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Malaysian oil palm industry: Prospect and problem

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Abstract

The oil palm in Malaysia has seen significant progress. Started as an ornamental plant in Malaysia, it has turned into a huge industry. It is the fastest growing global demand as an input for food products, cosmetics, animal feed, bio-energy etc. Nonetheless, currently it is encountering a period of slow or less growing in terms of contributing to the gross national productivity due to natural as well as policy level factors. Adverse weather, ageing trees, and plant diseases are most prominent among the natural factors that are hindering the growth of the industry. On the other hand, restrictive labour and immigration policies of the government are not less responsible for the stagnant state of the industry. Oil palm production has brought about unlimited economic profits and currently it is an emerging economic sector in Malaysia. At present, Malaysia accounts for an overwhelming contribution to world's palm oil production and export which is 39% and 44%, respectively. A massive 17.73 million tons of palm oil and 2.13 tons of palm kernel oil have been produced from about 4.49 million hectares of land. Malaysia has a vital role to play in achieving the rising global need for oils and fats, as Malaysia is one of the major producer and exporter countries of palm oil and palm oil products. This study is an attempt to discuss the current scenario of oil palm cultivation prospects and practices for income generation. Describing several issues and consequences that have impact to the oil palm production is also within the purview of this study.

Key words: Prospect and problem, economic growth, oil palm development, oil palm production, impact of the oil palm, oil palm industry, vegetable oils, economic profits, current scenario, Malaysia.

Introduction

The oil palm tree (*Elaeis guineensis* Jacq), an indigenious crop cultivated in West Africa, is a leading tropical vegetable oil worldwide. In early 1870's the British brought the African oil palm to Malaysia as an ornamental plant. A Frenchman, Henri Fauconnier was responsible for the establishment of the first commercial oil palm planting in 1917 at Tennamaram Estate, Selangor [1].

Palm oil provides one of the leading vegetable oils produced globally, accounting for one-quarter of global consumption and approximately 60% of international trade in vegetable oils [2]. An estimated 74% of global palm oil usage is for food products and 24% is for industrial purposes [2-4] . The capacity of oil palm production in total has been jumped by 128% growing strongly as 58 m tons per year over the last decade due to be increased in global population and oil consumption [5]. Around 85% of the production is concentrated in Indonesia and Malaysia, but its use is rapidly spreading in whole world as China and India are the main importing countries, next to the EU (Table 1)[6]. For high demand in China and India as well as in European Union global demand for palm oil is soaring and expected to be double by 2020. In the effort to meet the global demand an increasing area occupied for palm oil production since 1990s resulting in an expansion of 43% in area and cultivation of approximately 15 million ha throughout the world[7-9]. Moreover, an increasing number of plantations have been established together with the expansion of the existing ones[10]. The projected per capita consumption and population growth reveal that by next few decades the consumption of edible vegetable oil will skyrocket (from 120 to 240 M t yr^{-1} by 2050) [11]. Therefore, it was doubled from 2.9 million hectares to 6.3 million hectares, respectively, followed by significant smallholder participation and creation of an estimated 1.7 to 3 million jobs [12].

Previous research indicated that oil palm production acts as a great booster in promoting socio-economic development of a nation [13-15]. Not surprisingly, it is the 4th largest contributor to the national economy of Malaysia and one of the major driving forces for the country's agro-industry. Since the inception of oil palm development plantation about a century ago, its contribution is substantial (71%) to the national agricultural land bank. Regulated by the Malaysian Palm Oil Board (MPOB), Malaysian palm oil industry (MPOI) (Fig. 1) is responsible for developing policies, guidelines and practices for its stakeholders. As of 2009, Malaysia had 4.7 million hectares of oil palm plantations and it has also received worldwide attention in a number of success stories dealing with poverty alleviation and the equitable distribution of wealth. Therefore, this study seeks to describe several existing issues that have significant impact to the oil palm production in Malaysia.

Table 1. World major consumers of PO (1000 t).

No.	Country	2005	2012	2013	Growth rate (%)
1	India	3,309	7,588	8,352	12.3
2	Indonesia	3,546	7,128	7,930	10.6
3	EU	4,368	5,700	6,515	5.1
4	China, P. R.	4,340	6,090	6,239	4.6
5	Malaysia	1,965	2,267	2,420	2.6
6	Pakistan	1,546	2,040	2,138	4.1
7	Nigeria	1,107	1,800	1,892	6.9
8	Thailand	654	1,381	1,470	10.7
9	USA	376	947	1,269	16.4
10	Colombia	454	929	940	9.5
11	CIS	315	733	777	12.0
12	Egypt	591	573	626	0.7
13	Japan	478	580	584	2.5
14	Turkey	431	452	563	3.4
15	Others	10,175	13,807	15,889	5.7
Total		33,655	52,015	57,604	7.0

Source: Oil World

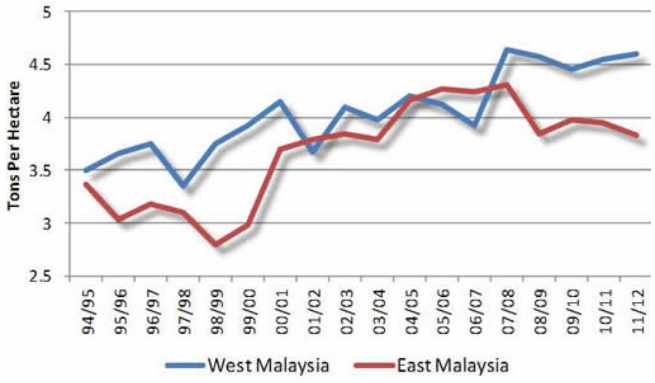

Figure 1. Palm oil production (Malaysian Palm Oil Board (MPOB)).

Development Scenario

The remarkable growth of palm industry though caused some environmental pollution, it did not take much to time restrain from creating adverse effects on the environment. Started with the plantation of an insignificant 400 ha in 1920, it reached to an astonishing increase of 54,000 ha by 1960. In subsequent years, oil palm has been cultivated in increasing areas by occupying virgin jungles as well as by converting areas that were used for cultivating rubber or other crops. Unlike fast upstream and downstream activities that resulted in considerable adverse impact on the environment, the oil palm industry despite its negative impact on the environment (e.g., open burning and polluting the water ways), it has made positive stride and turned friendly towards environment. Laws and regulations enacted to prohibit and control activities that caused environmental hazards while expanding oil palm plantation proved to be successful to reduce environmental pollution and to enhance environmental friendliness.

For developing countries that are notable as the producer, palm oil is celebrated as the new potential development to enter into the export market, job opportunities, rural livelihood development and national income generation [16]. However, palm oil development is highly contested. Moreover, despite promoting added value of palm oil for energy security, development and mitigating climate change, its development also accounts for negative impacts which resulted in reduced food availability [16].

Being a stakeholder of booming regional agribusiness and regardless of the location of its plantation, e.g., either in cleared forests or in croplands, oil palm has turned into South-East Asia's most economically important plantation crops [17]. Tropical weather and suitability of land have assisted Southeast Asia to reach to a leading position in oil palm production in the world [18, 19]. It is not surprising that in the economies of Indonesia and Malaysia, palm oil remains to be a top agro-industrial commodity [20]. Together these two largest palm producing countries yield 85% of the world's total production [21]. Moreover, oil palm contributes substantially both to the rural employment and to the economy of Malaysia by means of the plantations and by small-holder schemes, respectively [22]. As a whole, this regional trend of state-led development relied on oil palm cultivation as a main sector which is playing a major role to the economic development of the country as an important crop in the region, especially in Malaysia.

Historically, the abundant and fertile land of Southeast Asian states has been viewed as a rightful source of wealth to be exploited by the colonial rulers. Throughout mid-1990s the knowledge on forestry and agriculture gained during period of colonization, the newly independent Southeast Asian states employ them in the pursuit of nation-building and economic development [23]. These states formally considered farming and forestry as driving forces for uplifting their overall economic growth. They developed macro level policies towards forestry and agriculture and took steps to ensure that the overall macro level policy was conducive to the growth of the agricultural sector[24]. Besides, during the period of 1960s and 1970s, the abundance of pristine forests in the region caused logging turned out to be a major growth sector in the region [25]. However, the heedless clearing of these forests for timber led to a gradual reduction of pristine forest areas in the region which ultimately slowed the growth of the industry [26] and consequently, in the 1980's agribusiness received economic focus in the Southeast Asian states [25]. Hailed as the region's 'next economic miracle' [25], during 1990's the region saw a steady increase of annual agricultural output, a yearly 3.8% on an average [25]. The term 'agribusiness' springs from shift of farming as generating income for livelihood to farming as a business enterprise and coined as a popular term since the mid-1950s.[27]. No wonder, the burgeoning growth of agribusiness of Southeast Asia is drawn attracted by corporate entrepreneurs and agriculture in this region receives increasing corporate investment. Currently the term denotes an inclusive farming system which covers farming operations of both upstream and downstream manufacturing as well as distribution[27]. As a consequence of all these described above, existing logged lands gave into the pressure from flourishing agribusiness and thus these logged lands were converted into plantation and crop land in increasing number. Resource wealth and relatively cheap labour of Southeast Asia fostered production enclaves and thus export of primary agricultural products promoted in the 1990s [28]. Therefore, emergence of the region as important producers and

suppliers in the international market for agro-food was based on the exploitation of export-oriented agricultural products [27] around which Southeast Asian's economic strategies converged [29].

Most efficient among oil crops, palm oil is a major source of world's oil and fat among other 17 sources. Being the largest in terms of total production, it leads oils and fats trade and controls 57.7% of the export market share the overwhelming production capacity is almost 10, 6.9 and 6.3 times higher than that of soya bean, sunflower seed and rapeseed, respectively. Oil palm, unquestionably is the most efficient in terms of having the highest yield per hectare. Moreover, its reliable supply of fresh fruit bunches (FFB) throughout the year is hardly affected by the vagaries of the weather and other calamities compared to other vegetable oil crops.

Major Contemporary Issues

Despite enormous potential of palm oil industry in Malaysia, there are number of issues which are considered to have significant impact in the bid to its boastfulness. The issues discussed in the following sections include labour shortage, high competition from nearby countries, ageing trees, biodiversity, plant infections, carbon dioxide, hazard, deforestation, and local community problems demand adequate attention in order to pave the way for the sustainable development of palm oil industry in Malaysia.

Labour shortage: The number of workers employed in the oil palm plantation is insufficient and gives birth to complexities related to both economic and social factors despite the fact the Malaysian government has been devising development initiatives with multiple purposes for ensuring the growth of the plantation industry. The total labour pool, according to a 2012 report, is comprised of roughly 491,000 workers, a majority of them are foreign workers mostly from Indonesia, to look after approximately 675 million palm trees occupying 5.0 million hectares of land of which 4.3 million hectares of land is occupied by mature trees and the rest is occupied by immature ones. Land labour ratio in the plantation sector is 10.9: 1 ha (1 worker for 10.9 ha) [30]. Deficit in land labour ratio in recent years is reported to create negative impact in palm cultivations, especially in those plantations which rely on hand harvest for collecting FFB from the trees. A significant impact in per hectare yield is due to the shortage of labourers, mostly common in personnel areas. As a consequence, either FFB is left unharvest or collected FFBs could not be delivered to the mill in a timely manner, result in FFB rot in the trees or after collection, and ultimately, a reduction in the annual crop yield. Thus, an undue loss is visible in the chain of palm production caused by the unrecoverable fruits left in the tree mainly because of workers' deficit. Sarawak and Sabah, responsible for nearly half (45%) of the national production, incur a loss of 15 percent for fruits rotten in the trees, is estimated by SOPPOA to be roughly US$1.2 billion.

According to Indonesian embassy in Kuala Lumpur, 550,000 workers which is about 80 percent of Malaysia's palm oil workforce are Indonesians, rest of the Indians and others. Indonesian labour force receives higher priority in palm plants in Malaysia for their ability to easily communicate in Bahasa Malaysia compared to other nationalities working in this sector. Besides, they are also considered to be harder workers, and thereby, enjoy certain edge over their peers from other nations. The average income of the labor about 900 ringgit ($280) per month in Malaysia, up to about 2,000 ringgit, which is at least, 200 ringgit higher than in Indonesia, though the worker has to count in taxes and utilities in Malaysia while serving for the plants [31].

The existing insufficient labour pool for palm plantations though insufficient, comprised mostly of foreign work force, held to be responsible for creating social disturbance in Malaysia. Security issues pertinent with foreign labour force receive priority attention by Malaysian government. As a result, multi-purpose plans have been laid out by Malaysian government in order to curb the crimes committed by the undocumented foreign workers. It is thought that social related problems, e.g., drug abuse, increase of sex workers, sabotage, snatching, theft, robbery etc. are brought by foreign workers. However, PDRM report revealed that foreign workers are not responsible for most of the crimes committed in Malaysia – it is 10 to 15 per cent of the total crimes committed in Malaysia.

High competition from nearby countries: Since palm is considered to be a profitable oil crop, countries that have congenial weather for oil palm cultivation are also investing in this sector. Indonesia and Malaysia are turning out to be competitors because of their low cost of production. Since 2006 Indonesia is the highest producer of oil palm, which was previously occupied by Malaysia. When Malaysian government charged more duty on the shipment of crude palm oil, Indonesia reduced more than 50 percent export tax on this oil crop in 2011 [32]. Cheap supply of labour and availability of expansive land are also helping Indonesia to topple Malaysia in this sector. Brazil is also investing in this sector, especially in propitious Amazon forest, it is working to expand more than 850,000 hectares of land for palm cultivation along with the existing plantations.

Ageing tree population: Several studies conducted by government and non-government research organizations show that a substantial number of palm trees are ageing or on the process of ageing, and therefore, there are higher chances that oil palm production is likely to decrease if adequate steps are not taken to replant these ageing trees in a timely manner. Oil palm trees potentially produce economically viable volumes of FFB. With a lifespan of more than 30 years, palm trees are likely to yield an amount FFB which is capable of incurring profit when cultivated commercially. Peak yielding period for a palm tree is between the age of 9-18, and in the subsequent period, yielding capacity gradually decline (Fig. 2). It is estimated that currently a majority of Malaysia's total oil palm area is occupied by trees aged between 9-28+, while a significant 26 percent has crossed the pick yielding age. Government report shows that about 8 percent of the national crop area or palm trees in 365,000 hectares is currently 25-37 years old which is about 8 percent of the total crop area whereas a further 126,000 hectares of area has been predicted to be occupied by trees crossing peak yielding period. The increasing numbers of trees that are not suitable for the best harvest indicate an inevitable decline of national production in the future years.

A long-term plan has been developed in order to replace old trees with new high yielding varieties (HYV) on an ongoing basis. The newly developed cloned varieties are also expected to fill the deficit of older trees. Delay in replanting older cultivars will result in a bleak future of long-term deficit of having high yielding

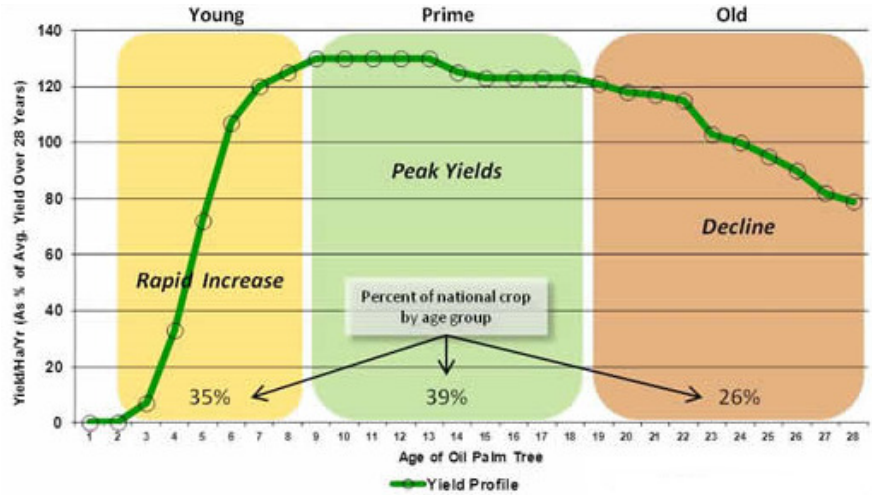

Figure 2. Oil palm age and yield profile [42] .

varieties. The government is investing a modest over US$135 million in 2013 to fuel a nationwide replanting program which targeted smallholder throughout the country. The government aims to provide financial grants to small producers which will cover replanting cost in the bid to replace 100,000 hectares per annum together with a monthly subsistence allowance of US$157 to growers of less than 2.5 hectares for a period of 2 years until the young trees are productive. Moreover, the private commercial palm oil companies are expected to replant another 100,000 hectares per annum, which will turn into a net 200,000 hectare replanting per annum. If this target is achieved, by 2018 Malaysia would be able to successfully address the impending danger related to slow growth, and ultimately, would reignite the national palm oil yield growth rate by 2020.

Biodiversity: Oil palm cultivation is a threat to the loss of biodiversity though the adverse effects it has had on the biodiversity is far less than other lower yielding vegetable oil crops. Cultivated as a monocrop, oil palm causes loss of biodiversity when native vegetation is replaced with it. However, during its productive the life span of around 25 years, palm plantations let grow other vegetations in the lower ground and maintains equilibrium of the environment by allowing wild animals and bird species in the plantation areas. As palm plantation requires less destruction and conversion of forests compared to its lower yielding oilseed peers, it is considered to have less negative effect on the loss of biodiversity.

Plant infections: Ganoderma, a soil borne fungus, is an increasing concern for those who operate plantations in Malaysia as it causes infection to oil palm trees. Ganoderma is a wood-decaying fungus which can affect different types of trees, including oil palm. A disease called basal stem rot (BSR) can be infected through Ganoderma. A drastic fall of the production of FFB is reported when infected by this fungus along with wilting or desiccation of leaves of palm trees. Another symptom of this fungal infection is that the exterior of the trunk forms conk-shaped mushroom bodies which also affect nearby soils and trees. Fungal threads caused by spores released from mushroom bodies grow over the roots of the oil palm tree and their tissue is penetrated by these threads. The fungus causes decay of palm trunk tissue when moves to the lower section of trunk near the soil line, increasing gradually in size and spreading high up at the center of the trunk.

Ganoderma is capable of causing significant yield losses that precedes the actual killing of a palm tree, while infectious spread through wind and water in increasing areas of a plantation can be caused by spores released from mushroom bodies. Despite the fact that BSR is likely to kill a majority of oil palm stands within 15 years and Ganoderma affected lands are recommended to be kept uncultivated for a good number of years not to let the fungus spread further, it is never followed as both individual and company enterprises invested heavily in their respective plantations and they are never willing to shy away from expected short-term profits.

Diseased trees are scattered and seen all around the country and their number is still not relatively high, comprised of nearly 4 percent of the total oil palm plantation area. Though the disease still has limited impact on present nation-wide total production, it is likely that it might further spread to a greater extent since no measure has yet been devised for the protection of these trees from the aforementioned disease. Nevertheless, BSR affected trees can be isolated in the plantations as possible means of letting the continuation of the harvest of FFB till they die [33]. It is evident that without introducing better practices in palm cultivation or discovering anti-fungal treatment for Ganoderma, the fungal disease, in ensuing years, can turn into a possible threat to a greater extent to the industry.

Forest fires and carbon dioxide: Oil palm plantations are major contributor to forest fires and periodic haze. Disturbance in humid tropical forests makes them more vulnerable to fire because of the drying effect of the opened canopy and greater amounts of dead woody debris [34, 35]. Drained peat land areas with degraded vegetation become extremely vulnerable to annual fires that further degrade these ecosystems [36]. Occasional but catastrophic fires on peat land can release immense quantities of carbon into the atmosphere from peat combustion [37, 38]. Oil palm good agriculture practice (OPGAP) allows zero burning in plantation, and since 1987 OPGAP follows Environmental Quality Act (EQA) 1974. The OPGAP, in its effort to pave the way for sustainability in oil palm cultivation, follows certain replanting processes: the oil palm trunks are chipped and the placement of fronds and residues in between rows for ensuring nutrients as a biomass mulch for replanted young plants.

Oil palm cultivation comprised of 16% of the total land mass of Malaysia, the total land mass being 32.86 million hectares, poses an insignificant threat to the environment. The palm plantation is also capable of storing carbon both above as well as below the ground. Mature palm trees play a significant role in balancing, fixing and accumulating carbon dioxide (CO_2), carbon and 100-120 tons of biomass per hectare, respectively. The greenhouse gas (GHG) emission through palm oil production is an indication that this industry emits low carbon, causing increased CO_2 loss and carbon emissions to the environment [39, 40]. Best practices implemented and savings in GMG emissions is an outcome of these best practices. To be sustainable, MPOB has been guiding

the industry to experiment of best practices and experimentation with new approaches and best for the industry has been guided by MOPB for the sake of sustainability.

Dealing hazard: Unexpected hazards, e.g., natural fires and other natural calamities such as floods, and the associated liabilities have potential adverse impacts on the growth of the industry as a whole. It is expected that measures such as implementing sustainable framework developed for palm oil industry, compliance and observing requirement schemes will curb the losses associated with different kinds of hazards [41]. Developing steps to prevent or reduce losses and introducing insurance schemes together with complying environmental, health and safety (EHS) management, and monitoring will create increased opportunities to reduce cost related to risks.

Deforestation: Forest removal is a major means of establishing and expansion of palm plantations. Generally, logging the land gives way for such plantations. Area expansion of oil palm accounts for a very small part of the total forest reserve depletion. Land usage by oil palm is one of the lowest in the world, 8.5 million ha, compared to a huge land usage for soybean, which is more than 58 million ha. Additionally, the increased expansion of palm plantation as well has insignificant negative impact on reserve forest depletion. Oil palm has the lowest land use compared with over 58 million ha of land used for soybean.

Sustainability: A number of mechanisms have been developed to make palm plantation and the industry sustainable as the existing use of enormous amount of fertilizers and pesticides indicate impending danger for further growth of the industry. Appropriate land use, land-use change and forestry (LULUCF) activities, good agricultural practice (GAP) for example that assists in recycling the nutrients through returning mill residues. Moreover, compared to other vegetable oil crops, efficient use of nutrients can be ensured in oil palm cultivation by using empty fruit bunches and by frond spreading. Besides, newly developed integrated pest management (IPM) methods infused with GAP is likely to usher in better sustainability in the palm plantations through bio pesticides like Metarhizzium fungi, Bt virus and Trichoderma to control Rhinocerous beetle grubs, bagworms and Ganoderma respectively. Barn owl has also proven to control rat in the plantations successfully.

Traceability: High proportion of chemical use increases the chance of degrading the quality of palm oil, and thereby, the necessity of using proportionately low use of chemicals has been underscored. Separated out as effluent with high proportion (95%) of water, the aqueous phase reveals even the slightest presence of pesticides while processing and sterilizing fresh fruit bunches is largely ignored, whereas residues of any pesticide is not found in the oil phase.

Local community: Though expanded palm plantations are responsible for the removal of the indigenous people from their native lands, the palm industry has significant contributions for rural employment through a number of means. Started as land scheme settlers, a good number of household members turned out to be trained professionals ultimately switched to other jobs, created a vacuum in the labor market and paved the way for potential recruitment of foreign laborers.

Conclusions

The Malaysian oil palm industry has significant impact on the national economy, especially on the agriculture sector, and it is the 4th largest contributor to the national economy. Around 60 % of international trade in vegetable oils whereas estimated 74 % of global palm oil usage is for food products and 24 % is for industrial purposes. Moreover, the oil palm industry is more eco-friendly compared to other related industries that produce oil crop. To overcome these discoursed obstacles, the exigency of suitable labor and immigration policies by offering more generous wages and medical/educational benefits to migrant laborers to be taken by the government has been underscored. Furthermore, companies are proposed to explore profit-sharing plans as an additional inducement to attract and keep a dedicated labor pool and more innovative mechanization can be able to reduce the labour dependency, increase productivity as well as improve the product quality. Besides, producing compost by the replantation of trees instead of burning can reduce haze problem. Research and development activities need to improvise continuous innovation efforts for sustaining and creating investment in Malaysia to find new opportunities, solutions and uses of oil palm and palm oil. Higher production, value addition and sustainability strategies are identified as vital to the oil palm industry.

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