

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

The palm oil plantation industry in Malaysia has been striving to make production sustainable but land issues have been its consistent bane for the last few decades. The industry stakeholders have set up various schemes of sustainability for palm oil, but none seem to meet the ever-changing sustainability demands by different consumer groups. This study entitled “Determinants for the Sustainable Management of the Oil Palm Plantation Industry in Malaysia” was designed to answer the following questions: Can all oil palm plantations in Malaysia be made sustainable? Is the oil palm sustainability debate driven by perception? Does perception play a major role in sustainable criteria setting? How does productivity relate to sustainability?

How could social, economic and environmental values be incorporated into sustainable practices for the industry? Can all the values from the social, economic and environmental variables of sustainable agriculture be used by all decision makers to get the best output from their land management practices within their industry?

To answer these questions, the following objectives were identified in Chapter 1:

1. To *review the framework* of palm oil sustainability and apply it to the development of oil palm plantations;
2. To *review the perception trends* in oil palm plantation development and consider their implications;

3. To *analyse and relate the economic, social and environmental variables* that are important for palm oil production to desired production practices; and
4. To *derive the key variables* for establishing the measurement of sustainable land resource management in the oil palm sector.

This final chapter is derived from all the previous chapters, but especially from the three analytical processes that were carried out, which cover three main areas:

- a. Perception Analysis and Survey: Key Issues and Findings;
- b. Oil Palm Variable Analysis: Key Issues and Findings ; and
- c. Oil Palm Variable Statistical Analysis: Key Issues and Findings.

7.2 The Framework and Sustainability Analysis of the Oil Palm Industry

Agriculture must be sustainably managed to help meet the nutritional needs of the growing world population. As palm oil is the cheapest of the edible fats, with the highest land productivity, it plays a major role in meeting this global demand for food. Consequently, meeting sustainability requirements are not a matter of choice, and the gaps and controversies in sustainability related issues need to be addressed and not ignored.

The premise on which sustainability science complements the Neo-Malthusian theory is as follows: Global food production is a linear curve that will eventually be crossed by the population curve, which is exponential. As demand for food keeps increasing through population pressure and agricultural systems respond with the over-production of food, and demand is fuelled further by growing markets, eventually the Earth will not

be able to sustain this ever-increasing demand on its capacity, and so a “crash” will occur in the system.

Sustainable management is the way forward to prevent the “crash” predicted by the Neo- Malthusian.

7.3 The Main Gaps and Controversies Concerning the Sustainability of the Oil Palm Industry

Based on a review of journals, reports and also personal communications with industry members, various controversies and gaps concerning the sustainability of the oil palm industry have been identified. The main controversies and gaps found are:

- The Roundtable Concept: The idea of managing the sustainability concerns about the palm oil industry through stakeholder agreement is an excellent concept. However, each stakeholder group needs to have their views heard and their concerns met adequately. Otherwise, the roundtable only serves as a vehicle to be misused by stakeholders who are more vocal or which have greater financial resources. The RSPO, ISPO, ISCC and other efforts to promote sustainable palm oil should be supported by all the players in the supply chain for these initiatives to move forward.
- Future Sustainability Requirements: Most of the requirements used are based on principles and criteria adopted by stakeholder groups, but there are significant differences between the measurements prescribed and those accepted by

industry players. This is especially true with regards to soil management, issues relating to greenhouse gas management. There are also differences in views about river and watershed management within and near plantations. All these requirements are necessary for sustainability, and the industries need to gear up to address these gaps between the requirements and their practices.

- Scientific Tools and International Standards: Scientific tools come with assumptions and limitations, so these parameters must be accounted for fairly in all calculations, and not be used for manipulation of outcomes. International standards must be adapted for each locality where they are used. They cannot be adopted “wholesale” as discrepancies due to local conditions may become an issue later.
- Lack of Data for Sustainability Challenges and Empirical Values for Sustainability Measurement: Even though sustainability science has been propagated for more than two decades, and the sustainability drive within the palm oil industry has been going on for more than a decade, there are still many crucial deficiencies in the measurement regime and most criteria are based on verbal discourses. Most important of all, there is still no acceptable index for sustainability that has been set up for the industry.
- Understanding Tropical Biodiversity: For sustainability criteria to be relevant to tropical ecosystems, the scientific tools and biodiversity database/ information that are used, as well as the policy outcomes that are sought, must suit the climatic conditions of the tropics. Overstating its fragility or the expected loss of biodiversity just creates unnecessary resistance from those who are already

working within the tropical zone to optimise the balance between development and conservation. On the other hand, underestimating the climatic changes that could occur also puts all stakeholders in danger of losing the biodiversity forever.

- Biofuel Production: The debate on the use of palm oil for fuel has been going on for a while, and now the industry players have designed scientific means for harvesting secondary oils from the empty fresh fruit bunch and other oil palm biomass. With this development, the biofuel market can be advanced without the “battle for food” being an issue.
- The Economic Crisis and the Oil Palm Industry: The oil palm crop is a perennial crop that can be harvested for about 30 years. The global economic shifts and financial crises have implications for the price of palm oil, but do not affect the management of the crop and daily production of the FFB. The industry players have however created enough downstream activities to keep the palm oil industry robust during the times of economic volatility.
- Carbon Trading for the Palm Oil Industry: This avenue for more income is a good add-on for the palm oil industry, but there are still many steps that need to be taken towards establishing the trade, and many processes need to be ironed out. These include developing the pathway maps and measuring the carbon content of all the activities concerned.

- The Role of Perception: Until now, even though perception has been the main driver behind the sustainability debates, perception itself has yet to be gauged well or a framework for the management of perception-based criteria set up.

The gist of the issues discussed above is presented in *Figure 2:7*.

Based on this analysis, stakeholders' perceptions were assessed through surveys, and the variables that they indicated as the most important were used to develop the list of variables that are important to the oil palm industry in Malaysia.

7.4 Perception Survey: Key Issues – Stakeholder Groups

Perceptions of the industry expressed by the media, NGOs and social groups indicate that oil palm cultivation is considered a crop that will never be sustainable, and so its overall production should be reduced. This study reviewed perception trends concerning oil palm plantations, and analysed the related variables (economic, social and environmental) that are important for palm oil production in Malaysia. The stakeholder groups that were deemed relevant and were important to the perception survey were:

- a. Growers
- b. Traders and Manufacturers
- c. NGOs
- d. Media

Other groups, which include consumers and retailers, were not addressed in this evaluation, as the main focus was on the determinants related to oil palm plantation activities and these groups were thought to be too far removed to impact the plantation

industry, apart from giving their opinions based on information gathered from the media. Moreover, the overall opinion of the media was already included in the survey.

One of the key points about this survey is that the stakeholders groups are different in size and structure from one another. Both the traders/manufacturers and the growers/local community are very large in numbers compared to the media/press or the NGOs. However, when it comes to outreach, the last two speak louder through press and strategic communication outputs. Also, the general perception received from the press and internet-based media can be quite different from that expressed by members of the stakeholders' group when they are approached individually.

With regards to the differences in perception among Malaysian, Asian and EU/USA respondents, the numbers of the others interviewed, apart from the Malaysians, were too small compared to the total of 742 respondents for relevant inferences to be made from their responses.

7.5 Perception Survey: Key Findings – Important Variables for the Oil Palm Industry

The survey of the 742 respondents from all the stakeholder groups gave rise to the conclusion that the most important variable for this agricultural produce is the palm oil price, followed by the total planted area for the crop. This perception did not differ for any of the stakeholder groups surveyed.

Amongst traders and manufacturers, for the environmental sector, deforestation and pollution are most important variables. For the economic sector, it was palm oil price, and for the social sector, cultural matters take precedence. Among the Growers, the

variables of importance in the environmental sector were deforestation and pollution, while the economic variables were land price and palm oil price. The most important variable in the social sector was labour matters.

Among the NGOs, the variables of importance in the environmental sector were water balance and deforestation. Important economic variables were the palm oil price and labour cost. Among the social variables, land claims and cultural matters take priority. For the Media, the most important environmental variable was deforestation, while the top economic variable was palm oil price and the social variable was cultural matters.

7.6 Perception Survey: Key Findings – Perception Weights for Sustainability Issues and Land Matters

Identification of Issues – Sectorial Awareness in the Palm Oil Industry: Through the questionnaire-based interviews with stakeholders to understand their perceptions of environmental issues, it was seen that there was general agreement to all statements made. This may be due to a high level of understanding about the issues among all the stakeholder groups.

Identification of Issues – Land-related matters in the palm oil industry: When the stakeholders were interviewed using the questionnaire to understand their perceptions of land-related matters, it was found that there was general agreement to all statements made. Again, this may be due to a high level of understanding of the issues among all the stakeholder groups.

7.7 Perception Survey: Main Findings and Its Relevance

All oil palm industry stakeholders regard the same land use issues as important. Environmental, economic and social variables are important to different stakeholder groups. The stakeholders state that their companies are doing enough in the sustainability area. They are also aware of a number of issues that arise in sustainability or land matters and take the appropriate decisions.

Their stated behaviour and perceptions however do not tally with the views found in the media, literature and reports of third parties. Hence a gap exists between what the industry perceives and what is actually required for sustainability in managing the industry throughout the palm oil life cycle.

7.8 Appropriate Inferences and Relevant Implications of the Perception Survey

There are gaps between what the industry perceives, what is actually required for sustainability and what is propagated in the media. Awareness raising is necessary for a reality check among all the stakeholders. The media view, if skewed, should be corrected with strategic communication output via research and government outreach.

The perception issues are linked with the lack of measurable variables for sustainability and the emergence of variables that were not considered important previously. The perception issues and history of the industry are the key determinants now for oil palm's lack of sustainability and there are obvious gaps between what the industry perceives as important and the international media's perception of the industry.

7.9 Oil Palm Variable Analysis and Key Issues – Production Trend

The trend in CPO production has been the main thrust of this whole industry. From all aspects, it can be observed that palm oil production has plateaued and has not increased very much in the last few years. Surprisingly, the introduction of new technology, further mechanization in the plantations and introduction new high yielding clones to the plantations have not increased Malaysia's productivity, even with the new advancement in oil palm breeding technology which has shown that a palm oil yield of 7.7 tonnes per hectare per year is possible.

7.10 Oil Palm Variable Analysis and Key Issues - Variables that Cannot be Tested Empirically

Though the selection of variables for sustainability is extensive, there was insufficient data for statistical testing for many of the important variables. Also, some are new ideas and concepts of measurements, so the industry does not have extensive records of them. Sustainability variables and measurements are based on the RSPO Principles, ISPO Principles and ISCC procedures. The governing values for important sustainability variables for Malaysia need to be set out systematically so that unnecessary disputes do not arise.

Furthermore, as environmental variables refer to factual information about greenhouse emissions, water usage, rainfall and pollution connected to the oil palm plantations, these environmental or plantation variables are highly correlated or "redundant" in

relation to one another. Their exchange capacity is very tightly correlated, making statistical analysis difficult and cumbersome. In addition, the values per unit of the variables can also be vastly different from one another, making reasonable comparison impossible. Also, the variations in the time chart for each variable constitute large inconsistencies. The main micro variables that could be shown with relevant implications for the production of palm oil in Malaysia, but for which statistical measurements need to be in place are:

- a. The non-recurrent cost in plantation establishment;
- b. The upkeep and cultivation cost for Malaysia;
- c. The fertilisation cost in palm oil plantations;
- d. Local and foreign labour cost in the plantations;
- e. R & D cost for plantation improvement and development;
- f. Mechanisation cost within the industry

7.11 Oil Palm Variable Analysis: Main Finding and Its Relevance

The main finding from this exercise is that these variables, although they could be verified through economic testing, demonstrate the need for a comprehensive evaluation of the industry's costs for its sustainable development. The variables are important because of their relevance and implications for decision making and for prioritising the future of oil palm production in Malaysia, be it for the expansion or reduction of the industry. The progression or changes in the values of these variables with time are also key indicators to show the status of palm oil production in Malaysia.

However, those variables that showed no particular relevance to palm oil production patterns in Malaysia should be considered with other agricultural products or may be considered for more in-depth research. Here again, important variables for sustainability could not be depicted sufficiently with palm oil production to show their relevance or implications for sustainable palm oil production.

7.12 Oil Palm Variable Analysis: Appropriate Inferences and Relevant Implications

Even though these variables could not be tested due to lack of data, their importance should not be ignored in the study of palm oil production in Malaysia, as the variables are important for sustainable agricultural production, especially sustainable palm oil.

7.13 Oil Palm Variable Statistical Analysis: Key Issues

A key issue in these tests was that there were too many variables that were relevant to this industry under the three sectors selected for the study, namely the environmental, economic and social sectors. There were 60 variables from the World Bank Metadata bank and 75 variables from the palm oil industry. The selection of the important variables for analysis was difficult due to the large number of variables available and the lack of consistency in the data formats.

The final selection of variables for testing was also challenging, as the degree of dependence among the dependent variables selected was very high, making the results of the correlation tests confusing and inconclusive at times.

The final selection of 11 variables was found to be the most relevant in terms of their implications for the production of palm oil in Malaysia. The variables also covered the appropriate time frame, from 1980 to 2011. Some of the more prominent variables in the literature, e.g. CO2 emissions, greenhouse gases and peat land coverage were not tested here as the data was sporadic in nature and did not cover a sufficient time frame for a regression or correlation analysis.

The testing also had to cover two separate economic models as there was too much interference from the dependent variables used. Finally two models were derived for this study, based on their appropriateness to the production of palm oil in Malaysia.

The 1st Model: Palm Oil Price:

$$\text{Palm Oil Price (CPO)} = \beta_0 + \beta_1 \text{ Harvested Area} + \beta_2 \text{ Agricultural Employment} + \beta_3 \text{ No. of Estates} + \beta_4 \text{ Planted Hectares}$$

The 2nd Model: Total Planted Area:

$$\text{Total Oil Palm Planted Area} = \beta_0 + \beta_1 \text{ Planted Hectares} + \beta_2 \text{ Number of Estates} + \beta_3 \text{ Agricultural Land} + \beta_4 \text{ Arable land}$$

These findings are relevant for decision making and prioritising future decisions for the expansion or reduction of oil palm production in Malaysia. The progression or changes in the values of these variables with time are also key indicators depicting the status of

palm oil production in Malaysia. All the variables had positive significance for palm oil production, while the variables that were most important for both the models were:

- I. *Planted Area;*
- II. *No of Estates.*

7.14 Oil Palm Variable Statistical Analysis: Appropriate Inferences and Relevant Implications – Regression and Correlation Test on the Variables

It is now verified that the following variables are important in planning palm oil production in Malaysia:

- I. Total Planted Area of Oil Palm;
- II. Palm Oil Price at Local Delivery;
- III. Agricultural Employment;
- IV. Total Harvested Area;
- V. Agricultural Land Available;
- VI. Number of Estates;
- VII. Arable Land Available

Even though some of the variables could not be tested due to lack of data, their importance should not be ignored in the consideration of palm oil production in Malaysia, since the variables suggested are important for sustainability. The gaps between these two sets of variables are too vast and steps should be taken to measure and quantify the variables (see *Table 7.1*).

Table 7 .1: Important Sustainability Variables for Agriculture

Important Sustainability Variables for Agriculture
Agricultural methane emissions (% of total)
Agricultural nitrous oxide emissions (% of total)
Annual freshwater withdrawals, agriculture (% of total freshwater withdrawal)
Annual freshwater withdrawals, domestic (% of total freshwater withdrawal)
Annual freshwater withdrawals, total (billion cubic meters)
Arable land (% of land area)
Arable land (hectares per person)
CO2 emissions (kt)
CO2 emissions (metric tons per capita)
Employment in agriculture (% of total employment)
Fertiliser consumption (kilograms per hectare of arable land)
Forest area (% of land area)
Forest area (sq. km)
Fossil fuel energy consumption (% of total)
Improved water source, rural (% of rural population with access)
Methane emissions (kt of CO2 equivalent)
Nitrous oxide emissions (thousand metric tons of CO2 equivalent)
Organic water pollutant (BOD) emissions (kg per day)
Other greenhouse gas emissions, HFC, PFC and SF6 (thousand metric tons of CO2 equivalent)
Permanent cropland (% of land area)
Terrestrial protected areas (% of total surface area)
Total Planted Hectares of Oil Palm (Total Area)
Total Planted Hectares of Oil Palm (Estates)
Total Planted Hectares of Oil Palm (Smallholdings)
Development & Maintenance Cost of Oil Palm Plantations (RM per hectare)
Non-Recurrent Costs of Oil Palm Plantations (Malaysia)
Upkeep & Cultivation of Oil Palm Plantations (Malaysia)
Fertilisation of Oil Palm Plantations (Malaysia)
Cost of Oil Palm Planting in Malaysia (RM per hectare)

Source: World Bank, 2012

7.15 Overall Recommendations from This Study

The following recommendations can be made for this study:

1. Perception can be used as a “new” determinant or variable for oil palm plantation management in Malaysia. Stakeholder perceptions towards the industry were captured, analyzed and assessments made with regards to the sustainability of the palm oil industry.
2. Perception issues are linked with the lack of measurable variables for sustainability. Variables that were previously considered not important, perception issues and the history of the industry are now the key determinants for oil palm’s lack of sustainability. There are obvious gaps between what the industry perceives as important and the international media’s perceptions. Insufficient measurements clearly show gaps in the requirements for sustainability science, especially for the agricultural sector. Also, the industry has set up its principles and criteria, yet these standards differ with stakeholder groups, geographical differences and priorities in the stakeholders’ requirements. Hence, perceptions have to be managed to ensure that a sound reputation for the palm oil industry is nurtured.
3. A model for sustainable management of land for the palm oil industry is lacking. The significant variables from the regression test can be considered paramount for land management in Malaysia. Two dependent variables were selected as dependent variables. The palm oil price per year and total planted area for oil palm in Malaysia (deforested area) were selected from the perception survey and analysis. The most important variables from the statistical analysis were: Total

Planted Area of Oil Palm; Palm Oil Price at Local Delivery; Agricultural Employment; Total Harvested Area; Agricultural Land Available; Number of Estates; and Arable Land Available.

4. A sustainability model or index can now be constructed for sustainable oil palm measurements, and the main determinates for Malaysia would include - Total Planted Area of Oil Palm; Palm Oil Price at Local Delivery; Agricultural Employment; Total Harvested Area; Agricultural Land Available; Number of Estates; and Arable Land Available. This can be the next area of research, a more detail work on the index and econometric expansion of this thesis.
5. Sustainability requirements need to be locality-specific, and should not be driven by generalities, unsubstantiated science or “scientific assumptions”. For Malaysia, important sustainability criteria would include: greenhouse gas management, good forestry programmes and efficient communications on sustainability efforts. However, some of these variables are recent in their importance and need to be systematized further to ensure that the development of sustainability progresses well.
6. Sustainability Perceptions and the Sale of Sustainable CPO: In 2011 alone, 4.78 million tonnes of RSPO-certified oil in the market were unsold. (MPOC, 2012). Therefore even though sustainable production is promoted, there seem to be no takers for the oil, even when the premium for it is just US\$10 per tonne. For fair trade to prevail, the growers who take all the efforts to ensure that their produce is sustainable, and also have it certified for its acceptability to the international

community, need the support of other market players so that the sustainability endeavour can succeed.

7. Future Research: The area of perception and variable analysis brought out in this study can be further expanded in future research. As for the variable, detail econometric work can be carried out to establish a sustainability index. While perception, can be worked out as a specific tool for further economic research.