

Efforts to Achieve Beyond Sugar in Indonesia

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Abstract

The development of a more meaningful sugarcane-based industry in Indonesia has not been realized yet because of incapability of overcoming a variety of fundamental problems, such as high operating costs, low sucrose content of sugarcane crop, less maximum engine performance, importation of sugar which is not in accordance with domestic demand causing excessive in market, and others. The development of a meaningful sugarcane-based industry in Indonesia is very difficult to realize until the next 5 years because there has been no synergy among ministries / agencies which eventually leads to conflict of interest. In addition, sugar commodity is a highly regulated business. Therefore, it is difficult to build a complex and integrated sugarcane-based industry in Indonesia. The results indicate that the costs of sugar production are very uneconomical. Inefficiency stretches from cultivation to production process in the factory which results in the difficulty to gain profit margins. The target of being sugar self-sufficiency and beyond sugar could not be achieved because this industry is highly regulated, has no synergy, and tends to raise conflict of interest among ministries or agencies. Internal conflicts often occur among sugar mills and there is disharmony between sugarcane growers and sugar mill officials.

Keywords

Sugarcane Based Industry, Upstream - Downstream, Profit Margin, Strategy.

1. Introduction

Historically, the existence of sugar factories in Java could not be separated from *cultuurstelsel*, a Dutch government policy for its Dutch East Indies colony, Indonesia. Financial difficulties as a result of the Java War (1825-1830) caused the Dutch government to impose *cultuurstelsel* or enforcement planting system to fill their coffers. Governor General Johannes Van Den Bosch obliged villages in Java to set aside 20 percent of their land for export crops, such as sugarcane, tea, and coffee. Sugarcane was mainly grown in a number of residencies, such as Surabaya, Pasuruan, and Besuki. Jombang, during Dutch East Indies colony, was part of the residency of Surabaya located in the fertile lowlands near to Brantas River flow. Lots of sugarcanes were planted there, including the establishment of Tjoekir sugar factory.

Tjoekir sugar factory and Tebulreng Islamic Boarding School have been closely associated with the history of Jombang from the period of colonialism to the present time. The presence of sugar factories and sugarcane plantation had formed their own community. Sugar factory built lodges for its directors and employees, while factory workers formed a community separated from the lodges and surrounding communities. The lives in sugar factory's lodges and labor community which were different from those in Islamic Boarding School, pioneered by Hashim Asyari, have colored the history of Jombang that at one time had become the gateway to the kingdom of Majapahit, based in Trowulan, 17 kilometers to the east. The same things also happened in Kediri, and others that have sugar factories.

The strong historical roots indicate that the sugarcane-based industry that has been in existence since the nineteenth century has a socio-economic engagement with people's lives, especially in rural areas. Infrastructures, such as railways, roads, irrigation, and urban landscape are determined on the bases of sugar mills that have been in existence since the Dutch era. Sugar mills in East Java are generally passed by the railway network, such as Kediri StoomtramMaatschappij (KSM) which controlled Jombang and Kediri, and ModjokertoStoomtramMaatschappij (MSM), which operated in Mojokerto and the surrounding areas, as well as the Babat-DjombangStoomtramMaatschappij (BDSM), and ProbolinggoStoomtramMaatschappij (PsSM). In addition to MSM and BDSM, there were Staatsspoorwegen (SS) and Oost Java StoomtramMaatschappij (OJS) which have a rail network in Mojokerto.

From the past events, it appeared that the sugar mill was very important in building a civilization of a region, such as East Java, Central Java and West Java Province. Sugar mills built prosperity not only in terms of economy, but also all aspects of human life, society, nation and state. Dutch looked sugarcane as one of the most important cultivations in the enforcement planting system from 1830 to 1870 and once reached 3 million tons per year, but after that the production was always below 3 million tons even until this time, and the current government target of 3.1 million tons sugar consumption has never been achieved. Indonesian sugar production in 2005 reached 2.24 million tons and in 2015 only reached 2.70 million tons, or with an average increase of 0.2% in last 10 years.

Up to now, the maximum sugar production has not been able to reach the target of self-sufficiency because of the decrease in the quality of the harvest and sucrose content of cane (hereinafter referred to as *rendemen*), weak productivity, high production cost of dry white sugar which makes the price of sugar less competitive, conflict of policies among ministries / agencies, importation of refined sugar that penetrates the consumer market, stop milling hours which are still around 6 percent, less precise planting time and harvest time, high government intervention, the shift from paddy fields with good water to dry land.

The production is not optimal because nearly 80 percent of the sugar factories still use old technology and cannot produce good *rendemen* of 8-10 percent (or Java ratio which indicates the percentage ratio of the percentage of *pol* in cane to the percentage of *pol* in the first juice). The sugar mills located in the environment of Perkebunan Nusantara have the lowest *rendemen* of 6.09 percent and the highest *rendemen* of 7.8 percent, while the private sugar mills ranged from 6.15 to 8.68 percent. The low *rendemen* makes the auction price of dry white sugar from the farmers is always below the price determined by the government and until now the competitiveness of Indonesian sugar factories, in general, is still far below the competitors and it is not easy to realize the *rendemen*

of 9-9.5 percent to compete with Thailand, India, and Brazil. An experience in the northern region of India shows that with lower price of sugar like today, as a result of oversupply, in fact, the sugar factories still cannot make a profit although the sucrose content (rendemen) gained is 10 percent. The sugar factories in the southern region of India will just make a profit when the rendemen reaches 12 percent, whereas the production cost of sugar is very low because the maintenance cost is only USD 60 cents per ton and the cost already includes the maintenance of re-tubing boiler.

Table 1. Production and Consumption of Sugar in Indonesia

YEAR	PRODUCTION (X MILLION TONS)	CONSUMPTION (X MILLION TONS)	RENDEMEN (%)	PRODUCTIVITY (X TONS OF SUGAR/Ha)
2005	2.24	4.00	7.12	5.87
2006	2.27	4.01	7.12	5.82
2007	2.59	4.29	7.20	6.13
2008	2.78	4.37	7.25	6.11
2009	2.62	4.37	7.30	5.70
2010	2.21	4.55	7.38	5.11
2011	2.23	4.60	7.48	5.20
2012	2.58	5.10	7.73	5.86
2013	2.58	5.70	7.75	5.90
2014	2.50	5.70	7.78	5.94
2015	2.76	5.90	7.80	5.98

Source: Various Sources, processed by the researchers

The fundamental problems of today and in the future are Indonesian sugar factories get difficulty in gaining profit margins, some factories suffer losses because of high operational costs, inefficiencies occur at the level of on-farm and off-farm, and the level of productivity is still low. The price of sugar in Indonesia does not follow market mechanisms and must follow the determination of the government because sugar is one of the basic commodities of the people and has a significant effect on inflation. Moreover, the price of imported sugar is, in fact, cheaper and more attractive in the market. Such conditions make sugar factories stay at the crossroads, in which on the one hand, the production costs continue to rise and there is a threat of difficulty to get sugarcane as the source of raw materials, but on the other hand, the price of sugar cannot be established at a level of sufficiently promising margin for the calculation of consumer purchasing power and there is high government intervention when the sugar price in the market is rising.

Another problem faced by the sugar factories is the increasingly limited availability of labor for the agricultural sector. This sector is no longer an option of younger generation because it is dirty and hot when they are in the sugar plantations and has no prestige. Similarly, the planting area is increasingly eroded by the rapid development of industry and property, while the needs for sugar and non-sugar are increasing every year due to the increasing population and the number of processing mills.

II. Literature Review

The productivity has an important role in the process of determining optimal input combinations in a production system. The best and most practical pattern to fit the company's goal is the increase of input and output. When there is a sustained improvement in productivity, the costs will decrease and the company profits will increase, so the company has an opportunity to make new investments or expansion.

Sink and Thomas (1989) in Triwulandari Dewayana S., et al. [14] explain that productivity and efficiency are two important aspects of the performance, which means that improved performance is required to obtain operating profit through performance measurement, either tactical performance measurement, operational performance measurement or strategic performance measurement. Craig and Grant (2002) in Triwulandari Dewayana S., et al. [14] argue that the competitive advantage of an organization (enterprise) is supported by the ability of resources and regular activities within the factory.

The concept of irrational production stages can be observed using the isoquant analysis which is explicitly aware of the potential variability of both factors of production in a production system 2 inputs and 1 output. Isoquant can indicate the degree of substitutability of input, which is capable of replacing one input and another in the production process. In some production systems, the use of certain input can be easily replaced by other input, such as bagasse can replace fossil energy to produce electrical energy.

Muhammad Saechu [16] explains that bagasse is a renewable energy source and available in such a large amount that it can be optimized by reducing the water content of the bagasse through the application of drying technology and the use of the scheduled maintenance program so that the stop milling hours can be reduced less than 5 percent. Sugarcane has a large amount of bagasse, in which most can be used to meet the required amount of fuel in the boiler, with the balanced installation, efficient equipment, sufficient amount and quality of sugarcane milled in order to obtain excess bagasse or energy which is useful as industrial raw materials. Bagasse is a renewable energy source and available in large quantity [16] in which the energy requirements for the production of crystal sugar can be filled with part of the bagasse of the mill end and the remaining can be sold as raw material of paper, mushroom, and compost industries or sold in the form of electric power.

Bagasse in sugar factory is an energy source that is available as output from the mill station, and some of the bagasse from the end mill through elevators and conveyor distributor which is brought to the boiler station, with specific setting, will be fed into the kitchen, while the rest to the warehouse. The amount of bagasse is affected by the level of fiber associated with varieties, given the high or low level of fiber is congenital genetic of varieties. Sugarcane with high rendement (10%) tends to have low level of fiber, as well as when sugarcane is still young. The quality of the bagasse as a fuel is also influenced by the level of softness and content of soil or sand in the bagasse [16]. Bagasse with ash content less than 2.5% can be categorized as good quality bagasse for fuel. However, the presence of soil or sand in the bagasse will increase the level of ash and decrease the efficiency of boiler, and it can even cause abrasion of the piping and the blower.

Alfred Marshall's idea, in Todaro MP., Smith SC. [11] that has been developed, allows the plural balance which can be explained by the curve "S" in which a company or factory can achieve the highest balance through business expansion by adding business capital, rejuvenating engine, developing types of new varieties, mechanizing sugarcane land, adding qualified human resources and incorporating new technologies. To achieve high balance ratings requires coordination and big boost so that the factory gets the results above the margin by setting the value chain of sugar factory and government policies to spur the industry which has important linkages, both upstream and downstream directions. Value chain is a pattern used by a company to understand cost position as well as to identify ways that can be used to facilitate the implementation of business-level strategy [15,1]

The value chain of a company is divided into two: primary activities and secondary activities. Primary activities are related to the creation of physical products, sales and distribution to buyers, including after sales services. Secondary or supporting activities provide the supports required for the ongoing primary activities [1]

III. Research Methodology

This research is descriptive qualitative with the aim to investigate and understand the phenomenon occurring in sugar factories, why these happened and how these happened in order to obtain the facts that are easy to understand, and possibly generate new hypotheses. The study of sugarcane-based industry is not a "value-free" discipline, meaning that business activities and management of sugar factory are highly dependent on values, norms, culture, and certain behaviors that occur in the sugar and non-sugar business environment. If the environment is different, the style and the approach used may be different, because the business and the management of sugar factory are a reality socially constructed through the interaction of business entity and its environment.

The use of symbolic interactionism and existential phenomenology models is meant to understand the meanings that emerge from social interaction existing in the content which develops in accordance with the corporate outlook. Results of interviews, participatory observation, data collection and data reduction are used for the SWOT Analysis of eleven sugar factories in East Java, as the research samples, the preparation of primary and secondary activities, as well as the strategy of the development of more meaningful sugarcane-based industry in Indonesia. The results of compilation and reduction are presented in the form interpretation in narrative text to obtain conclusion.

IV. Finding and Discussion

As a commodity that is fully loaded with regulation, sugarcane-based industry has become complicated and very complex industry. Sugar production costs continue to rise in line with the increase in the price of sugarcane that should be bought from farmers and the increase in wages of workers each year, as well as the increase in the cost of spare-parts. Indonesia is currently the largest sugar importer in the world, or approximately 3.5 million tons per year, in which 95 percent of them are raw sugar used as raw material for the refined sugar industry, such as food, beverage and pharmaceutical industries in large scale. The greater the production capacity of refined sugar industry, the higher the need for imported raw sugar.

The government's desire to optimize the milling capacity to the level of 10,000 TCD can only be realized by providing a large-scale investment of funds, redesigning the piping and pumping equipment, as well as changing the layout of the sugar factory. The government's target of 3.1 million tons per year to meet the needs of the sugar consumption can only be fulfilled if the Government has the courage to invest to increase the capacity of the station and to redesign of the piping and pumping equipment and the layout of the sugar factory on the assumption of 170 milling days and rendement of 9 percent.

Sugar is a commodity that is fully loaded of government policies to influence the decisions of businessmen, including consumers, in order to achieve self-sufficiency. Unfortunately, the national sugar policies are disaggregated among ministries or agencies, no synergy, and no coordinator who is able to lead to a national goal. Conflicts among ministries or state agencies often occur. Conflicts between sugarcane growers and producers of white crystal sugar are often unavoidable. The opposition between refined crystal sugar producers and white crystal sugar importers also frequently occurs. The condition of sugar business in Indonesia is getting worse by the presence of legitimate business mafia who has a great financial capital and is able to exploit the weaknesses of the rule of law. The existence of business mafia in the sugar trade tends to form a monopolistic market, dominate the market, and influence government policy to benefit the group.

Having in-depth exploration on the sugar industry in Indonesia which is filled with interests of some parties, it is known that the margins of sugar companies will never have the ability to expand the land and build new factories. The revenue generated from the production of sugar in one milling season is only enough for the salaries of employees, the company's operations, and the dividends to shareholders. If it relies on the sugar business only, the optimization of profits will be difficult to achieve.

Sugar factories in other countries also experience the same conditions, such as in India that fix the price of sugarcane from farmers to be purchased by the sugar factories. Standard price in India is called the statutory minimum price which is applied by the central government, and the price of sugar is always suppressed to a certain extent and the country fully supervises the supply of sugarcane from farmers to the sugar factories. All factories in India are always asked to supply their production in certain amount as "sugar levy" with low market prices, and then the government will sell the sugar to the poor through the public distribution system. The sugar factories are also asked to sell their excess sugar at a market price that must comply with the

quota that has been set within a certain period with the aim of maintaining price stability in the market and can be reached by the middle to lower class. Regulations applicable in India are so stiff that the sugar factories get difficulty to obtain operating margin or normal earnings, and some sugar factories have posted a loss so it is impossible to conduct additional production capacity to meet the required amount of sugar that is constantly increasing every year. So, almost all sugar factories around the world face the same problem when linked to pricing mechanism.

The government, together with the stakeholders, should strive toward the development of more meaningful sugarcane-based industry in Indonesia because nationally sugar industry has a direct relation with the sectors behind it, as many as 53 sectors of the 172 sectors, or 30.81 percent, and ahead with 30 sectors. This shows that sugar not only meets the needs of end consumer, but also necessary to encourage increased production of processing factories that use sugar as the raw material.

Table 2: Comparison of the Level of Sugar Factory Efficiency

No.	Indicator	World Average	India	Indonesia
1.	Sugarcane Productivity (ton/Ha)	8- 9	7 - 8,5	5,98
2.	Sugar Content (% sugarcane)	14 - 16	12,5 - 13	10,0-10,2
3.	Rendemen (%)	12 - 14	10,5 - 11	7,0 - 7,80
4.	Steam Consumption	< 40	42 - 45	52 - 60
5.	Consumption apacity(Kwh/TCD)	25	30	35
6.	Stop Milling Hours	< 2,5	< 2,5	>2,5
7.	Total Level of Factory Efficiency	85 - 87,5	85 - 87,5	70-75

Source: [10]

Since 2005, the competitiveness of national sugar industry, in terms of the price, has been far less than the world average where the price of imported sugar is lower than the price of white sugar crystal (GKP). The main cause is the difficulty to realize efficiencies, milling optimization and diversification of sugarcane-derived products. Inefficiency in the sugar industry extends from on farm to off farm. In terms of productivity, sugar industry in Indonesia, also lags behind other countries. The sugar production cost at the plant has not been in an economical position because of the use of fossil fuels, the problem of rendemen, high maintenance costs, low labor productivity, the problem in sugar content in sugar cane crops, and limited value-added products.

Related to the inefficiency of sugar factory in Indonesia compared to other countries, it is time to reform as a whole, i.e., from upstream to downstream as Thailand, South Korea and Taiwan did by relying on product quality through hygienic work culture and in house-keeping although they do not have raw material in their own. The success of these three countries in realizing efficiency can be an important lesson for sugarcane-based industry in Indonesia. One effort to do is to create efficiency at the off farm level by lowering the cost of residual fuel continuously without having to interrupt the production process, and reduce the dependence on the fossil fuels gradually.

Sugar factories in Indonesia should be able to increase the quality of in house-keeping in order to realize efficiency. Clean and prime condition of sugar factories may influence the level of pol small loss. The sugar factory should be able to reduce the loss rate of processed material so that it can optimize efficiency. Good in house-keeping can prevent leaks and spills in the production chain in the sugar mills so that the localization of potentially wasted processed material can be quickly returned to the production cycle and done as carefully as possible.

It is estimated that in the next five years the importation of sugar will still be very high, approximately 3.20 million tons, or USD 1.8 billion in average per year, considering the population of Indonesia is now approaching 250 million people and by 2020 it is predicted to reach about 260 million people. The sugar industry businessmen in Indonesia still feel uncertain until now considering

the difficulty in obtaining profit margins and competitive price. If the national sugar production is not efficient, the price of sugar will certainly not be able to compete with the Thai sugar, which is now able to produce 11 million tons, while the consumption of sugar in Thailand is only 780,000 tons of sugar. Thus Thailand has excess sugar of 10.22 million tons per year for export to various countries.

In the era of the ASEAN Economic Community, in which competition on sugar industry is increasingly stringent, this means that the high level of rendemen and the level of efficiency of sugar factories in the country need special attention. The same thing also applies to industrial users of sugar. And sugar as a raw material component contributes to the creation of efficient food and beverage products so as to be able to compete with similar product from other countries. Therefore, sugar is an important factor in food and beverage industry, and therefore the competitiveness of the sugar should be taken into high consideration, in addition to many other components that play a role.

Sugar factories in Indonesia should perform revitalization of machinery, mechanization of sugarcane land, and management changes gradually in order to compete with imported sugar and be able to earn profit margin. With such consideration, the big potential creation of the value of primary activity and supporting activity should be based on the principle of efficiency, optimization and diversification. In order to become the source of competitive advantage, sugar factories may re-combine parts of the value chain of primary activities and supporting activities in a unique way by choosing an effective, efficient, affordable and environmentally friendly technology. Integrated Precision Farming can be applied as a tool for providing accurate, fast, and adequate information in order to facilitate decision-making. The components required, among others are: (1) Global Positioning System; (2) Remote Sensing; (3) Geographic Information System; (4) Variance Rate Application; (5) Yield Map; (6) Spatial and Attribute Data Plan and Prepare; (7) Hardware and Software Technology; (8) Organization Structure; (9) Standard Operational Procedure; (10) Human Resources Plan and Prepare; and (11) Pilot Project to achieve sustainable corporate performance.

Table 3: SWOT Analysis of Eleven Sugar Factories in East Java

No.	Internal Factor	Weight (B)	Rating (R)	W x R
A.	Strength :			
	1. Production capacity 1.165,7- 5.900,2 tons of cane per day, sugar 139.307 tons, and molasses 213.550 tons per year.	0.10	3	0.30
	2. Availability of skilled work forces (software and hardware)	0.15	4	0.60
	3. Smooth Roadmap in house-keeping	0.10	4	0.40
	4. Milling capacity 37.434 TCD, steam 52,55% cane, boiler efficiency 62,26%, mill extraction, and stop milling hours 6,13%	0.10	3	0.30
	5. Fuel efficiency by utilizing residual bagasse and does not use fossil fuels	0.15	4	0.60
	TOTAL	-	-	2.20
B.	Weakness :			
	1. Sugar cane <i>rendemen</i> is still low (6-8%)	0.15	2	0.30
	2. Inefficiency of sugar production process (70-75)	0.10	2	0.20
	3. Sugar cane productivity per hectare is still low (62 ton/hectare)	0.10	1	0.10
	4. Factory stop hours > 2,5 jam	0.02	1	0.02
	5. Sugar content is only 10-10,2% sugarcane	0.03	2	0.06
	TOTAL	1	-	0.68
C.	Opportunity :			
	National sugar demand 5.9 million tons per year	0.15	4	0.60
	1. The high demand for sugar and non-sugar product to food, beverage, and pharmaceutical industries, and others	0.15	4	0.60
	2. Government together with state-owned banks provides credit to sugarcane growers	0.10	4	0.40
	3. State capital participation funds to the state-owned sugar factories	0.05	4	0.60
	4. Loyalty of business partners to sugar factory is very high	0.15	3	0.45
	TOTAL	-	-	2.65
D.	Threat :			
	1. The price of imported sugar from Thailand, India, and Brazil is cheaper than that of domestic sugar	0,05	2	0.10
	2. Policy conflict among ministries / state institutions	0,10	2	0.20
	3. The looseness of the policy on the imports of dry white sugar and refined sugar	0,10	3	0.30
	4. The number of young labors for cut and freight is increasingly decreased every year	0,10	3	0.30
	5. Conflict between sugar factory and cane growers related to <i>rendemen</i> and sugarcane varieties	0,05	1	0.05
	TOTAL	1	-	0.95

Description: IFAS value: 2.88 and EFAS value: 3.60

Source: Researchers, 2016.

The sugar factories which have been very aged are indeed in need of repair and large funds, but these can be solved gradually by fixing the parts that have been damaged or by renewing in accordance with technological developments of sugar mills today as it has been done by DjombangBaru sugar factory by adding certain parts according to the needs. Changes has occurred to the boiler, in which formerly DjombangBaru sugar factory used coal fuel, but now the factory uses bagasse fuel. Excess bagasse can be used as fuel for boiler and to reduce the cost of coal purchase, and in fact it is more friendly to the environment.

From the results of the observation of eleven sugar factories in East Java and interviews with sugarcane growers and the operators, it is obtained internal and external factors, weight and rating in order to construct a SWOT Analysis and to calculate the value of IFAS and EFAS, including the determination of the general equilibrium matrix

Table 4: Development Strategy of Sugar Factories

Strength – Opportunity Strategy	Weakness - Opportunity Strategy
1. Open sugarcane land fields in Madura, Sumatra, and Sulawesi	1. Mechanization of sugarcane plantation
2. The development of derivative products cane.	2. Improved quality in house keeping at the sugarcane factory gradually
3. keeping utility installed capacity to suppress the clock stops milled	3. Revitalization machines gradually sugar factory
Strength – Threats Strategy	Weakness – Threats Strategy
1. The latest development of sugarcane varieties	1. Utilization of alternative or renewable energy to fuel-efficient
2. Application of Integrated Precision Farming	2. Change the old sugar factory in to a mini sugar factory
3. Increased production of refined sugar for industrial processing	3. Sugar policy harmonization among ministries or state institutions

Source : Researchers, 2016.

EFAS value is in fact greater than IFAS value, indicating that the sugar factories in Indonesia should be able to realize efficiency, optimization and diversification in order to grow and compete with other countries, given that the business competition has been very tight. Efficiency, optimization and diversification can be done by means of mechanization of sugarcane land and revitalization of the old machines as done by DjombangBaru sugar factory. DjombangBaru sugar factory, in revitalizing the factory, has added some new equipment, such as Direct Contact Heater, Evaporator Semi Ketner, Continuous Vacuum Pan, and Mono Vertical Crystallizer. The application of this new technology is able to minimize the loss of sugar in the plant and can increase the energy efficiency. DjombangBaru sugar factory will be more efficient and faster in working time if there is improvement in the turbine and power plant technology so as not to use extra energy from outside. DjombangBaru sugar factory has a capacity of 3,000 tons per day and can use co-generation to produce geo-electricity generation of 9 MW, whereas the sugar factory requires only 3 MW so that the rest can be sold to the state-owned electricity company to meet the procurement of electricity in Jombang and surrounding areas. Experience in DjombangBaru sugar factory can also be applied in other sugar factories in Indonesia. The future condition of sugar factories is very worrying, unless there are fundamental changes and great financial support for the realization of food and energy security in Indonesia.

Sugar factory as the main sugarcane-based business industry has its own uniqueness because the period of production cannot take place throughout the year and thus making the budgeting done on a seasonal basis resulting in the high common costs. The sugar factory has to stop every six months of the year which could result in the damage or wear of the plant equipment. It will require special maintenance at a higher cost if the factory wants to operate throughout the year. Productivity of tools and manpower is always low because the formula used is the sale value of production compared to the costs to be incurred. In addition, the dependence of sugar factory performance on the climate is very high because there has been no cultivation of sugar cane which allows sugarcane to be harvested throughout the year with excellent rendement. Rain also greatly affects the quality of the sugar cane harvest,

including determining the amount of the sugar production that could be restored by the sugar factory.

Product diversification with the focus on doing non-sugar cane derivatives business is very beneficial for reducing the production risk in the effort of maintaining sugarcane fully, including exciting farmers because they can obtain better compensation in line with the increase in the sugar factory business. It seems that the sugar factory has not been so serious in doing cane derivatives products, such as molasses, filter cake, energy, cane shoot fiber, fermentation, and others, whereas in the time when Mr. Soekarno became the President of the Republic of Indonesia, there was a candle factory using filter cake as the raw material and was capable of exporting to various countries, as well as Indonesia used to have 4 alcohol and rubbing alcohol factories in several sugar factories. Unfortunately, all have ended up together with the complexity of the sugar factories in Indonesia, and prefer to import from various countries. Sugarcane is one of the renewable energy sources because it has the ability to convert solar energy into chemical energy, containing organic elements and compounds, such as carbon, hydrogen and oxygen whose biological and chemical reactions can produce energy.

Diversification of sugarcane derivatives products are not only associated with the diversification of risk and income, but can also be backrest of the sugar factory performance. So, the next agenda is that the financial performance of sugar factories will even be mainly supported by the market development of downstream cane products of non-sugar. The utilization of downstream cane products of non-sugar can contribute 60 percent of the income of sugar factory and cane derivatives product per unit of area can print two to four times as much as the income from the production of sugar [10]

Table 5: Primary and Secondary Activities of Sugar Factory

Primary Activities	Secondary / Supporting Activities
1. Logistics to inside : Acceptance of sugarcane from farmers in accordance with rendemen transported using a cane haul trucks and trains (lorry)	1. Purchase machine: a. Purchase of new and more modern machinery and equipment b. Purchase of new variety of seeds that are resistant to pests
2. Operational activity a. Keeping the utility of installed capacity to suppress the milling stop hours b. The use of bagasse as fuel for the boiler c. An increase in house-keeping to suppress the rate of loss of processed materials	2. Technology development a. Application of integrated precision farming b. Application of repeated batch fermentation c. Application of co-generation to process bagasse into electricity
3. Logistics to outside Transportation of sugar, molasses, and premium sugar using huge trucks	3. Human resource management a. Corporate Performance Acceleration b. Implementation of enterprise resource planning which is oriented in system, application, product
4. Marketing and Selling a. Sales of sugar and molasses b. sales of premium sugar	4. Corporate infrastructure : a. Implementation of corporate vision, mission and strategy b. Implementation of organizational structure and standard operating procedures c. Availability of spatial data and attribute
5. Services a. Training of tractor implementation for cultivation of sugar cane b. Regular meeting with sugarcane farmers c. Training of sugarcane pests and diseases identification	5. Banking and Fiscal Policy a. Lending on sugarcane farmers b. Grand funds of state capital investment to state-owned sugar factory

Source: [1,2], Researcher, 2016

One of the derivatives products which have potentially high market is bio-ethanol which can be produced from molasses, and Gempol Kerep sugar factory in Mojokerto Regency has already succeeded in realizing bio-ethanol products in collaboration with New Energy and Industrial Technology Development Organization (NEDO) Japan with an investment value of IDR 467.79 billion, and has a capacity of about 30 million liters per year. Similarly, Ngadiredjo sugar factory in Kediri Regency has successfully executed co generation plant. Meanwhile, most of the sugar factories in Indonesia just serve as the suppliers of molasses to other factories that develop cane derivatives products without being able to obtain added value. This should receive particular attention from the Ministry of State-Owned Enterprises and the Ministry of Industry of the Republic of Indonesia.

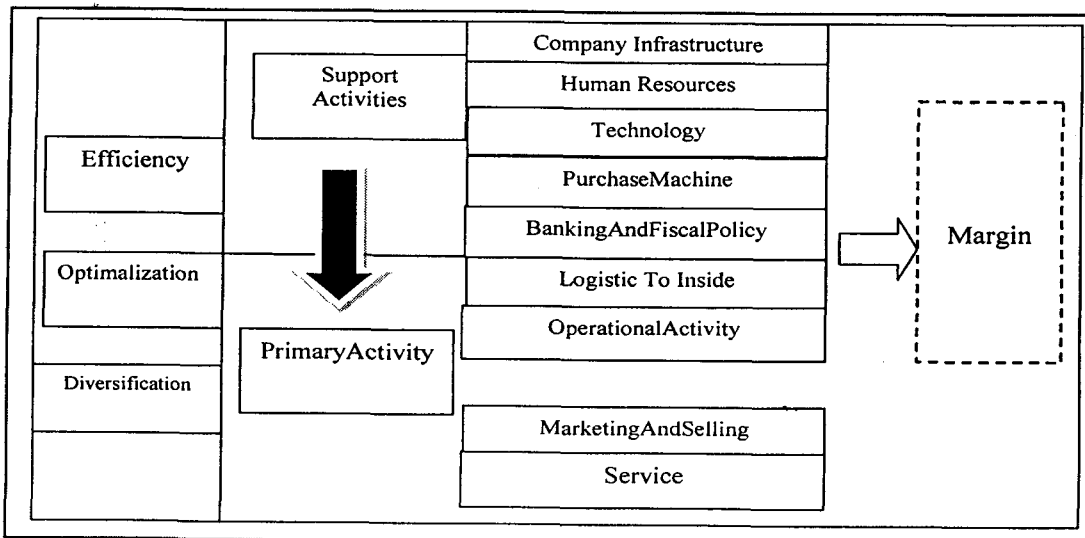


Fig. 1: Basic Value Chain Sugar Factory

Source: [1], Researcher, 2016

The primary activities and supporting activities can be going according to plan when there are commitment, well integrated and organized actions, and qualified human resources who have sufficient skills: professional, productive, innovative, and talented. Human resources in the enterprise cannot be considered as a minor element in business because in normal conditions human resources are a commodity, the most important asset, always moving, have fire, faith, and focus that are difficult to calculate. Talented human resources have become a major requirement and all employees are still individually expected to contribute to the progress of the sugar factory. The difference lies in the level of happiness of the individuals of the company which prioritizes talent management as number one, given the self-esteem of each to be higher because each individual of the workers is diligent to achieve his own goals, and not because of external pressures. Talent management will not work well when the directors are still looking at an individual's career like stairs, because basically every employee should be able to work together, think together and work on improving his own competence. Each individual of employees must be given the opportunity to develop his uniqueness and has a higher purpose than just money, power or position.

Sugar factory employees who have orientation on system, applications and products have to change the mindset of looking at the development of the sugar industry in order to be fully implemented in all units and headquarters to realize efficiencies, optimization and diversification because mechanisms are based on real time data processing so that each inputted data will automatically be updated in the system which covers the whole business process from upstream to downstream, and vice versa. Sugar mill's competitiveness in the face and utilization of the changes is one significant factor for the corporation to survive, thrive, and continue to provide significant added value for all stakeholders. This means that competition needs to be controlled properly, given the patterns of cooperation that are developed constantly will be able to obtain a more optimal results.

V. Concluding Remarks

Now it is time for the national sugar industry to achieve beyond sugar and transform into sugarcane-based industry from upstream to downstream. Considering the production costs that continue to rise, the difficult to obtain margin results, the sugar prices that continue to fluctuate, and the high import of sugar with a pretext to meet domestic demand and prevent inflation, the sugar factories should focus on working on the business of non-sugar derivatives, such as bagasse which is used to generate molasses, briquettes, fuel, fiber, bio-ethanol, ammonia, animal feed, and others that have high economic value, and can be a primary backrest of the income of sugar factories in the future. Development towards the production of non sugar will make sugar mills more meaningful, though they have to struggle to make progress like the achievement of success in Thailand, India and Brazil.

Sugarcane derivatives product per unit area can provide income 2 to 4 times as much as the income from sugar production. There is even certain sugarcane downstream product that can reach a value of 500% to 700% compared to the price of sugar. In the modern sugarcane-based industry, every ton of sugarcane, after processing, is capable of producing a surplus power of 100 Kilo Watt, 12 liters of bio ethanol, and 40 kilo grams of bio compos. The experiences in various countries have proved that co-generation which is done by sugar mills to generate electricity is very cheap

because they utilize the rest of the processed sugarcane, and do not require too large investments because each sugar mill only requires from IDR 200 billion to IDR 400 billion with a payback period of less than five years.

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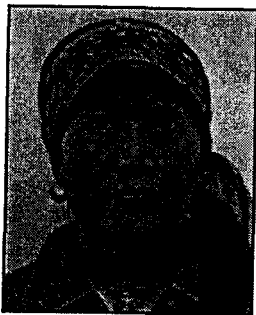
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