

POLICY OF ETHANOL IN BRAZIL: CURRENT SCENARIO AND RESEARCH AGENDA

POLÍTICA DO ETANOL NO BRASIL: CENÁRIO ATUAL E AGENDA DE PESQUISA

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Abstract

Since the early 2000s, the restoration of Brazilian policies focusing specifically to ethanol has been observed with the clear intention of the government to stimulate this productive sector and thus boost its development. Thus, it aims to identify the actions adopted and their impacts on the sector, verifying how this process was perceived by the academic community. For this purpose, a review of the literature and research in Federal Government reports about the topic was carried out, mainly focused on the Growth Acceleration Plan 2 (PAC2). As a result, this paper seeks to present the main characteristics that demonstrate the revival of the sector by means of government policies, as well as focuses on the current research agenda, proposing the necessary adjustments and advances.

Keywords: ethanol; public policies; Brazilian policy; policy agenda.

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Resumo

No início dos anos 2000 foram reestabelecidas as políticas brasileiras voltadas especificamente para o etanol com a clara intenção do governo de estimular esse setor produtivo e assim impulsionar seu desenvolvimento. Sendo assim, objetiva-se identificar as medidas adotadas e seus impactos no setor, verificando como esse processo foi percebido pela comunidade acadêmica. Para isso foi efetuada revisão de literatura e pesquisa em relatórios do Governo Federal sobre o tema, centrado principalmente no Plano de Aceleração do Crescimento 2 (PAC2). Como resultado, este trabalho apresenta as principais características que demonstram a revitalização do setor por meio de políticas governamentais. Como resultado, este trabalho apresenta as principais características que demonstram a revitalização do setor por meio de políticas governamentais, bem como se concentra na atual agenda de pesquisa, propondo os ajustes e avanços necessários.

Palavras chave: etanol; política pública; política brasileira; agenda política.

1. INTRODUCTION

The resumption of investment in ethanol in Brazil, specifically after the year 2003, rekindles the need for investigating the multiplicity of factors that culminated in high governmental investment in this specific sector, and, beyond that, in the reflexes produced by the volume of resources applied with the purpose of fostering the production of ethanol in the country.

Thus, this paper aims to provide an overview of the situation of ethanol policies in Brazil between the years 2000 and 2014, identifying in the literature the adopted measures and their impacts on the sector, and at the same time, it is verified how this process was perceived by the academic community. In view of the recurrent perception that the new cycle of investments in the industry is directly connected to the government's view that the product is strategic for the country not only in the current period, but also for the coming years, the need and justification for research with this feature is emphasized at aiming at the economic growth of the internal and external markets.

However, strategies to encourage the production of ethanol are not new in the Brazilian scenario, as observed as in the actions undertaken in the mid-1970s to foster the production of alcohol, having it as the central public policy during the period; i.e., the historical element is already inserted in the governmental agenda, so that from the experience taken as a failure in the past decades, it is possible to establish guidelines which actions lead to results different from those achieved in the past. In this regard, elements such as the intersectoral collaboration and integration of public policies are essential to achieve the goals towards overcoming the operational plan and enabling, for example, the production and its flow, but also including the environmental and social aspects of public policy - which should be investigated by the academic community.

Therefore, the following section will present the history of the policy of ethanol in Brazil, highlighting past actions and investments planned for the next few years; subsequently the scientific production of ethanol will be highlighted, evidencing advancements and space for studies that better understand the governmental programs; finally, the final considerations will be presented and proposals to move forward analytically in the topic will be recommended.

2. FROM THE PRO-ALCOHOL PROGRAM TO THE PAC 2

Undertaking efforts to analyze the public policy related to ethanol requires, necessarily, a brief contextualization of the Brazilian experience in the 1970's, under the perspective of the National Alcohol Program, the Pro-Alcohol Program. Paulillo *et al.* (2007) emphasize that alcohol stands out and becomes relevant in the Brazilian scenario from the midst 70's, a time when the oil crisis served as a motivating factor to shift the focus, inside the sugarcane agribusiness, from sugar to alcohol. At this time, the changes in the production of the agribusiness were strongly encouraged and subsidized by the government, which started to grant benefits not only to the producers of the product, but also to all those involved in the supply chain. This was the period of "moderate expansion". In this same motto of government subsidies for the development of the sector, in the beginning of the 80's, the "accelerated expansion" of the industry occurred, also motivated by the new oil crisis; in this period, new and more lands became dedicated to the product, as well as new technologies emerging for greater efficiency, as Macedo (2007) emphasizes.

Such characteristics of government action allow the clear identification of an "Interventionist State", according to the paradigms defined by Keinert (1994); the signs of a state which policies developed are aimed, above all, at the technical rationality to promote economic development are clear; in this way, the justification for large governmental incentives become evident, financing the expansion of the sector.

In the following years, between 1986 and 1995, with the end of the oil crisis there is a deceleration of the market and, consequently, of those interested in this market, such as the government, the agribusiness industry and the automobile industry - strongly driven by the production of alcohol-powered automobiles; the period characterized by the deceleration triggered a crisis in the sector, which could no longer rely on the large volume of public resources, and the previous advantages of producing alcohol were no longer evident (PAULILLO *et al.*, 2007).

Paulillo *et al.* (2007) also highlight that from 1996 onwards, without the state interference in this industry, competitiveness among alcohol producers increased and they were forced to adapt to the new governmental standards, without subsidies. Even after the 90's period, with the end of the Pro-Alcohol Program and a new paradigm in the industry and in the State, several factors rekindled the sector, such as the mandatory blending of alcohol in gasoline, the entry of flex-fuel cars in the market and the emergence of research centers that sought the technological development of the sector.

Regarding the technological development, Macedo (2007) highlights that the production of ethanol has advanced a lot over last thirty years. Initially, thought was turned to the fast increase of production, resulted from the mid 70's gap. In a second moment, the sector started to worry about efficiency, in the expansion of production. Finally, more recently, actions aimed at increasing the productivity and at reducing cost in the entire chain began.

When Vazzoler *et al.* (2010) made the mapping of scientific production related to alcohol and flex-fuel engines in Brazil, they detected the increase of research regarding technological development and indicated, complementarily, the concentration of such production in public institutions located in the State of Sao Paulo, revealing this as a center of scientific and technological production.

Analyzing the most recent period and discussing the perspectives of ethanol, Macedo (2007), Jank and Nappo (2009) and Safatle (2011) emphasize the possibilities of resuming the growth of the Brazilian industry in face of the goals defined by the Kyoto Protocol, thanks to

the fact that ethanol produced from sugar cane is the most advantageous product in terms of energy production when compared to other types of ethanol, such as those produced from maize, sugar beet, sweet sorghum, wheat and cassava. In addition, Brazil is the largest producer of sugar cane, which highlights the market potential of the product not only for the internal market, but also for the external market.

With regards to the structures of the market and competition, Farina *et al.* (2010) consider the regulation of the sector essential for its development, as the distribution and production of ethanol require governmental strategies for their development. These governmental actions are necessary because of typical problems of the sector (such as seasonality, inter-harvest and competition for land) and of aspects related to price and quantity which, depending on the degree of State control, can be influenced. In this regard, the state intervention is needed to ensure the development of the sector, as ethanol cannot be considered a perfect substitute for petrol, a fact that requires governmental actions for possible market failures. Likewise, if the demand for exports increases, other governmental measures will be also applicable, with the purpose of maximizing the capacity of the sector.

However, it is necessary to stress that, regardless of the economic intervention regarding incentives to consumption, the government action should be careful to the social and environmental aspects of this growth in ethanol production. Currently, the Government of the State of Sao Paulo has been a precursor in policies of this nature, with the adoption of the “Green Protocol”, by means of which the public power and other actors in the sugar and alcohol industry commit to adopt sustainable practices, such as the end of the burning of sugar cane straw (JANK; NAPPO, 2009).

In short, it is possible to check that ethanol, after massive government intervention during its peak - in the mid-1980s - has once again been the object of the government attention from 2003, with the resumption of demand derived from the entry of flex-fuel cars in the market (EPE, 2008). According to the study titled “Prospects for Ethanol in Brazil”, some elements reveal the prospects of increased production and consumption of ethanol in the coming years, and it is worthwhile mentioning:

- (i) in 2008, only 1% of the area used for cultivation of the sugar cane was dedicated for the production of ethanol, which evidences the potentiality of a territorial advance and the consequent increase in the supply of the product;
- (ii) the competitiveness of ethanol versus gasoline. It is important to emphasize that the study collected data up to the year 2007, when the consumption of ethanol was more advantageous to consumers of flex-fuel cars than gasoline. As it can be observed in the study by Farina, Pereda and Viegas (2010), the consumer is price sensitive and, in this sense, ethanol is not a perfect substitute for gasoline;
- (iii) the prospect of increasing national demand for ethanol fuel at an annual rate of 11.3% until 2017;
- (iv) concerning the international demand, the difficulties and uncertainties in relation to the international market were considered, projecting its timid increase until 2017;
- (v) the possibility of industrial expansion, while the product becomes attractive;
- (vi) the investments in infrastructure defined by the PAC, by means of Petrobras and Transpetro;
- (vii) the possibility of “technological leap”, allowing the production to double, without the need to extend the area of planting.

Such prospects, dating back to the year 2008, are directly aligned with the “National Energy Plan - 2030” (MME; EPE, 2007), prepared in the year 2007 and aimed at the several energy matrixes, such as liquid fuels, which also comprise ethanol. The highlight is estimate of a growing demand for renewable energies, a factor that attributes the solid expansion to ethanol, biodiesel and H-bio. This way, the government attention given to the issues related to ethanol becomes clear, as well as its strong inclination towards financing projects that promote the development of the sector.

It is worth observing that because of the multiple factors that influence the supply of and the demand for ethanol, some changes not comprised in the plans become evident, in short-term. As an illustration, the periodic newsletter “Análise da Conjuntura dos Biocombustíveis - Ano 2011” (EPE, 2012) - last newsletter available for consultation - brings information about the reduction in the supply of the year 2010 to the year 2011, and it should be understood, therefore, that the planning of the energy sector should be made for the long term, but also that the situations and measures that must be adopted in short and medium terms should be perceived.

In this regard, the government planning in long term is clear, while it allocates resources to make such estimates feasible. The evidence to that can be observed from the 1st Growth Acceleration Program - PAC 1, in which, according to the “10th Balance of the PAC”, a total R\$ 4,500,000,000.00 investments was planned from the year 2007 for the construction of the Senador Canedo/GO – Sao Sebastiao/SP ethanol pipeline. The total invested has Petrobras (100% of the first and 20% of the second section) as the main investor and other private investors (Copersucar, Cosan, Odebrecht Transport Participações, Uniduto and Camargo Correa), complementarily.

Likewise, it is possible to identify the volume of investments for the sector, planned in 2nd Growth Acceleration Plan - PAC 2, whose resources, destined to the “Energy” axis, amount a total value of R\$ 6,462,220,000.00. Especially for the sort named “Renewable Fuels”, among which are the activities concerning ethanol, as it can be observed in table 1, it is possible.

Table 1 - Federal investment in energy infrastructure - ethanol - from 2011

Title	Phase	Executor	Planned for 2011 - 2014 (R\$)	Planned for 2014 on (R\$)
SEDA - RJ	Under construction	Petrobras	92,820,000.00	Does not apply
Ethanol Pipeline System - SP Metro I	Under construction	Petrobras	166,400,000.00	Does not apply
Logistic System for Ethanol - GO-MG-SP	Under construction	Petrobras	3,416,000,000.00	2,356,400,000.00
Expansion of Ethanol Plant	Under construction	Private Investor	379,300,000.00	51,300,000.00
TOTAL			4,054,520,000.00	2,407,700,000.00
GRAND TOTAL				6,462,220,000.00

Source: Organized by the authors based on the 2nd Growth Acceleration Plan (2013).

It is noteworthy that the data collected refers to data in which the ethanol product appears as the central element of the infrastructure actions, as well as the existence of other parallel actions - technological development for example - that will certainly affect the industry.

Thus, although the perspective presented does not cover the other possibilities of government investment, it clearly evidences the government's effort towards promoting the sector. However, there are no records in these plans that take the perspectives of social and environmental programs into account, neither directly nor interconnected with other policies; i.e., as an early analysis, the ideal of development in a purely economic point of view remains, as already occurred during the extinct Pro-Alcohol Program.

3. THE RESEARCH AGENDA

The diversity of studies related to ethanol is broad, comprehensive and considers it as the subject of analysis by different areas of knowledge. It is also noticed that such studies grew stronger from the 1980s, i.e., during the phase when ethanol was a highlight in national and international spheres. At that moment, some studies related mainly to the "Energy Economy" came up, including the technical and political aspects concerning the Brazilian energy issue and, above all, conducted analysis that presented strong economic bias. The field of engineering has also digested this debate over the years, especially production engineering, contributing to the consolidation of not only economic views, but also technical and management views. More recently, the presence of studies related to the environmental field has been perceived, with focus on aspects related to law, management and sustainability. In conducting an analysis on the scientific production related to ethanol, Puerta (2011) verified a production increasing chiefly after the year 2004, when flex-fuel cars entered the automobile market. This is a fact that has boosted research, particularly related to the field of engineering.

However, the various contributions related to ethanol do not contemplate the details directly related to public policies. At the same time, the researchers in the field of public policies (and public affairs related areas), do not take the issue of ethanol as an object of research. It is clear, that the studies in public policies mainly focus on the social issues in the last few years, ignoring those issues that may be related to infrastructure, such as the energy issue. With this movement, or lack of it, the field of public policies no longer contributes significantly to the understanding and development of energy public policies, in this case related to ethanol.

In a survey conducted during the main events and periodicals of the field of public affairs in the last few years (last 12 years), it is possible to notice the need for studies that deal with topics related to ethanol, and the lack of those studies that have ethanol as the subject of study.

For that, academic divisions and thematic areas concerning the field of public affairs, were checked in the following events:

- (i) National Meeting of the Association of Graduate and Research Studies in Administration - EnANPAD (addressed academic divisions regarding public administration/public management/social management);
- (ii) ANPAD - EnAPG Public Administration Division Meeting;
- (iii) Meeting of the National Association of Research and Graduate Studies in Social Sciences - ANPOCS; and
- (iv) Political Science Brazilian Association Meeting - ABCP.

In addition, the following periodicals were analyzed and the articles related to the field of public affairs were selected:

- (i) Revista de Administração Contemporânea – RAC;
- (ii) Revista de Administração Pública – RAP;
- (iii) Revista do Serviço Público – RSP;
- (iv) Revista Organizações & Sociedade – O&S;
- (v) Revista de Políticas Públicas – RPP;
- (vi) Revista Brasileira de Ciências Sociais – RBCS;
- (vii) Revista Lua Nova – Revista de Cultura e Política.

Table 2 - Publications about ethanol, and their direct correlations found in the field of public affairs

Title	Authors	Place of Publication	Year
A Gestão Ambiental e os Benefícios Econômicos na Agroindústria Sucroalcooleira: um Estudo de Caso da Usina Coruripe Matriz	LIMA, J.R.T.; CUNHA, N.C.V; LIRA, T.K.S.	EnANPAD	2008
Articulação e (Des) Articulação de Atores Sociais: um Estudo de Caso da Crise do Setor Canavieiro e a Reconversão Produtiva de Campos dos Goytacazes	PAES, M. W.	ANPOCS	2000
Experiência Sindical de Trabalhadores Migrantes na Agricultura Canavieira em Pernambuco	MENEZES, M. A.	ANPOCS	2000
O Governo e a Mídia na Configuração do Macroambiente para os Biocombustíveis Líquidos no Brasil	TALAMINI, E; DEWES, H.	RAP	2009
Sol, Terra e Tecnologia: A Promessa da “Revolução Dourada” Dos Biocombustíveis no Governo Lula	JESUS, D.S.V.	RPP	2011
Formulação e Execução de Estratégias Políticas no Setor de Etanol: Um Modelo Processual	SILVA, A.T.B; CALDEIRA, C.A; BANDEIRA-DE-MELLO, R.	RAC	2014
O Cenário Sobre Biocombustíveis, Políticas Públicas e Sustentabilidade na Produção Científica Nacional e Internacional: a Internacionalização das Pesquisas do Brasil?	FERREIRA, V.R.S; PASSADOR, C.S.	EnANPAD	2014
Fomento Federal ao Etanol de segunda geração no Brasil: um exame da atuação da FINEP e do BNDES	PEREIRA, W; PAULA, N.	RPP	2016

Source: Organized by the authors.

Considering the 3,252 analyzed articles from their titles and keywords, it was observed that only 5 focus on subjects directly related to ethanol as seen in Table 2. None of them has presented a detailed analysis of public policies with regard to ethanol.

Expanding the research not only to the issue of ethanol, furthermore to topics that encompass studies in the energy field, it is possible to expand this range of studies, shown in Table 3:

Table 3 - Publications about the energy sector and direct correlations found in the field of public affairs

Topic	Approaches	Number of articles
Adjustment	Restructuring of the sector; institutional Design; Competition; Privatization; Autonomy; Decentralization.	19
Industrial Policy / Scientific and Technological Policy	Analysis of training; management Review. Energy Planning; Relationship with external market.	5
Agriculture	PRONAF; Family Agriculture; Agribusiness; productive Chain.	7
Social Development	Sustainability; clean Technologies; Territory; Cooperatives; socioenvironmental Responsibility.	7

Source: elaborated by the authors

It is worth pointing out that a large portion of these studies directs the reviews to the oil issue, adopting Petrobras as the central element of the research. In other words, even expanding the range of analysis, the focus of the research on the energy sector still reveals a dim material, focused mainly on analyzes related to the topic of regulation, which highlights, once again, the lack of studies that address the topic in depth.

However, some studies of the field already returned analysis in which ethanol approached the research subjects, as observed in: Paes (2000), who uses the case of the sugar cane sector in the analysis of social actors linked to the sector; the same is done by Menezes (2000), when he analyzes the trade union movement of workers in the sugar cane sector; Lima *et al.* (2008) turned their analysis to the sugar cane and alcohol agribusiness from the perspective of environmental management; Talamini and Dewes (2009) conducted a study more related to the position of the government and the media in the configuration of the macro-environment of biofuels (ethanol is part); finally, Jesus (2011) researches the reasons for which biofuels gained strategic prominence in the government of Luiz Inácio Lula da Silva, emphasizing the political intention to offer a sustainable product to the market. It has also the aim of preserving energy security in case of several energies, environmental and geopolitical crises that ravage countries all over the world.

Thus, it is the state of the art related to ethanol and public policies. In fact, there is not an in-depth study about public policies related to ethanol. The existing studies focus on highlighting the issue in a historical perspective, or with a technical bias, whose results do not include aspects regarding to the government's strategies concerning the development model and the social and environmental problems. There is, therefore, a clear lack of studies that assess, in fact, the public policies of ethanol in Brazil.

4. FINAL CONSIDERATIONS

The high volume of investments destined to the specific sector of ethanol, in the order of 6 billion only for infrastructure by means of the Growth Acceleration Program 2 - PAC 2, makes the government's intention of providing conditions for the full development of such activity clear. Therefore, it is observed that planning interested exists not only in the current stage of production, but also with plans for a larger scope in the long-term.

However, in spite of the already reported limitation of analysis by the fact that the other modalities, used by the government to promote economic activity, were excluded, such as subsidies and credit lines turned to the sugar and alcohol sector, the volume of investment does not necessarily represent a change in the social field, since the programs analyzed do not

contemplate integrated actions that consider all the ones involved in the supply chain. The case of the State of Sao Paulo would be an isolated experience and must also be originated from analyzes about its effectiveness. In this sense, it is worth mentioning that states and municipalities also play an essential role in fostering the industry, accepting more detailed analyzes on the activities of each one of the bodies, also checking the social and environmental perspective.

Corroborating such results, it is observed that the academic studies do not follow the movement of resumption of ethanol as a strategic product, at least from the public policy point of view. There is only research turned into the productive and technological sectors, searching for solutions and development alternatives that clarify the direct relationship with the rhythm of development of the sector and with governmental investment. But there is also a lack of studies that seek to understand these movements from the multiple players who influence public policies and the effects of these actions beyond the economic point of view, also covering the social and environmental aspects of the policies of the sector.

Soon, the research agenda on ethanol must overcome the aspects related to production and economic development and must also address the effectiveness of these public policies, discussing the model of incentives and the consequences to the society. In other words, a broad discussion of the integration of the policy of incentives must be raised, with issues such as employment and income generation, education, empowerment, democratization, labor rights, environmental preservation, social technologies and sustainability, at last, with a series of actions under the responsibility of the public administration, which must follow a government strategy that proposed to spend high amount in the sugar and alcohol sector.

Thus, this article reveals that there is massive investment in ethanol in Brazil, within the policies of governmental incentive. However, there should be a more detailed examination of the effectiveness of those policies, going beyond economic results, so that the effects on the citizens' lives, who finance such investments, can be investigated.

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