Review article

Analysis of marketing mix model of the bioethanol industry in Colombia

Análisis del modelo 'Mezcla de Marketing' de la industria del bioetanol en Colombia[1]

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Abstract

The search for alternative energy production and supply, allow a new perspective on the biofuels industry as bioethanol, the focus of this work, as an alternative energy that enables to overcome the disadvantages generated by the traditional methods of production and consumption, by generating competitive advantages over other primary energy sources. The evaluation of the bioethanol industry from a global analysis such as that posed by the Marketing Mix, and exposed how attractive or competitive can become your industry today. It is certainly of great importance to note the challenge facing today's society while trying to maintain a high standard of living without this represents a danger to the environment or to human welfare. The main challenge lies in finding alternatives that allow ecological and economic energy needs through the efficient use of alternative sources, and in turn, reduce extreme dependence and vulnerability to fossil fuels.

Key words: Bioenergy, bioethanol, biomass, Colombia, energy sources, Marketing Mix, renewable energy, *Saccharum* sp., sugarcane.

Resumen

La búsqueda de alternativas de producción y consumo energético permite una nueva perspectiva para la industria de los combustibles biológicos como el bioetanol, tema central del presente trabajo, ya que sus ventajas competitivas frente a otras fuentes primarias de energía constituye una alternativa energética que permite superar los problemas generados por los métodos tradicionales de producción y consumo. A partir de la evaluación de la industria del bioetanol desde un análisis global, como el que se plantea en la Mezcla de Marketing, se expone que tan atractiva o competitiva puede llegar a ser esta industria en la

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actualidad. Es sin duda de gran importancia señalar el reto al que enfrenta la sociedad actual al intentar mantener un elevado nivel de vida sin que éste represente un peligro contra el medio ambiente o el bienestar humano. El principal desafío se centra en encontrar alternativas ecológicas y económicas que permitan cubrir las necesidades de energía, mediante el uso eficiente de fuentes alternativas y, a su vez, reducir la extrema dependencia y vulnerabilidad frente a los combustibles fósiles.

Palabras clave: Bioenergía, bioetanol, biomasa, caña de azúcar, Colombia, energía renovable, fuentes de energía, mezcla de Marketing, *Saccharum* sp.

JEL
Q42 Alternative Energy Sources.
Q57 Ecological Economics: Ecosystem Services; Biodiversity Conservation; Bioeconomics; Industrial Ecology.
L65 Chemicals; Rubber; Drugs; Biotechnology.
Q16 RyD; Agricultural Technology; Biofuels; Agricultural Extension Services.
Q13 Agricultural Markets and Marketing; Cooperatives; Agrobusiness.
M31 Marketing.
M38 Government Policy and Regulation.

Introduction

In the global energetic market is evident the constant and accelerated deterioration of the environment, due to the excessive use of fossil fuels as primary source of energy. The impact generated by the excessive consumption of no-renewable sources, especially the one caused by emissions of methane and carbon dioxide gases to the atmosphere, have revealed the vulnerability of systems based on fossil fuels, this has forced to ask the consequences of the traditional methods of production and of the fuel consumption (Millennium Ecosystem Assessment, 2005).

The evident incapacity of an energetic system bases on fossil energy is, nowadays, one main reason to orient the world in the development of methods and practices that are more friendly, flexible and compatible with the environment and the politics for industrial and economic growth of each country (Hooper and Li, 1996).

It is because this situation that the debate has surpassed the environmental and scientific scopes and, has reached political, social, economic and business contexts. The challenge faced by the modern society invites the study of new production and energetic consumption alternatives oriented to sustainable development, which allow overcoming of the maladjustments caused by traditional methods and generate competitive advantages in fuel industry, like is the case for bioethanol. In the present work the evaluation of the competitiveness of fossil fuels through its mix with marketing is proposed, to define how attractive is its industrialization by showing achieved goals and future challenges.

Justification

A major number of articles available in the market are produced with oil derivatives. Modern societies used them as fuel and as raw material to make medicines, paints, textiles, fertilizers, plastics, food products and construction materials, among others. Their generalized use, not only for product manufacture but for energy production, have become the modern society in dependent of petroleum (Table 1) and coal (Table 2). Nonetheless the accelerated growth of the oil industry did not take long in making notice of the damages associated with the dependency on no-renewable energetic sources. The increasing consumption of these minerals has led to alarming concentrations of carbon dioxide in the atmosphere and of other contaminant agents, which cause unforeseeable damages to the ecosystem (Roosa *et al.*, 2000) and, to an increase in prices that does not stop. This worrying situation has realized the vulnerability of current society because of the excessive use of these products as major energy sources.

According to Silveira (2005) the emerging and varied energetic needs have motivated the development of clean, efficient and

Table 1. List of oil producing, consumer and exporter countries for the years 2011-2010. Thousands of barrels per day.

	Oil production	2011	Consumption	2011	Imports	2010
1	Saudi Arabia	11,153.02	United States	18,835.47	United States	3741
2	Russia	10,228.52	China	9790.04	Germany	3520
3	United States	10,107.33	Japan	4464.06	Japan	3489
4	China	4302.88	India	3292.22	Italy	2661
5	Iran	4234.12	Saudi Arabia	2817.47	England	1894
6	Canada	3664.61	Brazil	2594.15	France	1727
7	United Arab Emirates	3096.34	Russia	3145.13	South Korea	1502
8	Mexico	2959.47	Germany	2400.14	Russia	1349
9	Brazil	2686.78	Canada	2259.14	Turkey	1343
10	Kuwait	2681.89	South Korea	2230.17	Spain	1297

Source: International Energy Statistics – 2012. Available on:
http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=5ypid=54yaid=4, consulted 10 June 2012.

Table 2. List of coal producing and consumer countries of coal. Thousands of tons.

Coal production	2010	Consumption	2010
China	3,522,973	China	3,695,378
Unites States	1,085,281	United States	1,048,295
India	622,818	India	721,986.4
Australia	463,256.3	Russia	256,795.6
Indonesia	370,378.8	Germany	255,746.2
Russia	357,043.1	Japan	205,983.4
South Africa	280,788.5	Poland	148,870.5
Germany	200,954.7	Australia	145,155.7
Poland	146,237	South Korea	12,557.5
Kazakhstan	122,135	Turkey	109,120
Colombia	81,956.85	Kazakhstan	86,862.14
		Taiwan	75,603.27

Source: International Energy Statistics – 2012 Available on:
http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=5ypid=54yaid=4, consulted 10 June 2012.

cheaper technologies in economic and ecologic terms when compared to conventional processes. This is reached by limited emissions of contaminant agents and products and by the exploration of new energetic sources aimed to sustainable development. Development on technological and scientific innovations achieved in the last decades, have made markets composed of diverse forms of alternative energy, where the variety in options allows the consumer to choose the one that is more adjusted to his resources and needs (Rouch and Santi, 2001).

The historical evolution of biofuels can be looked from the very beginning of the use of renewable energy as alternative energy source. The basic use of natural resources as energetic sources (Grove, 1979) has been done since ancient times to generate different types of energy as the kinetic or potential energy, to satisfy the man needs of each time. For instance, the use of biofuels as sources

and centers of sustainability and energetic stability started no more than 230 years ago, when the Industrial Revolution began to generate new ways to get energy. After the water vapor energy (Bahr, 1991), the ethanol was the next approximation of the industry in searching a natural resource that could compete with traditional fuels. In this way, at the end of XIX Century in the 1989 world fair of Paris, the German engineer Rudolf Christian Karl Diesel showed the first diesel motor of the world and, ethanol started its production as direct substitute of coal and oil. But only until 1908 when Henry Ford, the father of the modern assembly chain, fomented the massive use of ethanol as fuel for his cars and tried to position it as a fuel that can compete directly with petroleum.

Renewable energy, also known as soft energy, is a group of energetic source theoretically available that cause lower environmental impact when compared to conventional sources (Demirbas, 2008). These alternative sources can be differentiated in different types: geothermic energy, hydraulic energy, wind energy, solar energy and biomass. The alternative offered by the renewable energies is wide and generalized based on their diversification and marketing. Their contributions have made a favorable impact in economic, social, environmental and industrial terms (Clarke y Gaston, 2006).

Biomass is one of the main renewable energy sources, and it refers to those fuels obtained directly or indirectly from biological resources, that means, the biodegradable organic matter from energetic crops or agricultural, forest, industrial or urban residues. The so called biofuels have been widely used as alternative energy sources, especially in development countries. However, the production and storage costs together with the industrial and commercial hegemony of petroleum, have been ones of the main factors that have limited their exit from the early developmental phases. Besides of the environmental benefits, the biofuel industry supposed a series of social and economic benefits like, the reduction of energy dependency (Balat *et al.*, 2008; Naik *et al.*, 2010; Pimentel and Patzek, 2005), the increase in supply diversification (Hacisaligoglu, 2009; Vergagni, 2007), the improvement on commercial balance (Asociación de Productores de Energías Renovables (APPA), 2009; Miller, 2007), the increase on car yield, the impulse to the agricultural sector and the development of alternative markets (Hektor, 2000; Malsa and Freireb, 2006; Mohr, 2002).

According to the Association of Renewable Energies Producers (APPA, 2010) at the industrial scale the produced biofuels are: biodiesel, bioethanol and biogas. According to APPA, the advantages of these biofuels are associated with a lower use of oil products and, in consequence, a reduction in the environmental risks associated with fossil fuels. Biofuels can be a significant contribution to a new energetic and transportation model more diverse, efficient and sustainable (Ministerio de Medio Ambiente de España, 2005). The largest ethanol production is located in USA, where it is mainly obtained from corn. Under these circumstances it led to an extreme increase of this cereal, from US$2.117 to US$6.115 per bushel (equivalent to 25.401 kg) in less than 10 years.

The main countries in production with the largest use of bioenergy are USA and Brazil, followed by Germany, France and China (Table 3). The first two have driven the internal market and developed a large industry aiming to consolidate marketing plans that are attractive to cover the global energy needs. Nowadays, bioethanol is the biofuel with the best market performance due to its high selling values and constant growth (Hernandez and Kafarov, 2009).

Since the ethanol has diverse significant implications in various scopes, its production and commercialization have generated a large scale industrial phenomenon, which can be studied from the social, environmental, scientific and politic perspectives. The diverse uses of ethanol can be group in three categories: (1) products for human consumption like drinks and drugs, (2) use as raw material for industrial products and (3) as fuel (F.O. Licht's, 2006).

As a product subject to a market, bioethanol faces a high competition as well (Potocnik, 2007) (Table 4 and 5). Such substitution process is done in an economic favorable context, in which its price is more competitive than the one for oil and, its competitiveness is related to its capacity to reduce the

Table 3. List of bioenergetics producing and consumer countries. Thousands of barrels per day.

Production	**2010**	**Consumption**	**2010**
United States	887.6	United States	853.7
Brazil	527.3	Brazil	424.3
Germany	62.0	Germany	75.5
France	55.0	France	55.0
China	43.0	China	43.0
Argentina	38.1	Italy	34.7
Canada	26.4	Canada	34.2
Spain	24.0	Spain	34.0
Thailand	18.5	England	29.0
Italy	16.5	Poland	18.0
Belgium	13.5	Thailand	18.0
Colombia	12.0	Austria	12.5
		Colombia	12.0
		Argentina	11.9

Source: International Energy Statistics – 2012 Available on:
http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=79ypid=79yaid=2

Table 4. Ethanol producing plants in Colombia**.**

Region	**Investor**	**Capacity (lt/day)**	**Sowing area (Ha)**	**Direct employments**	**Indirect employments**
Miranda, Cauca	Incauca	350,000	11,942	2171	4342
Palmira, Valle	Providencia	300,000	9287	1688	3376
Palmira, Valle	Manuelita	250,000	8721	1586	3172
Candelaria, Valle	Mayagüez	250,000	6587	1198	2396
La Virginia, Risaralda	Ingenio Risaralda	100,000	3004	546	1092
Canta Claro, Puerto López	GPC	25,000	1200	240	480
Total Production		1,275,000	40,741	7429	14,858

Source: Fedebiocombustibles, 2012.

environmental impact (Schubert and Blasch, 2010), to eliminate the energetic dependence, to increase the security of the supply and to contribute to the development of local economies, mainly in the agricultural sector (APPA, 2007), the reduction of oil imports, the reduction in contaminant gases emissions, the improvement in motor performance and the impulse to economic development, mainly in the rural economies. These are some of the reasons why the bioethanol industry has been largely strengthened (Luo *et al.*, 2009; Rosillo, 2006).

According to Escobar *et al.* (2009) in most of the countries suffering from food insecurity, the vulnerable population depends mainly on local agriculture (Blanco and Azqueta, 2007; Qiu *et al.*, 2010). A large investment on the agricultural sector on those countries could, with biomass production, achieve an important rural development reflected on reduction in the unemployment indexes and in poverty. However, the use of large land extensions to produce biomass would generate greater concentration of wealth and, in consequence, more poverty

Table 5. Future ethanol producing plants in Colombia.

Company	Region	Capacity (lt/day)	Raw material	Year
Bionergy	Puerto López – Puerto Gaitán, Meta	300,000	Sugarcane	January 2013
Maquiltec	Tuta, Boyacá	300,000	Sugar beat	January 2014
Agrifuels S.A.	Pivijay –Magdalena	300,000	Sugarcane	January 2013
Alcohol del Río Suarez	Barbosa, Santander	300,000	Sugarcane	January 2014
Aqa S.A.	Valle Ris., La Vieja; Quindío	150,000	Sugarcane	January 2014
Ingenio Mayagüez (expansion)	Candelaria, Valle	150,000	Sugarcane	December 2011
Total Production		**1,500,000**		

Source: Fedebiocombustibles, 2012.

and increment in forest destruction aggravating the environmental impact.

Social and environmental effects associated with large scale biomass production are still topics of debate. The balance between energy and food security has to be equilibrated by the development of regulatory mechanisms for land use and politics of social responsibility that favor not only the large industries but, that protect the population wellness (Ministerio de Minería y Energía de Chile, 2006; Zhou *et al.,* 2006).

In Colombia, bioethanol is produced mainly from sugarcane since it is the raw material that gives the largest input to elaborate ethanol and the one with better profit in the industry (Bruszies, 2010) and, potentially reduces 74% of greenhouses gas emissions compared to fuel gasoline (Portafolio, 2012, 2011). The offer of bioethanol in Colombia depends on the amount of cultivated sugarcane, which according to Asocaña (Association for Sugarcane Growers of Colombia, 2012) in 2012 was 2,036,134 metric t in its equivalent to raw sugar volume. From this weight, 16% is used for ethanol production which equals 79.29 million of gallons of bioethanol for 2008, which is produced in four plants (see Table 4). Additionally, it is planned to build six new plants for bioethanol production (Table 5).

Since bioethanol contributes to the biodegradation process of gasoline and increases the octane index, it is normally mix with gasoline. The mix, called gasohol, is done in different proportions according to the demands of each country. In Colombia, these percentages has been established according to the Decree 2629 2007, as well as, the deadlines for conditioning engines and new machines that use these product for its function. This was supported by the CONPES 3510 of March 31st 2008, which established the 'Policy Guidelines for Promoting Sustainable Biofuels Production in Colombia' that demands from the Ministry of Mines and Energy to adopt regulatory measurements (economic and technical) that encourage the development of infrastructure for fuel distribution in chain, like building tanks, suppliers of pure biofuel, and others in order to distribute biofuels in larger proportions than the ones in the compulsory mixes. The Decree 2926 was modified by the Decree 1135 2009, in which the National Government determined that as January 1st 2012 the use of ethane will be 85% and only 15% will be gasoline. However, and due to FTA and the automotive incapacity to accept such a drastic change, the Colombian Government took the decision to reduce it between 8 and 10% (Portafolio, 2011, 2012).

Conceptual framework

The competitiveness and rivalry level that is presented in the industrial scenario of biofuels demands a great strategic ability. The capacity to understand, compete and survive in a specific market, represents a competitive advantage characteristic of successful businesses (Páramo, 2004, Prahalad and Hamel, 1990). Current businesses and industries are characterized for being complex systems formed by multiple subsystems with mutual influence with the environment (Porter, 1987, 1985) and, with the strategy to reach the market with unique products and activities that break the established industrial scheme for determined product (Porter, 1996, 1983). One of the most used tools as model for industrial and business understanding is what is nowadays known as marketing mix model (Kotler and Keller, 2011; Kotler and Armstrong, 2011) (Figure 1), which will be the methodological tool for the development of the present work. This proposal is composed by four basic variables that allow the development of a conductive thread to understand the different spheres that associate a business with its industry and its market.

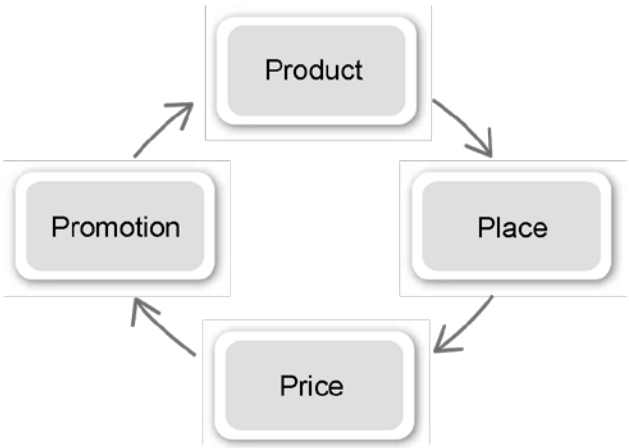

Figure 1. Marketing mix components.

Source: Kotler and Keller, 2011; Kotler and Armstrong, 2011.

Product. This is the first 'P' that composes the model. This is the variable that defines all the productive and commercial scheme of a business because, it is through an adequate definition and design of the product that the needs of consumers are satisfied and the productive chain is structured. Products have a life cycle that has been shorter each time since the growing tendencies of industry together with an disproportionate globalization, have made substitute products readily available each day. Life cycle of a product has five phases (Figure 2): Research and Development (Birth), Introduction to the market, Growth in the market, Maturity in the market and Decay (Death) (Kotler and Keller, 2011). Bioethanol, although it has a long industrial development and has reach consolidation in the international sphere as a competitive energy source, is still in the initial phases of the product life cycle (Luo *et al.*, 2009).

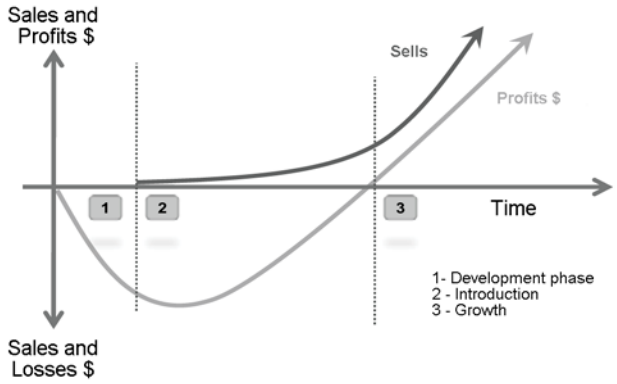

Figure 2. Bioethanol life cycle.

Bioethanol release to the market, as massive commercialization product compared to other type of biofuels and fossil fuels, is very recent (Luo *et al.*, 2009). This fact make it as a product in the phase of research and industrial, business and commercial development considering that its global structure still needs large economical and productive efforts. In terms of its growth in sales and its economic incursion in the market, bioethanol shows strong attitudes for introduction and growth. It was only in 1980 when it started to be consolidates as a direct substitute of petroleum. For bioethanol being in this phase means a relatively low level of sales but with growing tendencies, the productive process can be seen in Figure 3. In this phase the number of sales is limited because the productive capacity of bioethanol have not reached yet an industrial massification, as it

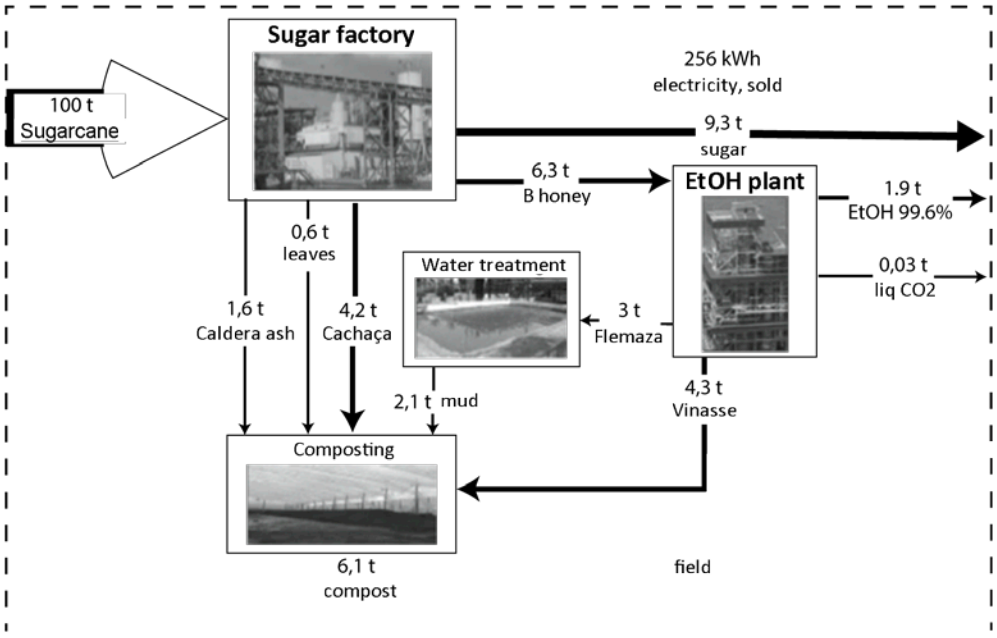

Figure 3. Mass flux of bioethanol production per 100 tons of sugarcane.

Source: BID, 2012.

is required for the population to substitute oil. It had a safe research and develop process, and more than 40 years of research had passed to forge knowledge about this well-structured product (Balat *et al.* 2008) (Table 6).

Bioethanol is currently in phase 2 of the product life cycle as sales are registered at the commercial level, but the profits are covering most of the investment done in research and development and infrastructure from the beginning of the productive process (Kotler and Keller, 2011). Potential in Colombia can be seen as increasing due to the potential in expanding sugarcane crops as is observed in Figure 4, where is pointed that from short to medium term is possible to increase sugarcane total area to 10,973,000 hectares.

Price. The definition of Price is a fundamental aspect and a task that requires a complete analysis of each part of industry, because is through evaluation of each process that an

Table 6. Annual production of ethanol from sugarcane in Colombia.

Indicator	**Year**				
	2008	**2009**	**2010**	**2011**	**2012[a]**
Hectares in sugarcane	205,664	208,254	218,311	223,905	nd
Grinded sugarcane in millions of tons	19.20	23.58	20.27	22.72	nd
Sugar production in millions TMVC	2.03	2.359	2.07	2.34	2.4
Ethanol production (millions of liters)	255.84	326.84	291.28	336.95	370
Ethanol sells (millions of liters)	247.09	338.36	292.08	351.08	nd
Sugar internal market in millions TMVC	1.56	1.65	1.62	1.59	nd
Sugar exports in millions TMVC	0.48	1.05	0.69	0.94	nd

TMVC: Metric tons of sugar in its equivalent to raw sugar.

a. Estimated

Source: Fedebiocombustibles, 2012.

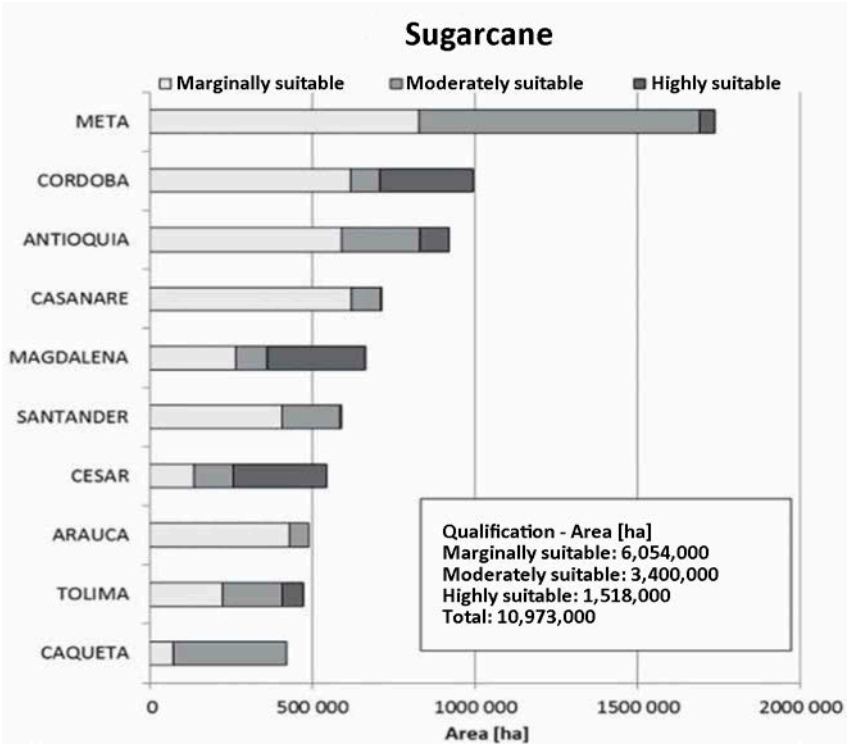

Figure 4. Sugarcane crop potential in Colombia.

Source: BID, 2012.

appropriate price could be inferred for the business to be sustainable and for the client to buy it (Kotler and Armstrong, 2011). This is the only variable of the mix marketing that provides a real and physical income to the production of a product. The definition of a product price starts is in essence the sum of the production, distribution and marketing costs.

Price definition is an important task in structural terms of the product market. Price should correspond to the payment capacities of consumers and should be in a price range where the substitute products and the competence are. On the other hand, depending on the type of product or service that is offered and the market aiming to, there are different price rules that should meet some characteristics of the business environment. This means that the product price should be competitive but at the same time should offer tranquility to the consumer that is getting a quality product or service (Kotler and Keller, 2011). Till now, in Colombia each 1st day of the month the National Government, by means of the Ministry of Mines and Energy, fixes the price of biofuels ethanol and biodiesel that will be apply during the month, as well as, the percentage in mixes. The price rule is established by: (1) a basic price annually adjusted with the wholesale price index and the exchange rate, ensuring to industry a minimum return rate; (2) a price that takes into account the price of the raw material plus a fixed cost for its industrial transformation and, (3) a price that depends on the hydrocarbon price that is replace by the biofuel plus the transformation cost (Table 7). To biofuels producers is paid the higher price resulting from these formulas (Fedebiocombustibles, 2012).

Place. The variable place indicates the specialized scenario where the product is sold and the sale is materialized. From a technical aspect of the production and marketing chain, this is the moment where qualities are validated and the market approval is presented (Kotler and Armstrong, 2011). Depending on the country security rules and the technical characteristics in the fabrics or ethanol distillers, the storage form can vary.

Table 7. Monthly prices of bioethanol in the national market of Colombia.

Date	($col./gallon)[a]
2006	4900.20
2007	4744.69
2008	4738.21
2009	6581.51
2010	7824.62
2011	8392.18
2012	8526.88

Until June 12 2012. a. Established price by resolution of the Ministry of Mines and Energy of Colombia.
Source: Ministry of Mines and Energy.

As bioethanol has as priority goal to supply fuel for city cars, the space where this need is satisfy is in the gasoil stations. These are the places that can be called as marketing places for bioethanol. This place is shared with other type of fuels that are direct substitutes of bioethanol and that represent a stronger competition. In these stations is commercialized the strongest competitor of bioethanol, the gasoline.

Because it is a highly specialized and structured market, bioethanol is under strong pressure from the competition, causing that its sell abilities are in constant disadvantage compared to oil. If the business is one of the companies that at the same time owns the sales point and commercializes the product, the distribution is done directly. For instance, in the Colombian case, bioethanol producers are the sugar mills that do not have distribution channels of established fuels and, in consequence, need to use indirect channels. Bioethanol distribution depends on a complex logistic that determines the best way for product transport and distribution according to available amount, times, destinies, resources, transportation, etc (Brimer, 1995). All this logistic is directed to optimize distribution times by a better coordination of the implicated areas looking for reducing risks and cost in product transportation. To offer an indirect distribution channel shows big challenges for bioethanol industry because, the producer should ensure that product is transported and sold in the correct way keeping the quality standards imposed by industry and final consumers. However, as it is an industrial product in a market of few transactions and large and growing demands in time, biofuel industries are generating their own distribution and marketing chains. In the case of bioethanol, the producing industries are setting distribution and marketing nets from the already established distribution nets for fossil fuels. The distribution chain is structured depending on the geographical location where the production plant is and the place where biofuel is sold (Rakesh *et al.*, 2007). Depending on the geographical barriers imposed by the market some combination of transportation means are used. This distribution at global or local level should be focused on a massive and intense market. It should be aimed to sell bioethanol in all the possible locations provided that there are consumers with large use and buy habits. Massive selling places should be recognized and try to have a reserved selling place for bioethanol, looking for a commercial disposition to exclusivity. In Colombia, the different production plants need truck transportation on an average distance of 129 km. The transportation distance between Buenaventura to Los Angeles harbor is 4903 km (Fedebiocombustibles, 2012). For the internal market, diesel is transported by pipelines from a refinery until the mixing station Puente Aranda in Bogotá. Transport process from the refinery is based on high quality data supplied by Ecopetrol, relative to GHG emissions and, the remaining emissions and entrances are based on data by defect from Ecoinvent21. The transportation distance was adapted to 509.07 km according to Colombia´s conditions (Fedebiocombustibles, 2012).

Promotion. Promotion is a fundamental aspect for a winner product in the market. The promotion and reception way determines the success potential. Promotional strength that joins the product and the exposure level in the market are determined by the target market, the industry desires and the economic leverage of the product (Buil *et al.*, 2008). These are some of the variables that should be taken into account initially in the moment of deciding the type of promotion or advertisement that is going to be used (Balakrishnan,

2009). By the product characteristics, industrial and economic backing of bioethanol and the market dimensions for biofuels, it can be said that the type of advertisement use for bioethanol industry is promotion at the selling points (direct marketing) (Kotler and Keller, 2011). As it is on a market with a high competence index, it should be remembering its presence and participation in the fuel and biofuel market. Generally, bioethanol publicity shows a consistent and complete message to the market (Jansson *et al.*, 2010). Bioethanol should transmit a message of renovation and change that persuades consumer to change habits towards a growing use of bioethanol. Most of the communication associated with bioethanol is originated on environmental, scientific, economic and political news referring to benefits and defects of this product and, the environmental and social responsibility. There are also massive communications remembering or noticing the labels found on bioethanol industry, as it is done by oil industries that are diversifying its product portfolio and using bioethanol as renovation and modernization resource under a concept of environmental awareness.

As bioethanol is in its introduction to market phase, the advertisement should be strong and rigid and directed to specific market sectors, in order to aware the possible and future consumers about the benefits and attributes of the product, it means, it should be informed the most of the aspects related to the product to get customers wishing to consume it (Luo *et al.*, 2009).

Productive and competitive capacity of bioethanol

Colombian ethanol from sugarcane has an important potential since it only generates 26% of GHE emissions compared to fossil fuel, without considering the direct and indirect effects on land use. This good balance is related to relatively low emissions, good practices and favorable climatic conditions in the main area of sugarcane crops in Colombia, along the Cauca River, resulting in high resources productivity and efficiency (BID, 2012).

According to Vergagni (2007) the current productive structure of bioethanol has been greatly favored by the technological advances in the area, which has represented industrial advantages as: higher yield rate in the ethanol production by biomass unit used; higher yield rate in the productive conversion; lower generation of affluents; development of new coproducts; use of new raw material combinations (for instance, biomass from giant grasses); and the reduction on contaminants emissions and residues.

Related to its industrial and marketing potential it is highlighted that bioethanol is on a very privileged productive position. In 2007 represented 94% of the global biofuels production, representing a 32% replacement on the global oil production (Balat *et al.*, 2008). This demonstrates a very strong positioning that cannot be removed from the future analysis of bioethanol, considering that it shows a commercial and industrial scenario with great potential of growth (Demirbas, 2008; Fischer and Schrattenholzer, 2001).

- From the economic, management and industrial point of view, bioethanol has a growth fronts: Raw material diversification for bioethanol production in order to generate a supplies net from diverse plants with a more efficient structure of costs. Reduction on production costs and sale price will help positioning bioethanol in the market (Haykiri-Acma and Yaman, 2010; Kim and Dale, 2004).
- Generation of a complete and integrated productive chain that can articulate each industrial and commercial aspect, from the raw material crops till the bioethanol placement in the market. Inclusive, a growth source is related to construction of biorefineries equipped with the latest technology, which can work integrally with other industrial biorefineries (Coppola *et al.*, 2009).
- Implementation of an aggressive and direct marketing proposal directed to governments and consumers, in order to achieve a larger participation in the market, better label remembering, promotion of customers loyalty and, government help to generate large scale changes (Soccol *et al.*, 2010).

Structuration of a work plan for long term in which these three pillars are the strategic goals of the production industry, framed un-

der an international marketing scheme, could mean the consolidation of a predominant bioethanol industry in the global energetic scenario. The integration of a system based on a suitable configuration and coordination of the marketing mix at the national and international level, can contribute to accelerate the growing process pose by these three pillars (McCarthy and Perreault, 2000; Porter, 1986, 1990).

Bioethanol future could be determined by new technologies use that achieve the maximum profit of raw materials and crop fields, as well as the increase in industrial demand of energy from biomass (Hernández and Kafarov, 2009; Rosillo, 2006).

Bioethanol competitive level in the market will be strong and direct, renewable sources of energy, for instance, pose a solid competitive and rivalry scenario since, until now, they are the ones reporting the greater environmental benefits. Additionally, they are the ones with more social and political acceptance; however, the current regulatory framework has not been enough to encourage biofuel use. The compulsory use of no-fossil fuels or less contaminant fuels, together with solid punitive measurements that protect the environment from the multiple attacks suffered in the last years, could increase bioethanol use and its development, which is currently under its potential.

The government has an important role in this scenario, because Colombia has generated a program for consolidation of the biofuel mixing program, a technical norm for bioethanol transport, the possibility to diversify the energetic options, good practices norms, biofuel market studies, among others (Rodado, 2011).

Final considerations

- Bioethanol as an energy alternative is one of the contemporaneous proposals with greater development opportunities in the fuel market, considering its huge marketing and industrial potential. Its multiple social, environmental, economic and scientific advantages, have made the ethanol an excellent substitute for fossil energy sources.
- Although the bioethanol has big challenges to overcome in the industry and market, the constant advances and proposal improvement, given the raw material diversification (multiple biomass types), have structured a really strong productive scheme. Despite of the disadvantages that can have the industrial production of bioethanol, the growing energy demand demands permanent supply. In consequence, diverse strategies have been created to improve product quality and to promote the introduction of biofuels to the market. As example is the searching for alternative sources of raw materials, exploration of new production and processing methods, and the development of technological innovations at various levels.
- Now, the big advances in development of this industry are achieved thanks to scientific discoveries structures from studies on diverse raw materials to produce ethanol. Nowadays, the industry action field for bioethanol is very wide because it is still in its first developmental phases. The ones interested in participating as competitors will face the challenge of developing growth strategies to reach new markets, new geographic zones, diversify the product line or apply changes to the existing structure, in order to improve productivity and cost structure.
- The companies that want to be part of the productive industry of bioethanol should understand the strategic and competitive challenges governing this economic sector. Understanding and defining the competitive strategy in the industry will allow companies to generate competitive advantages to survive in the bioethanol market (Porter, 1985).
- Energy industry shows a prosperous panorama for investors. The analysis performed shows that despite of requiring a large initial capital, the earnings scheme is progressive, making it an attractive business. Analyzing the bioethanol demand and supply growth, it is found that countries are focused on increasing the productive capacity of bioethanol, in order to reduce their dependence on no renewable energy sources.

- On the other hand, there should be promoted social habits for utilization of resources that are more aware and friendly with the current environmental situation. Campaigns and scientific and technological programs should be generated to promote and foster the development of new technologies for new methods that help the creation of sustainable energetic productive systems. Therefore, it should exist political disposition in the countries to expand these type of thoughts and ideas of change, considering that it is from this kind of proposals and measurements that societies are strengthen. This is noticed because thanks to this type of innovations and productive, scientific and industrial discoveries, positive changes in the economic composition of a specific industrial sector are generated, and those are considerable benefits that lead to greater global profits in the economic sector. These phenomena show the incorporation of more players from diverse knowing areas working to compose economic structures with higher horizontal transformation, which are the ones that can increase social development.

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