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Macro-environment for Liquid Biofuels in a Governmental Perspective: a Comparative Analysis of Public Policies in Germany, Brazil and The United States of America

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INTRODUCTION

- Global Warming and the emergence of liquid biofuels;
- Public policies influence the strategic decisions of agents;
- Evidence of changes in macro-environmental dimensions in public policies in the main liquid biofuel producers:
    - **Brazil**: from political dimension (Proalcool) to social dimension (National Agroenergy Plan);
    - **Germany**: from environmental dimension (environmentally-correct products) to economic/political dimensions (Renewable Energy Act);
    - **United States**: from less oriented to the environmental dimension (Kyoto Protocol) to geopolitical dimension (energy independence).

INTRODUCTION

Assumptions:

- *first*, economic agents decide on their investments following a strategic plan;
- *second*, strategic plans, designed to stimulate growth of liquid biofuel production are directly related to the initial macro-environmental analysis and interpretation, and;
- *third*, the Government, as an important agent, participates in and strongly influences the macro-environmental configuration.

INTRODUCTION

The questions:

(1) which macro-environmental dimensions have been used by the Governments of Brazil, United States and Germany to shape the macro-environment for liquid biofuels over time?

(2) are there similarities in the macro-environmental configurations established by the Governments of these countries?

The objectives:

(1) identify the dimensions used by the Governments of Germany, Brazil and United States to shape macro-environment for liquid biofuels over time, and;

(2) test for similarities/dissimilarities between the macro-environments for biofuels in these countries.

MACRO-ENVIRONMENTAL ANALYSIS

- Strategic Planning starts with the macro-environmental analysis to establishe the Strategic Position;
- The macro-environment dimensions:

Writers	Macroenvironment Dimensions
Thomas (1974)	Social, Political, Regulatory, Economic and Technological
Fahey and King (1977)	Economic, Political, Regulatoy, Social, Cultural, Technological, Energy, Marketing/Industrial and Financial
Preble, Rau and Reichel (1985)	Legal, Economic, Political, Competitive, Technological and Cultural
Ginter, Duncan and Capper (1991)	Economic, Political, Social, Technological and Regional
Costa (1995)	Political, Economic, Social and Technological – PEST
Leonidou (1997)	Physical, Demographic, Sociocultural, Economic, Political/Legal and Technological
Fleisher and Bensoussan (2002)	Social, Technological, Economic, Ecological and Political or Legal – STEEP
Walsh (2005); Johnson, Scholes AND Whittington (2008)	Political, Economic, Sociocultural, Technological, Environmental and Legal - PESTEL

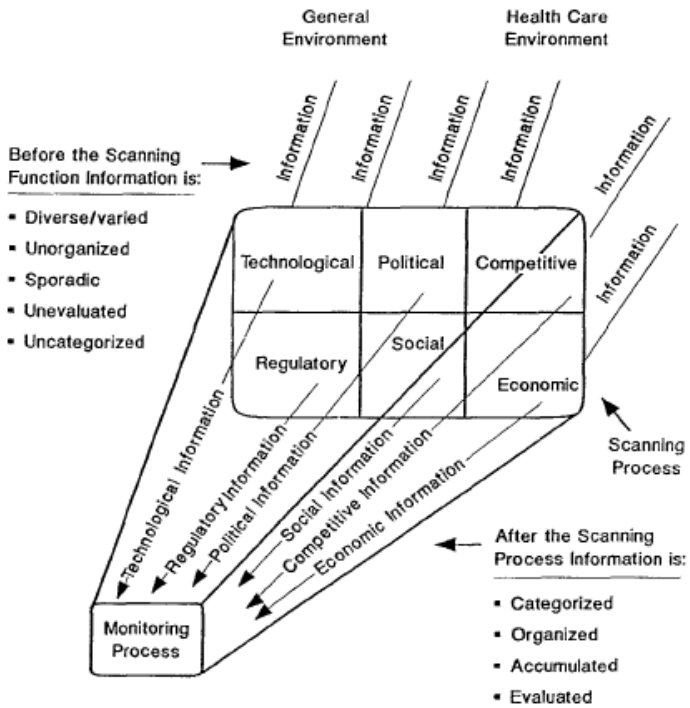
MACRO-ENVIRONMENTAL ANALYSIS

- Macro-environmental Analysis Process (Duncan, 1990, Duncan et al., 1992):
  - Scanning;
  - Monitoring;
  - Forecasting;
  - Assessment;

- MAPing (Bates, 1985):
  - Monitor;
  - Analize;
  - Predict;

MACRO-ENVIRONMENTAL ANALYSIS

Treatment of information through the scanning process:



Source: Ginter et al. (1992, p. 255)

- The World Wide Web as a source of information;
- Text Mining as a technique in the scanning process.

METHODS AND PROCEDURES

- Documental analysis;
- Brazilian, German and USA Governments;
- Text Mining procedures:
  - Selection of governmental documents using the following key-words which are representative of “liquid biofuels” and search engine in the government websites:
    BIOFUEL, BIOFUELS, BIO-FUEL, BIO-FUELS, BIODIESEL, BIO-DIESEL, ETHANOL, BIO-ETHANOL, BIOETHANOL, BIO-OIL, ALCOHOL
  - The database construction: 1997 to 2006;

METHODS AND PROCEDURES

- Text Mining procedures:
  - Final database: Brazil: 624; Germany: 168; USA: 854; Total: 1.646 documents;
  - First document found in the German Government websites was from 2001;
  - Macro-environmental dimension (based on the PESTEL acronym): Political, Economic, Social, Technological, Environmental, Legal, Agronomic, Cultural and Geopolitical;
  - Defining the Dimension-Words (d-words);
  - Economic *d-words (example);* *ECONOMY, EQUILIBRIUM, GAME, GAMES , INCOME, INFORMATION, LABOR, LABOUR, MARKETS, PRICE, PRICES, RISK, TAX*

METHODS AND PROCEDURES

- Text Mining procedures:
  - Words found in the title, abstract and key-words of governmental documents
  - Selected words with highest power of discrimination (measured by TF*IDF Rate);
  - Structure of analysis: Dimension + *d-words*;
  - Text Mining: WordStat from SIMStat software;

RESULTS

(a) Brazilian Government **(b) North-American Government** **(c) German Government**

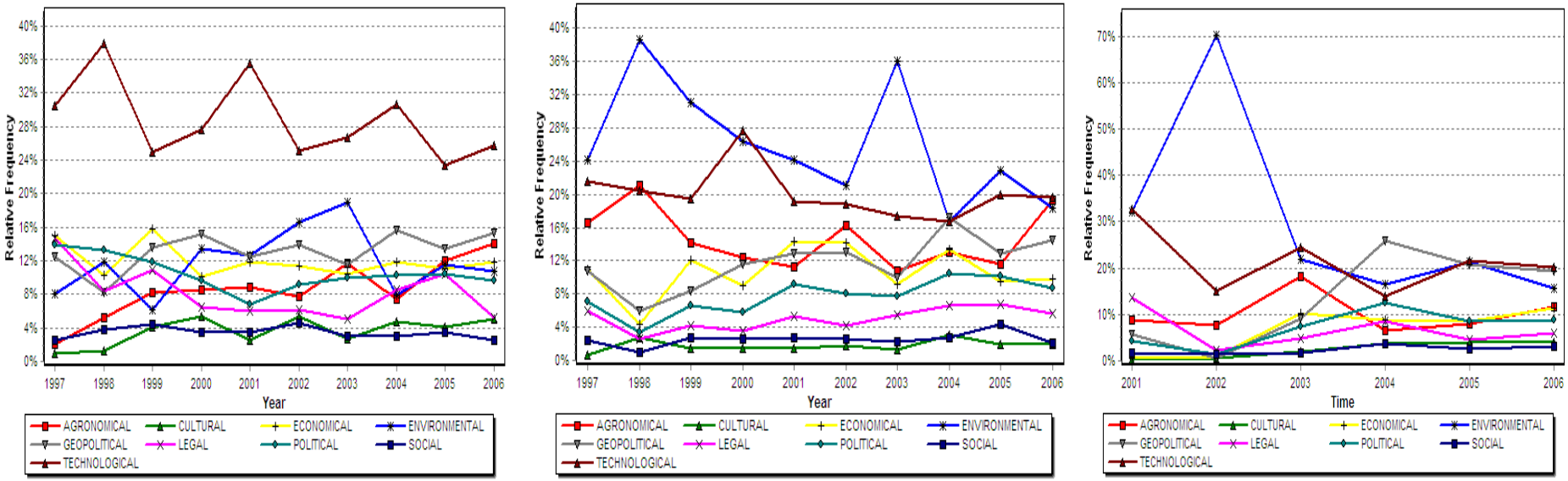


Figure 4 – Relative frequency of the macroenvironmental dimensions under which the liquid biofuels were categorized by the Governments of Brazil (a), United States (b) and Germany (c) in the ten-year period
Source: Research data

RESULTS

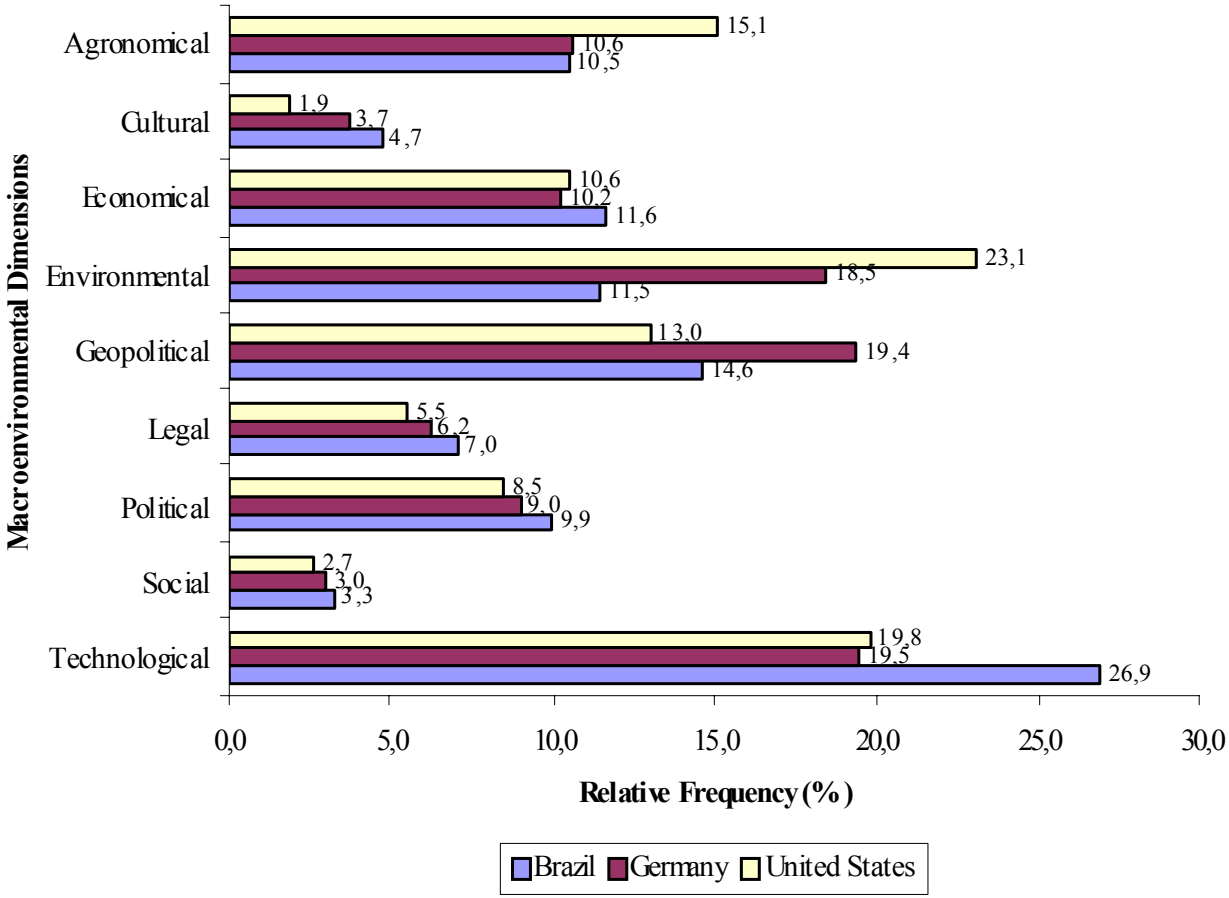


Figure 5 - Relative frequency of the macroenvironmental dimensions under which the liquid biofuels were categorized by the Governments of each country in the ten-year period
Source: Research data

ANALYSIS

Table 1 - Homogeneity Test between the Governments of the three countries – total dimensions

Governments	χ^2 Value
Germany x Brazil	4824.3
Germany x United States	5049.4
Brazil x United States	20522.2

gl = 8; $\alpha = 0.01$; χ^2 Critical = 20.09; *p > 0.01
Source: results obtained from the research data

ANALYSIS

Table 3 - Homogeneity Test between the Governments of the three countries – by macroenvironmental dimension

Macroenvironmental Dimensions	χ2 Value		
	Brazil[b] x Germany[a]	Germany x United States[b]	Brazil x United States[c]
AGRONOMICAL	1229.9	2458.8	5268.8
ENVIRONMENTAL	941.6	5545.3	9212.4
CULTURAL	769.6	1317.1	2499.2
ECONOMIC	2564.8	5548.7	6239.8
GEOPOLITICAL	3216.0	6036.5	8267.4
LEGAL	1799.4	2341.6	4944.9
POLITICAL	1553.7	3394.2	6385.5
SOCIAL	914.7	1783.0	2354.6
TECHNOLOGICAL	4226.0	5784.0	12634.4

[a] between the years 2001 and 2006. In periods before 2001 the frequencies are under the necessary requirements for the homogeneity calculation;
[b] gl = 5; $\alpha = 0.01$; χ^2 Critical = 15.08; *p < 0.01
[c] gl = 9; $\alpha = 0.01$; χ^2 Critical = 20.09; *p < 0.01
Source: results obtained from the research data

CONCLUDING REMARKS

- Results show that the Governments of Brazil, Germany and United States have shaped the macro-environment for liquid biofuels using different dimensions;
- Predominant dimensions for the German Government: TECHNOLOGICAL, GEOPOLITICAL and ENVIRONMENTAL, in this order;
- Predominant dimension for the Brazilian Government across the entire period analyzed: TECHNOLOGICAL. The GEOPOLITICAL and ENVIRONMENTAL dimensions appear with much lower frequencies;
- Predominant dimensions for the North American Government: ENVIRONMENTAL and TECHNOLOGICAL, in this order;

- It can be seen that, even though the liquid biofuels have been a global topic seemingly dominated by the ENVIRONMENTAL dimension, it emerges from the data that the three countries have shaped different macro-environments, emphasizing different dimensions, especially the TECHNOLOGICAL one.

Managerial implications for the biofuel business:

1. Investment decisions and expansion of production and use of liquid biofuels may be more or less affected by (changes in) the prevalent macro-environment in the country;
2. A country-by-country analysis of Governmental policies may help to safeguard private biofuel activities in different countries by deploying country-specific strategies;
3. The fact that the macro-environment of liquid biofuels changes from one dimension to the other over time reinforces the importance of making the environmental 'scanning' step a structured and continuous process;

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