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**Myanmar Sugar SMEs:
History, Technology, Location
and Government Policy**

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Abstract

Small and medium enterprises (SMEs) engaged in sugar processing in Myanmar appeared in the last decade of the socialist era. An acute sugar deficit, restricted trade in white sugar, and high demand from the conventional dairy business led to the growth of sugar SMEs by appropriate blending of semi-finished products (syrup) in the fields, which were then processed in vacuum pans and centrifugals to obtain white sugar. This became a tradable commodity and sugar SMEs grew in clusters in big cities. They are family-owned businesses. However, they lack the bagasse-based power generation.

In recent years, large modern sugar factories operated by private and military companies have emerged as key players. The current shortage of fuel feedstock and competition for raw materials have become driving forces that shift sugar SMEs from market-oriented to raw material-oriented locations. Internal competition among key players made sugar price highly volatile, too. Being placed on a level playing field, the whole industry should be upgraded in terms of price and quality to become export-oriented.

Keywords: Myanmar (Burma), small and medium enterprise (SME), state-owned economic enterprise (SEE), sugar, sugarcane, resource-based location, market economy, Mandalay, Pyawbwe

JEL classification: L11, L52, L66, N85

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Introduction

Small and medium enterprises (SMEs) engaged in sugar processing in Myanmar have emerged as an outgrowth of traditional home-grown manufacture of jaggery.¹ Myanmar entrepreneurs were not able to jump directly into the modern sugar industry, but instead passed through nearly three decades of development from pioneer works, innovation, and transformation into an appropriate business structure and growth into a cluster pattern in the large market centers of Myanmar.

¹ Jaggery is brownish yellow, crystalline, hard and non-centrifugal sugar obtained from clarified and solidified sugarcane juice.

The earliest white sugar production was started by British colonial pioneers in 1840, but the industry was short-lived. After a gap of 85 years, white sugar factories with standard processing and other facilities were set on a firm footing in Myanmar with the successful operation of Shamaw factory by Finely Flemming Co. in 1926 and the Zeyawaddy factory, begun by an Indian-based businessman in 1934 (Kudo [2002:Chapter 3]). Due to a lack of commercial networks, initiative and capital, the indigenous entrepreneurs could not pursue a straightforward path to the development of the sugar industry. During the colonial period, sugar was considered a luxury item and the demand for white sugar was not very high. Jaggery, on the other hand, had been used in the average household diet and there was a fairly important internal trade, production being mainly from several small local cottage plants operated by Burmese, and the trade itself largely in Chinese hands.

After 1954, sugar factories were nationalized and centrifugal sugar production became a state enterprise. During the socialist economy period, sugar commodity was a government-controlled item. Sugarcane was a nationally-planned crop in sugar mill areas, whereas its cultivation was restricted outside the mill area. The state-owned factories assigned cane quotas to farmers to supply cane at a controlled price. Only after the farmers had fulfilled their factory quota was it permitted to divert the surplus cane to the jaggery processing cottage plants outside market channels. Except for a brief period in 1972-73, sugar production declined gradually throughout the whole era. The state-owned economic enterprises (SEEs) factories encountered raw material shortages and ran at under-capacity utilization. When white sugar production could not meet the growing domestic demand, local entrepreneurs attempted by trial and error to process jaggery at first, and then a better form of a semi-finished product of sugarcane into white centrifugal sugar. Vacuum pans and centrifuges were locally fabricated and sugar quality was gradually improved. Finally, the local technology was diffused. In 1988, the socialist economy was changed to a market economy, and by that time private sugar processing SMEs had become well established. To-date, the industry has achieved nearly twice the total white sugar production of the state sector in the country (Table 1).

Table 1: Sugar Output of SEEs and Private Sector

	(mt)				
	2002-03	2003-04	2004-05	2005-06	2006-07
SEEs	88,852	64,701	82,897	71,450	92,598
Private Sector	127,199	141,779	129,382	154,314	159,963
Total	216,051	206,480	212,279	225,764	252,561

(Source) Sugarcane Development Department, MICDE.

The Myanmar sugar industry is currently run by six dominant players: the Sugarcane Development Department of Myanmar Industrial Crops Development Enterprise (MICDE), a reformed organization under the Ministry of Agriculture and Irrigation (MOAI); Myanmar Food Industries (MFI) under the Ministry of Industry No.1 (MI 1); Myanmar Economic Corporation (MEC) and the Union of Myanmar Economic Holdings Ltd. (UMEHL), two military-affiliated enterprises; private firms inclusive of both SMEs and a joint venture enterprise with a Thai company. The detailed industrial structure has been presented by San Thein [2006]. Except for SMEs, all players, particularly the state and military-operated businesses, are well-organized with full manpower, operating modern and capital-intensive factories.

Among those players, despite their having been founded under restricted circumstances, SMEs have continued to grow in number, size, production and market share. The driving forces and conducive factors towards such industrial expansion have been discussed in the previous publications of Kudo ed. [2002: Chapter 3] and Kudo ed. [2003: Chapter 8]. After the joint survey on Myanmar sugar SMEs by the present authors at the end of 2006 and the follow-up survey by the first author in January 2008, we attempted to characterize the entrepreneurs by addressing the questions: who are the pioneers, what are their characteristics, how do they connect their innovative ideas with the given structure of the business, and how rapidly does technology disperse once it is developed?

Moreover, the earlier SMEs, were located first in Pyawbwe (central Myanmar), then shifting to Mandalay (the largest city of upper Myanmar), with some emerging during later periods in Taunggyi (Shan State of Myanmar). We have looked at some market forces and conditioning factors that may indicate why the private sugar SMEs first appeared in Pyawbwe and then accumulated in Mandalay. Upon close examination of the situation in Myanmar, we considered that the trend of location movements in the sugar SMEs is indicative of the degree of the nation's transformation from a

centrally-planned economy to a market economy. After two decades since the changes in the economic system, the direction of some driving forces may have shifted and accordingly, one might wonder where the private sugar manufacturing might shift to in the future. This is indeed a headache issue for all SMEs located in the cities since transport and transfer costs of raw materials become increasingly high with the rising costs of fossil fuels and dwindling supply of fuel wood, making processing very costly. Thus, competition for raw materials and fuel energy requirements has become intense.

Recently, three private entrepreneurs² with a strong access to both the Chinese business network and Myanmar authorities have taken a bold and giant step in moving to the source regions. They enlarged their modern large-scale factories to equip them with product diversification facilities amidst huge and extensive sugarcane growing areas. The existing cane areas are still backed up by unexploited virgin lands and they are now sited at raw material centers with a large resource potential. Their factories give record outputs of fair quality product. Will they absorb all the raw materials that might otherwise go to Mandalay SMEs? SMEs have survived and expanded under the centrally-planned economy, but will they survive under the open economy? The majority of SME entrepreneurs are now facing the challenges of structural adjustment. Will they attempt to move from the market center to the resource center? Those production sites at the resource centers are less developed areas, if measured by infrastructural facilities and socio-economic yardsticks. What will be the implications if the SMEs are assumed to move from Mandalay to those resource-based locations?

Furthermore, the single most important issue that is common to all players is that domestic sugar prices have dropped within one year to an all-time low of ks.640 per viss of export quality sugar from the peak price of ks.1300 per viss³. Price movement is in no way related to the world sugar price. However, when the price of domestic sugar was high, the massive inflow of sugar-based products such as condensed canned milk, bakery and biscuits, sweeteners and snacks through formal and informal border trade channels have hit the country's downstream sugar industry hard. It appears that the entry of large private sugar-producing enterprises into the domestic market has started to exercise an influence over the domestic market. At the time of writing, it seems that a

² U Tin Maung of the Great Wall Company Ltd. Mandalay, U Htay Myint of Yuzana Company Ltd. Yangon, and U Thein Myint of Ngwe Ye Pale Mining Company, Mandalay.

³ 1 viss is equivalent to 1.63 kg, or 1 kg = 0.613 viss. The Myanmar currency is Kyats (ks.). Market exchange rates varied from ks.1100 to ks.1350 per US dollar during the 2007-08 period, while the official exchange rate is fixed at about six Kyats per US dollar.

sugar price recovery is unlikely to occur, and that effectively the market is collapsing.

Two decades ago, the domestic sugar industry was run by an oligopoly with dominant players from the SEEs. The scenario has now changed. Internal competition by several players has started to take place for market share, efficiency and quality. If properly guided by the state with a sound sugar policy, the internal competition should enhance sugar commodity competitiveness in the ASEAN region.⁴ In the realistic view, however, uncertainties, inequality, and lack of a level playing field are still hanging on the business horizon. Will the sugar SMEs wither and disappear? Will the small cane farmers at one tail-end of the production chain suffer most?

The findings of our survey are reported in an attempt to answer some of these questions. The paper is organized as follows. Section 1 explains the process of SME establishment in the sugar industry through innovations, entrepreneurial endeavor and commercial links under the given business environment during the transitional period of Myanmar's political economy. Section 2 analyzes the effect of location factors on industrial growth and expansion. Section 3 discusses the emergence of several players in the sugar industry, the change in market share and the structural changes in the private sugar industry. Section 4 discusses the role of sugar market centers and trade channels, the demand and supply situation and internal competition in the market, and the implications for downstream sugar industries. Section 5 concludes the paper by giving some thoughts on prospects and challenges for sugar SMEs.

1. Growth of Sugar SMEs

The present growth patterns of sugar SMEs and their future direction can be meaningfully understood only when related processes are properly analyzed. In this section, we will attempt to link the patterns of every aspect of resource potential and socio-economic environments with the relevant processes.

1.1 Birth of Sugar SMEs

Sugar SMEs could not pursue a pathway of direct extraction of white sugar from sugarcane, which came about as an outgrowth of cottage jaggery manufacturing plants.

⁴ The timetable for Myanmar to allow free flow of sugar commodity from the ASEAN region was set at 2011.

The “Burmese Way to Socialism” prohibited sugarcane cultivation and sugar trade except by the relevant state enterprises. In the SEE sugar mill areas, farmers are allowed to manufacture jaggery only after they have fulfilled their cane quota to supply to the sugar factory. Due to the large differences in reward, cane supply from farmers has decreased year after year since 1973-74. From 1988 to 1991, sugar output dropped to its lowest level. Sugar import virtually ceased after 1966. For direct consumption, Myanmar could rely on jaggery from private channels as snacks and sweeteners, but sugar-based businesses such as cottage dairy and food-processing plants have long been starved of white crystal sugar. Such strong demand became a driving force for the birth of the private sugar SMEs.

It was in the town of Pyawbwe that sugar SMEs started to establish themselves around 1981. Pyawbwe is located approximately 60 miles (approximately 100 kilometers) from Pyinmana, the nearest town to Naypyitaw, the new capital of the country, and just beyond the limit of the production zone of Pyinmana state-owned sugar factory. Pyawbwe is also the home of a number of groups of families raising dairy cows and operating cottage milk processing plants by crude methods of boiling and condensing milk in used bath tubs. Sugar is required in about an equal amount to milk. They were unable to gain access to sugar from public trade channels. Jaggery, as a sugar product from the Pyinmana area could be traded freely, but jaggery in solid, coarse and slab form is not suitable raw material for dairy plants. The so-called sugar, but in fact a powder form or relatively low-purified transformed product of jaggery, first appeared in Pyawbwe to meet the needs of dairy milk processing.

1.2 Pioneers

A small private entrepreneur, U Thaung Pe, resident of Pyawbwe, attempted to modify jaggery into an acceptable sugar form for dairy cottage plants. The jaggery was re-melted and boiled to 102 or 103 degrees Celsius and transferred to large ceramic earthen pots. The sugar liquid was allowed to cool for two days while sedimentation was prevented by a forced draft of air into the pot from a small compressor. Crystallization slowly took place, but since crystal sugar had already been converted into non-sugar forms during the jaggery manufacturing process, only a powdered form of the so-called sugar was obtained. This was accomplished by a crude method of centrifugal separation from the mother liquor. The output was very low, not more than one bag (50 kg) for each

full day's work. Later, with the help of U Htaung Kwae (of Chinese descent), a resident of the small town of Yeni attempted to fabricate a crude form of centrifuge by adapting component parts of a washing machine, which he saw being applied to the screening of salt in a salt-making business. The fabricated machine was further improved by an Indian workshop owner, Kalar U Maung Gyi in Pyawbwe. The initial product was brownish and in powdered form. It was sold as sugarcane powder to avoid being in breach of the prohibition on trade in sugar crystal. This was the first entry into the market.

Parallel progress was taking place in Mandalay. U Ko Lay, one of the three pioneers in Mandalay, fabricated a centrifuge around 1982-83 in an effort to produce 'Kha' (a Burmese word meaning to shake) sugar by means of centrifugal separation. He used old air cylinder parts of a rail wagon as a basket with a 14 inch diameter, placing a copper wire-mesh sheet vertically in the wall of the basket. Revolution of the basket was made possible by a motor attached to a pulley at the bottom of the basket. It achieved a centrifugal force of about 1200 rpm.

In 1983, U Thaung (also widely known as Shwe Man Maung U Thaung) from Palyne quarter of Mandalay tried the method of boiling sugarcane juice to a state of semi-solid syrup before reaching the stage of jaggery. The syrup was then poured into the pot and cooled, allowing it to settle until a slow crystallization occurred. He then added clear lime solution and achieved a good rate of crystallization. It was then put in a 14 inch centrifuge to separate the crystal sugar from molasses (literally named 'set kya yi') which was thrown outside the basket as a byproduct. It was sold to a dairy processing plant, but the sugar caused the deterioration of the condensed milk. Food-making businesses were, however, able to use this sugar directly. U Thaung then consulted with the condensed milk plant owner and attempted to purify the Kha sugar by re-melting and screening it with clothes to remove dirt and impurities. The relatively purified Kha sugar was found to be suitable for making condensed milk without any further damaging effect. He delivered this technology to all his colleagues and produced centrifugal baskets in collaboration with the lathe machine-owner and sold out the adopters.

He himself was running a small steamship along the Ayeyarwady river as a water transport business. He urged farmers alongside the river to grow sugarcane. At that time, sugarcane fields in Motesoghone Village, Shwebo were destroyed by local

authorities of the socialist government since the cane was grown in paddy fields. Sugarcane fields were then shifted to villages on the river banks such as Kalama, Htonebo, Latkaukkyia, and other villages, where farmers manufactured jaggery and sent it to Shwebo Town and then to Mandalay. U Thaung urged the farmers to reduce the time the juice was boiled to achieve the syrup stage. This would promote the formation of sugar crystal. After U Thaung, adopters of the Kha sugar production were Daw Khin Myint, Mya Nan Kyaing, Yangyi Aung Mya, U Thein Tan, U Thar Myint, and U Maung Lay of Mandaaly entrepreneurs.

Up to this stage, private sugar processing had attempted to obtain crystal sugar from the existing form of jaggery or syrup. The jaggery or syrup was obtained by boiling the cane juice in open pans in the fields. If jaggery was re-melted, as in the case of Pyawbwe, it was also done by the open pan method. The basic idea was the application of centrifugal separation of sugar powder from the mother liquor.

The next pioneer attempted to re-melt molasses in a vacuum pan. U Sai Kyaw Tin was the first owner-operator to build a vacuum pan sugar processing plant in 1985. He is a Shan-Chinese and lived in Nankhan-Shweli in northeastern Shan State, close to the Chinese border. He moved to Mandalay in 1978, operating a car workshop and running a transport car from Nan Khan to Mandalay. He made the acquaintance of a Chinese mechanic and former sugar factory employee (not an engineer) who said that he could fabricate a sugar-processing plant although he was not involved in sugar processing in the Chinese factory. With his home-made design and technical assistance, U Sai Kyaw Htin built the factory, fabricated the vacuum pan and commenced operation in 1985. He first used jaggery as input but no sugar resulted. Finally, he used molasses (called 'set kya yi' in Burmese) obtained from the Kha sugar centrifugal plant and successfully produced crystal sugar. On the first production attempt, the factory produced 20 bags (1mt) of sugar. He then modified and restructured the factory in 1987. The pans, quads and boilers were locally fabricated. He consulted with retired pan men and boiler technicians from the SEE sugar factories. He initially estimated the cost of building the factory to be about two hundred thousand Kyats, but he improved it three to four times and finally the cost went up to eight hundred thousand Kyats (equivalent to 5 viss of gold). That cost in 1986 would be equivalent to two hundred million Kyats in 2006. The factory was named after his daughter, Nan Chaw.

The attempt resulted in a good reward. The performance of the factory was

recorded as below.

<u>Month, Year</u>	<u>outturn %</u>	<u>Type of feedstock</u>
February, 1988	20.5	liquid molasses from Kha sugar plant
February, 1988	61.7	syrup, a semi-finished product from farmers
March, 1988	20.8	liquid molasses from Kha sugar plant
March, 1988	52.1	jaggery
April, 1988	19.9	liquid molasses from Kha sugar plant

The factory capacity was 1500 viss (2.3 mt) of sugar output daily, and was later expanded to 1800 viss (2.93 mt) of sugar output. The quality was acceptable for use as a food ingredient. In the market it was known as ‘vacuum pan sugar’ (literally called Paung sugar). The Chinese mechanic later accepted the factory installation order and he built three more vacuum pan factories for fellow entrepreneurs in 1989, 1990, and 1991. The workshop owner, U Kyaw Kyaw, who had opportunities to fabricate pans and accessories, acquired the technological know-how and thereafter he and his assistant started to take orders for pans and parts for later construction of vacuum pan factories in Mandalay.

Basically, the technology had long been well-developed in the world sugar industry. All modern factories adopt this vacuum pan boiling method in order not to spoil the sugar crystallization, to prevent sugar loss, to conserve energy, and finally to achieve efficiency. The previous political and economic system in Myanmar, however, had excluded the entry of private entrepreneurs into the industry. Myanmar people also lacked access to imported equipment and machinery. Thus, the short stories of the private entrepreneurs reveal that they had pursued a long and indirect access route to industrialization. They had to modify and locally fabricate the equipment and structure to be applicable to the given business environment and socio-economic conditions.

1.3 Assembly Market and Commercial Links

During the previous political and economic system, sugar trade was prohibited. The agents for condensed milk processing plants purchased sugar produced by the SEE factories on the black market indirectly through public channels. When Kha sugar first appeared from jaggery feedstock, sugar trade became an open and lively activity in Mandalay. Finally, the sugar assembly market was formed on 19 February, 1983. The market has taken the name of a religious association (Khataintaw) of sugar and syrup

employees. Still under the socialist regime, no business organization was allowed. Under cover of the name of a religious association, they conducted regular sugar marketing and moreover, once every year, all the members collectively celebrated the important offering of Khatain noble robes to the Buddhist monks. For that one-day moment, donations were collected every month from each member of the assembly market association. The activity has expanded since that time, and at the present time the association has grown to over 1,000 members directly or partially involved in sugar processing.

Upon examination of their innovations, it is clear that the pioneers attempted to carry out sugar processing by employing the methods of vacuum pan boiling, static crystallization and centrifugal separation to obtain white crystal sugar. They used semi-finished syrup or jaggery as feedstock. They still could not directly process sugarcane. Extraction of sugarcane juice and boiling it in open pan was carried out by farmers beside the cane fields to obtain the semi-finished syrup. It was then transported long distances to processing plants. Thus, the whole process was broken down into the three steps. The first is sugarcane production by farmers. The second step is jaggery or syrup processing jointly by farmers and cottage plant owners in a certain equity ratio for value-added semi-finished product. The last step is the extraction of sugar in marketable forms from that semi-finished feedstock by a vacuum pan sugar factory. The product varied widely in quality. Depending on the degree of clarification, the color of Kha sugar varied from yellow, dark yellow, brownish yellow, light yellow, whitish, shining white, to cloudy white, and so on. There was no clear-cut crystal form, with the sugar being a mixture of pieces of tubular or powder forms. Marketing and purchase of the sugar are usually based on a visual examination of the sample for sale. Generally, no advanced purchase was conducted without being able to visually examine the product sample.

The product from vacuum pan processing is literally called Paung sugar (vacuum pan sugar). The quality has improved year after year. In fact, the sugar industry business started from a small scale with a slow and circumspect outlook. We carried out interviews with over 15 factory-owner-operators. Before they started in the sugar business, some entrepreneurs had operated rice mills, some had conducted marketing of agricultural produce, while some had done farming and upon accumulation of money went up to Mandalay, initially being dependent on business connections with their

native town for raw material flow, and then launched into the sugar business. They might have started with a small centrifuge at first, and then climbed up the business ladder to become the owner of a medium to relatively large scale vacuum pan sugar factory. The time frame to achieve their present status may have covered approximately 10 to 20 years. Some hired and operated other factories, successful business leading them to become an owner-operator after three years or so.

Business connections also help to increase the number of factories. Two partners, U Ar Yu and U Soe Tint came up from Pyawbwe to Mandalay and learned at the successful vacuum pan sugar factory 'Nanchaw'. The Chinese mechanic who constructed the Nanchaw factory received a job order from U Ar Yu. The two partners then established the Thirizeya vacuum pan sugar factory in 1986. It was a success. The partner, U Soe Tint later left the business and went back his hometown, but his brother U Kyaw Shwe followed in his footsteps and founded the 'Kathitpan' factory in 1990. His son-in-law sent his child to Mandalay for schooling. While staying in the 'Kathitpan' factory compound, the son learned the know-how of sugar processing, and finally set up a similar small factory called "Pho Shwe Hla" in 2004.

The majority of the factory operations are found to be family businesses. There was rarely any lump sum input of money involved in the first establishment of the factory. With a small initial investment, the business is first operated at small scale, and then gradually expanded.

One owner operated a factory in 1997 in which the capacity of the vacuum pan was 5,000 viss (8.15 mt). After four years he expanded to a capacity of 12,000 viss (19.56 mt). A factory of 1,000 viss (1.63 mt) of feedstock is said to require a revolving fund of ks. 10 million. If the capacity is increased to 10,000 viss (16.3 mt) the revolving fund needed will be ks.100 million. Some entrepreneurs borrowed money from Myanmar Economic Bank, a state-owned one. The loan amount taken varied from about ks.15 million to ks.50 million. The interest rate was 15 percent (currently 17 percent) and the repayment schedule is one year. Extension periods are applicable for up to two years. Loan acquisition was, however, said to be a difficult process.

2. Effect of Location Factors on Industrial Growth and Expansion

Private sugar SMEs were localized as a result of several factors. It happens that almost all

SME establishment resolves itself in finding a site with a sufficient number of favorable factors to counterbalance the disadvantageous conditions. For location factors of the Myanmar sugar SMEs, the prevailing political and economic system was considered as one determinant, besides the common factors such as raw materials, power, fuel, markets, labor, transportation and capital.

2.1 Distribution Patterns

In Pyawbwe, sugar-processing SMEs and vacuum pan factories operated from 1990 to 2003. There were up to 12 sugar SME plants located in Pyawbwe. Three alcohol distillery plants appeared, relying on the molasses, a by product of the sugar SMEs. In turn, sugar SMEs rely on jaggery obtained from Pyinmana and Taundwingyi areas, but when new SEE factories emerged near those areas, jaggery processing ceased. Having no raw material supply, Pyawbwe factories, together with their downstream alcohol plants were forced to cease operation. These factories sold out or moved to Mandalay after 2003.

As of 2006, there were only 79 vacuum pan sugar plants and 88 mini-plants with centrifugal separation in Mandalay. The township-wise distribution pattern is shown in the following table.

Table 2: Number of Vacuum Pan Plants and Centrifugal Plants in Mandalay District, 2006

Township	Vacuum Pan Plant	Centrifugal Plant
	(Paung Sugar)	(Kha Sugar)
Patheingyi	7	0
Aungmyaythezan	7	32
Chanayethazan	10	55
Maha-aungmyay	5	1
Chanmayathazi	2	0
Pyigyitagun	41	0
Amarapura	7	0
Total	79	88

(Source) Khataintaw Association of Sugar and Molasses Employers' Office, 2006.

The township-wise distribution indicated that 65 sugar plants were found in Chanayethazan while Chanmaythazi township has only two sugar plants. Thein Zaw (2007) analyzed the distribution pattern of sugar plants in Mandalay district by using point pattern analysis and quadrature analysis. The distribution pattern in Mandalay was found to

be a clustered pattern. The concentration of the private sugar plants was observed to be close to the Ayarwaddy River, where the raw material came from.

2.2 Why and How Private Sugar SMEs Concentrated in Mandalay

The sugar industry is usually characterized as a raw material-oriented industry. To the contrary, Myanmar private sugar SMEs are found in large cities such as Mandalay, about 70 miles away from the sources of raw materials. Our survey attempted to find out what temporal and spatial factors brought about the present situation.

Under the centrally-planned economic system, sugar was in deficit. Domestic condensed milk plants and sugar-based businesses exerted the demand-driving forces. Sugar-processing SMEs thus appeared beyond the limit of the SEE factory zones. In those zones, jaggery processing was allowed as an outlet only when surplus cane was available. Private sugar SMEs, located just outside the factory zone, obtained the jaggery and transformed it into a marketable form. Pyawbwe sugar SMEs stand out as an exemplary case. When more new sugar factories were erected in the SEE zones, jaggery processing was no longer permitted and raw material supply ceased. The SMEs in Pyawbwe closed down, some moving to Mandalay.

Mandalay is a similar case in localization. In response to the socialist political economy, excluding the entry of private entrepreneurs to the industry, the private sugar SMEs first emerged in Mandalay beyond the SEE factory zones rather than in the location where operations would be at an economic advantage at that time. The SMEs did not, however, rely on raw material supply from the SEE factory zones. Mandalay SMEs acquired raw materials by inducing sugarcane cultivation alongside the Ayarwaddy River, an area remote from the SEE factory zones. SMEs financed the farmers to expand the cultivated area. Thus, cane cultivation extended from Madaya, Singu, Shwebo, Tagaung, Myataung, Htigaint, and Katha townships. More than ten times the raw material weight was reduced in converting from sugarcane to the semi-finished product. In the early period, only water transport was available and cheap. The transport cost was 35 ks. per viss, while inland transport may have cost 47 ks. per viss of syrup as of 2005-06.

Mandalay is well-known for good performance of workshops and lathe machining. After 1991, vacuum pan fabrication workshops and machining shops were well established. U Kyaw Kyaw in the Sein Pan Workshop group was the first to fabricate the equipment. His assistant U Min Min Oo, worked with him for up to five years from 1991. In 1997, U

Min Min Oo set up his own workshop in Sein Pan Quarter and moved to Mandalay Industrial Zone (2), fabricating vacuum pans and milk processing equipment. From 1997 to the time of writing, he had produced 10 vacuum pans and five milk processing equipments. His former employer, U Kyaw Kyaw, produced 30 sets of vacuum pans from 1991 to 1997. At present, there are seven workshop owners who have produced custom-made pans and quads for sugar SMEs. Besides that, no specialized parts have been produced. It would now appear that SME plants in Mandalay have access to the skilled labor market for fabrication and maintenance of the factories.

Factory workers are also easy to find in Mandalay under the cluster formation of the sugar SMEs in that city. Retired pan-men from SEE factories have gathered in Mandalay, where they can easily obtain employment.

More importantly, factory owners and agents were able to visit the sugar assembly market (Kthaintaw association) regularly for the purchase and sale of raw materials and sugar respectively. Mandalay is in the dry zone area and storage of the syrup for long periods is possible under the dry and less-humid conditions. The advantage of the sugar SMEs is year-round operation of the factory based on incoming fresh raw materials. Fresh syrup or jaggery cannot be stored for long period without deterioration.

Mandalay sugar SME factories are somewhat similar to sugar refinery plants where there is little difference between the procurement costs and distribution costs. The semi-finished product (i.e. syrup) yielded at least 50 percent sugar by vacuum pan processing plants while the molasses byproduct could be sold only to the nearby alcohol distillation plants. The problem of the transfer of the raw materials from the source to the factory site was not a major issue for the location of industrialization.

This was particularly true during the early period of SME establishment. In the later period, however, the temporal changes witness that the economic system has become relatively open. The Government issued the Private Industrial Enterprise Law in 1990 and the Promotion of Cottage Industries Law in 1991. The development of the (unpaved) strategic road from Bahmo down to Mandalay has facilitated the rapid movement of raw materials via inland road transport. Later, fossil fuel costs became increasingly high. Fuel costs have now become a large denominator in determining the unit cost of the output. In the early period of SME growth, factory location in Mandalay was considered with justification. Moreover, SME factories expanded in the direction of the southern Shan State. Around Taunggyi, there are currently 31 vacuum pan sugar processing plants operating.

The Taunggyi plants are relatively near the source of raw materials. But for Mandalay SMEs, where else could the private sugar factories be shifted? This issue will be addressed in a later section.

2.3 New Constraints on SMEs in Mandalay

Sugar factories are said to be energetically self-sufficient due to the merit of bagasse-based power generation and the boiling of cane juice in vacuum pans at low temperature. An efficient factory would usually produce surplus energy. In order to be energetically self-reliant, the industry has to strike a good balance between the three phases of operation: sugarcane production, cane assembly and transport, and sugar processing. Sugarcane crushing needs to be regulated in a continuous manner with no more and no less the required supply of sugarcane to be crushed each day. Thus, industrial management becomes complex and must be systematic. The investment requirement is also high, and a skilled labor force is essential.

Myanmar sugar processing SMEs bypassed the above-mentioned route by procuring and processing the semi-finished product in batch loads. The semi-finished raw material is relatively durable and can be processed throughout the year. Thus, it makes management simple and easy, but this advantage is severely offset by huge requirements for fuel wood, rice husks, sawdust or coal, instead of bagasse, to be fed into the boiler. Under the demand-push situation, however, sugar SMEs made large profits when fuel feedstock was relatively easy to collect. Water-borne transport of raw material is relatively cheap. Accordingly, sugar SMEs were established in large numbers in Mandalay. When the industry reached maturity around 2001, the business climate started to change.

For a daily processing of 18,000 viss (29 mt) of syrup feedstock in a vacuum pan plant, the procurement of rice husks as fuel cost ks.390,000 in 2006. Out of the unit production cost of ks.45, the fuel cost was found to be ks.20, approximately 50 percent of the unit cost. Rice husks themselves were not costly, but had seasonal fluctuation. Transport and handling charges are more than the price of the rice husks. Increasing numbers of sugar SMEs has led to competition for fuel sources. The supply has also declined due to diversion to other uses. Both official and market prices of diesel fuel are increasing. This severely affects the road transport of raw materials. For a large factory with a capacity of 35,000 viss (57 mt) of raw material, the transport of raw material

from Tagaung sugarcane area to Mandalay cost ks.1.3 million per day in late 2006. Unit transport cost was ks.47 per viss of raw material as compared to ks.35 per viss by the water-borne route. Since prices of sugar and raw materials fluctuated wildly, rapid road transport was preferred, but became very costly.

Moreover, electricity shortages are a common problem of sugar SMEs. Electricity was often made available for six hours a day. Diesel engine generators were used to supplement the electricity need for the remaining period. One barrel of diesel costing ks.208,000 gave 84 hours of electricity generation. The entrepreneur thus paid ks.2476 per hour for electricity. Comparatively, the unit cost of the power line was only ks.50 but this was not available for the whole day.

3. Emergence of Key Players in Private Industry

All private sugar SMEs can be characterized as self-financed family businesses where managerial power is concentrated in the owner-manager. This is the rule, but exceptions were also observed in some Chinese-owned enterprises. Kudo [2005] pointed out, based on a separate survey, the major reasons why the Chinese were far more important in business than their minority status in Myanmar would suggest. This view is applicable to Myanmar sugar SMEs, particularly to their rising status in this business. Let us take some examples.

3.1 The Great Wall Company

In 1990, the Great Wall Company was founded by U Tin Maung, born to Chinese parents in a small village in the northeastern Shan State. Among his diversified businesses, the Great Wall vacuum pan sugar factory was operated in the company style. Of Myanmar sugar SMEs, the Great Wall factory was the largest, with a processing capacity of 80 mt of feedstock per day. The company hired a professional sugar chemist who had retired from an SEE sugar factory. U Tin Maung's sugar business could be considered a forerunner in transforming a vacuum pan processing plant to a full-scale modern sugar factory which directly processes sugarcane. This was carried out through a step by step process.

U Tin Maung's livelihood started from the bottom. During his youth, he was employed as casual worker in a dried tea factory in Kyaukme, Shan State. After years of hardship, innovation, disciplinary habits, and industrious work made him promoted to the factory

manager of that medium-sized tea factory and rice mill. In moving up to Mandalay in 1984, he was said to be determined in the face of adversity, and could spot and exploit opportunities. At the turn of the transitional economy in 1988, he earned sufficient capital for the internal trade of exportable pulses and other indigenous products in the border trade with China. He was an early member of the Mandalay agricultural produce assembly market, including the sugar employees' Khataintaw association. After the Great Wall Company began operating the vacuum pan sugar plants at full production, U Tin Maung initiated sugarcane production by hiring underutilized farm lands currently in the possession of a military unit. He expanded the farmed area up to 2,000 acres and produced 26 mt of syrup per day as feedstock supply to his vacuum pan factory from the farm, located about 20 miles from Mandalay. He set up 15 cottage-scale syrup processing plants in the fields. Since his factory is large, he secured the feedstock supply in addition to the regular procurement of raw materials from the Khataintaw assembly market.

Being the largest in processing capacity, the factory management shouldered a huge financial burden for the daily power consumption of the factory. About half of the unit production cost went for fuel wood, coal, or rice husks. During the boom period of Mandalay sugar SMEs, around 2000, the wasteful process of making white sugar from syrup was seriously recognized. Immediate action was taken and the Great Wall No.1 Sugar factory was established at Madaya, close to the source of sugarcane production.

The factory, fully organized with a sugar milling tandem and bagasse-based power generation plants, could now directly process sugarcane to white sugar. The factory was, however, built with old, worn-out machinery and equipment bought from a dumping ground in Yunnan Province, China at the time the Chinese Dumping Act for obsolete factories was put into effect. The machinery and equipment cost RMB 1.4 million (equivalent to about ks.20 million). U Tin Maung sought additional loans to supplement the factory with new essential equipment. Upon looking at the old and worn-out pieces and parts of the dismantled factory, the private bankers refused to inject loans into his sugar factory project. He obtained financing from his own sources and partners for an additional ks.60 million. Finally the factory started crushing cane in October 2001. Relying on his field production and contract farming with surrounding farmers, the factory had a full cane supply. The capacity was initially 500 mt and this was later extended to 800-1000 mt of cane crushing per day (TCD). this is the first private sugar factory to operate full-scale direct processing of sugarcane since 1954. The Mandalay vacuum pan sugar factory was

closed down.

The industrial structure began to change. The factory organization style has followed this movement in order to perform the functions of coordination and management in sugarcane production, procurement and cane transport, and sugar processing in a balanced and continuous manner. The lessons learned have promoted the capability of the company workers, which has led to further expansion of the business.

Besides the sugar business, it was learnt that persons in authority in the regional command area trusted U Tin Maung, allowing him to carry out a crude petroleum extracting business on a contractual basis outside the premises of the Ministry of Energy. The financial resources generated formed a basis for moving a further step forward in establishing another large sugar factory and bio-ethanol plant. He was granted permission to exploit arable and virgin lands exceeding 34,000 acres in Katha and Htigaint townships. The government began to take interest in bio-ethanol production in 2004. On 6 April, 2006, the Prime Minister visited the site of U Tin Maung's new factory and supported his efforts. U Tin Maung not only sought support from both state and regional authorities, but also formed a close partnership with sugarcane growers on his estate. He constructed and operated the No.2 Great Wall sugar factory with a daily crushing capacity of 2000 mt cane, extendable to 5000 mt. Fully-fledged human resources consisting of sugar professionals, Chinese experts, technicians and a skilled labor force of about 500 have been organized and recruited.

At the start of the commissioning year, there was a record production of white sugar with 11 percent recovery of sugar. A large fleet of high-powered tractors, farm machinery, and cane transport trucks were procured from China and organized to cope with the cane planting and harvesting of over 9800 acres surrounding the factory. In the factory compound, the company built a large new bio-ethanol plant, supplied from Feicheng Pyramid Machinery Co., Ltd., Shandong Province, China. The bio-ethanol production is expected to commence by the end of April, 2008.

3.2 Other Chinese Business Connections

A parallel development of sugar factory establishment by a group of sugar and alcohol SME entrepreneurs from Mandalay was also taking place. With support from the Commander of Northeast Command, the factory parts and structures, some of which are considered to be old, were imported from China and brought to Naungcho, in northeastern Shan State. The

company shareholders are mostly ethnic Chinese and some of them had been involved in cross-border trade. They belong to the company known as Ngwe Ye Pale Mining Co. Ltd. with a coal mining business at Namma. The factory has a crushing capacity of 1500 mt cane per day. An annex factory will be built for bio-ethanol production. The factory started commissioning in 2007-08.

Later, the Commander of Central Command also encouraged a group of entrepreneurs by granting the right to cultivate arable lands in the degraded forest in Thabeikkyin township for producing bio-ethanol. Some people started clearing the lands. One company, Anyone Oo, prepared to move its vacuum pan sugar factory from Mandalay to the assigned lands of Tagaung sub-township in the sugarcane area. He was faced with the challenge of choosing either modern technology or access to raw materials. Lacking sufficient investment, he could not abandon his old vacuum pan sugar factory structure. Expecting that his SME factory could be replaced with sugar milling machinery, sugar boiling and processing pans and parts, he visited several provinces of China. He noted that for old factory parts and structure in dumping areas in China, it would cost him 1.5 million US dollars. Neither his family business nor shareholders could invest such an amount yet.

Being born and married into a Chinese family in Upper Myanmar, he was steadily going up the business ladder. He entered the business early in 1978 starting with a miniature centrifugal sugar separating machine. With three partners, he founded the alcohol distillation plants in Pyawbwe in 1995 and then moved to Mandalay. In 1998, he then successfully established a vacuum pan sugar factory. After he obtained the land assignment in the sugarcane area, he dismantled the vacuum pan factory of Mandalay to move to the sugarcane area of Tagaung. He could not afford the modern complete milling and processing parts and structure, but he attempted to attach bagasse-based power generation facilities to the old vacuum pan factory.

3.3 History Repeats Itself

It could be said that the refinery process of sugar manufacturing was passed to Myanmar from China in earlier days. An Italian, Father Sangermano, visited the Myanmar Kingdom from 1783 to 1866 and recorded his observation that the Chinese established in Amarapura refined coarse and flat cake (jaggery) which was extracted and made from sugarcane. White sugar was made as it was in Bengal (Sangermano [1893; Reprinted in 1984]). The first vacuum pan white sugar plant of pioneer entrepreneur U Sai Kyaw Htin

was also built by the Chinese mechanic who was brought to Mandalay from Yunnan, China. Sugar technology had been developed in India since the 18th century. The first privately owned European sugar factory in India was established in 1784. The first factory-style jaggery refinery was set up in Kanpur, India in 1874 (Pruthi [1995]). Yet the route of technology diffusion to Myanmar came from China rather than India. This fact is still valid today. By the time China had developed from small, old factories to the large modern structures in its modernization scheme, Myanmar entrepreneurs were entering the sugar business, and the old Chinese factory structures and cane milling machinery were brought into Myanmar, as in the case of the Great Wall and Ngwe Ye Pale companies. History appeared to repeat itself three times.

On the other hand, a Burmese SME entrepreneur, named U Nyi Khin moved his vacuum pan sugar factory from Mandalay to Naungcho. He attempted to crush cane and process it into white sugar from the multiple sets of local small three-roller mills. There were no cane preparation sets. Cane feeding was done by human labor. The prime mover for milling sets was supplied by diesel engine. Milling and processing were found to be unbalanced. He then discontinued the direct crushing of cane by his multiple set of small mills. Presently he is running a routine process of vacuum pan operation based on syrup as raw material. Being near to the large Ngwe Ye Pale sugar factory, which is connected with Chinese businessmen, a small factory built with Burmese investment has to compete for cane supply from the same area.

4. Domestic Sugar Market and Market Channels

The sugar employer's Khataintaw assembly market has been understood as a major locative factor in the growth and expansion of sugar SMEs. Even in the transitional period from market-oriented to resource-oriented location, the influence of the Khataintaw sugar assembly market is not yet declining. Apart from this market, another influential market is Bayintnaung market located in Yangon. The Khataintaw assembly market had been and still is a trading place of both semi-finished product, syrup and the different types of SME sugar. Bayintnaung market has traded all sources of sugar, SME sugar, standard white and refined sugar from SEE factories, and those of private and military-owned factories. From time to time, Thai and Indian sugar enter the Bayintnaung market.

4.1 Market Channels

According to the Sugarcane Development Department of the MICDE, the market share of SMEs and SEEs is said to be 50:50. However, the production share has changed among the key players with time, as shown in Table 3. Private sugar is usually sold in retail outlets while sugar from SEEs is sold in lots. From Bayintnaung market, sugar flows into all parts of the country except Mandalay. There are seven sugar dealing houses in the Bayintnaung market. Their total volume of daily trade is estimated to be 200 mt. The annual sugar flow may be as high as 72,000 mt.

Major marketing channels are delta areas in Ayayawady Division, Mon State, Tininthari Division, Pyi, Natalin and other parts of Bago Division and Rakhin State. Sugar flow from Khataintaw market goes down to Taungoo, and also goes up to Pyinoolwin, Lashio and other parts of Shan State. Mandalay sugar is traded in a northwestern direction to Monywa, Kalae, and Tamu, near the Indian border. Sugar from Taunggyi SMEs goes down to Yangon terminal market.

Table 3: Sugar Production Volume by Business Organizations

Business Organizations	2006-07		2007-08	
	sugar output, mt	% of total	sugar output, mt	% of total
SEEs and Military	92,598	39.5	76,216	39.8
MICDE (former MSE)	35,341	15.1	24,307	12.7
MI (1)	1,408	0.6	1,621	0.8
MEC	39,958	17.0	34,378	17.9
UMEHL	15,891	6.8	15,910	8.3
Private	141,928	60.5	115,366	60.2
(i) SMEs	124,163	52.9	60,366	31.5
(ii) Companies				0.0
(a) Great Wall	17,765	7.6	45,000	23.5
(b) Ngwe Ye Pale	0	0.0	10,000	5.2
Total	234,526	100.0	191,582	100.0

(Note) MICDE: Myanmar Industrial Crops Development Enterprise; MI (1): Ministry of Industry No.1.

MEC: Myanmar Economic Corporation, a military-owned commercial entity.

UMEHL: The Union of Myanmar Economic Holding Ltd., a military-related commercial entity.

(Source) Sugarcane Development Department, MICDE and authors' survey data.

4.2 Buyers and Sellers

Among the sugar traders, Daw Yone's sugar house started sugar procurement and selling forty years ago in Nyaungbinlay Bazaar, 19th Street, Yangon. During the socialist era, sugar was a controlled commodity, and was usually collected from the army ration

outlet. The state-owned sugar factories had distribution quotas for the military camps all over the country at a subsidized price. This system continued until a military-based company took over some of the SEE factories in 2004.

Finally sugar was collected by the sugar dealer from whom sugar was sold at market price (called 'black market' price at that time) to consumers. The selling of sugar as an army ration outlet kept police action at bay. In those days, the sugar business was a small one. Around 1990, the Bayintnaung wholesale market was established in Yangon. The four sugar retailers including Daw Yone House moved to Bayintanaung. Since then the business has started to expand.

In 1994, the military government organized the Myanmar Sugarcane Enterprise (MSE) under the Ministry of Agriculture and Irrigation (MOAI). The sole responsibility for sugarcane procurement, sugar processing, and distribution and marketing was vested in MSE. SEE business was expanded from seven old sugar factories (handed over from the Ministry of Industry No.1) to a further nine newly established factories. MSE could have exercised monopoly power in the sugar trade until the emergence of other key players in the sugar industry.

The sugar from SEEs could be purchased by those who acquired a permit from the Ministry. It was possible to trade the permit letter on the market. Through this channel, SEE sugar entered the Bayintaung market. During 1994 to 2004, SEE sugar was the single dominant commodity in the market. Thus the holder of several permits became a dominant player in the market. The sugar selling of Bayintaung has grown into a huge business. The monthly sugar flow has been regulated by SEEs in attempt to maintain a supply and demand balance. This objective was achieved in the initial years.

After several producers entered the market, selling practices varied. The JV sugar factory often undertook advanced sales to cover a financial deficit. The military-owned factories tendered their sugar and sold it at the highest offered price. In some cases, sugar was sold to the direct user in accordance with an agreement.

On the demand side, three kinds of buyers were noted: (i) those who conducted direct purchase for industrial use, (ii) those who played an intermediate role in buying and selling and (iii) those who engaged in sugar hoarding for price manipulation. Among these, direct purchase was made by soft drinks producers, condensed-milk processors, coffee-mix producers, and so on, mostly in the private sector. Sugar export was banned by the government at the end of 2002. The domestic price was not directly

reflective of the world price.

The Mandalay sugar assembly market conducted bargaining and transaction daily during the week, except on the Buddhist Sabbath Day. Upon opening, bargaining for sugar price was started. Once the price settled, the raw material (syrup) was traded. It was bought by SME entrepreneurs. Competition for syrup usually followed a seasonal pattern. From November to January, farmers processed syrup. Farmers delivered most of their produce as soon as the season started in order to cover their expenses. The continued supply caused the price to drop. When the supply slowed down, the price went up again. The rate of the commodity flow from farmers caused price fluctuations and *vice versa*. From February to March, competition for syrup was often taking place between SME entrepreneurs and brokers who hoarded the produce for price manipulation. Brokers offered prices in competition with SME entrepreneurs.

Sugar price movements at Bayintaung market were independent of the Mandalay assembly market. SME entrepreneurs keep their eyes and ears open only to the price signals in Yangon. As the Yangon sugar price becomes high, entrepreneurs send their sugar to Yangon. The more the demand-pull from Yangon, the more entrepreneurs purchase syrup in the Mandalay assembly market. Sometimes competition comes from the speculative behavior of SME entrepreneurs.

4.3 Price Movements in the Domestic Market

The selling price for white sugar produced by large modern factories is always higher compared to SME sugar. Both products showed a parallel trend of steady price increase in 2003 and 2004 (Table 4).

Table 4: Yearly Lowest and Highest Prices of Sugar, ks. per viss

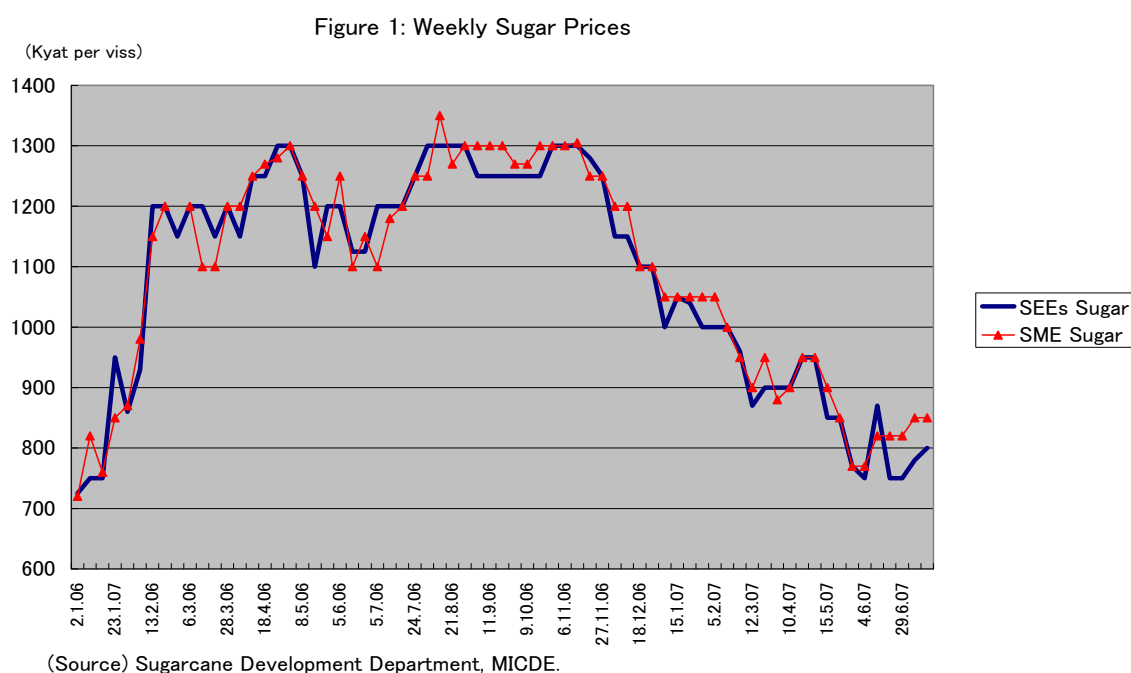
Year	Modern Factories			SMEs Plants		
	Lowest	Highest	Average	Lowest	Highest	Average
2003	380	475	428	300	415	358
2004	380	450	415	360	440	400
2005	410	730	570	365	710	538
2006	805	1300	1053	785	1250	1018
2007(Jan-June)	780	1020	900	720	985	853
2007(July)	800	850	825	730	850	790

Source: Authors' Survey in Bayintnaung Market and Khataintaw Market.

The year 2006 witnessed the highest competitive price of sugar in the domestic

market. It rose from ks.800 to ks.1300 per viss. A producer of coffee-mix had bid for the sugar tender of UMEHL, a military-operated company, at the highest price of ks.1050 per viss of export-quality sugar. Expecting a market monopoly, the price was pushed up to ks.1200. Likewise, the SEE sugar price rose from ks.450 to ks.850 per viss. There was speculation that the sugar balance still remained at a minimum reserve, and with the expectation of continued price increases, traders and buyers competed for the sugar. The price shot up to ks.1300 per viss at the time of the Myanmar New Year Festival (April, 2006). The price remained high until the opening of the next sugarcane season.

At the start of the cane season in November–December, 2007 the newly-produced sugar from the Great Wall factory entered the market with advanced sales at ks.1,000 per viss. The SME sugar followed suit after the fine quality of the Great Wall sugar and thus the SME sugar was offered at a competitively low price. The sugar price started to collapse. There was speculation that the 2006 sugar stock would be at all sold out, but in fact the stock piled up. No information was clearly available to stockholders, although each has access to a piece of the information. When only SEEs were operating in the industry with SMEs, production statistics were known through the statistical bulletin. After several new producers entered the industry, however, the majority of producers declined to release their figures of production and distribution. Such information asymmetry has led even experienced entrepreneurs to speculate in their trade. As prices weakened, speculative liquidation compounded the rate of decline (Figure 1).



After the fine quality sugar from the privately-owned modern factory had been sold out at ks.1100, the improved quality sugar of SMEs was traded down first to ks.800 and then further to ks.700 per viss. Condensed-milk processors further pulled the price down. The sugar from modern factories declined to ks.900. By the end of the Myanmar New Year, 2007, the selling price remained low at ks.750-780 per viss of white sugar. The line of resistance from the SMEs was clearly downside. Under heavy pressure, the market sold out at a discount for sugar already over-procured at a high price. In fact, the procured sugar remained intact in the respective warehouses, but the price fluctuated from peak to valley. Table 5 shows prices for different classes of sugar and semi-finished raw materials (syrup).

Table 5: Prevailing Prices of Different Classes of Sugar, March 2008

Sugar class	Price, ks. per viss
SEE export-grade sugar	600
SEE white sugar	540
MEC refined sugar	900-920
MEC white sugar	600
"Great Wall" white sugar	570– 580
"Ngwe Ye Pale" white sugar	605
SME sugar (high quality)	600
SME sugar (ordinary)	540
Raw material (syrup)	250

(Source) Khataintaw Association, Mandalay and Sugarcane Development Department, MICDE.

Upon examination of the corresponding price changes in each month of 2006, 2007 and early 2008, based on the respective market exchange rate, it was surprising to find that the domestic price of Myanmar sugar at all times stood just above the world FOB sugar prices.

The price increases of 2006 showed a repercussion in the following year. Sugar proper was not allowed to enter into the country from outside. Until 2011, sugar is still placed on a list of sensitive commodities in Myanmar in relation to the ASEAN Free Trade Area (AFTA). However, the high price of domestic sugar led to the inflow of sugar-based products such as condensed milk, bakery and biscuits from neighboring countries through either border trade or overseas shipping channels.

The yearly import of condensed milk increased from US\$ 19.40 million in 2002-03

to US\$ 27.4 million in 2007-08. The sugar content in condensed milk is considered to be 50 percent, and the value of incoming sugar in the form of condensed milk is found to be from US\$ 9.7 million to US\$ 13.7 million in the corresponding year (Table 6).

Table 6: Condensed Milk Imports

Year	Value (US\$ Million)
2002-03	19.4
2003-04	13.7
2004-05	17.0
2005-06	21.5
2006-07	27.4
April 07-Aug 08	11.6

(Source) CSO.

After the time of Myanmar's integration into AFTA, sugar will no longer be a controlled item. Domestic sugar will have to compete with foreign sugar in terms of quality and price. Myanmar has now received a preliminary lesson for the need to upgrade its industry.

Concluding Remarks: Prospects and Challenges for Sugar SMEs

As has been discussed, the growth and development of sugar SMEs is shown to be interdependent with the whole sugar industry of Myanmar. The growth of the private sugar industry was checked by the Nationalization Scheme in 1954. The traditional home-grown jaggery processing sub-sector continued to expand to partially fulfill domestic consumption. During the socialist era, sugar production in the SEE sub-sector declined. Acute sugar deficit, restricted trade in white sugar, growing demand for sugar from private milk processing plants, innovative attempts at setting up private factories, and a technology diffusion process - all these factors contributed to the birth of sugar processing SMEs through utilization of the existing jaggery plants. The resultant product is white crystal sugar, which is tradable in the downstream sugar industry.

The quality has been improving, and the SME sub-sector was expanding. However, at the time of its maturity, SMEs face the challenges of the high cost of energy inputs and declining supply of fuel feedstock. The changing conditions have forced the SMEs to shift from market-oriented to raw material-oriented locations. Among them, some businessmen with strong access to the support of the regional authority and close links

with Chinese commercial networks have accumulated sufficient capital to divert some of their surplus to the sugar business. Thus, along with relocation, those SMEs have undergone structural and technological changes. What will be the implications of these changes on the whole SME group? Can they survive or will SMEs be able to adapt to the changing conditions? Future directions should be assessed in the context of the whole sugar industry.

Under the circumstances that the large enterprises have moved in large numbers to resource-based locations, the supply of sugarcane syrup (feedstock) to SMEs may be limited or become costly for further processing. They need to establish wide-ranging networks to assure stable procurement of raw materials on a contractual basis. They could still rely on alternative raw materials, such as palm jaggery, but this would result in inferior white sugar. However there are some market outlets for this. The real issue is not only the supply of raw material (feedstock) but access to fuels. Survival of SME plants depends on how far energetically efficient processes can be implemented. Moreover, under the pressure of competition for price and quality, SME entrepreneurs should focus on outturn, quality improvement, and energy use efficiency, which could determine their survival and growth.

There may be some overseas market with a great demand for wholesome jaggery as an organic form of sugar or candy. To gain access to such market segments, SMEs have to carefully improve their methods of production to meet all the product specifications.

If some sources of financing are accessible, a small number of SMEs should consolidate to attain an economically optimum structure and size and move to the resource-based areas. It should be borne in mind that SME factories could not be formed in a cluster pattern as in Mandalay. Such action would cause severe competition for sugarcane and other raw materials. There should be a policy framework or regulatory mechanism to demarcate the boundary or scope of raw material supplying areas, or permissible distances between one factory and another in accordance with the production capacity of each factory.

Expandable areas for sugarcane cultivation exist in the less-developed countryside. Moving from Mandalay City to rural areas requires many socio-economic needs be fulfilled first before operations can get into full-swing. Power lines are still lacking in most areas. Without good arrangements for energy self-sufficiency in the factory throughout the year, sugar production will be costly. In order to be energetically

self-sufficient, the production process must be changed from batch type to continuous operation throughout the season. This requires skill and technology. Labor stability becomes an important issue for a skilled labor force. The unskilled labor force is highly mobile. In contrast, skilled labor behaves in an entirely different manner. Their settlement pattern assumes a relatively permanent character. Accordingly, schooling, health clinics, mobility, shopping and entertainment sites – all such social and commercial activities should be in place after the SME relocation. Government support is essential in this respect. If private banking institutions are allowed by the government to expand, private banking services will facilitate the development of the area. Telecommunications and at least a gravel road network are urgently needed. Considering these fundamentals, relocation of factory-style SMEs could be a long process.

The immediate task for the whole sugar industry is how to rescue the producers from the price drop. The collapse of the sugar market has hit all stakeholders hard, including farmers. Due to the drop in sugar price, next year's sugarcane crop will receive a low payment and sugarcane will disappear in alternate years. SME entrepreneurs are looking forward anxiously to export outlets for price recovery.

One SME entrepreneur coined an analogy by comparing a movie star with the sugar industry. The famous movie star, U Kyaw Hein is acting the villain in a movie, and his performance is genuine and artistic. He won an Academy award. If he continued to perform the role of the villain in following movies, the entrepreneur said, all actors who actually perform the role of villains will become jobless. Likewise, if the large modern factories continued to dump their exportable sugar into the domestic market, the SME sugar would soon be displaced and disappear.

The government's ban on sugar exports should be lifted to reverse the situation of excess supply in relation to demand. The sugar industry should be nurtured to become a strong resource-based, export-oriented industry. Being placed on a level playing field, all enterprises will be able to compete for efficiency, quality and diversified products.

Reality is still far from the vision. Manipulation to push up sugar prices is not a sustainable way forward for the industry. High domestic prices induced the inflow of sugar-based commodities from outside the country. This will again adversely affect the local downstream industry. If the sugar price is pulled down, sugarcane will also disappear.

It is clear that there is a narrow margin within which the industry must be able to operate to gain efficiency and quality with a product price that is neither too high nor too low in relation to global price signals. The combination of sugar production with bio-ethanol processing would be a versatile approach to reduce price fluctuation and to attain energy self-sufficiency. Finally, the community-level approach to a dual production system for sugar and bio-ethanol would be a further prospect for Myanmar sugar SMEs.

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