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Copersucar: A World Leader in Sugar and Ethanol

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Abstract

Copersucar is a Brazilian sugar and ethanol cooperative founded in 1959. Today, it's the world's largest originator and trader of cane sugar, and one of the largest ethanol trading organizations. Copersucar's mission is to create value through logistic capacity, differentiated trading operations, and operational excellence. The case is designed to help participants conduct both internal and external analyses through engaging, first-hand materials detailing Copersucar's growth, operations, finances, and cooperative structure. It is written primarily for professional, executive, and graduate students.

Keywords: cooperative, global supply chain operations, financial management, sugar, ethanol, case study, Brazil

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IFAMA Agribusiness Case 19.2

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Copersucar: A World Leader in Sugar and Ethanol

Luís Pogetti looks out the window of his office located in the heart of São Paulo, Brazil, a city with 20 million people. He is executive president of the board of Copersucar, an ethanol and sugar trading company with 600 employees and over $8.1 billion[1] in sales. Luís notices the traffic jams across São Paulo and considers the amount of fuel being consumed. With almost 3.5 million new cars sold each year, there will be 50 million cars in Brazil by 2020.

Eighty-five % of all new cars sold are flex-fuel[2], which means that in 2020, 40 million cars will be capable of using ethanol, gasoline, or both, depending on the consumer's choice based on economics, environmental and even employment issues. Copersucar, which currently produces 12% of the world's ethanol, is also its largest ethanol trader. In the future, how many of these cars will use ethanol, and how much ethanol will be needed? It's a difficult question: ethanol consumption depends on the price of its major competitor, gasoline, and with the recent fall of oil prices in 2014 and 2015, what will the situation look like?

As Luís looks out at the traffic, so many questions run through his mind. Will ethanol be feasible as a worldwide gasoline additive commodity, increasing export opportunities? Will US public policies allow the adoption of E15[3], given the current consumption of gas in the United States? Can E85[4] be a competitive, feasible alternative that breaks the blend wall? Will second-generation ethanol come to market using other biomass sources that are more competitive than sugarcane, which is Copersucar's source?

Copersucar is also the world's largest trader of sugar, a commodity that has worldwide consumption growth of 2–3% per year. Copersucar currently has a 12% market share, selling 8.6 million tons[5] and exporting 6.9 million tons in crop year, 2013–2014 (the sugar crop year is from 1-April to 31-March).

Luís wonders what will happen to the sugar market by 2020. Will Asian demand continue to increase based on the consumption of industrialized products that use sugar? Will other countries be able to undercut Brazil in sugar production costs and emerge as new world suppliers? How should he manage the low prices and excess of sugar production of 2013–2014, given its effects on the cash flows and investment capacity of farmers and industries? Will the recent campaigns against sugar and suggestions of tax increases for soft drinks and others have a negative impact? Copersucar's partner mills also produce electric energy from biomass, and even with the relatively small economic growth, Brazil faces energy consumption growth of 5–7% per year. Energy from biomass at current prices and costs cannot compete with other energy sources in an

[1] In US dollars unless otherwise noted. Brazilian Real to US dollar exchange rate from February 2015.
[2] Flex-fuel cars in Brazil can use any mix of the E100 or gasoline (E27) sold in Brazilian gas stations.
[3] E15 contains 15 percent ethanol and 85 percent gasoline. This is generally the highest ratio of ethanol to gasoline that is possible to use in vehicles recommended by some auto manufacturers to run on E10 in the United States.
[4] E85, a mixture of 85 percent ethanol and 15 percent gasoline, is generally the highest ethanol fuel mixture found in the United States and several European countries, particularly in Sweden, as this blend is the standard fuel for flexible-fuel vehicles.
[5] 1 ton=2,000 pounds

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institutional environment that does not value its renewability and cleanliness through taxes and prices. What will happen in the Brazilian energy market? How will regulations change by 2020? When it comes to electricity, should Copersucar act as a trading company for its partner mills?

Several other products are created from crushing sugarcane, and those are possible future investments. They include plastic (one-third of Coca-Cola's plastic bottles), diesel, and jet fuel. What should Copersucar's role be in these developments and markets?

Luís sees many challenges in Copersucar's major markets. But he also faces challenges inside the organization. How can he better manage an organization that has twenty-four groups of sugar mills as shareholders, owns forty-seven industrial units, was a cooperative until seven years ago, and is now, after acquisitions in the United States and Hong Kong, the world's largest trader of ethanol and sugar? How can he manage this complex organization to remain focused on creating, capturing, and sharing value in logistics and commercialization of commodities?

Copersucar's Business Model

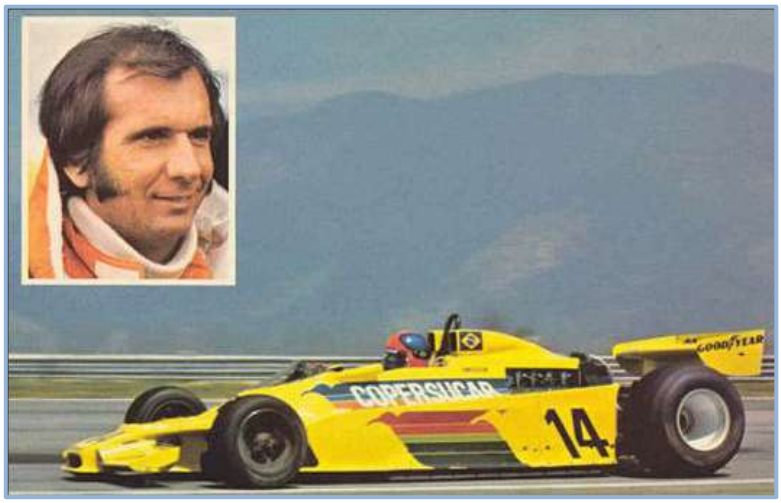

Figure 1. Emerson Fittipaldi and Copersucar's F1 Car.
Source. Copersucar.

Copersucar is one of the world's most important and relevant organizations in the history of sugar production and trade. Established as a cooperative in 1959 by two Brazilian cooperatives, it initially focused on cane production, as sales were regulated by the government. The organization continued growing in the 1960s and 1970s and was active in the creation of the Brazilian Ethanol Program (Proálcool), launched by the military government to reduce dependence on foreign oil. Near the end of the 1970s, Copersucar became a major supporter of the legendary Brazilian race car driver Emerson Fittipaldi (the 1972 and 1974 Formula One champion and the 1989 and 1993 Indianapolis 500 winner). Fittipaldi wanted to have a Formula One team, and Copersucar made it possible (Figure 1). Although the Fittipaldi/Copersucar team competed in 104 Grand Prix all over the world, they were unable to beat Ferrari, Lotus, McLaren and other European teams.

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Through the 1980s and 1990s, most of Copersucar's growth took place as a normal cooperative, but in 2006, the company made a major change. They disinvested from various industrial and retail operations (primarily coffee and sugar for retail, where Copersucar had the brand União—a leader in Brazilian retailing and focused on logistics and chain coordination as a trading company. The new strategy resulted in some challenges for the company's traditional cooperative model, such as management capacity and investment flexibility.

In 2008, the cooperative members created Copersucar S.A., a private firm, to gain the flexibility to operate in national and international markets and to grow with new commercial strategies. In addition to cost reduction, the company also targeted world leadership in sugar and ethanol trading without losing the principles of the cooperative system. The new business model retained the cooperative, Cooperativa de Produtores de Cana-de-Açúcar, Açúcar e Álcool do Estado de São Paulo, and established a holding company, Produpar, owned by the cooperative. Copersucar S.A. is the private firm used to conduct business on behalf of the cooperative through its holding firm. It is wholly owned by the cooperative and in turn the cooperative members.[6]

As the company states: "*The capacity to integrate all chain participants, from producers to the final clients using the company's logistic capacity and partnership with its partner mills is the biggest differential of this business model.*"

Within this new model, all twenty-four partner groups with their forty-seven industrial units are both suppliers of Copersucar and shareholders who sit at the executive board. The board has eleven positions, including eight people from partner mills, two from independent sources, and Luís, the president. In general, it is a conservative board, consistent with the traditional profile of sugar producers.

This model respects each unit's individuality in management and decisions, but makes Copersucar the unique buyer of their products, consolidating as a large sugar and ethanol originator. The model is difficult to replicate because of the partner mills' long-term supply contracts, which guarantee origination. Investments are guaranteed by future production and storage flexibility. It also represents advantages over other consolidation movements since it involves lower capital needs, growing organically as origination increases.

Mission, Vision and Values

Mission: Copersucar strives to create value by the vertical coordination of the sugar and ethanol chain in a sustainable way based on:

- Logistic capacity.
- Differentiated trading operations: scale, relevance and reliability; decision making in physical and future markets; risk management; ability to arbitrage between products, channels, and selling.
- Operational excellence.

[6] "Brazil's Largets Sugar Co-Op Turns into a Company," article by *Reuters*. 1-October, 2008. http://www.reuters.com/article/sugar-brazil-copersucar-idUSN0128938220081001.

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Vision: To be the leader in the global supply of sugar and ethanol, with a 30% share of Brazilian sugarcane production via:

- Having a significant presence in key global markets.
- Supporting the client's success.
- Being recognized as a global player.
- Focusing on value creation.

Values**:**

- Integrity: Transparent conduct in relation to business; observing good corporate governance practices in daily activities and relationships between employees, customers and shareholders.
- Respect: Conducts business with a commitment to respect people, society and the environment.
- Value creation: Establishes lasting business relationships, creating value for customers, shareholders, employees and partners.
- Operational excellence: Invests in continuous improvement of management, logistics and commercialization processes of sugar and ethanol.
- Sustainability: Creates value for shareholders and society, manages risk and seeks economic, social and environment development for current and future generations.

In order to understand Copersucar's business model, it is important to understand the basics of the sugarcane production and supply chain.

The Sugarcane Chain

> *"Sugarcane is the world's leading feedstock for energy production."*
>
> –John Melo, CEO, Amyris[7]

Sugarcane originated in Asia. It is a perennial grass, a plant of the genus Sacharum and from the same family (Poaceaa) as corn, wheat, sorghum and rice. It is the world's largest crop in production volume (approaching almost two billion tons), cultivated on approximately 25 million hectares[8] in more than ninety countries. The plant is the major sugar supplier to the world via the accumulation of sucrose in its nodes. It is a C4 plant, known as one of the most efficient photosynthesizers.[9] Sugarcane is a plant of the tropics and subtropics as it does not tolerate low temperatures, and in Brazil, it has an economic cycle of six years. After planting, it is first

[7] Speech at the Ethanol Summit, São Paulo, Brazil; Feb. 5, 2009.

[8] 1 hectare= 2.47 acres.

[9] The sugar beet is the second most important sugar producer, mostly in temperate areas. C4 plants are those using the C4 photosynthesis mechanism, which is more efficient at fixing carbon di-oxide (CO2), but also more energy intense within the plant.

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harvested after one and a half years, with five subsequent harvests each year. Production declines with each harvest, thus requiring replanting every five to six years to maintain profitability.

Using FAO[10] data from 2013, Brazil leads world sugarcane production with 739 million tons (over 39% of total 2013 global production), followed by India (341 million tons), China (126), Thailand (100), Pakistan (64), Mexico (61), the Philippines (32), the United States (28), Australia (27) and Argentina (24) (see Figure 2). The world's average production is of 70 tons of sugarcane per hectare (28.3 tons per acre). Under ideal conditions, including a long, warm, sunny and moist growing season followed by a moderately dry and cooler ripening and harvest season[11], sugarcane can potentially yield up to 280 tons per hectare (113.3 tons per acre) or more.

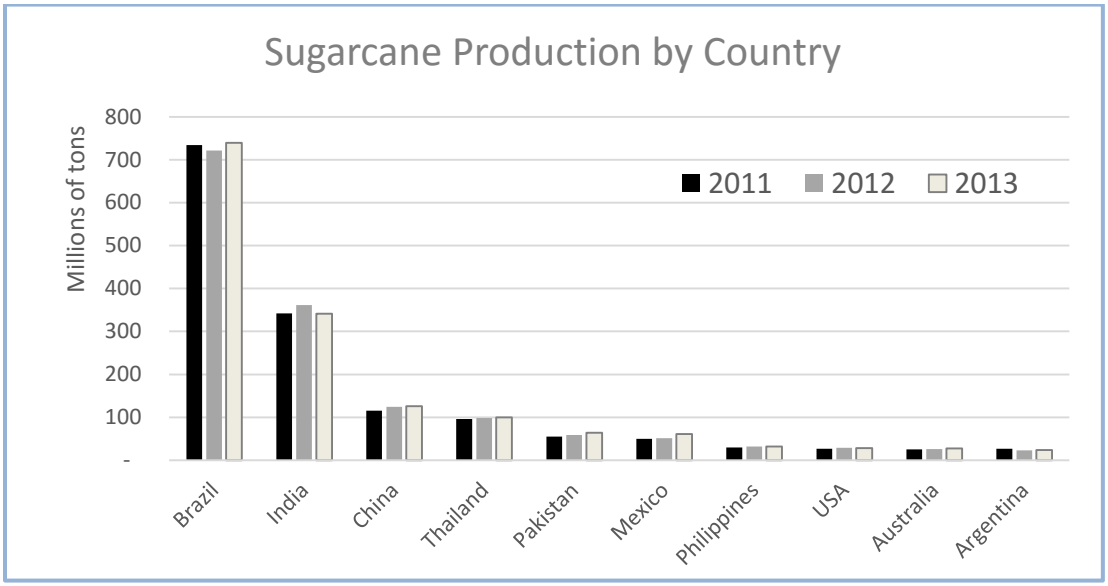

Figure 2. Sugarcane Production by Country and Year, 2011–2013

Source. FAO.[12]

One ton of sugar can produce about 70–80 liters of ethanol or about 140 kg[13] of sugar. Eighty-five percent of Brazilian production takes place in the South Central region of the country, where harvest starts in April and ends in November. The other 15% is produced in the North–Northeastern region, where harvest lasts from September until March.

In addition to producing sugar and ethanol, the remnants from production (bagasse, a fibrous matter that remains after sugarcane is crushed to extract their juice) are used as biomass in boiler systems, supplying energy to the mill while the surplus is sold to the network. One ton of

[10] Food and Agriculture Organization.
[11] United Nations Food and Agriculture Organization, Crop Water Information: Sugarcane. http://www.fao.org/nr/water/cropinfo_sugarcane.html.
[12] Food and Agriculture Organization of the United Nations.
[13] 1kg= 2.205 pounds

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bagasse can produce up to 300 kilowatt hours of electricity. The sugar cane business supplied almost 5% of Brazilian electricity consumption in 2014, a figure that could increase to around 20% in 2020. It has the potential electricity output of another Itaipu, the world's second largest hydro-electrical facility, located in the border of Brazil and Paraguay.

The sugarcane chain consists of many links: the input suppliers; the producers of sugarcane; processors of sugar, ethanol and derivative products; distributors and traders; and final consumers. It also includes service providers for research, technical assistance and finance, transportation, commercialization, and exports. These links and activities build a network around the mills (Figure 3).

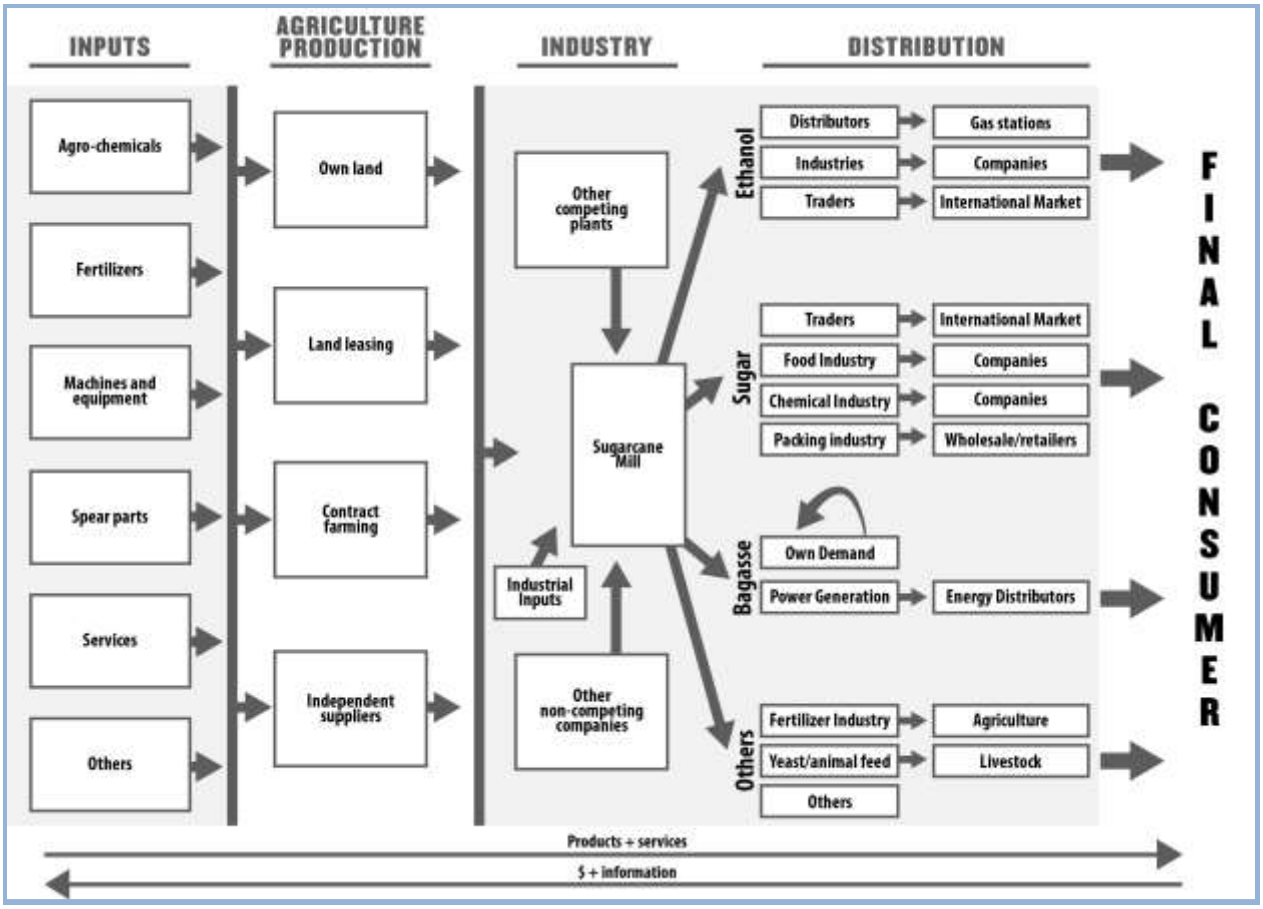

Figure 3. The Sugarcane Chain
Source. Author's calculations

The most complex operation is the purchase of sugarcane, which accounts for almost 70% of the sugar mill's production cost. Mills have different forms of governance, such as long-term contracts, vertical integration, and the spot market, with a current trend toward contractual relations. Mills were originally founded and operated by farming families but are now owned by oil companies, trading companies, and others organizations that tend to exit agricultural activities when agriculture is not part of their core business.

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From the sugarcane mills, sugar is purchased by traders, distributors, the food industry, and many others. It is easy to understand Copersucar's position in the network as a sugar and ethanol trader.

Previously, sugarcane was burned before being harvested, a practice that created environmental problems. Now, the majority of cane production is harvested by combines and no longer burned, which creates more biomass. Considering production, cane ethanol emissions are about 10–15 % of total gasoline emissions.

Sugarcane is the most efficient plant that produces ethanol, generating 9.3 times the amount of energy consumed during production (Figure 4).

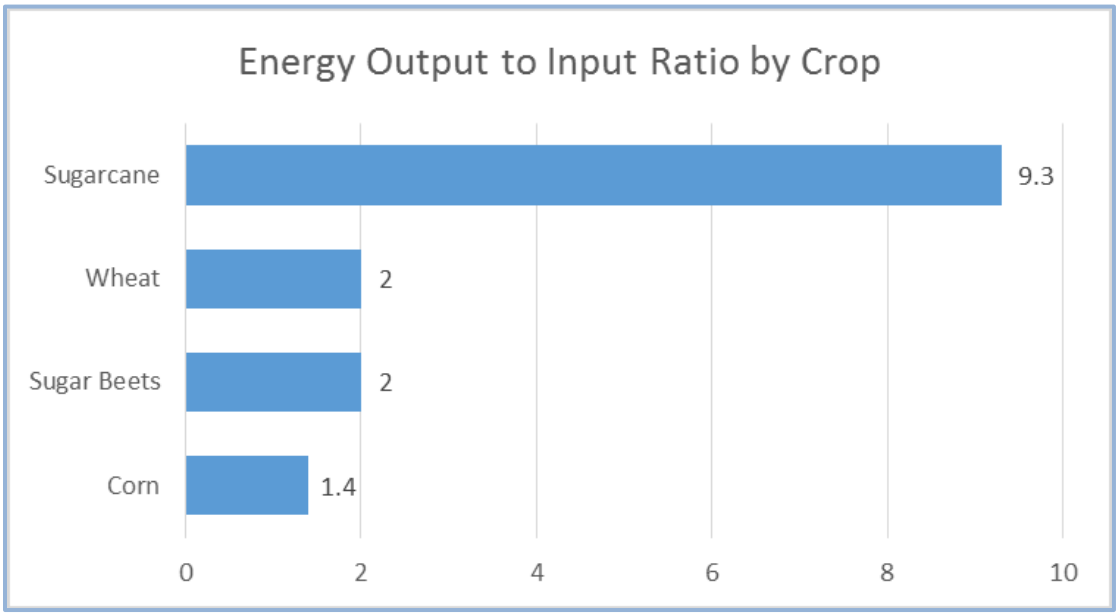

Figure 4. Energy Output to Input Ratio by Crop.

Sugarcane production costs are increasing in several parts of the world, notably in Brazil. Sugarcane is heavy and needs to be planted close to processing plants; however, land in these areas has become very expensive. Increasing the efficiency of sugarcane production is a major challenge. The Brazilian government and the private sector are investing millions of dollars to generate production innovations. The hope is that these innovations will allow the growth and cost reduction that would make it possible for ethanol to compete with oil, shale gas, and other energy sources, even with lower prices of these competitors.

Copersucar as an Originator of Sugar and Ethanol

Copersucar's major activity is sugar and ethanol trade based on large scale and logistic assets that integrate the supply chain. More specifically, Copersucar has exclusivity deals to sell the products of forty-three partner mills and also buys from over fifty other independent sugar mills. Almost 100 of Brazil's 430 units have their sugar traded by Copersucar. This provides a unique position in the supply chain due to the geographic diversity of Copersucar's production units,

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which are spread across Brazil's production areas; this regional diversification reduces risks and makes it possible to face the climate variations and sugar production variations that affect total supply (Figure 5).

The benefit for Copersucar is guaranteed supply, such that the company can focus on logistics, sales and risk management, and on creating, capturing, and sharing value. Copersucar's access to so much sugarcane creates barriers for competitors and gives Copersucar a competitive, sustainable advantage, guaranteeing stable supply contracts to international clients. As industrial and agricultural risks are borne by its members, Copersucar can focus on its core business as a sugar and ethanol marketing and logistics organization.

Figure 5. Locations of Copersucar's Partner Mills.
Source. Copersucar

To maintain access to its supply, Copersucar has to offer profit margins above the market via financial management and operational excellence. Working with Copersucar allows its partner mills to outsource all commercial activities, like logistics, market intelligence and marketing channels, focusing on the production of sugar, ethanol and its by-products. Additionally, partner mills do not need to maintain a commercial and risk structure or worry about market price guarantees. This allows Copersucar's shareholders to specialize in the production of sugarcane. Copersucar's process of buying sugar and ethanol from the partner mills deserves clear understanding due to its uniqueness and advantages:

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- Partner mills are associates of the cooperative and own 100 % of the holding company, Produpar, and therefore 100 % of Copersucar S.A. The management team of the cooperative and Copersucar are the same.
- All of the partner mills' sugar should be sold to the cooperative, and 100 % of the cooperative's sugar is traded by Copersucar.
- As soon as a partner mill produces, it delivers the sugar to the cooperative. The same contracts are applied to all partner mills, the same market prices are paid and there are no differences in the quantity purchased. The purchase price is based on current sugar prices for the specific sugar type, plus a fidelity premium of 2%. This means that all partners receive a price 2% higher than current market price. Partner members receive their payments equally each week. This brings another advantage of cash flow management. If, in a particular year, a partner mill produces and sells $52 million worth of sugar, the partner mill will receive $1 million each week.
- The sugar sold may stay in storage with partners, be moved to Copersucar's storage or be moved directly to clients. The cooperative allows this flexibility of retention and storage, which improves logistic optimization. In this way, Copersucar can use the facilities of its cooperative members to increase its logistic flexibility. Copersucar can sell sugar to a Nestlé factory and ship it from its inventory at the closest mill. Copersucar only has to pay a partner mill for storage if it uses more than 67 % of the specific partner's ethanol capacity or 58 % of its sugar capacity.
- The cooperative also allows for partner mill specialization without losing focus. If one of the partners is better at producing a specific type of sugar, it is able to produce that sugar. In the end, the cooperative provides a balancing of cost adjustments.
- Copersucar pays taxes only at the end of the process, when the sugar is sold to final clients. The intermediary processes, from partners to the cooperative, do not pay taxes, which has clear cash flow benefits.

Copersucar is the largest player in Brazil and operates in a quickly consolidating international industry. Some competitors like Dreyfus, Bunge, Noble and Cargill are multi-product trading companies. Guarani, owned by the French Farmers Cooperative Tereos, is very active in sugar beet production in Europe. Cosan, which is partially owned by Shell, has advanced to the ethanol distribution channel in Brazil, owning logistics and gas stations. São Martinho is also operating in cane diesel and other innovations. Some companies have refineries and distribute their own sugar brand at the Brazilian retail level. Strategies are diverse amongst the major players.

Global sugar competition is intense but dominated by large organizations. Multi-product trading firms, such as Bunge and Louis Dreyfus, have made inroads into sugar refining and trading over the past decade. Bunge began trading sugar in 2006 and has since acquired eight sugar mills in Brazil, capable of crushing 21 million tons of cane and producing an estimated 1.5 million tons of sugar per year. Bunge's mills are also equipped to produce ethanol, and like Copersucar's millers, can switch between the two commodity outputs. Louis Dreyfus entered the Brazilian market in 2009 with its purchase of a large Brazilian operator, naming the new operation Biosev. Biosev operates twelve sugar and ethanol mills, capable of crushing 38 million tons of cane and producing 2.8 million tons of sugar and 1.8 million tons of ethanol each year.

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To compete, Copersucar has expanded significantly. Its cane-crushing capacity moved from 72 million tons in 2007-2008 to almost 130 million tons in 2013-2014 (Table 1).

Table 1. Sugarcane Crushed under Copersucar by Source,

	2008–2009	2009–2010	2010–2011	2011–2012	2012–2013	2013–2014
Members	68	74	82.2	84.8	94.8	101.4
Outside	4	11.5	14.4	24.5	19.4	27.8
Total Cane	72	85.5	96.6	109.3	114.2	129.2

Note. *Millions of tons
Source. Copersucar

Before choosing Copersucar as their trader, companies typically consider competitors' offers and the "make-versus-buy" option. This is why Copersucar must perform better and constantly innovate to offer benefits of the "buy" decision to use Copersucar. Member companies, as well as Copersucar's independent suppliers, always have one question in mind: could I perform better and cheaper without Copersucar? For example, Clealco, which owned 7% of Copersucar and was one of its most important participants, left the group in 2013, complaining about trading prices. (See Appendix 2 for a list of Copersucar's participants and shares.)

Beyond reducing costs for its partner mills, Copersucar's challenge is to gain new partners and to operate as the originator for other producer groups in order to increase asset utilization, turnover, and financial performance.

Copersucar as a Logistic Operator and Trading Company

Copersucar has to outperform as a logistic operator and trading company. This is its core business, and sugar and ethanol are commodities with high transportation costs when compared to their value, so any cost difference is significant.

Logistic assets include storage capacity for 2.5 million tons for sugar and 3 billion liters[14] of ethanol, internal logistics (contracts for using trains), pipelines for ethanol (as a 20 % owner of Logum Logistica), and export logistics (vessels and transport companies such as Copa Shipping).

Copersucar has long-term contracts with train system operators in Brazil that carry sugar to Santos Port. Using trains allows Copersucar to save 70,000 250–mile truck trips. Copersucar's goal is to move 70 % of its sugar via rail systems in 2015.

Copersucar, as well as other companies and government institutions, invested $1.5 billion[15] in logistics, making it possible to bring sugar transport costs down from $50 to $42 per ton.
Together with other companies, Copersucar is participating in the Logum Initiative, an 800-mile pipeline that will carry ethanol from the producing regions to the port (Figure 6). The first phase, with 200 miles already operational in 2013, has made it possible to take ethanol from Ribeirão Preto to the petrochemical cluster of Paulinia (a distribution hub of fuels in Brazil) and then to

[14] 1 liter=0.264 gallons

[15] In US dollars. US$1=R$2.30 (September 6, 2013)

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Santos Port. This initiative will replace 1.2 million truckloads between the production area and Santos Port, avoiding more than 250 million miles of truck movement and 350,000 tons of CO^2 emissions each year.

Figure 6. The Logum Pipeline
Source. Copersucar.

The ethanol pipeline is a shared investment of $3.5 billion. It will reduce the cost of transportation from $64 per cubic meter[16] to $44 per cubic meter, a decrease of almost 31%. For the domestic market, the pipelines will reduce costs from $45 to $35 per cubic meter.

Several investments in storage and movement were made at Santos Port, and Copersucar‘s up-to-date facility allows it to have one of the lowest logistics costs in the industry. In order to deliver commercial and logistical excellence to its shareholders, Copersucar made several investments in companies to transport, store and sell its products. Table 2 describes these companies and Copersucar’s participation.

Copersucar estimates investing approximately $710 million[17] through 2015 in logistics projects, including the Logum Initiative. Besides the pipeline, other investments include enhancing the Terminal Açucareiro Copersucar (TAC), which concluded in June 2013, and the construction of an ethanol terminal, Terminal Copersucar de Etanol (TEC), in Paulínia (São Paulo), which was operational in the first half of 2014. The investments are aligned to the company’s strategy of increasing the contribution of the logistic segment in total net revenue. Growing the organization’s structural capacity will reduce marginal operating costs, and in some cases, intensify the offer by selling services to other companies.

[16] 1 cubic meter = 1000 literes.
[17] February 2015 Real to US Dollar exchange rate, R$2 billion total: 1USD = 2.816 BRL.

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Copersucar also generates income by providing service operations of its logistic structures to third parties. This generated $42.8 million (R$120.6 million) in the 2012–2013 season, a 45% increase from 2011–2012, and $35.8 million (R$100.7 million)[18] in 2013–2014.

Table 2. Logistic Subsidiaries of Copersucar.

Company Name	Location	Shares	Function
Cia. Auxiliar Armazens Gerais	São Paulo	100	Sale of sugar to wholesalers, storage capacity lease and operation, exports of sugar and port activities.
Copersucar Armazens Gerais	São Paulo	100	Sale of sugar to wholesalers, storage capacity lease and operation, sale of fuels to wholesalers and retailers.
Uniduto Logística	São Paulo	38.6	Build, develop and operate pipelines for fuels movement to be sold in national and international markets, port terminals and other facilities for export of fuels (also partner of Logum Logistica).
Logum Logistica	São Paulo	20	Build, develop and operate pipelines for fuels movement to be sold in national and international markets, port terminals and other facilities for export of fuels; and, import and export of machineries involved in these activities, and optical cables for information transport in pipeline areas.
Sugar Express Transportes	Rio de Janeiro	100	Road transport of sugar and ethanol.
Copersucar International NV	Curação	100	Developed to be a shareholder of other companies.

Source. Copersucar.

Sales Efforts and Strategies

In addition to excellence in logistical performance, Copersucar seeks to grow and develop worldwide sales of sugar and ethanol in competition with global trading companies. Both commodity markets, sugar and ethanol, involve significant risks and regulations.

Geographically, Copersucar's most important market is Brazil; however, the organization operates and sells in many global markets.

In order to build its global presence, Copersucar invested in companies around the world (Table 3). Copersucar made three recent, significant moves in sugar and ethanol chains. Copersucar Asia, a subsidiary based in Hong Kong, was founded in order to build more intimacy with Asian buyers and to originate sugar in Asia, thus expanding Copersucar's supply beyond Brazil. This also allows Copersucar to be a year-round supplier to China, as Brazilian production is not competitive there for part of the year due to freight costs.

[18] February 2015 Real to US Dollar exchange rate: 1USD = 2.816 BRL.

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Table 3. Sales and Marketing Subsidiaries

Company Name	Location	Shares	Function
Cia. Auxiliar Armazens Gerais	São Paulo, Brazil	100	Sales of sugar to wholesalers, storage capacity lease and operation, exports of sugar and port activities
Copersucar Armazens Gerais	São Paulo, Brazil	100	Sales of sugar to wholesalers, storage capacity lease and operation, sales of fuels to wholesalers and retailers
Copersucar International NV	Curação	100	Developed to be a shareholder of other companies
Copersucar Trading A.V.V.	Aruba	100	Imports and exports of sugar and ethanol acquired mostly from the Cooperative of Sugar Planters and Producers of São Paulo
Copersucar Europe B.V.	Rotterdam, NETH	100	Sugar and ethanol trade
Copersucar North America, LLC	Franklin, TN USA	100	Participate as a shareholder of the capital of other companies
Copersucar Asia	Hong Kong	100	Sugar and ethanol trading
Eco-Energy Global Biofuels LLC	Franklin, TN USA	65	Ethanol origination and trade

Source. Copersucar

The second major international expansion was the creation of Alvean, a joint venture between Copersucar and Cargill announced in 2014. The move surprised the industry globally, and is expected to contribute in the near future to both organizations. From the August 2014 press release:

> "Cargill and Copersucar have successfully completed all required regulatory clearances to form Alvean, their new 50/50 sugar trading joint venture. Operating as an independent entity, Alvean will begin integrating global activities to originate, commercialize and trade raw and white sugar. Alvean will bring together two of the world's leading and most respected sugar trading operations. Our customers will benefit from the complementary strengths of Copersucar and Cargill," said Ivo Sarjanovic, new Chief Executive Officer of Alvean. "We will have a strong combined global supply chain, a worldwide presence and excellent logistics management." Sarjanovic, who previously headed up Cargill's global sugar business, continued, "I am very confident that we are embarking on an exciting journey which will reshape the sugar industry. We are bringing together the best of both Cargill's and Copersucar's sugar expertise, talents and capabilities—the base on which we build our new and unparalleled company, Alvean." Soren Hoed Jensen, Alvean's Chief Operating Officer, explained the origin of the new company's name: "Alvi, derived from the Latin word albus signifies 'white/crystal clear' and symbolizes our engagement to be ethical and inclusive towards our partners. The suffix 'an' brings the notion of movement, expressing the dynamism of the sugar market and our commitment to be the unique link between supply and demand around the world. Alvean will seek new ways to be innovative and agile for the benefit of our customers and suppliers by bringing comprehensive global market knowledge and trading expertise.

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> Alvean's trading activities will be based in Geneva, Switzerland. The joint venture will also have offices in Bangkok, Bilbao, Delhi, Dubai, Hong Kong, Jakarta, Miami, Moscow, Sao Paulo, and Shanghai."
>
> – Press Announcement, 20-August, 2014.

The third global move occurred in ethanol. In 2012, Copersucar acquired 65% of Eco-Energy, a US based trading company founded in 1992 in California. Eco-Energy has a 9% market share of the US ethanol trade, with sales of $3.1 billion in 2012. This acquisition cost $90 million and was financed entirely by Banco do Brasil (Brazilian Federal Pubic Bank) in a project finance style. Now based in Nashville, Tenn., Eco-Energy originates ethanol from sixteen units with exclusivity contracts, representing 60% of its ethanol origination. Like Copersucar in Brazil, Eco-Energy has several logistical assets, including twenty-five terminals and import-export facilities. Prior to this acquisition, Copersucar had a global presence in sugar, but not in ethanol. After the acquisition, Copersucar is now the world's leading ethanol trader, and can continue to build a strong ethanol platform as a global supplier (Figures 7 and 8).

Figure 7. Ethanol Traded by Company, 2011 in meters cubed.
Source. Copersucar.

The Copersucar and Eco-Energy business models are similar, focusing on vertical coordination of the ethanol chain. Together, they traded approximately 14.1 billion liters of ethanol in 2013–2014, 12% of the world's demand.

The purchase of Eco-Energy will diversify the way that the company operates, making it possible to increase the sourcing of ethanol from two different feedstocks in two different regions, further mitigating climate risks. It will allow Copersucar to build storage and distribution capacity and make it possible to have long-term ethanol export contracts based on the optimal matching of

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arbitrage, regulations, carbon balance, and emissions. The move will facilitate the imports between both countries. However, management challenges to the acquisition remain, including the effective integration of the two companies and issues related to cultural differences.

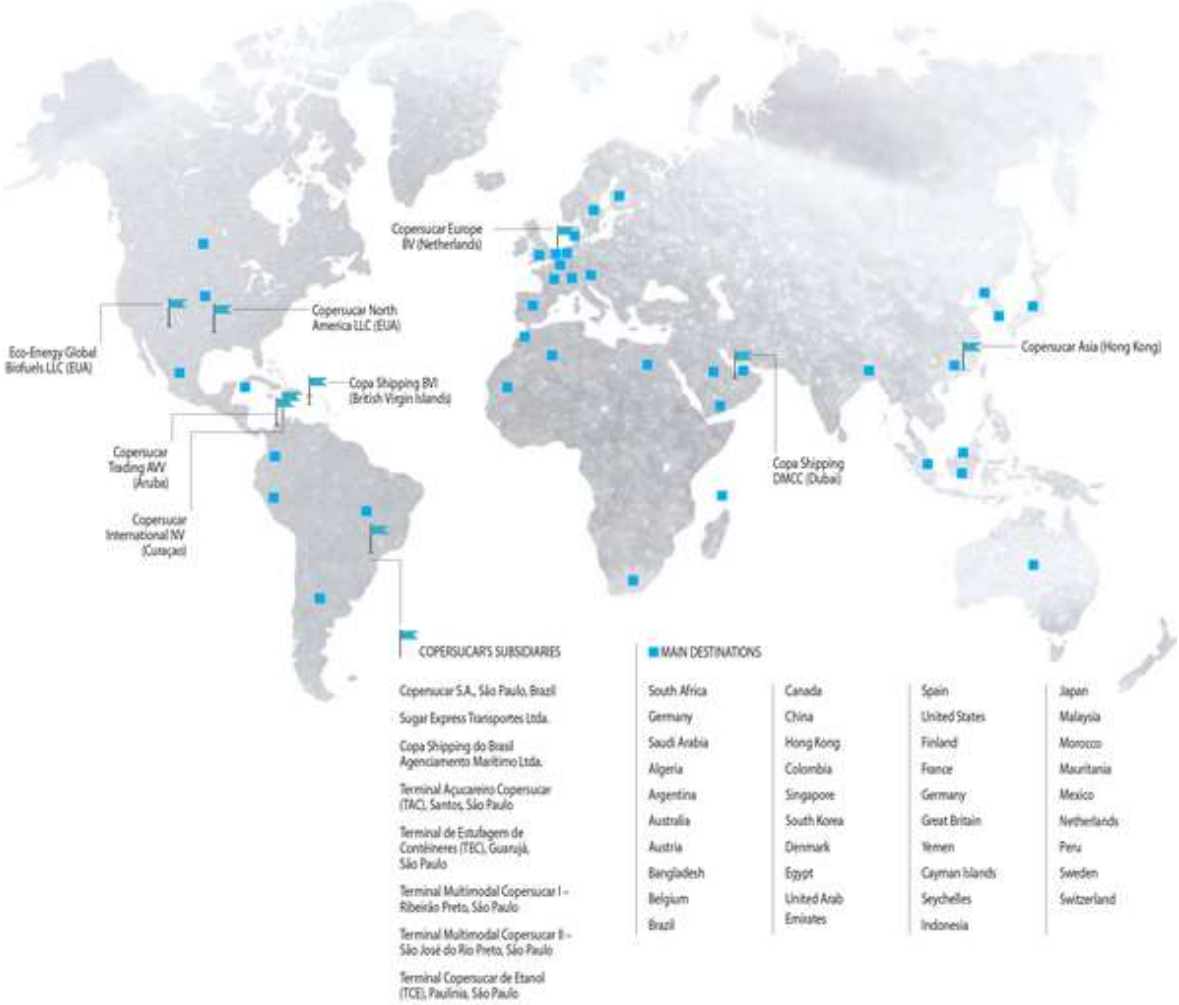

Figure 8. Copersucar's Global Operations.
Source. Copersucar Annual Report, 2013/2014.

Risk Management in a Turbulent Scenario and Financial Performance

Copersucar faces severe risks as a commodity business, particularly given its complex, global buying and selling structure. To manage these risks, the management team selected four priority risk categories to receive special attention: credit, liquidity, market, and operational risk. The company created an audit and risk committee that is responsible for risk management and reports to the administrative board. Due to the business's sensitivity to this issue, Copersucar's risk management policies obey strict rules and limits.

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Credit risk involves receivables from clients. Its policies are to follow each client's limit, select clients and regions, and other criteria. Normally, sugar for the domestic market is paid in twenty days, and ethanol in fifteen days. For international markets, most of the sales are on the condition of cash against documents. Additionally, Copersucar uses international banks' credit insurances. More than 80% of Copersucar's clients have more than five years of relationships and low historical losses.

Liquidity risk involves the capacity of Copersucar to face its debts and liabilities. The company's policy is to face these obligations within the contractual conditions in order to maintain its reputation. The company ended its 2014 financial year with a quick-ratio of 0.93, compared to 2013's year end 0.97 quick-ratio. Copersucar's primary short-term liabilities include accounts payable to suppliers, and short-term lending and financing expenses. The largest current assets are inventories and accounts receivable.

Market risk is the most complex issue, as the company faces risks in commodity price, exchange rate, and interest rate changes. In terms of commodity prices, the company uses future markets and derivatives operating on the New York Board of Trade (Sugar #11 ICE) on a daily basis in acceptable and pre-defined parameters by the committee. The sugar market has experience significant volatility; in the last four years, prices moved from $0.1039 per pound[19] to $0.3531 per pound and back to $0.1217 per pound at the end of September 2015, putting significant pressure on Copersucar's commercial team.

In the case of ethanol, most sales are in the domestic market. Hedging mechanisms, although available through Brazil's BMF (securities, commodities and futures exchange), are not popularly used by the market, thus this alternative is underdeveloped for Copersucar. To manage exchange rate risks, Copersucar protects its import and export business and debts in foreign currencies through currency hedging transactions.

Finally, operational risk is the risk of direct or indirect losses arising from the organization's business processes, personnel, technology, infrastructure, and external factors not included in liquidity or market risk. Operational risk at Copersucar is managed by the audit and risk committee, which monitors people, technologies, and infrastructure, as well as external factors such as regulations monitoring. Given Copersucar's expansion over the past decade, operational risks are now global in nature and are becoming more complex.

Copersucar ended its fifth year of operation under the new format in 2013-2014. The statements of income show that net sales were of R$23.2 billion ($8.2 billion)[20], up 57 % from the previous year's sales of R$14.7 billion ($5.2 billion). Financial results include the full year of operations of Eco-Energy, which more than doubled Copersucar's total ethanol sales to R$14.6 billion ($5.2 billion) for the year.

For the financial year 2012–2013, sugar represented about 45% of sales and ethanol 50%, with logistical service making up the remaining 5%. Despite a large increase in total sales, the cost of

[19] A pound is a unit of weight. Prices in US dollars as quoted by the New York Board of Trade.
[20] February 2015 exchange rate, BRL 1 = USD 0.355.

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goods sold increased substantially, leaving Copersucar with smaller profits than in 2011–2012. Copersucar (consolidated numbers) had an EBITDA of R$180 million ($63.9 million) in 2012–2013, down from R$250 million ($88.8 million) in the previous cycle and much lower than the R$404 million ($143.4 million) of 2010-2011.

Net profit in 2012–2013 was R$86.2 million ($30.6 million)[21], also lower than in previous years because of lower volatility in the ethanol market and the fact that the company acted conservatively due to the risk of government intervention in ethanol prices. In addition, partner mills produced more ethanol than sugar in 2013.

Total revenues increased significantly during the 2013–2014 financial year, and the addition of Eco-Energy for the full year dramatically shifted the sales mix: sugar comprised 34% of sales, ethanol 62%, with the remaining 4% of coming from services, financial instruments, gasoline sales, and renewable fuels registration. The increase in revenues resulted in a 2013–2014 EBITDA of R$476.9 million ($168.2 million), and increase of almost 165%. Net income for 2013–2014 was R$157.7 million ($55.6 million), a significant increase over 2012–2013's R$86.3 million ($30.4 million).

Although the company has a high level of gross debt, as seen on its balance sheets—R$2.76 billion ($974.1 million) in 2013-2014, R$2.33 billion ($822.9 million) in 2012–2013, and R$2.23 billion ($786.7 million) in 2011–2012—it is important to note that the cooperative is the guarantor of Copersucar, and stocks serve as guarantees for the cooperative's obligations. This is how banks understand Copersucar. Using this analysis, the situation in 2013 is improved over 2012, as net debt less inventories and cash decreased from R$809 million to R$573 million. In 2014, the spread fell again to R$437.3 million ($154.3 million).

The decrease in the spread was due to slower growth in loans and financing as well as significant increases in inventory holdings. For Copersucar, the most relevant issue is not the debt, but the risk over stocks. Banks consider Copersucar a conservative company with a comfortable financial situation, and the company received a prime risk evaluation. At the beginning of September 2013, Copersucar received a $220 million loan from BNDES (Brazilian National Development Bank) for ethanol storage, indicating confidence in the organization's credit worthiness.

The company had planned an initial public offering in 2011, but postponed it due to the economic crisis. Even with this postponement, Copersucar made plans to invest R$2 billion between 2010 and 2015, including having already invested over R$360 million in logistics projects between 2012 and 2014.

The future of Copersucar and the success of its investment strategies is intimately tied to the futures of its two primary trade products: sugar and ethanol.

[21] February 2015 exchange rate, BRL 1 = USD 0.355.

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The Sugar Market Highlights and Big Questions

Around the world, sugar is recognized as the basic source of energy for metabolism, and the food and drink industry depends extensively on sugar. According to the International Sugar Organization, sugar consumption has grown 2–2.4 % per year subsequent to 2000. In 2005–2006, 143 million tons were consumed; in 2014–2015, 171 million tons are expected to be consumed globally.[22] The largest sugar consumers are India (23 million tons), the European Union (19), China (15), Brazil (13), the United States (10), the Russian Federation (5.8), Indonesia (5.2), Pakistan (4.7), Mexico (4.5) and Egypt (2.9). The United States Department of Agriculture predicts production has declined slightly in the 2014–2015 crop year, but that consumption will continue to increase.

Average consumption can grow up to 4 million tons each year, expanding the market by about $1.6 billion. Projections with this growth pattern may take sugar consumption to 204 million tons in 2021, with 131 million tons being domestically produced and consumed, and 73 million tons traded globally. This would expand the export market by 15 million tons compared to 2013. Following current patterns, the sugar import market may be $6 billion larger in 2021.

On the production side, because of its importance, almost all countries produce sugar, either out of sugarcane or sugar beets. Global sugar production grew from 145 million tons in 2005 to 175 million tons in 2013–2014; the United States Department of Agriculture expects global sugar production to decline to 172.5 million tons in 2014-2015. The largest producers are Brazil (35.8 million tons expected for the 2014-2015 crop year), India (27.3), the European Union (16.3), China (13.3), Thailand (10.2), the United States (7.7), Mexico (6.5), Russia (4.2) and Australia (4.6). Brazil had the largest production growth between 2005 and 2015 of 32.6% (from 27 million tons to an estimated 35.8 million tons), while other countries' growth averaged about 16 %. This trend increased Brazil's global production share from 19 to 21%. Brazil's peak production occurred in 2012–2013, at 38.6 million tons, representing 21.7% of global production. Global production will continue to grow, and is estimated to be about 206 million tons in 2021.

A total of 58 million tons of sugar was traded in 2012-2013, of which Brazil supplied 50%, followed by Thailand (16%), Australia (5 %), India (4 %) and the European Union (4%), with several other countries supplying the remaining 21%. Brazilian exports jumped from 17 million tons to 28 million tons in the last seven years, representing growth of almost 60%, while other countries' exports declined by almost 6%. In 2014–2015, Brazilian exports are expected to fall to 24 million tons of sugar, due partly to drought conditions, but also to increased ethanol production.

The biggest sugar importers in 2014–2015[23] are expected to be China and Indonesia (3.8 million tons each), the European Union (3.5), the United States (3.15), the United Arab Emirates (2.35), South Korea, Malaysia, and Bangladesh (1.9 each), Algeria (1.85), Iran (1.6) and Russia (1.5).

[22] United States Department of Agriculture, Foreign Agricultural Service, *Sugar: World Markets and Trade*, November 2014.
[23] USDA, Foreign Agricultural Service, World Centrifugal Sugar: Imports and Exports data, November 20, 2014.

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Currently, sugar stocks are high (approximately 42.2 million tons in 2014–2015, down from 43.6 million tons in 2013–2014) due to three years of production exceeding demand. Sugar prices started 2015 at $0.1417 per pound[24], the lowest in recent years. Increased production was a reaction to higher prices between 2009 and 2011, with sugar reaching approximately $0.37 per pound for daily contracts in December 2011. Current prices may discourage production and stock may be used in the next two or three crops, creating a new equilibrium in the market, even with recent subsidies offered by India and Thailand to its producers. Sugar prices are historically volatile, and over the last decade have fluctuated between a low under $0.11 in 2007 to a high of $0.37 per pound in late 2011.[25]

Figure 9. Sugar Market Price, 2007-2015.
Source. Data: Intercontinental Commodity Exchange, US. Chart: CommodityCharts.com, February 2015.

Before meeting with Copersucar's market intelligence team to discuss sugar, Luís is considering the following questions:

- Asian countries are responsible for 60% of global consumption growth. Per capita consumption of sugar in China and India, and also other populated countries in Asia and Africa is lower when compared with the United States, Europe, and Brazil. Income growth and urbanization that drives the market of soft drinks, chocolate, sweets, juices and other products that use sugar may bring huge impacts in these regions. For example, China's 2012 per capita consumption of 24 pounds[26] is 44 % of the world's 2012 average

[24] ICEUS, SBY00 = Daily contract, spot price for sugar, as priced January 2, 2015. US dollars.
[25] ICEUS, SBY00 daily contract prices. US dollars.
[26] OECD-FAO Agricultural Outlook 2013-2022 Highlights, from www.oecd.org, retrieved January 2016.

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of 54.4 pounds,[27] and an 11 pound per person change in China would create a market of 7 million tons. Will per capita consumption in these countries grow at a faster rate, increasing the average 2.4 % annual growth in sugar consumption?

- India was responsible for the major sugar price volatility, due to its production variation and also its high consumption. With land pressures and the need to produce more grains for its domestic consumers, will India have the capacity to expand sugar production to meet its demand, or will the country focus on other crops for its growing population, consolidating as a net sugar importer?
- Some sugar-producing countries are adopting mandates to blend ethanol to gasoline. India started a 5% blend in 2013 and other countries such as Thailand, the European Union, Australia, Mexico and Brazil either already have or are discussing mandates. How will these affect sugar production as they will create ethanol markets that compete for sugarcane and sugar beets?
- With current sugar prices, production is not economically feasible in some areas and for some industrial groups. Which industries (such as oil, food, and trading companies) and countries will be able to consolidate and lead sugar expansion in a total, low-cost basis (production and logistics), taking advantage of the growth of import markets?
- Which new plants or production technologies might provide a breakthrough in the relatively old-fashioned and traditional sugar industry?
- Although sugarcane has lower production costs than sugar beets and other sources, will substitute products, such as a sweetener with its own price and cost structure, take market share from sugarcane?
- The European Union highly subsidizes sugar beet production. What will happen in the coming years with the reform of the Common Agricultural Policy, and how this will affect European Union production and consumption balance?
- Brazil is the largest player in the sugar market. Approximately 40 to 60 % of Brazilian sugarcane goes to ethanol, which is consumed mostly in the domestic market for Brazil's growing fleet of flex-fuel vehicles. Will ethanol be competitive with gasoline, diverting more cane to E100 ethanol (pure ethanol) in the future and removing some sugar from the international market?
- How will climate changes and general weather conditions impact the production capacities of different regions?
- As ethanol can be produced from both corn and sugarcane, there is a growing relationship in their prices. How will future corn prices affect sugar prices and consumption? In the same way, gasoline competes directly with ethanol as fuel, and ethanol is also directly linked to sugar. How will oil prices affect sugar prices and consumption?

[27] United Nations FAO Food Outlook: Biannual Report on Global Food Markets, May 2015.

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Regarding the domestic market, Brazilian sugar production has experienced almost continuous growth in the last 20 years. The sector represents 2% of the country's GDP and in 2014, exports totaled $13.2 billion, generating significant tax revenues and employment.

Retail sugar sales to consumers comprise 40% of total consumption, while industry sales are responsible for 60 % of domestic demand. Within industry, 20 % of total demand is used for producing soft drinks and 10 % for producing candy and chocolate. Brazil's per capita chocolate consumption is 15 times lower than in Sweden and ten times lower than in the United States, and per capita consumption of soft drinks in Brazil is one-fourth that of the United States, indicating there is still room for growth in sugar consumption through industrialized products.

In 2013–2014, Copersucar traded about 8.6 million tons of sugar, up 10% from 2012–2013's production of 7.8 million tons. The company exported 6.9 million tons, over 13% more than 2012–2013, to about twenty-five clients, mostly refiners. In the Latin American market, Copersucar has about 330 clients, the majority of whom are in the food industry.

According to Luís, of the total 73 million tons of sugar to be traded in 2021-2022, Brazil may provide about 37 million tons, representing over 10 million tons of new export opportunities. Together with the 2.5 million tons traded in Brazil's domestic market, the sugar opportunity in 2021–2022 will total approximately 12.5 million tons. Copersucar will be able to act in a market that may be $4.28 billion larger. Luís is not considering Copersucar Asia in these numbers, as the subsidiary may source sugar from other countries.

Important to the growth and future of Copersucar is the Brazilian Real to US Dollar exchange rate. At the end of February 2014, the exchange rate was R$1 (BRL) = $0.427 (USD); at the end of February 2015, the rate had fallen to R$1 = $0.349, a decline of over 18 %. The decline reflects not only a strengthening US dollar over the period, but also international concern over the Brazilian economy, and thus a weakening Real.

Luís worries about the sugar business; however, with some careful considerations, he can predict with relative certainty what the sugar market will do. This is not the case for ethanol, where the market is driven by external forces. The uncertainty surrounding the ethanol market is what keeps Luís awake at night.

The Ethanol Market: Dealing with Regulations and Uncertainties

The OECD and FAO predicted that global ethanol production would be over 115 billion liters in 2014 (2013 production was 104.8 billion liters), and the United States and Brazil will be responsible for over 75% of that ethanol. Most ethanol trade occurs between the United States, which was forecast to produce over 57 billion liters in 2014 (2013 production was 49.9 billion liters), and Brazil, which was forecast to produce almost 30 billion liters in 2014 (2013 production was 27.2 billion liters). By 2023, global ethanol production is expected to exceed 158 billion liters per year, with over 70 billion liters produced in the United States, and almost 50 billion liters produced in Brazil.

The industrial production of fuel ethanol in Brazil started in the 1930s, stimulated by the first governmental incentives. A federal law from 1931 mandated a 5% ethanol blend in all imported

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gasoline. In the same year, all public service automobiles were required to use a 10% ethanol blend. In 1938, the 5% mix became mandatory to all gasoline produced in the country. However, it was not until 1973's Oil Shock that sugarcane became an important agent in Brazil's energy matrix. At that time, 77% of the oil consumed in the country came from abroad. Oil imports increased from $760 million to $2.9 billion within one year.

In an effort to reduce the negative impact of oil prices in the trade balance, the Brazilian government launched the Alcohol National Program (Proálcool) in 1975. This was the beginning of a series of large investments in the development of ethanol-burning engines and efforts to stimulate the production of sugarcane and its products through tax cuts, price control, strategic stocks, special lines of credit, and mandatory blending and distribution. Between 1975 and 1978, the demand for anhydrous ethanol (used in non-ethanol engines, for blending purposes) jumped from 1.1% to 9% of total fuel consumption. In 1979, the first ethanol-engine car entered the market. In 1986, 95 % of new cars sold could use ethanol.

Ethanol, also known as ethyl alcohol, can be produced by the fermentation of sugarcane juice and molasses. It has been used in various forms for thousands of years, and has recently emerged as a leading fuel for combustion engines. Since March 2008, ethanol represents more than 50 % of Brazil's overall gasoline consumption. Brazil produces two types of ethanol: hydrous, which contains about 5.6 % water content by volume; and anhydrous, which is virtually water-free. Hydrous ethanol is used to power vehicles equipped with pure ethanol or flex-fuel engines, while anhydrous ethanol is mixed with gasoline before it reaches pumps. Several countries are now blending anhydrous ethanol with gasoline to reduce petroleum consumption, boost the octane rating and provide motorists with a less-polluting fuel. Brazil is a pioneer in using ethanol as a motor vehicle fuel. The country began using ethanol in automobiles as early as the 1920s, but the industry gained significant momentum in the 1970s with the introduction of ProAlcool, a trailblazing federal program created in response to global oil crises. ProAlcool succeeded in making ethanol an integral part of Brazil's energy matrix, but the program faced numerous challenges, particularly in the late 1980s, when oil prices tumbled and sugar prices were high. Ethanol use blossomed again in Brazil because of sky-high gasoline prices, environmental concerns and the 2003 introduction of flex-fuel vehicles that can run on ethanol, straight gasoline or any mixture of the two.

Source. UNICA — Sugar Cane Industry Association

However, in the late 1980s and early 1990s, oil prices fell and the Brazilian government promoted the deregulation of the sector, ending subsidies and shrinking credit, and mills responded to high sugar prices by shifting industrial production in favor of sugar. Soon, ethanol prices rose to the same level of gasoline, the strategic stocks were sucked up and the drivers of ethanol cars found themselves literally out of fuel, which caused significant damage to the public image of the milling sector.

The launch of flex–fuel cars in May 2003 allowed ethanol to regain the trust of consumers and car manufacturers. With the flex-fuel car, drivers could fill up their tanks with gasoline when ethanol was in short supply.

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In 2013, Brazil had almost 20 million flex-fuel cars, more than the number of cars that use gasoline. Almost 85% of the 3.5 million new cars sold each year are flex-fuel. By 2021, it is expected that there will be 50 million cars in Brazil, 40 million of which will be flex-fuel.

The price of ethanol is linked to oil prices, but for the past several years in Brazil, the government has kept the price of gasoline below the international average as an attempt to control inflation. This strategy, together with a high level of corruption, damaged Petrobras, the Brazilian state-owned oil company, costing it over $24 billion since the end of 2010; the price fixing is also damaging to ethanol, because the price of ethanol is kept to a maximum of 70% of the price of gasoline since ethanol gets lower miles per gallon. At the end of 2014, Petrobras was forced to raise the wholesale price of gas by 3% and diesel by 5%, which portends increasing inflation throughout the economy. In 2015, the Brazilian Government, in an effort to bring some equilibrium to their fiscal situation, raised taxes on gasoline and diesel (called CIDE), resulting in a price increase of approximately $0.10 per liter.

In some cases, to compensate for price changes, the Brazilian government can alter the blending level of anhydrous ethanol in gasoline, and it ranges from 18 to 27%, depending on sugarcane production.

The story of ethanol in the United States is equally interesting, although much shorter. In 2005, the Environmental Protection Agency (EPA) created the renewable fuels standard (RFS). The objective was to use 36 billion gallons of renewable fuel by 2022, corresponding to 23% of consumption. The RFS2 was delivered in 2007, which differentiated between the sources of ethanol and considered greenhouse gas emissions.

Ethanol in the United States is also linked to public policy. Until the end of 2011, oil companies received a blending credit of $0.45 per gallon ($0.119 per liter), called the VEETC — Volumetric Ethanol Exercise Tax Credit. The VEETC was eliminated on January 1, 2012. At the same time, the ethanol import tariff of $0.54 per gallon ($0.142 per liter) was eliminated, resulting in a more open and competitive ethanol market within the United States.

Although ethanol uses less than 5% of the world's grain production, almost 40% of US corn goes to ethanol production, generating significant complaints from meat producers. Because of this, communicating about ethanol in the United States is much more challenging than in Brazil.

The mandate in the United States fixed an ethanol target of 13.8 billion gallons for 2013 and 14.4 billion gallons for 2014.[28] But with gasoline consumption declining from 142 billion gallons in 2007 to 135.6 billion gallons in 2013 (although lower gasoline prices in 2015 will likely increase consumption), and a maximum ethanol to gasoline blend level of 10%, the blend wall is lower than the fixed ethanol target. In 2011, the Environmental Protection Agency approved a blend of 15% ethanol (E15) for sale at clearly advertised and separate pumps, but only for cars manufactured after 2001. These challenges made E15 implementation more difficult; as such, it can be found in less than fifty gas stations around the United States.

[28] US Energy Information Administration – Petroleum and Other Liquids, data released 1/29/2015.

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In his meetings with the Copersucar and the Eco-Energy market intelligence team, Luís is considering some important questions about the future of ethanol:

- In late 2013, the US Energy Information Administration predicted that in 2014, China would be a larger net importer of oil than the US. With the extensive sales of new cars, and oil consumption in the growing truck fleet, it is expected that in 2020, 70% of China's oil needs will come from imports of about $500 billion per year. The number of cars will jump from 20 million in 2005 to 160 million in 2020.[29] What will be China's influence in oil prices and the role of ethanol, particularly as the largest Chinese cities already face severe pollution challenges?
- Concerns regarding environmental issues, global warming and the instability of oil prices have led a growing number of countries to add ethanol to their fuel matrix. What should we expect? Will this movement continue creating blending markets for ethanol all over the world?
- India created a "Green Initiative" that mandates a 5% ethanol blend to gasoline. Many in India see the mandate as a transfer of wealth from oil companies to sugar producers. What will be the future of ethanol in India? With a significant sugarcane crop, and given current sugar prices, will India have a more aggressive policy on ethanol to substitute oil imports, copying Brazilian policies?
- The future of the US ethanol mandate is often questioned by the media and targeted for change or elimination by politicians. If changes occur, how could they impact the future domestic consumption of ethanol? Will E85 be economically feasible and serve the 11 million flex-fuel cars (out of a total of 240 million cars) on the road in the United States? If the amount produced in the United States exceeds the blending target, will US exports of ethanol be economically attractive? Classified by the EPA as an advanced fuel, and receiving special tax treatment, what will be the role of sugarcane ethanol in the United States?
- There are several promising sugarcane production innovations in the pipeline – will innovation in sugarcane production result in the ability to produce three or four times more ethanol using the same sugarcane production acreage, making ethanol more competitive?
- If 50 % of Brazil's Flex-Fuel cars used hydrous ethanol, the market could be up to 33.6 billion liters by 2021. A 27% blend of anhydrous ethanol blended to gasoline could create a market of 14 billion liters by 2021, up from 8.4 billion in 2013. What will happen in the domestic Brazilian ethanol market? Will it serve flex-fuel car drivers?
- Will cellulosic ethanol be feasible in the short term, challenging the feedstock used today to produce ethanol, such as sugarcane, corn, and beets?
- What will be the impact of shale gas on the US ethanol market and in the global market in the long term? The Brent Crude Oil spot price went from over $100 per barrel in late June 2014 to under $50 per barrel in January 2015 (the Brent Oil price is used as the

[29] Wood Mackenzie, Macro Oils Service Report – August 2013.

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benchmark price in approximately two-thirds of oil contracts and in the production of gasoline). What does this recent instability in global oil prices portend for global and domestic ethanol markets?

- Which innovations can create substitute products that might endanger the future of ethanol as an energy source? What types of innovations may reduce or negate the need for ethanol as an energy source?

Despite the many questions about its future, the global ethanol market may be promising. According to Copersucar's estimates, the market may grow from 92 billion liters consumed in 2012 to 165 billion liters in 2020, primarily in North and Latin America.

In 2013–2014, Copersucar traded about 4.9 billion liters of ethanol, almost 9% more than in 2011–2012 (after 22% growth between 2011–2012 and 2012–2013). Brazil's internal market absorbed 3.9 billion liters (18% more) and exports totaled 1 billion liters, a decline of almost 17% from 2012–2013 (but up 43% from 2011–2012). Unlike sugar, for which Copersucar is well-positioned as a service provider for non-partners, 94 % of the ethanol came from partner mills in the crop year of 2013–2014. Copersucar has 150 major ethanol clients in Brazil and forty in international markets. The majority of ethanol exports go to the United States, Japan, and Europe. While it is difficult to predict the future of ethanol markets, Copersucar's view is toward long-term growth in the market.

Discussion Questions

1. Based on information from the case, what major threats and opportunities face the ethanol industry? Consider government policies, oil and gas markets, technology advancements, etc.
2. Based on information from the case, what major threats and opportunities face the sugar industry? Consider Asian demand growth, substitute sweeteners, health concerns, government policies, etc.
3. Based on what was shown in the case, which risks does Copersucar face in its supply chain? How can those be mitigated?
4. What contracts in Copersucar's supply chain are the most important? Which contracts are critical to the organization's success and which are incidental?
5. What are the unique challenges faced by a global cooperative whose supply chains go beyond its original supplier base? What does this mean for member-owners versus users?
6. What unique challenges does Copersucar face given its owner-user organizational structure? What principal-agent problems derive from this structure and how can Copersucar address them?
7. Based on the financial information provided, is Copersucar in a good financial position? As managers, would participants be concerned if their organizations were in a similar situation? What unique characteristics of Copersucar make the financial situation acceptable?

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8. What are the key managerial decisions facing Copersucar?
9. Should Copersucar expand and use its structure to diversify and trade other commodities? Which other investments would you suggest for Copersucar to increase value creation, capture and sharing within the trade business, toward its major clients?
10. Would you invest in Copersucar? If yes, on what arguments do you base your answer? If no, what are your reasons, and what different investments would you make?

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Appendix 1. Sustainability and Innovation

Sustainability

Although Copersucar sells mostly to emerging economies, the company has felt increasing pressure regarding sustainability issues from its major clients. Sugarcane is complex and demanding in terms of resources due to its weight and production cycle. Several by-products are also generated and a lot of research is being done to reuse them and reduce water consumption, among other issues.

Due to the diversity of its supply chain, Sustainability is defined as one of the most important and challenging issues that Copersucar faces. Copersucar consists of forty-seven different companies from twenty-four different groups, management styles, capital ownership arrangements and financial situations.

The most relevant subjects related to sustainability and governance were summarized by its shareholders and are presented in Table 4.

Table 4. Sustainability Concerns Expressed by Shareholders.

Issues	Content
Transparency in business	Transparency in the disclosure of results
	Suppliers' qualification
Ethics and governance	Bribery, fraud, and corruption
	Corporate governance
	Code of conduct
Product responsibility	Quality of products
Health and safety	Labor risks
Climate changes	Reduction of emissions
	Burning sugarcane
	Impacts of climate change to production
Conservation of resources and biodiversity	Conservation of soil and water
	Protection of forested areas and reserves
Human rights and value chain	Child work and forced labor
	Respect to people
	Labor's conditions of suppliers
Byproduct Management	Innovation and research

Source. Copersucar

Sustainability is progressing with the engagement of the cooperative's members. Six of its forty-seven associate producing units are certified by Bonsucro, the Better Sugarcane Initiative, which analyzes practices around labor and the environment. Bonsucro is one of the most recognized certification processes in the sugar industry. Also, thirty-nine of its forty-seven units were previously certified by Renewable Fuel Standard 2 (RFS2) to enter the US market. They were registered at the California Air Resources Board (CARB) for adequately meeting the Low Carbon Fuel Standards (LCFS). Twenty-one of these companies were granted approval by the

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EPA, being responsible for 64 % of ethanol exports to the United States. Each of these issues is being covered and addressed within all forty-seven industrial units.

Innovation

Additionally, innovation is critical to the future of the industry given the potential of the sugarcane plant. Yields need to be improved, and improved sugarcane varietals with increased sucrose are becoming available. To face the innovation challenges collectively with other businesses, Copersucar is a member of the Cane Technology Center (CTC). CTC was originally the cooperative's technology center but it suffered from governance challenges. The department did not retain technology gains — Copersucar made the investment, but the materials were used without payment by several free riders. Recently, CTC transformed into a private company owned by major sugarcane producers. Copersucar owns 32% of CTC shares and access to CTC's most important innovations. This will allow for cane technology gains, growing the production of its partner mills without having to grow their planting area. Copersucar will also receive royalties from the genetic material and other services sold by CTC.

In the future, the company expects that it will be able to produce more than 30,000 liters of ethanol per hectare, much more than the 7,000 produced on average today. This will be possible with several improvements in agronomy, improved varietals and cellulosic ethanol.

Appendix 2. Copersucar Shareholders

Table 5. Shareholders of Copersucar.

Shareholder	Ownership	Shareholder	Ownership
Virgolino Oliveira	11.06%	Pitangueiras	2.52%
Zilor	11.05%	Furlan	2.50%
Pedra	10.00%	São Luiz	2.34%
Santa Adélia	6.78%	Umoe Bioenergy	2.14%
Cocal	6.25%	Jacarezinho	1.62%
Batatais	6.04%	Melhoramentos	1.37%
Aralco	5.83%	Cerradão	1.33%
Viralcool	5.75%	Santa Lucia	1.25%
Balbo	5.51%	Santa Maria	1.12%
Ipiranga	5.10%	Caçu	0.71%
São J. da Estiva	3.43%	Decal - Rio Verde	0.48%
São Manoel	3.26%	Others	0.01%
Ferrari	2.56%	**Total**	**100%**

Source. Copersucar

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Appendix 3. Financial Statements

A. 2013 and 2014 income statement as prepared by KPMG on behalf of Copersucar:

Consolidated statement of income

Years ended March 31, 2014 and 2013

(In thousands of reais)

		Consolidated		Parent company	
	Note	2014	2013	2014	2013
Net income	29	23.153.315	14.741.802	5.936.899	4.712.809
Unrealized derivative financial instruments	24	(69.150)	34.583	-	-
Cost of sales	33	(22.156.769)	(14.323.865)	(5.743.067)	(4.765.010)
Gross income (loss)		**927.396**	**452.520**	**193.832**	**(52.201)**
Sales expenses	33	(295.326)	(185.581)	(55.676)	(39.474)
Administrative expenses	33	(147.431)	(59.394)	(73.585)	(32.520)
Other income	30	38.699	23.786	3.543	1.373
Other expenses	31	(46.437)	(50.809)	(1.192)	(10.573)
Income before net financial		**476.901**	**180.522**	**66.922**	**(133.395)**
Financial income	32	514.228	394.362	235.015	262.103
Financial expenses	32	(738.074)	(499.990)	(337.401)	(392.679)
Net financial		**(223.846)**	**(105.628)**	**(102.386)**	**(130.576)**
Equity in income of subsidiaries	15	(13.456)	12.413	157.550	265.875
Income (loss) before taxes		**239.599**	**87.307**	**122.086**	**1.904**
Current income and social contribution taxes	34	(55.098)	(54.200)	(4.931)	-
Deferred income and social contribution taxes - liabilities	34	(26.770)	53.185	(38.513)	65.671
Total income and social contribution taxes		**(81.868)**	**(1.015)**	**(43.444)**	**65.671**
Net income for the year		**157.731**	**86.292**	**78.642**	**67.575**
Income (loss) attributed to					
Controlling shareholders		78.642	67.575	78.642	67.575
Non-controlling shareholders		79.089	18.717	-	-
Net income for the year		**157.731**	**86.292**	**78.642**	**67.575**

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B. 2013 and 2014 balance sheet statement as prepared by KPMG on behalf of Copersucar:

Copersucar S.A.

Consolidated statements of financial position as of March 31, 2014 and 2013

(In thousands of reais)

		Consolidated		Parent company	
Assets	**Note**	**2014**	**2013**	**2014**	**2013**
Current assets					
Cash and cash equivalents	7	604.346	569.648	298.442	278.861
Trade accounts receivable	8	1.163.026	750.044	401.443	210.815
Dividends receivable	25	-	-	4.881	1.149
Inventories	9	1.719.845	1.190.194	720.226	557.992
Recoverable taxes and contributions	10	237.988	171.510	230.832	168.713
Advances to suppliers of inventory	11	790.275	552.442	21.676	17.789
Stock Exchange transactions	13	121.146	24.913	74	3
Unrealized derivative financial instruments	24	319.229	211.723	20.790	60.990
Other accounts receivable	12	110.340	15.457	6.531	1.308
Total current assets		**5.066.195**	**3.485.931**	**1.704.895**	**1.297.620**
Non-current assets					
Deferred tax assets	14	132.768	147.990	114.804	142.727
Judicial deposits	23	34.529	33.782	20.985	20.985
Unrealized derivative financial instruments	24	12.389	32.876	12.376	32.848
Loan operations	26	-	-	90.247	46.605
Other accounts receivable		910	263	68	-
Investments	15	107.929	107.093	1.121.745	932.279
Investment property	16	-	-	21.572	22.072
Property, plant and equipment	17	465.372	322.747	120.437	42.343
Intangible assets	18	181.356	164.715	19.486	14.950
Total non-current assets		**935.253**	**809.466**	**1.521.720**	**1.254.809**

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B. 2013 and 2014 Balance Sheet –*Continued*

		Consolidated		Parent company	
Liabilities	**Note**	**2014**	**2013**	**2014**	**2013**
Current liabilities					
Suppliers	19	2.040.708	1.313.600	1.220.207	1.018.545
Loans and financing	20	990.349	1.243.791	477.174	801.854
Labor payroll obligations		31.939	35.907	19.984	24.813
Provision for income and social contribution taxes		4.936	459	4.931	-
Taxes and contributions payable	21	65.602	34.964	16.445	10.780
Stock Exchange transactions	13	70.189	42.642	-	39
Advances from clients	22	28.914	32.772	11.284	102.545
Dividends payable		1.906	676	1.906	676
Unrealized derivative financial instruments	24	323.933	92.685	3.423	-
Other accounts payable		28.557	10.196	590	234
Total current liabilities		**3.587.033**	**2.807.692**	**1.755.944**	**1.959.486**
Non-current liabilities					
Loans and financing	20	1.771.155	1.088.995	1.066.477	356.824
Employee benefits	35	20.385	16.610	9.041	16.610
Taxes and contributions payable	21	565	675	-	-
Provisions for contingencies	23	35.870	35.152	20.985	20.985
Deferred tax liabilities	14	43.905	32.358	10.881	291
Other accounts payable		6.580	10.646	-	64
Unsecured liability of the subsidiary	15	-	-	3.441	-
Total non-current liabilities		**1.878.460**	**1.184.436**	**1.110.825**	**394.774**
Shareholders' equity					
Capital		180.301	80.301	180.301	80.301
Treasury shares		(8)	(8)	(8)	(8)
Legal reserve		19.992	16.060	19.992	16.060
Profit reserves		131.508	62.434	131.508	62.434
Equity evaluation adjustment		14.090	23.164	14.090	23.164
Additional dividend proposed		13.963	16.218	13.963	16.218
Net assets attributable to controlling shareholders	27	**359.846**	**198.169**	**359.846**	**198.169**
Interest of non-controlling shareholders		**176.109**	**105.100**	-	-
Total shareholders' equity		**535.955**	**303.269**	**359.846**	**198.169**
Total liabilities and shareholders' equity		**6.001.448**	**4.295.397**	**3.226.615**	**2.552.429**

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C. 2013 and 2014 statement of cash flows as prepared by KPMG on behalf of Copersucar:

Copersucar S.A.

Consolidated statements of cash flows

Years ended March 31, 2014 and 2013

(In thousands of reais)

	Consolidated		Parent company	
	2014	2013	2014	2013
Cash flow from operating activities				
Net income for the year	**157.731**	**86.292**	**78.642**	**67.575**
Adjusted by:				
Equity in income of subsidiaries and associated companies	13.456	(12.413)	(157.550)	(265.875)
Subsidiary gains with foreign exchange variation	(33.506)	-	(1.127)	61.848
Depreciation and amortization	24.535	15.684	5.445	4.087
Deferred taxes	26.770	(53.185)	38.513	(65.671)
Interest and exchange variation on loans and financings	354.101	255.009	201.538	161.981
Net amount of write-offs of permanent assets	44.602	466	298	465
Increase in provision for contingencies	718	7.238	-	5.829
Employee benefits	12.080	1.160	736	1.160
Change in inventories' fair values	(220.568)	44.187	(75.331)	57.337
Change in fair value of derivative financial instruments	144.228	(101.589)	64.095	(52.718)
Loss of interest in investments in subsidiaries	-	5.936	-	8.819
Provision for impairment (accounts receivable)	-	2.037	-	2.041
Changes in assets and liabilities				
(Increase) decrease in trade accounts receivable	(412.982)	(5.350)	(190.628)	76.837
(Increase) decrease in operations with related parties	(3.859)	33.935	(134.903)	(268.448)
(Increase) decrease in inventories	(309.083)	41.371	(86.903)	106.201
(Increase) decrease in recoverable taxes	(66.478)	111.491	(62.119)	112.958
(Increase) decrease in other accounts receivable	(95.530)	1.026	(5.291)	1.534
(Increase) in advances to suppliers	(237.833)	(497.769)	(3.887)	(13.307)
(Increase) decrease in stock exchange operations	(68.685)	80.949	(110)	708
(Increase) in judicial deposits	(747)	(7.824)	-	(6.274)
Increase in suppliers	727.108	937.524	201.662	848.872
(Decrease) in social and labor obligations and employee benefits	(12.273)	(3.853)	(13.134)	(9.233)
Increase in taxes and contributions payable	37.493	52.439	10.565	(2.073)
Increase (decrease) in other accounts payable	14.326	(23.856)	323	(11.122)
Interest paid on loans and financing	(110.877)	(107.443)	(73.072)	(70.956)
Income and social contribution taxes paid	(2.519)	(54.638)	-	-
Dividends received	18.771	12.253	1.149	1.809
Net cash generated/(used) in operational activities	**979**	**821.077**	**(201.089)**	**754.384**

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C. 2013 and 2014 statements of cash flows–*Continued*

Cash deriving from acquisition of subsidiary	-	33.505	-	-
Application of funds in investments	(32.229)	(48.068)	(32.229)	(113.531)
Funds invested in properties	-	-	(175)	(1.251)
Application of funds in property, plant and equipment	(194.301)	(133.047)	(79.485)	(32.623)
Application of funds in intangible assets	(9.510)	(150.472)	(8.213)	(6.026)
Shareholders' equity attributable to non-controlling shareholders	-	15.105	-	-
Net cash used in investment activities	**(236.040)**	**(282.977)**	**(120.102)**	**(153.431)**
Paid-in capital	100.000	-	100.000	-
Dividends paid	(15.735)	(100.000)	(15.735)	(100.000)
Treasury shares	-	(8)	-	(8)
Loans and financing obtained	3.038.228	1.266.899	1.815.677	100.001
Payments of loans and financing	(2.852.734)	(1.508.923)	(1.559.170)	(380.808)
Net cash generated (used) in financing activities	**269.759**	**(342.032)**	**340.772**	**(380.815)**
Net increase in cash and cash equivalents	**34.698**	**196.068**	**19.581**	**220.138**
Variation in cash and cash equivalents				
At the end of the year	604.346	569.648	298.442	278.861
At the beginning of the year	569.648	373.580	278.861	58.723
Net increase in cash and cash equivalents	**34.698**	**196.068**	**19.581**	**220.138**

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