
Overview of Malaysian Cocoa Industry

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Though the area planted with cocoa (Theobroma cacao L.) has decreased from 414,236 hectares in 1989 to about 17,554 hectares by 2017, it is still an important crop in Malaysia with most of it grown by smallholders. Although the production of cocoa bean has declined, Malaysia is currently the second largest cocoa processor in the Asian and Oceania regions; and the seventh in the world. The Malaysian Cocoa Board, as the guardian of cocoa industry, has been actively involved in upstream research and development (R&D) programmes such as breeding for improved varieties (releasing 14 clones for commercial planting), developed appropriate fertiliser formulation for enhancing yield and improved pest controls. The advancement of the cocoa downstream technology has also been rapid and particularly addresses developments in use of cocoa for food and non-food products; such as antioxidant and anti-cancer properties in chocolate to increase cocoa values. Increasing market for organic products create a path for Malaysia's first certified organic chocolate from certified organic cocoa fields. Nevertheless, the major challenge to the cocoa industry is the imbalanced growth between local cocoa bean production and local cocoa grindings activity which has resulted in the need for increasing importation of cocoa beans. Therefore, with the latest advancement in cocoa cultivation, technologies and opportunities, it is urged to revise the interests of major players to get involved in the cocoa industry again.

Keywords: Malaysian Cocoa Board, cocoa, Theobroma cacao, research and development.

Cocoa, *Theobroma cacao* [(Linnaeus) (Malvaceae): Sterculiaceae]] is native to South and Central America. It was first commercially cultivated in Jerangau, Terengganu in 1950 followed by the Abaca Limited Company in Sabah in 1955. Since then, the cocoa industry has grown to become the third major commodity crop in Malaysia after oil palm and rubber. The rapid expansion of the cocoa industry in 1980s (*Figure 1*) triggered the realisation of the multi-faceted activities that need to be coordinated and integrated under unique organisation to ensure its continued healthy growth. Thus, in 1988, the Malaysian Cocoa Board (MCB) was established under the Act of Parliament 343 (Incorporated) and was officially in operation a year later. The main

objective is to develop the cocoa industry in Malaysia to be well integrated and competitive in the global market. Emphasis is given to increasing productivity and efficiency in cocoa bean production and increasing downstream activities. This paper shares the progress made by the Malaysian Cocoa Board since its establishment more than three decade ago and the future outlook and challenges of the Malaysian Cocoa Industry in the next millennium.

HISTORY AND DEVELOPMENT OF COCOA INDUSTRY IN MALAYSIA

Even though cocoa is not indigenous to Malaysia, it has experienced a remarkable

* Reproduced from the 14th ISP National Seminar 2018 Book, "Malaysian Plantation Industry: Crop Options".

growth in the total cultivated area from 1950 to 1989 and reached a peak at 414,236 hectares in 1989 (Figure 1). Forty- nine per cent of the total cocoa area belonged to the estate sectors while the remaining area was the cocoa smallholders. The production of dry cocoa beans also attained its higher peak at 247,000 tonnes in 1989. However, from the beginning of 1990, the cocoa areas in Malaysia had gradually declined indicating a negative growth of cocoa cultivation as well as the cocoa production in the subsequent years. To date, there are 17,554. hectares of cocoa cultivation in Malaysia, of which 6,958 hectares is in Sabah, followed by Sarawak (6,862 hectares) and Peninsular Malaysia (3,734 hectares). Smallholding sector contributed 94 per cent of the planted area and is currently the predominant local producer in Malaysia. Due to decline in cocoa production, Malaysia has dropped from being once the fourth largest cocoa producer in 1989/1990 to the twenty-eighth in 2015/2016. Cote d’Ivoire, Ghana, and Indonesia remains the top three largest producers of cocoa beans.

Despite the decline in the total cultivated area devoted to cocoa and the reduction in the

production of dry cocoa beans, the cocoa downstream processing industry has experienced a rapid growth since the 1990s and has been transformed into a major component of the Malaysian cocoa industry with export earnings of cocoa and cocoa products increasing from less than RM1.0 billion in the year 2000 to RM3.3 billion in 2008 and hit the highest record of RM 5.78 billion in 2016 (Figure 2). Today, Malaysia is the second largest cocoa grinder in Asia and ranked eighth in the world after Cote d’Ivoire, Netherlands, Indonesia, Germany, USA, Brazil and Ghana.

However, the cocoa downstream sector is facing a problem of shortage of locally produced cocoa beans to meet the grinders’ requirement due to negative growth of cocoa cultivation. Local grinders import most of their supply from other producing countries mainly Indonesia, Ghana and Cote d’Ivoire, which cause outflow of foreign exchange amounting to billions of Ringgit Malaysia annually. Four factors have been identified as contributing to the decline in the cultivated area. They are competition for land use either for development or for other commodity crops such as oil palm, the availability of labour, instability in cocoa

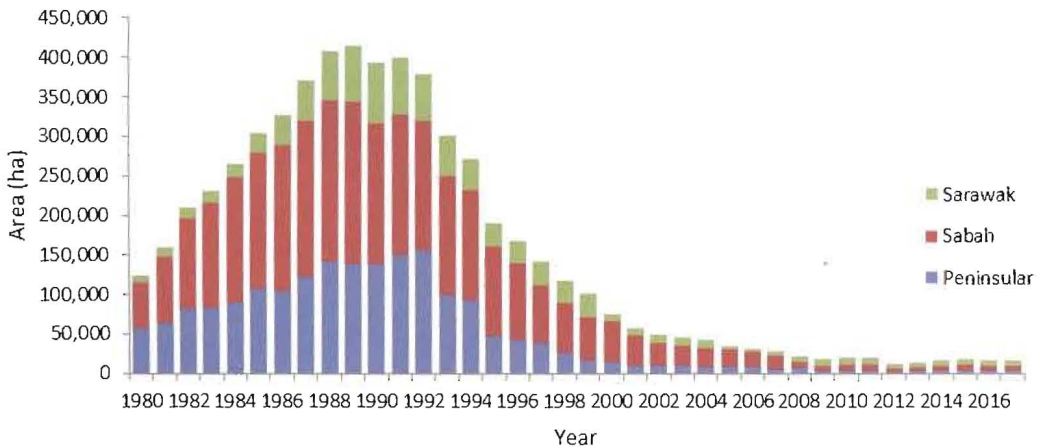


Figure 1 The cocoa cultivated area in Malaysia by region

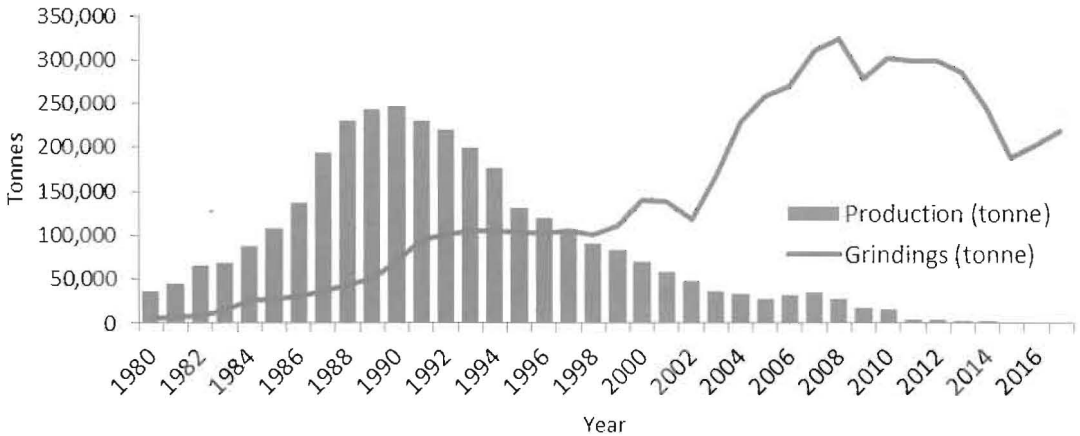


Figure 2 The production and grindings of cocoa bean in Malaysia

prices, and increasing production costs, particularly when cocoa pod borer (CPB) was discovered attacking cocoa. A combination of these factors has led to a rapid decline in the area of cocoa cultivation even though cocoa price has been good for the past five years.

TECHNOLOGIES IN COCOA CULTIVATION

Research and development (R & D) are the major activities of the Malaysian Cocoa Board. Research programmes and projects are carried out to address the various problems and needs of the cocoa planting and downstream industry. Significant achievement made by the Malaysian Cocoa Board towards sustainable development and processing in the country is highlighted.

Cocoa upstream industry

Planting materials

The Malaysian Cocoa Board initiated the cocoa breeding programme in late 1991 with the main thrust of breeding for yield i.e. to increase the production potential of an area; bean qualities to ensure better quality and uniform bean size; pests and diseases resistance and plant traits

selection, to facilitate and reduce labour in field operation (Francis *et al.*, 2005). With the merger of MARDI Cocoa Research Department with Malaysian Cocoa Board, the breeding programme of the Malaysian Cocoa Board expanded its activities especially in conservation and evaluation of cocoa germplasm, progeny evaluation for progeny trials and ortet selection, clone trials to evaluate outstanding clones and others related breeding trials.

To date, the Malaysian Cocoa Board has released 14 commercial clones since 2005 (MCBC 1 to MCBC 14) (Haya *et al.*, 2013) (Table 1). Thus, a total of 53 commercial clones are available for planting. All these clones are known as high-yielding planting materials and tolerant to pests and diseases. In addition, these cocoa clones also have been registered as national plant variety in Malaysia under the Department of Agriculture (Table 2).

Through the technologies developed for the cocoa industries, Malaysia had achieved international recognition for Malaysian Planting Materials. The Cocoa of Excellence (CoEx) Programme which is conducted in France is the entry point for cocoa-producers to participate in the International Cocoa Awards (ICA), a global competition recognising the

TABLE 1
MALAYSIAN COCOA BOARD'S NEWLY RELEASED COMMERCIAL CLONES

Clone	Pods /tree	Pod value	Bean (Number / pod)	Dry bean weight (g)	Butter fat content (%)	Estimated dried bean yield (kg/ha/yr)
MCB C1	69	19.2	39	1.30	56.0	3,590
MCB C2	51	17.5	38	1.50	56.0	2,920
MCB C3	60	19.1	38	1.37	59.0	3,140
MCB C4	58	20.9	35	1.33	55.0	2,770
MCB C5	109	19.0	37	1.41	55.0	5,740
MCB C6	75	21.7	37	1.38	55.2	3,460
MCB C7	50	19.2	46	1.22	55.4	2,600
MCB C8	60	17.1	40	1.50	54.7	3,510
MCB C9	91	24.1	33	1.29	51.3	3,760
MCB C10	92	22.1	35	1.18	54.7	4,625
MCB C11	76	18.3	43	1.38	54.4	4,619
MCB C12	63	23.1	43	1.08	58.9	3,030
MCB C13	70	21.1	39	1.23	56.5	3,695
MCB C14	66	20.0	35	1.14	56.2	3,666

TABLE 2
INTELLECTUAL PROPERTY RIGHT OF COCOA PLANTING MATERIALS

No.	Title	Period
1	Plant Variety Protection and Breeders Right (MCBC 6)	2010 - 2035
2	Plant Variety Protection and Breeders Right (MCBC 7)	2010 - 2035
3	Plant Variety Protection and Breeders Right (MCBC 8)	2010 - 2035
4	Plant Variety Protection and Breeders Right (MCBC 9)	2010 - 2035

work of cocoa farmers and celebrating the diversity of cocoa flavours. Malaysian beans have won the Cocoa of Excellence International Cocoa Award in 2011, 2013 and 2017 for cocoa with the best flavour. The taste of unique flavour especially spicy flavour from Sarawak region could open the world's eyes of cocoa industry that Malaysia could serve as one of the best regions with premium chocolate. This indicates that Malaysia has been recognised as one of the world's best cocoa flavour region with the best planting materials incorporated

with best cocoa processing.

Specific fertiliser for cocoa

In 2016, the Malaysian Cocoa Board collaborated with the National Farmers Organisation (NAFAS) and released the first compound fertiliser known as MCB F1 HYFer specific for mature cocoa trees. It improves yield by up to 20 per cent to 24 per cent of dry beans (*Figure 3*) in line with the good agriculture practices (GAP). MCB F1 HYFer formulations were derived through several

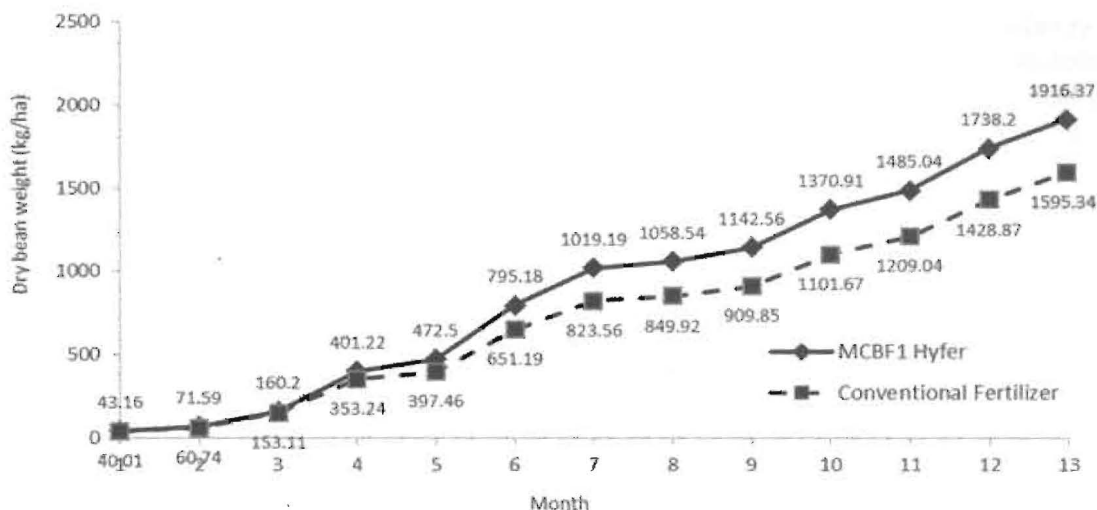


Figure 3 Cumulative yield increase due to using MCB F1 HYFer

years of study identifying nutrient needs of cocoa.

The addition of zeolite also increases soil fertility and enhances nutrient uptake by the tree. Zeolites are microporous aluminosilicate minerals that could help increase cation exchangeable capacity (CEC) and holds on to nutrient. The addition of zeolite and clay coating has shown to reduce nutrient loss and increase nutrient availability for the plant (Helmi *et al.*, 2016).

Microbial for pest and disease control

The cocoa pod borer, *Conopomorpha cramerella* (Snellen) (Lepidoptera: Gracillaridae) has been the most devastating insect pest of cocoa since it was first discovered attacking cocoa in 1980 in Sabah. No single approach at the moment is effective in controlling cocoa pod borer (CPB). Of the methods developed, biweekly prophylactic treatment with chemical pesticides remains the most effective in controlling CPB although expensive. However, extensive usage of insecticides leads to the development of resistance in the CPB, insecticides residues and

in environmental deterioration.

Microbial population, which is found naturally in cocoa ecosystem appears promising for controlling the black pod. This beneficial micro-organism when sprayed onto the pods was also reported to have some good effect for controlling CPB damage. The cost for controlling black pod and CPB using microbes is cheaper than that of chemical spraying. A pilot plan for mass production of the microbes has been established in Tawau, Sabah in 2016 and efforts have been made with private sector to produce them commercially. In conjunction with that, large scale trials for verification have been established throughout Malaysia for further evaluating the effectiveness of microbes in controlling CPB and black pod at various places.

Mechanisation in cocoa plantation

Increasing cost of production and labour shortage have compelled the cocoa industry to look for improved production techniques to reduce costs in order to maximise profits. The labour utilisation is skewed to certain field

operations mainly harvesting, pruning, fertiliser application, pest and disease management and infield transportation. Current planting pattern which is the distance between cocoa trees is 3 m x 3 m does not allow mechanisation of certain activities. In order to establish mechanisation in cocoa farm, the planting pattern must be first evaluated. After eight years of research on this planting pattern, the Malaysian Cocoa Board has come out with the suitable planting pattern for cocoa in certain field activities such as fertiliser application and insect control *via* application of insecticides. The best planting distance for cocoa mechanisation is four rows of cocoa at 3 m x 3 m distance with 6 m mechanisation path to allow a path for tractor with the equipment (Figure 4). Currently, the Malaysian Cocoa Board is also working intensively to invent new tools for mechanisation in all its management chain from nursery to bean processing.

Organic farming

Organic farming has given prospective

development opportunities particularly for cocoa commodities in the future. Although organic farming is relatively young and with less spectacular history, with an understanding of organic farming, improvement through evaluation in this farming system has led to improvements in cocoa.

Study on the organic farming in cocoa planting area reported that the organic farming is actually feasible and has a positive effect to the qualities of pod and bean (Table 3) and its yield production (Figure 5). With the potential of yield from organic farming being closer to conventional farming, organic farming has clearly demonstrated its ability to be adapted to the cocoa industry to provide competitive growth mainly in its production.

Cocoa downstream industry

Food products

Cocoa downstream activity constantly undergoes an increasing trend due to the nature of the demand for chocolate. Currently, there

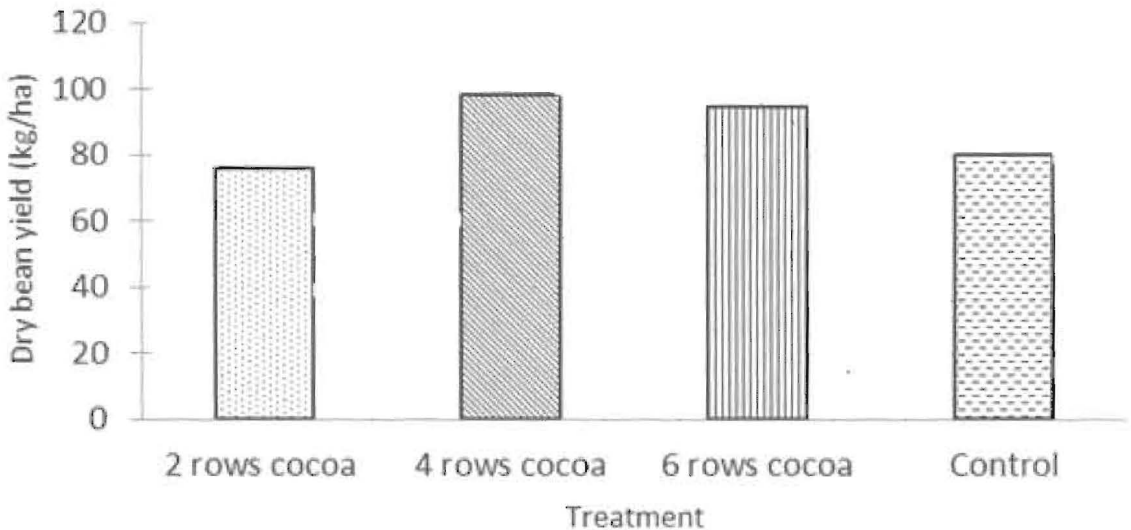


Figure 4 Yield of dry beans with different planting system

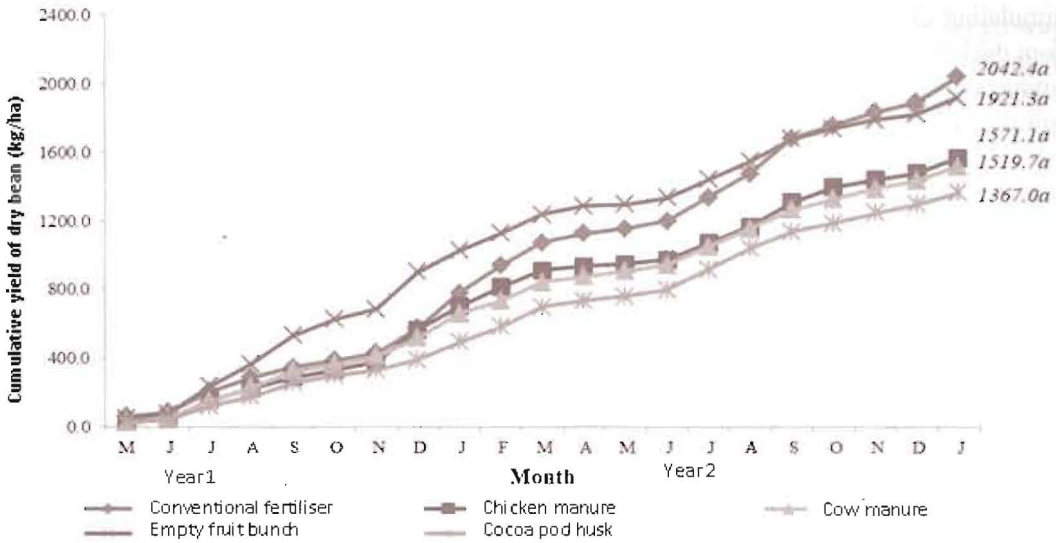


Figure 5 Cumulative yield for different types of fertiliser (Means with same letter were not statistically different using Tukey's at $p > 0.05$ probability level).

are six grinders in Malaysia that process beans into semi-finished products such as cocoa mass, butter, cakes and powder used as ingredients in the manufacture of food, beverages and chocolates. Semi-finished products can be extracted from the raw cocoa beans and these involve processing to get the nibs out from the husks and the nibs are roasted and ground into a liquid cocoa mass. Liquid cocoa mass is also basis for the production of cocoa powder and cocoa butter. In 2017, Malaysia successfully exported 79,288 tonnes of cocoa butter, 146,447 tonnes of cocoa powder and 47,042 tonnes of chocolate which contributed RM1,628,021, RM1,272,046 and RM868,190, respectively, to the Malaysia income (MCB, 2017). Currently, downstream technologies are much focused towards niche and premium chocolate products with the increasing demand for premium chocolate, including organic, single origin, fine and unique flavours of chocolate. Thus, the confectionery market has been characterised by consumer

demand for taste, health and products that address ethical and environment concerns. The Malaysian Cocoa Board has recently focused on research towards health and nutritional benefits of cocoa products with high flavonoids in cocoa that may decrease low density of lipoprotein and thus help to prevent cardiovascular diseases. Further, cocoa with high antioxidants content also helps to reduce the risk of cancer. Moreover, the demand for dark chocolate has created a niche market in response to these positive findings.

Non-food products

Cocoa non-food products have been innovated in the Malaysian Cocoa Board's activities and is based on the properties and specialty factors of each component of cocoa. Cocoa based ingredients has made up part of the fast growing market of organic and natural based cosmetics where the antioxidant contained in the cocoa are believed to delay the signs of ageing, activate fat burn and have a psychologically

stimulating effect. Cocoa based ingredients from the beans are used for making non-food products such as toothpaste made from cocoa tannin gel, charcoal from cocoa shells, antioxidant tablets, cocoa based lipstick and lip balm, oral care products, cocoa body scrub, cocoa bath gel, cocoa shower cream, cocoa cream for cracked heel, cocoa butter moisturising cream and cocoa shaving cream. So far, these innovated non-food products are ready for pre-commercialisation.

FUTURE OUTLOOK AND CHALLENGES

The Malaysian cocoa industry has been one of the major foreign exchange earners, increasing significantly from year 2000 onwards and registered an annual increase of 4.6 per cent from 2011 to RM5.57 billion in 2017. Within this period the increase was contributed by the expansion in downstream activities and moving towards value added chain and producing end products for exports. The cocoa sector contribution to the national gross domestic products (GDP) has registered an increase of 7.4 per cent estimated at RM1,566 million in 2017 from the previous year. The cocoa industry had spurred 28,000 employment opportunities for locals, with its chocolate and confectionery-based manufacturing factories expanding to 49 and with 211 local entrepreneurs operating across the country.

The future development of the cocoa industry in Malaysia depends on the sustainability of the industry to meet the challenges at the domestic as well as the international fronts. In order to be competitive in the globalised environment, the cocoa industry will have to be productive and efficient in every aspect as far as possible. Therefore, the future outlook for the cocoa sector in

achieving the target set for 2020 can be approached in three major strategic thrusts of *Re-engineering of Cocoa Production*, which emphasises on the development of smallholder sector as the backbone of the country's cocoa production; comprehensive transformation of both grindings and chocolate manufacturing sectors that covers the entire eco-system in the downstream sector including market, trade, investment and technical support; and finally driving the growth of entrepreneur development.

Therefore, to ensure the continuous development and to safeguard the future of the cocoa industry as a dynamic and competitive sector, the current issues and challenges faced by the cocoa industry need to be addressed. The increasing disparity in the imbalanced growth between local cocoa bean production and local cocoa grindings activity has resulted in the need for increasing importation of cocoa beans and this resulted in the outflow of foreign exchange amounting to billions of Ringgit Malaysia annually. There is a need to revive cocoa planting in Malaysia in order to become one of the most influential global players and to take the opportunity from the consistently growing global market. MCB will intensify its activities on cocoa cultivation expansion programmes to increase the productivity per unit area, and hence increase the domestic cocoa production. This could be done through encouraging the cocoa farmers to maintain and engage continuously in the cocoa cultivation by practicing GAP to achieve optimum level of productivity and transferring the modern technology in cocoa production to target groups under the Cocoa Cluster Development Programme, drastic intervention to encourage more youth to venture into cocoa farming and become the next generation of farmers to overcome the issues of ageing farmers,

encourage the involvement of the private sector in the cultivation of cocoa plantation, the expansion of cocoa area under the state-owned land and intensification of the R&D activities to address the need of the whole value chain of the cocoa industry.

In view of the more competitive environment, the development of the cocoa industry has to be technology driven in order to be sustainable. In order to sustain as one of the important centre for world cocoa processing and the vision to become *King of Chocolate in Asia*, the downstream activities have to expand; and in order to maximise the contribution of the cocoa industry to the Malaysian economy, the production of cocoa beans has to increase gradually in tandem with the growth of the downstream activities. On the other hand, the conducive business environment for cocoa downstream industry need to be enhanced and growth support for specific product segments such as origin-branded specialty cocoa (spicy, floral, nutty and fruity), organic cocoa (organic beans), compound chocolate and non-food products.

CONCLUSION

The Malaysian Cocoa Board as the guardian of the cocoa industry will continue its initiatives and transform the farming sector to make it more attractive for them to increase the supply of beans domestically. The Board's strategy to enhance productivity and increase production was to formulate and implement initiatives addressing the main causes for the lower production and productivity; and high labour cost. However, there are limitations in influencing prices, partly because Malaysia is not one of the major cocoa producing countries. High productivity per unit area can lower cost of production substantially, and subsequently

enhance the economic life of cocoa growers. Initiatives have been taken to transform the cocoa industry with technologies imply in research to target serious issues in cocoa productivity.

Presently, the biggest challenge for Malaysia to be competitive and sustain production of beans is to keep a balance with the growth of local grindings requirement. This is because sustainability of cocoa cultivation primarily depends on its productivity, efficiency and quality. The average cocoa production in smallholder per unit area is low despite hard work from the Malaysian Cocoa Board. Therefore we need people who can operate cocoa in a high-tech environment effectively as we know labour and agriculture inputs are no longer cheap in Malaysia. We need to boost cocoa productivity, modernise farming system and then make it more lucrative so that it will attract and sustain the interest of the youth in cocoa farming.

ACKNOWLEDGEMENTS

We would like to thank Saripah Bakar, Mohamed Helmi Shari, Nuraziawati Mat Yazik, Tee Yei Kheng, Dr. Rozita Osman, Dr. Ahmad Kamil Mohd Jaafar and Boney Muda for their contributions and comments in preparing this paper.

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