation, analyzing also the degree of participation of each of the agents, university, companies and government in these interactions. The model that defines the interactions between agents in the cooperation process used in this study is based on the Triple-Helix model, which advocates partnership relations, leading the university and enterprises to work together for the same objective (Etzkowitz & Leydesdorff, 2000). In this context, the research seeks to contribute to the discussion about eco-innovation, and it is a pro-active or reactive consequence in relation to the prevention or treatment of environmental impacts generated by bio-digesters used in the industry of starch, flours and starches processing companies (Angelidaki et al., 2009; Deublein & Steinhauser, 2008; Kocar, 2008).

The study of the Brazilian context is justified by the country’s leadership in Latin America and for its participation in the economic block composed of Brazil, Russia, India and China (BRIC). Agribusiness is a cornerstone of Brazil’s economy, represented by agro-industries, among other sub-sectors. This segment accounts for 22% of the Brazilian GDP, and cassava, beans and orange are some of the most important sectors, along with commodities, generating wealth (Portal Brasil, 2013). According to Abam (2012), several chemical modifications have generated various types of starch of great use in manufacturing industries, such as in the production of medicines, food,

Download English Version:

<https://daneshyari.com/en/article/7438253>

Download Persian Version:

<https://daneshyari.com/article/7438253>

[Daneshyari.com](https://daneshyari.com)