CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter describes the methods used, which consist of a stakeholder survey and secondary data collection, and discusses their relevance to this study. The chapter also describes the parameters that were used to frame both the primary data and secondary data collection and how the data are analyzed. The theoretical framework that underlies this study and links it to the methodology used is also presented here

3.2 The Quantitative Approach

The methodology used for this study is that of quantitative research. At the onset, it is necessary to examine the models of sustainability that have been postulated to understand their scope and recognise the implications of adopting sustainability criteria.

3.2.1   Theorisation of The Study and Supporting Theories

The Prescott-Allen model of a balanced society makes a good reference point. Under this model, social and economic factors are optimised through good governance, the prioritisation of human wellbeing and the sound management of resource demands (Allen, 2006), drawing a wider rim around sustainability measures than sector-specific sustainability programmes. This broader framework takes the farmers/growers into regional systems for sustainable resource use, including water management, watershed conservation, soil quality rehabilitation, ecosystem restoration, and reforestation, among

other things. Thereby, all activities including agriculture need to be considered within the whole human paradigm of sustainable management, and the progress of society.

In recent years, sustainability science has emerged as a focus area of cross-disciplinary inquiry. Sustainability science is not yet become established as an autonomous field or discipline of its own, and has tended to be problem-driven and oriented towards guiding decision-making.

Currently, theories of sustainability have attempted to prioritise and integrate social responses to environmental and cultural problems. For example, economic models of sustainability look to sustain natural and financial capital, ecological models look to biological diversity and ecological integrity, whereas political models look to social systems that promote human dignity. Religion has entered the debate with symbolic, critical, and motivational resources that aim to effect cultural change. The main economic theories that support this work are the Neo-Malthusian theory, Kuznet's Hypothesis and Hardin's Tragedy of the Commons.

Neo-Malthusian Theory: It is a matter of time before the human population exceeds the Earth's carrying capacity. This is evident since the 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 occurs in the system. ("Crash" here indicates undergoing a sudden change from the normal or existing pattern.)

The Neo-Malthusian Theory is supported by the growing calls for sustainability to be practiced in agriculture to prevent this "crash" from occurring by managing the Earth's finite resources within the planet's capacity and not to go beyond the limit. The efforts to establish sustainability in agriculture now, will take the Neo-Malthusian Theory to its next phase of human civilization.

Many critics believe that the basis of Malthusian theory has been fundamentally discredited in the years since the publication of *Principle of Population*, often citing major advances in agricultural techniques and modern reductions in human fertility. Many modern proponents believe that the basic concept of population growth eventually outstripping resources is still fundamentally valid, and "positive checks" are still likely in humanity's future if there is no action to curb population growth.

Hardin's "Tragedy of the Commons": There are no economic disincentives to discourage anyone from using up natural resources, even though overuse and pollution of resources leads to environmental collapse. This means that users are free riders. The tragedy of the commons is a dilemma arising from a situation in which many individuals, acting independently and rationally consulting their own self-interest, will ultimately deplete a shared limited resource, even when it is clear that it is not in anyone's long-term interest for this to happen.

A similar dilemma of the commons is seen in the overuse of natural resources (including land for agriculture). Without the intervention of stakeholders or protection by regulators and others, this dilemma continues to threaten the viability of resource-based activities.

Kuznets Hypothesis: The Kuznets curve when applied to environmental issues presents a hypothesised relationship between various indicators of environmental degradation and income per capita. In the early stages of economic growth, degradation and pollution increase, but beyond some level of income per capita (which will vary for different indicators) the trend reverses, so that at high income levels, economic growth leads to environmental improvement.

The Kuznets curve implies that as a nation undergoes industrialisation, especially through the mechanisation of agriculture, the centre of the nation's economy will shift to the cities. As capitalism causes a significant rural-urban inequality gap (the owners of firms would be profiting, while labourers from lagging industries and agriculture production would be losing income), rural populations are expected to decrease as urban populations increases, due to people migrating to cities in search of higher incomes. Inequality is then expected to decrease when a certain level of average income is reached and the processes of industrialisation – with a concomitant growth of democratisation and the rise of the welfare state – allow for the trickling-down of the benefits from rapid growth, and increase the per capita income. It was Kuznets' belief that inequality would follow an inverted "U" shape as it rises and then falls again with the increase of income per capita. Critics of the Kuznets Curve theory argue that its U-shape comes not from progression in the development of individual countries, but rather from historical differences between countries. For instance, many of the middle income countries used in Kuznets' data set were in Latin America, a region with historically high levels of inequality. When controlling for this variable, the U-shape of the curve tends to disappear (e.g. Deininger and Squire, 1998). Regarding the empirical evidence, based on large panels of countries or time series approaches, Fields (2001) considers the Kuznets hypothesis refuted.

These four economic theories (***Table 3.1***) support the formulation of sustainable science in terms of its approach and conceptualization. Next, the methodology needs to be designed to identify the values/variables that need to be given high priority in resource management.

**Table 3.1: Connecting Economic Theories and Sustainability Needs**

Economic Theories	Brief	Sustainability Support
Neo Classical Production Theory	Is the study of production: converting inputs into output? The inputs or resources used in the production process are called "*factors of production" by* economists.	For the palm oil industry the economic, social and environmental variables are necessary for good palm oil productivity (managing "factors of production").
Hardin's "Tragedy of the Commons"	No economic disincentive to not use up resources: overuse and pollution of resources leads to environmental collapse. (Users are free riders.)	Sustainable measurements of activities that meet the needs of the present without compromising the ability of future generations to meet their needs.
Neo-Malthusian Theory	Population will exceed Earth's carrying capacity: the food production linear curve and population exponential curve cross. If there are no interventions, there will be a production crash due to excessive demand.	Sustainability measurements are necessary to be in place to help meet the needs of the growing human population. As palm oil is the cheapest edible fat, this is especially relevant.
Kuznets Hypothesis	In an environmental context, Kuznets' curve is a hypothesized relationship between various indicators of environmental degradation and income per capita. In the early stages of economic growth, degradation and pollution increase, but beyond some level of income per capita (which will vary for different indicators) the trend reverses, so that at high-income levels economic growth leads to environmental improvement.	The palm oil industry needs to have empirical measurements to support its sustainability work, for which it needs to develop clear sustainability criteria. Otherwise, assessments will be based on human perception on what is going on the ground.

Source: Author, 2013

3.3   Theoretical and Conceptual Framework

In the preceding section, the subject of research was introduced and its link to economic theories established. To ascertain the validity of the sustainability needs that underlie the research, the analytical framework on which this study is based was theorized.

In Figure 3.1: a visual map is presented to show how the conceptual framework relates to the oil palm industry. It depicts how the management of oil palm plantations connects the Neo-Malthusian Theory, which is most relevant to palm oil production, to the stakeholder groups and the economic, environmental and social rationales for the current state of the oil palm industry. This helps to clarify how the sustainable production of palm oil is linked to the growth of oil palm plantations, with the Neo-Malthusian Theory as the basis for the increasing production of palm oil.
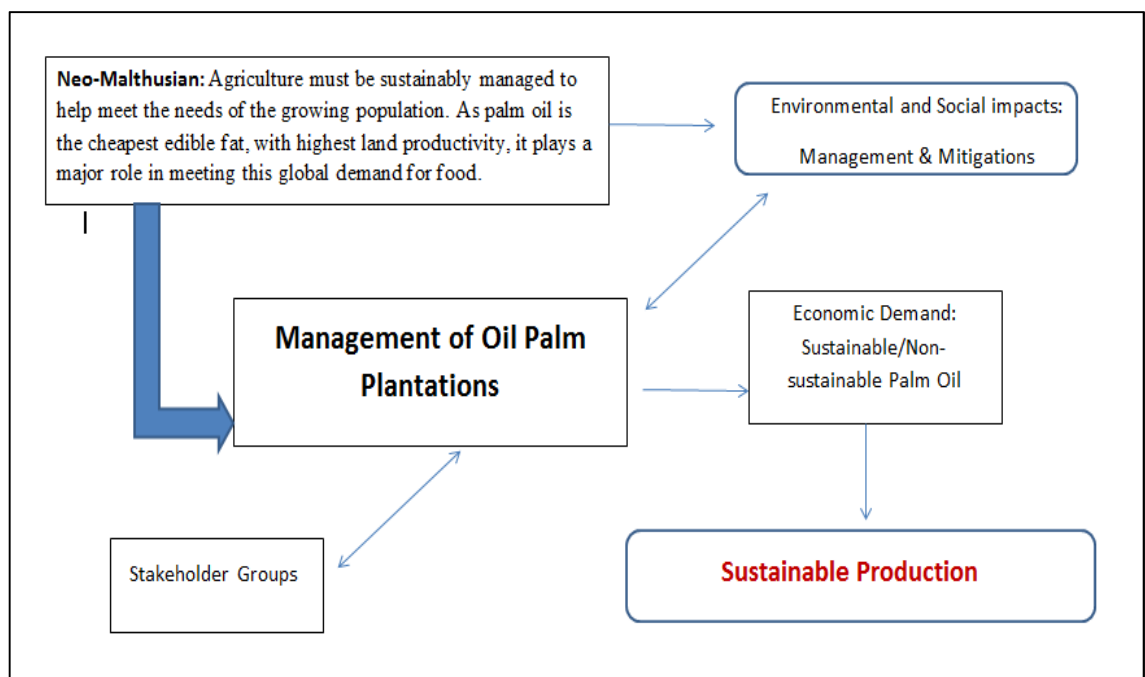

Figure 3.1: Theoretical Framework for the Sustainability of the Palm Oil Industry

From the theoretical framework, the relevance of sustainable development to palm oil production is established. The sustainable development of the oil palm industry in order that it can meet the current need for food is therefore the focus of this study. Within this

focal area, sustainable production is identified as the main focus. Limitations for the growth of the palm oil industry relate mainly to trade and new innovations in Science and Technology (R&D), and this study will not focus on the limitations. As trade barriers are ever changing brings in many unknown dimensions in production. As for Science and Technology input, for the purpose of quantifications of the variables in the study, this sector was not brought in.

There are two elements of interest in relation to the sustainable production of palm oil. The first is the requirement that palm oil production is sustainably managed and the second is the ever-changing demands in terms of sustainability criteria that are imposed on palm oil producers. For good governance to prevail in sustainable palm oil production, it is crucial to manage the following: product demand, stakeholder perceptions of sustainability and the variables or determinants for sustainable management of palm oil production. *Figures 3.2* shows the graphic connections among all the elements identified.

Conceptual Framework for New Sustainability Model
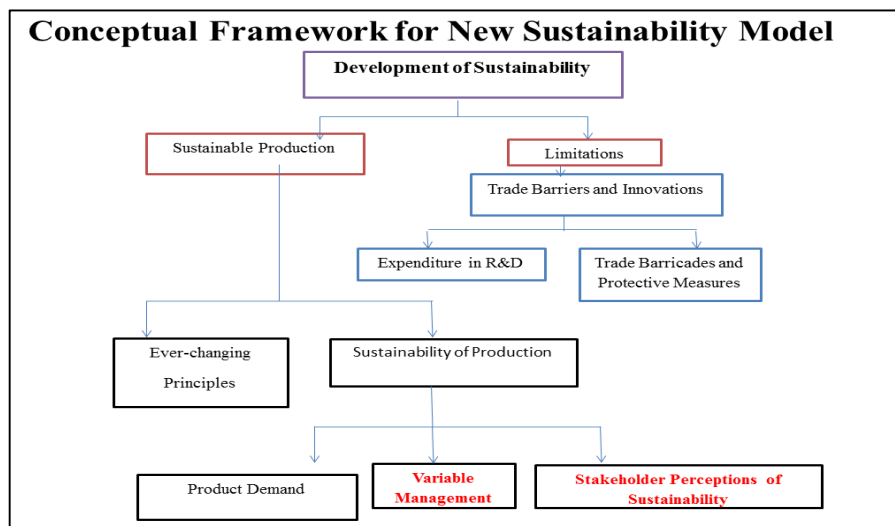
Source: Author, 2013

Figure 3.2: Conceptual Framework for a New Sustainability Model

3.4 Linking Framework to Methodology

To establish the research methodologies, the literature reviewed has been linked with the economic theories in order to ensure that suitable variables form the basis for data collection. Since this study covers the environment, social and economic sectors, a qualitative method is employed to undertake the analysis using both primary data (from a stakeholder survey) and secondary data (from industry information) in the form of determinants/variables from the social, economic and environmental sectors.

3.5 Variables Used for the Study

The quantitative data were narrowed down to variables that impact the industry as per land use, and they were divided into the environmental, social and economic sectors. The data focused on were also those that could be dated and quantified, so as to be tested or graphed.

Importance of Variables: The variables were evaluated according to the following considerations:

- Environmental variables: Minimum Environmental impact
- Social variables: Maximum yield (fresh fruit bunch) with minimum energy input
- Economic variables: Best price for fresh fruit bunch and crude palm oil.

The choice of variables was made based on:

- The sector studied and its importance in that sector
- Whether the variables could be quantified;
- Literature review supporting the importance of the variables;
- Whether the variables could be quantified in time-periods.

3.6 Description of the Variables Chosen and Supporting Science

The selection of variables was made with reference to the existing database for secondary data, and existing literature. Previous work by Adebowale (2009) and Rasiah & Shahrin (2006) have highlighted the main components of the industry that require focus. Another important reference is the databases from the World Bank data bank and International Monetary Fund, which have listed what these financial agencies consider to be important social and environmental information in financial disbursements. Table 4.1 (Chapter 4) is an example of determinants collected for the study.

3.7 Survey, Primary Data Collection and Sample of Data

The survey form was designed based on the literature review and other examples of survey forms previously designed. Details of the survey form are found in *Appendix 1*

3.8 Survey and Construction of Questionnaire

The questionnaire was constructed, and administered at focus group meetings organised by representatives of the palm oil industry. Questionnaires were administered to the respondents by research staff and volunteers. Clear, detailed instructions were given in either case, matching the needs of each audience.

The construction of the questionnaire was based on examples of survey work carried out by RSPO, WWF and MPOC. The questionnaire was made up of close-ended questions, where respondents' answers are limited to a fixed set of responses. Most scales are close-ended. Other types of close ended questions include:

- **Yes/no questions** - The respondent answers with a "yes" or a "no".

- **Multiple choices** - The respondent has several options from which to choose.

- **Scaled questions** - Responses are graded on a continuum (example: Rate the appearance of the product on a scale from 1 to 10, with 10 being the most preferred appearance).

How (and whether) the results of the survey would be used was the main consideration in the questionnaire design. The research objectives and frame of reference were defined beforehand.
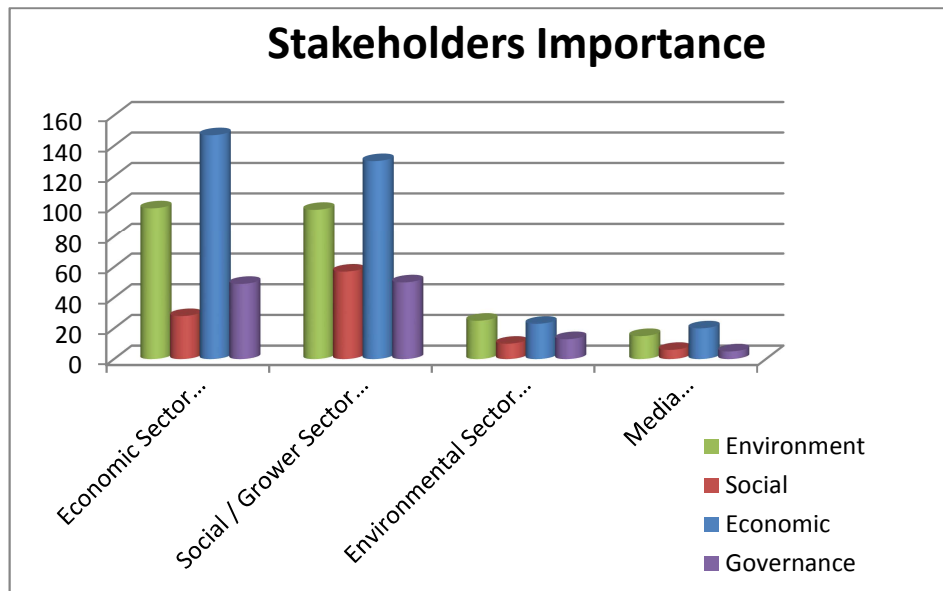
Figure 3.3: Sample of Data Gathered in the Perception Survey

Importance of selected sustainability criteria to different stakeholder groups is shown in *Figure 3.3*, and it's a sample of perception data collected.

3.9 Limitations

The research has essentially confined itself to the largest and more visible component of the palm oil industry in Malaysia, that is the plantation sector or the up-stream portion of the industry. It is a vast subject, and hence, other components of the palm oil industry, including manufacturing and downstream activities were not studied.

This research study is based on secondary data, primary data and review of the following sectors.

Quantitative focus group surveys of the industry's three main stakeholder groups, namely (NGOs, local communities and plantation managers) were undertaken. The data from this quantitative study will depict a three-dimensional view of managing the palm oil industry. The results from this survey were used to run a social sciences statistical package (SPSS).

The focus group survey of the industries was targeted at the three main stakeholder groups in Malaysia. The data from this quantitative study depicts three-point views of managing the palm oil industry. Data collection was carried out by interviewer-administered questionnaires through focal group surveys. The study population consists of four stakeholder groups, namely: The Economic Sector (comprising traders/manufacturers); Environmental Sector (NGOs, local communities and oil palm growers); Social Sector (NGOs/growers/ local community) and the Media Group (Press/Network).

For this study, the focus area was limited, and the data was collected from Malaysia (including Sabah and Sarawak), but was limited to Malaysian perspective only.

Survey sample size: The total numbers were: 312 from the Economic Sector (traders or manufacturers); 323 from the Social Sector (Growers); 55 from the Environmental Sector (NGOs); and 48 Media (communication network or press) personnel.

3.10 Analysis and Write-up

The data analysis was divided up according to the tools that could be used to process the information gathered. The methods of analysis were also different for the primary and secondary information gathered.

For the analysis, the following tasks were carried out:

i.   An evaluation was done to determine a suitable method of analysis to meet the objectives of the study

ii.   The frame of reference was examined to ensure the meaningful interpretation of the results

iii.   The relevance and significance of the findings of the data analysis were examined.

3.11 Quantitative Analysis and Tools Used

Data that covered a sufficient range to establish an economic model were used to carry out an econometric test. While there were many data which were sparse, short-term and non-consistent for a certain period of time, the SPSS package could not be used to derive any trends or correlations. Whereas for qualitative data collected, it was possible to establish trends via the SPSS package, and so the analysis was done.

Information compiled from literature search and personal interviews was fitted together for its relevance and significance to this study.