

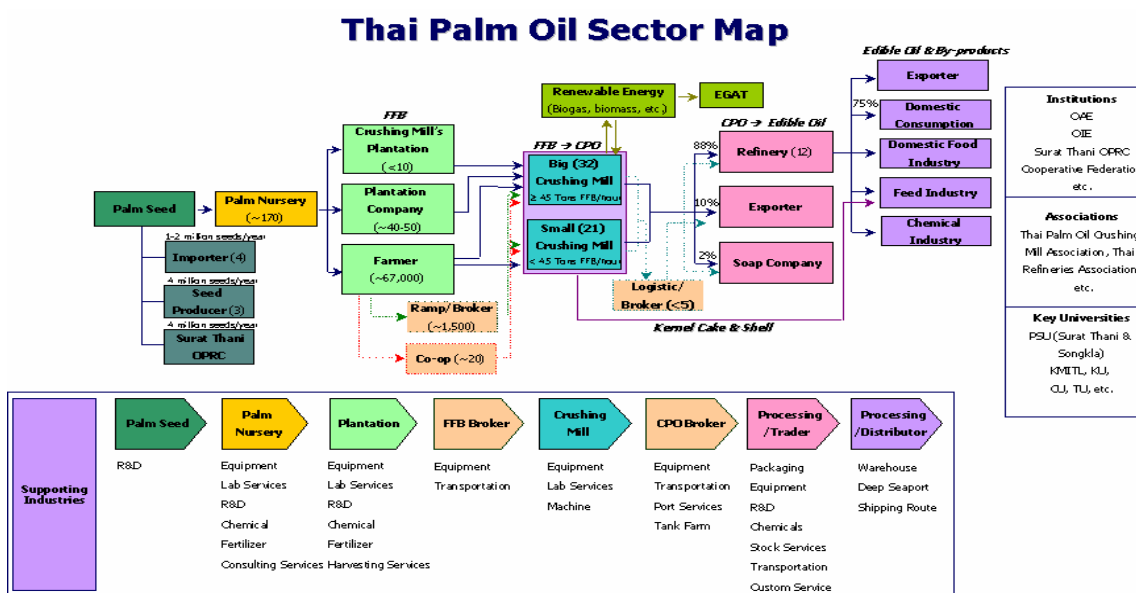
Sub-sector Strategy

Palm Oil Sub-sector

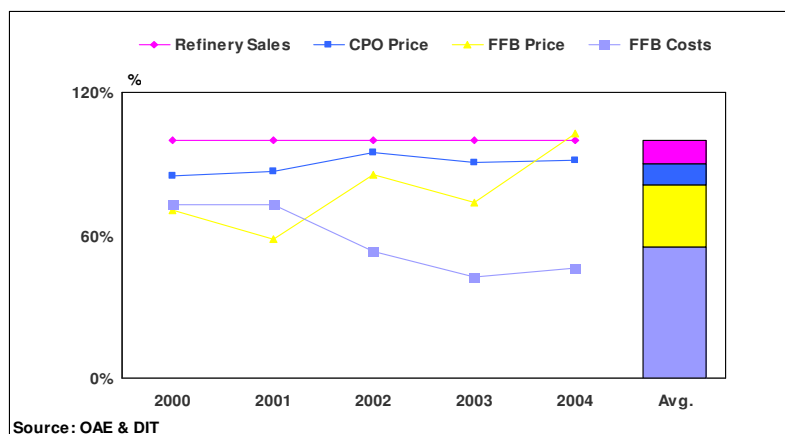
Importance of the Sector

Commercial exploitation of oil palm in Asia began around a hundred years ago, initially in Sumatra and spreading to Thailand in the '60s. In Thailand, oil palm is planted in the southern region, particularly in Krabi, Surat Thani and Chumporn. According to the Office of Agricultural Economics, the plantation area for oil palm has been growing at the compounded annual rate of 8% for the past five years and in 2003 comprised 1.8 million rai which yielded 4.9 million tons of fresh fruit bunches (FFB), providing livelihoods to 75,000 households. There are approximately 67,000 small-scale palm oil farms and 50-60 large-scale plantations, some of which are owned by crushing mills. Among plantations, the number of small farmers is approximately 96.5% covering about 72% of the whole planted area and accounting for 75% of Thai edible oil production. There are now 53 crushing mills and 12 palm oil refineries. In 2004, the production of Crude Palm Oil (CPO) was around 760,000 metric ton representing 14 billion Thai Baht (THB) in terms of value.

Figure 1: Thai Palm Oil Sector Map



From the above figure, the industry is composed of small number of refineries and crushing mills compared to a relatively large number of small-hold farms. This structure, which is very common in agro-industry, normally forces small farmers into a disadvantageous position in terms of bargaining power with their buyers. However, this is not the case in Thai palm oil industry at the moment. Due to the shortage of supplied FFB compared to increasing crushing mill capacity (crushing mill utilization is currently around 50% as the crushing capacity has increased more than 200% over the last three years), it is the small holders who were able to capture majority of added value in the form of higher FFB prices (figure 2).

Figure 2: Value Added Structure

For Thailand, the palm oil industry is very important to the Thai economy for at least two reasons. Firstly, palm oil is the major edible oil that is produced and consumed domestically. With palm oil, Thailand is self-sufficient in terms of edible oil and fat. Palm oil is also an important raw material for industrial manufacturing. Secondly, for the southern region, palm oil is the second most important crop after rubber and is a primary source of income and employment in rural areas for the present and will be in the future. More than 75,000 people are involved in the upstream industries which are mainly located in the south. Finally, in recent years, the Thai Government has promoted the extensive expansion of the palm oil plantations in order to support its bio diesel initiative.

From an industry's sector promotion perspective, the palm oil industry is an attractive choice for several reasons. Firstly, as it is explained below, the global palm oil industry has a very attractive long-term growth potential. Secondly, the sector is mainly comprised of SMEs and small holders, hence, any increase in sector's competitiveness will have a favourable impact on the large numbers of people. Finally, Thailand has some basic comparative advantages in oil palm cultivation and palm oil production. As compared to its main competitors, Thailand's palm oil industry is comprised of mostly small holder farms who can achieve much higher productivity than commercial plantations if they are willing to adopt intensive or precision farming methods like in Japan. In addition, Thailand's crushing mills close location to the grid allows them to easily tap into the grid and sell electricity for the additional income generation.

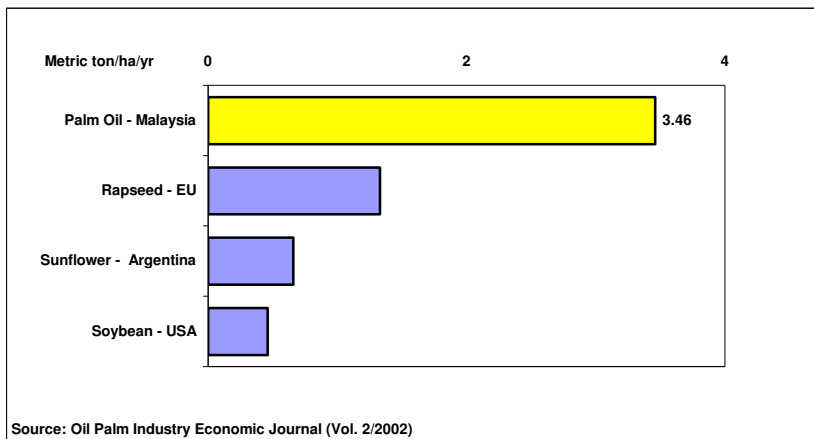
The Competitive Position/ Situation of Thailand

Currently, palm oil is the second most consumed vegetable oil globally with a current production of 32 million metric ton and the market share of 29 % (compare to 30% for soybean oil). It is also the most traded edible oil, with the global trade market share of 56%. Historically, palm oil has enjoyed the highest growth compared to other major vegetable oil products. Globally, the palm oil market has been growing at the rate of 8% compared to 4 % for the overall vegetable oil market. It is forecasted that in the next decade, palm oil will overtake soybean oil as the most consumed vegetable oil globally. In addition, palm oil has also been the cheapest. In Thailand, the palm oil market has been growing at the healthy compounded annual rate of 11% for the past five years (USDA).

Palm oil's higher than average growth comes from its fundamentally superior position compare to other substitute vegetable oils and fats: it is more economic, versatile, healthy and

environmental friendly. From an eco-efficiency perspective, palm oil has the highest crop productivity (see figure 3), the lowest requirements for fertiliser and pesticides and the most positive contribution to the climate change through efficient sequestration of carbon. In Thailand, the expansion of palm oil plantation areas will be mainly on idle lands and old rubber plantations.

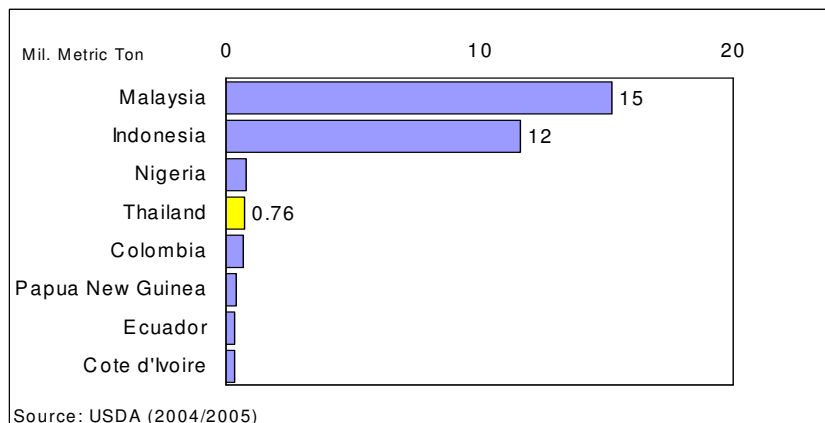
Figure 3: Productivity Comparison



In terms of global palm oil supply, Malaysia is the world's market leader with an annual production of around 15 million metric tons followed by Indonesia with an annual production of 12 million metric tons (figure 4). However, it's been forecasted that in the next decade Indonesia will overtake Malaysia as the world largest producer. Thailand is the distant fourth biggest palm oil producer with the annual production of 0.76 million metric tons, far behind its regional neighbours. However, palm oil has been identified as one of the main products to be reformed and promoted by the Thai government plan. According to Palm Oil Strategy from the Office of Agricultural Economics (OAE), Thailand's palm oil plantation area will be expanded from the current 1.8 mln rai to 7 mln rai in 2019, of which 4.3 rai will be converted from the rubber plantations and 0.7 rai coming from the abandoned fields. Malaysia on the other hand, has already achieved its maximum plantation area potential which currently stands at 24 mln rai.

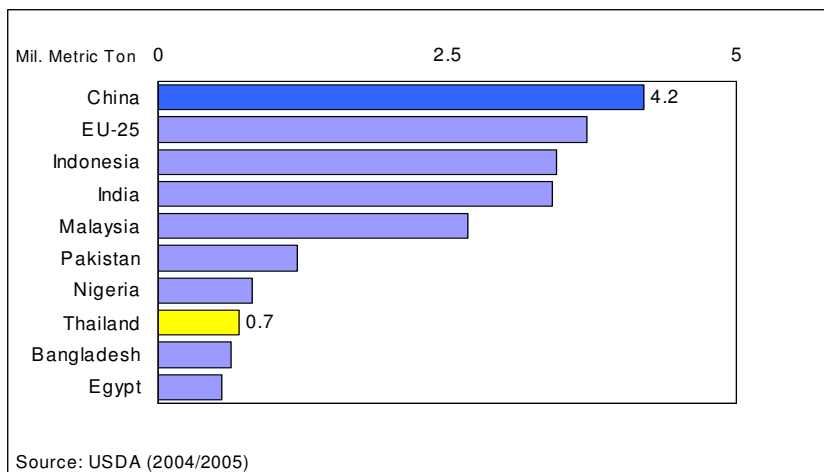
In terms of the export, Malaysia is still the biggest exporter with a share of around 57% followed by Indonesia with the share of 36%. Most of Thailand's palm oil production is consumed domestically with export representing only 17 % of total production, and was mainly done in an attempt to control the domestic stock levels.

Figure 4: Major Palm Oil Producers



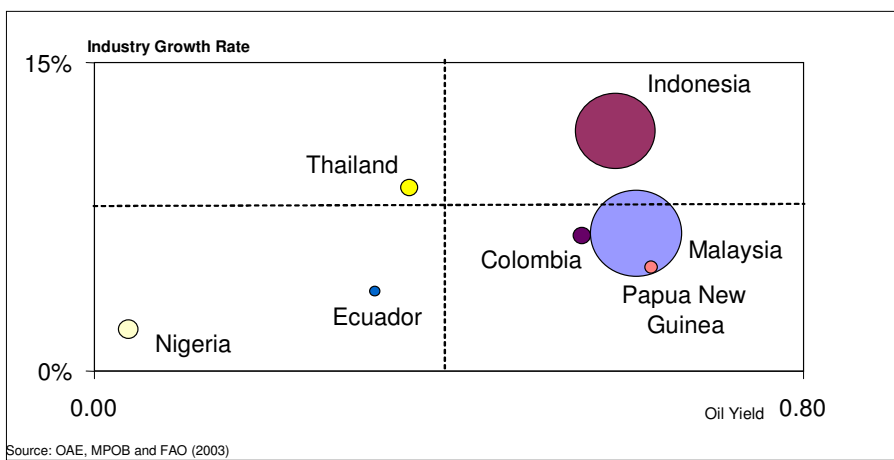
In terms of consumption, China is the largest market with the annual consumption of around 4.2 million metric ton followed by EU, Indonesia and India (figure 5). In terms of import, China is the largest market followed by EU and India.

Figure 5: Palm Oil Consumption



The overall competitive position of the palm oil producing countries can be seen in the figure 6. Although Thailand has an average industry growth rate, oil yield, which is the amount of crude palm oil (in kg) produced per one rai of palm trees plantation, is significantly lower than the industry averages compared to the oil yields of the two major palm oil producing countries as Malaysia and Indonesia. This gap represents an imminent danger to the domestic palm oil industry from the cheaper imports and has to be addressed in order for Thailand to be competitive enough to stay in the game. This productivity differential has led to an increasing amount of crude palm oil being smuggled into Thailand from Malaysia. Only after addressing this productivity gap, should we start considering developing some sources of sustainable competitive advantage.

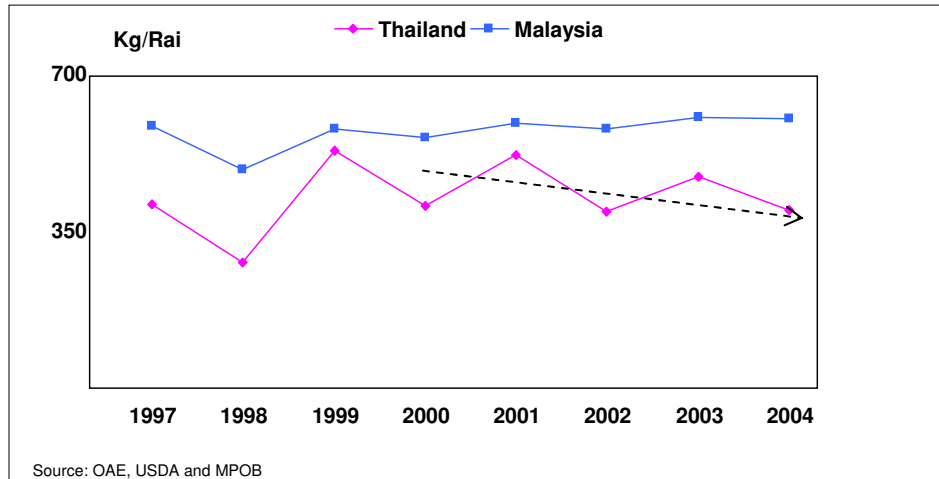
Figure 6: Competitive Position



$$\text{Oil Yield (kg/rai)} = \text{FFB Yield (ton/rai)} \times \% \text{ Oil Extraction Rate (OER)}$$

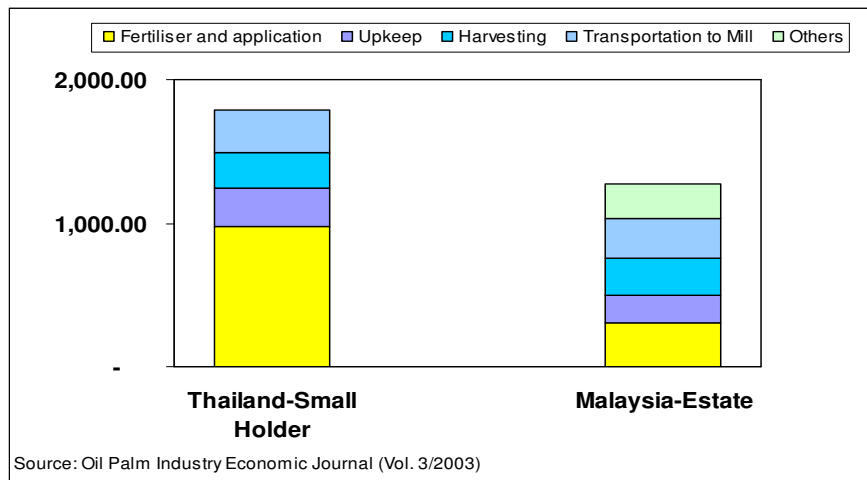
Thailand's oil yield has been on average 33% lower than Malaysia's for the past 8 years (figure 7). This is a result of lower levels of both FFB Yields, caused by lower productivity at the farm level, and Oil Extraction Rates, caused by lower FFB quality. In addition, the trend is not so promising. As it can be seen from the figure below, the oil yield gap is widening. In 2004, the Thailand's oil yield was only 393 kg/rai compared to 597 kg/rai in Malaysia. For % OER and FFB yield, Thailand's 2004 figures were only 15% and 2.7 metric ton/rai compared to 20% and 3 metric ton/rai in Malaysia.

Figure 7: Oil Yield Comparison (Kg-CPO/ rai)



As it can be seen from figure 8, Thailand's FFB production costs per metric ton are 29% higher than Malaysia's. This not only comes from a higher absolute price of fertiliser but also from the lower average FFB yield even with the additional fertilizer costs.

Figure 8: FFB Production Cost Comparison

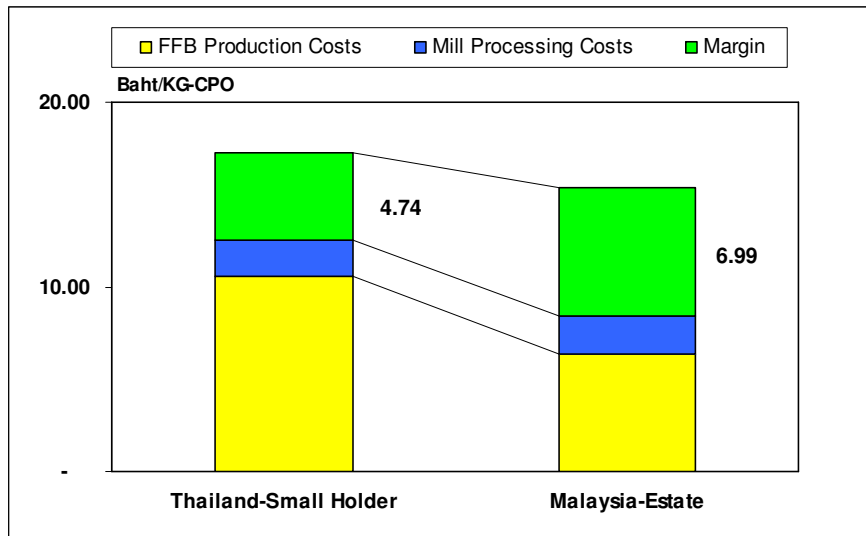


As a result of the lower production costs, even when the average price of Malaysian crude palm oil is 12% lower, the margins enjoyed by Malaysian crushing mills are around 47% higher compared to Thailand (figure 9).

As seen from the cost and price comparisons, the productivity gap between Thailand and its neighbours has to be improved in order for the sector to stay competitive. Whatever the long

term strategy of the industry, the issue of operational effectiveness has to be addressed first and treated as a prerequisite for a successful competitiveness strategy.

Figure 9: Crude Palm Oil Production Cost and Margin Comparison



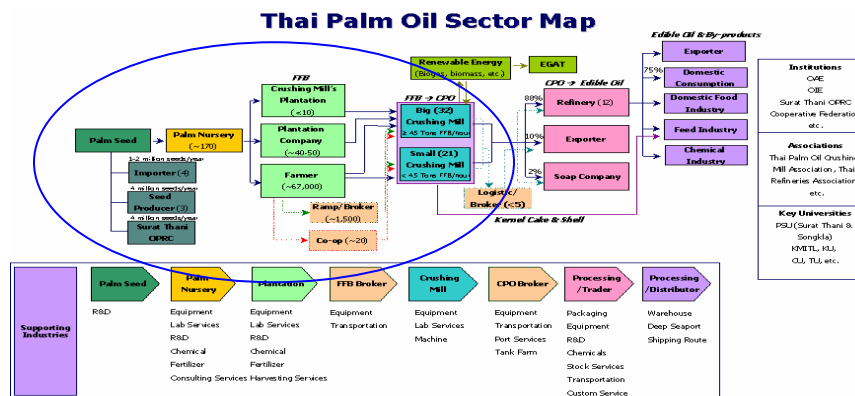
Sector Strategy

As seen from the above section, Thailand's palm oil industry is too small to compete on the economies of scale even when it expands to its full potential. Hence, the option for Thailand is to utilise a focus strategy whether in terms of cost or differentiation. It seems that the Thai government is focusing on moving the industry towards the specialty route. The government recently initiated the promotion of bio diesel production from palm oil. Another study on promoting Surat Thani as an oil palm cluster/city was conducted. The study has also suggested the establishment of downstream oleochemical industries as a part of this project. However, establishing a viable bio-diesel industry is not feasible right now since the current domestic prices of CPO, the main input for bio-diesel production are 12% higher than imports.

For GTZ, as discussed in the above section, the immediate focus should be on **improving the overall sector productivity** in order to be competitive enough to stay in the game when trade barriers begin being removed. In terms of the value chain, the focus should be in the upstream industry between nurseries and crushing mills (figure 10). This is where the productivity gap is the widest and where the interdependence in the value chain is the greatest. It is believed that these issues can be addressed within the project timeframe.

Another issue that has been widely discussed is the establishment of a kind of apex organisation for the industry such as Malaysia Palm Oil Board. This idea has been championed by several leading industry participants both in public and private sector; however, it has not been implemented.

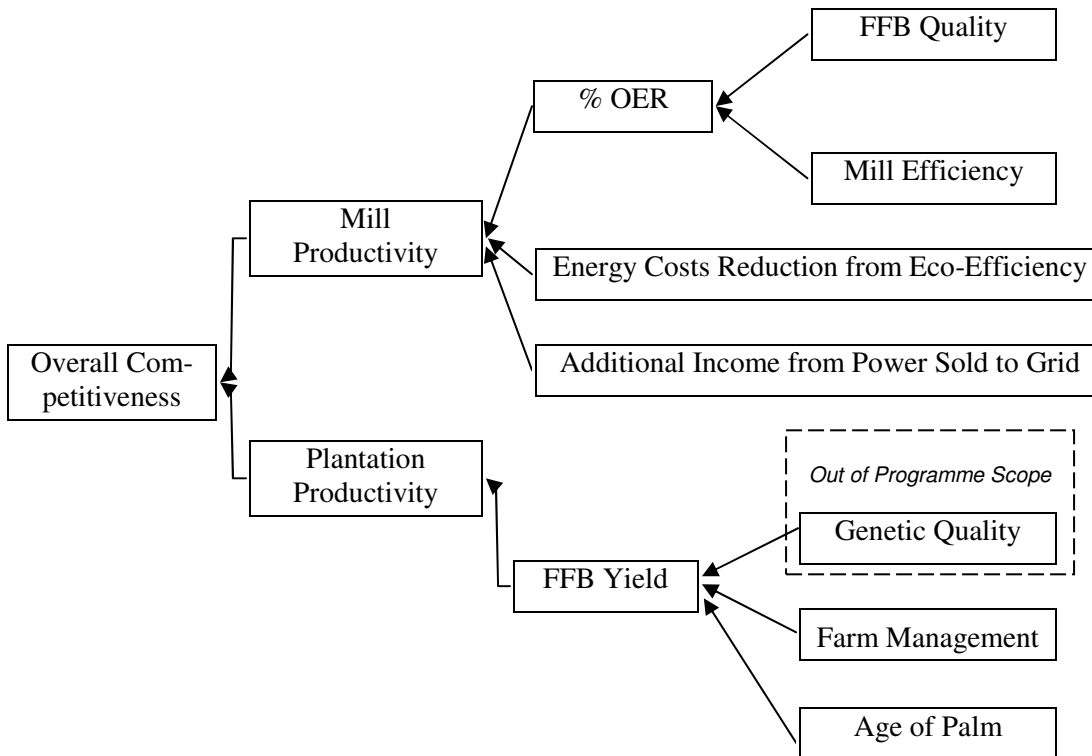
Figure 11: Focus Area for Implementation



Programme Focus

Specifically, the programme will focus on two major issues which are related to productivity and eco-efficiency. In terms of productivity, the focal point will be on improving oil yields which can be achieved by increasing % OER and FFB yield. % OER can be increased by improving quality of the fruit and mill extraction efficiency. FFB yield can be increased by improving genetic quality of planting material, age distribution of the plantation and farm management techniques. As a result, increase in productivity will increase business performance by reducing costs and improving margins.

Figure 11: Programme Issue Diagram



For % OER, the programme will focus on improving FFB quality in terms of reducing unripe and loose fruit used in extraction. Although improvement in the genetic planting material will eventually have a significant impact on increasing oil content in the bunch, this is a very long-term issue that is well over the time frame of the programme. Hence, the interventions will focus on improving the quality of FFB by facilitating the adoption of appropriate sourcing practices for crushing mills and establishment of stronger linkages between crushing mills and farmers. In this component, the short-term strategy is to make bio-mass energy production more commonly feasible thereby improving mill efficiency.

For FFB yields, the focus will be on improving farm management practices and creating financial products that facilitate the replanting programme for poor quality and old palm. At small plantations, proper farm management is more an exception than a rule. Even with the good genetic material, if the farm is not properly managed, the yield will be very low. Hence, several programme interventions will be focused on facilitating the transfer of proper farm management practices and upgrading the necessary business services, like financial assistance.

Another major issue to be dealt with is the environmental aspect of the palm oil industry, and specifically, the issue of biomass. In the crushing process, palm oil only accounts for around 20% of the total bunch weight. The rest is a solid and liquid residue in the form of fibre, shells, empty fruit bunches and waste water. Furthermore, when compared to the total biomass of the palm tree, palm oil accounts for less than 10 %. Hence, the biomass utilisation issue is uniquely critical to the palm oil industry. One of Thailand's competitive advantages is the location of the crushing mills close to the grid which makes the process of selling the additional energy generated in the crushing process to the Thai electric authority much easier than in other countries.

Hence, any improvement in eco-efficiency of the industry will improve the business performance in terms of lower costs and/or additional income. The interventions will focus on technology transfer, management information system, mill efficiency benchmarking and implementation of best practices in energy conservation.

Interventions

As seen in the above section, the programme will focus on improving productivity and eco-efficiency. In order to improve the competitiveness of the sector, a series of interventions have been designed and partly implemented to address the related competitive issues. This can be seen in the following section.

Completed Interventions

- **Study Tour on Biomass Technology to Germany:** This intervention was aimed to improve the eco-efficiency of crushing mills by introducing crushing mills to new innovative technologies and practices. The programme worked with Palm Oil Crushing Mills Association to organise a study tour to Germany. The main objectives of a study tour were to gain a first-hand practical experience from state of the art biomass energy projects in Germany, to get an overview of the technical, organisational and financial requirements of biomass energy projects and to establish contacts with suppliers, project developers and information providers.

- **Seminar on Biomass Energy for Thai Palm Oil Industry:** The seminar was jointly organized by the programme, Palm Oil Crushing Mills Association and the Department of Alternative Energy Development and Efficiency (DEDE) in order to create awareness of the potential of biomass energy and, at the same time, to introduce modern biomass-related power generation technology to the crushing mills. The suppliers of combustion technology for solid mass as well as turbine and gas engine technologies from Germany have made their presentation to the crushing mills. This intervention was focused on the adoption of new technologies that could improve the eco-efficiency of the sector.

Ongoing Interventions

- **Energy Policy Proposal:** The right policy framework is important to encourage conversion of biomass residues from waste to energy and to improve the overall efficiency of the production process. The right policy framework includes attractive feed-in tariffs (price paid to mills by provincial electricity authority for additional electricity generated), practical, not cumbersome application procedures for selling electricity to grid, etc. The government should also be aware of the impact of the different alternative energy policy measures on the economic, environmental, and social aspects of the community and the country as a whole. The appropriate policy should stimulate the broader involvement of the industry, technology and other service providers in the bio-energy generation. Currently, only 3-4 mills are involved in selling energy to the grid. The strategy of the project is to bring the stakeholders together and to stimulate a supportive environment for appropriate policies development.
- **Eco-efficiency Benchmarking in the Palm Oil Industry:** The Programme is working with selected quality consultants to promote higher productivity in the crushing mills. Benchmarking activities were introduced to the palm oil crushing mills as a management tool to improve efficiency in energy management. 17 out of 34 wet-processing palm oil mills are participating in the activities. The gap between the current performance of each mill and the best performance or the benchmark shall give motivation for the mills to implement improvement measures. A Best Practice Guide is under preparation to provide the guidelines to the mills on more efficient biomass and energy utilization, hence, enabling them to reduce their energy costs and increase their income from selling excess power to the grid.
- **Management Information System (MIS) for Industrial Pollution Prevention and Control Project:** By utilising a specially designed MIS application, this intervention aims to improve the eco-efficiency of the crushing mills as well as to provide the necessary information for the pollution prevention and control activities of the government. The system will have two major components. The first component is the MIS system that will be installed at the crushing mills. This system will help the crushing mills to improve their eco-efficiency performance and will send the required information to the central system. To support the implementation, maintenance and improvement of the system at the crushing mills, the specialised MIS consultancy services will also be developed. The second component is the central MIS system at the Department of Industrial Works. This system will be specially designed for the enforcement activities. In addition, some part of the MIS system can also be accessible by public in order to facilitate the policy dialogue.
- **Promotion of Embedded Extension Services:** The aim of this intervention is to provide sustainable training on farm management, including fertilizer application, harvesting techniques, general upkeeping, to the small hold farmers paid by the crushing mills. In re-

turn, the mills are expected to get the steady supply of the high quality FFB. The programme also works with Prince of Songkhla University (PSU) to develop the farmer-friendly training programme which includes the newly designed structured learning experience (SLE) element. PSU will also act as a local training service provider. At this stage, the programme is working with two crushing mills with outreach to 2,000 farmers as pilot cases. If this model is proved to be successful and the participating mills will get higher benefits than the costs paid, the other mills is likely to follow whether providing training to farmers by themselves, using PSU or using other service providers. Another factor that will increase the potential outreach of this intervention is spreading information from trained farmers to their neighbours by word of mouth since this is one of the major ways Thai farmers get their information.

- **Soil and Leaf Analysis Services:** The soil and leaf analysis is an important service for optimising the FFB yield, however, this service is not widely available. The cost is also high and the accuracy of results is still in doubts. The Programme will work with Vichitbhan Palm Oil to upgrade their laboratory to be a dedicated, accurate and costs effective analysis facility for Thai palm oil industry. The programme will also improve their capacity to deliver quality fertiliser recommendation. In addition, the programme will engage in several service demand stimulating activities in order to develop stronger market for the service.
- **Building Mill-to-Farmer Service Relationships:** The Programme will work with the Palm Oil Crushing Mills Association and leading organisations in Malaysia to organise the study tour to Malaysia. The study tour will be organised as a value added service provided by the association to its members. The main objective of the tour is to identify and study the palm oil industry's best practices in the areas of small holder relationship management, energy efficiency and biomass utilisation. The knowledge gained from the trip could be adapted and applied locally to improve the energy efficiency and % OER. In addition, the association will gain experience in organising the trip and will be able to provide similar services in the future.

Valid Intervention Ideas

- **Farmers Study Tour to Malaysia:** The Programme will work with Palm Oil Crushing Mills Association, selected crushing mills and leading organisation in Malaysia to organise a study tour to Malaysia. The aim is to organise the tour for farmers paid by the sponsoring mills. The main objective of the tour is to identify and study the oil palm plantation management best practices starting from seedling selection to harvesting technique. The knowledge gains from the trip could be adapted and applied locally to improve the FFB yields.
- **Univanich Field Day – Promoting Improved Seedling Selection and Replanting Practices:** Working with the programme, Univanich, the largest seeds producer in Thailand, will host an open field day on its own research and trial areas that will demonstrate to attendees the benefits of high quality genetic materials as well as good replanting practices and young palm management. Farmers will greatly benefit from this programme since these factors will have a significant impact on FFB yields in the maturing stage. At the same time, Univanich will likely to benefit from higher demand on their high quality seeds.

Raw Intervention Ideas

- **FFB Purchasing Practice:** The programme will work with Palm Oil Crushing Mills Association, selected crushing mills, ramps, small holders and other stakeholders to develop and facilitate the adoption of new purchasing practices that give enough incentives to encourage better quality FFB and discourage the supply of low quality FFB by raising awareness of the magnitude of FFB quality on crushing mill margins. This intervention will lead to an improvement in the % OER as well as establishing stronger linkages amongst the parties.
- **Establishment of a Private Farm Management Company:** The Programme will work with the private sector to develop a business model and facilitate the establishment of a commercial plantation management company. The company will provide full range of services to the small holders starting from plantation management service, harvesting, logistics and the supply arrangement with crushing mills. The company will be paid a fee both by farmers and the crushing mills based on a fix percentage of the FFB sold and a bonus when the FFB yields improved. Farmers will still own the lands, pay for the input supplies and take the selling price risk. By utilising proper management techniques, the FFB yields and the quality of harvested FFB can be improved which in turn will increase the revenue of both farmers and crushing mills. The fee for the management company will be partly paid by this gain.
- **Access to Special Credit for Replanting Programme:** The Programme will work with the Bank for Agriculture and Agricultural Co-operatives (BAAC) to develop suitable financial products for small farmers to be able to replant old palm trees which currently comprise 20% of all palms, as well as have access to quality seedlings. By replanting poor quality and old palms, FFB yields will be increased.
- **Establishment of Pilot Irrigated Farms:** The FFB Yields can be improved with irrigation. Hence, in the area with high annual water deficit and available water sources, the irrigation system should be utilised. The Programme will work with selected small holders, private consultants and irrigation system suppliers to conduct a feasibility study for establishment of commercially irrigated plantations in areas that water sources are readily available. These pilot farms will be used as a model for further development.

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