Managing Land as a Natural Resource With Regards to Environmental, Social and Economic Values.
(The Oil Palm Industry as a Case-study)

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Agenda

- ❑ Background
- ❑ Literature Review
- ❑ Objectives
- ❑ Methodology
- ❑ Data Analysis
- ❑ Analytical Chapters
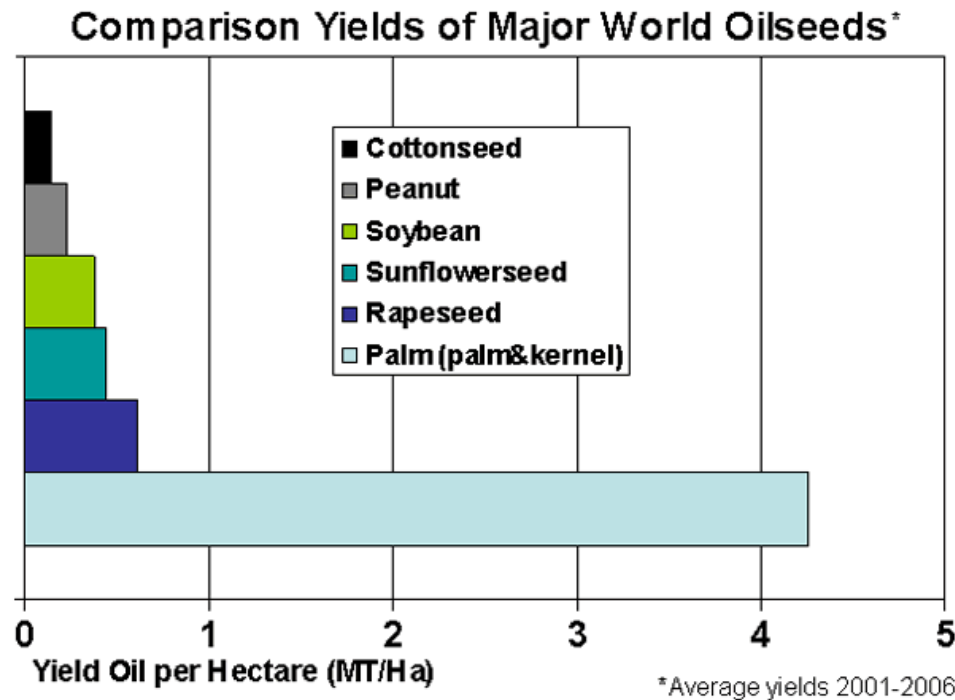- ❑ Findings & Recommendations
- ❑ Conclusion

Background: Dwindling Land Availability

❑ More than 99 per cent of the world's food supply comes from the land, while less than 1 per cent is from oceans and other aquatic habitats (Pimentel et al., 1994).

❑ At present, fertile cropland, is being lost at an alarming rate. For instance, nearly one-third of the world's cropland (1.5 billion hectares) has been abandoned during the past 40 years because erosion has made it unproductive (Pimentel et al., 1995).

Background: Importance of Palm Oil

Palm oil gives the best yield, per hectare compared to other crop. It has 4-6 times higher yield compared to other edible oils.

Comparison Yields of Major World Oilseeds*

Legend:
- Cottonseed
- Peanut
- Soybean
- Sunflowerseed
- Rapeseed
- Palm (palm&kernel)

Yield Oil per Hectare (MT/Ha)

*Average yields 2001-2006

Definitions

Balanced Society

A balanced society, in Prescott-Allen's model, is one where social and economic factors are further emphasised through governance, human wellbeing and resources demands.
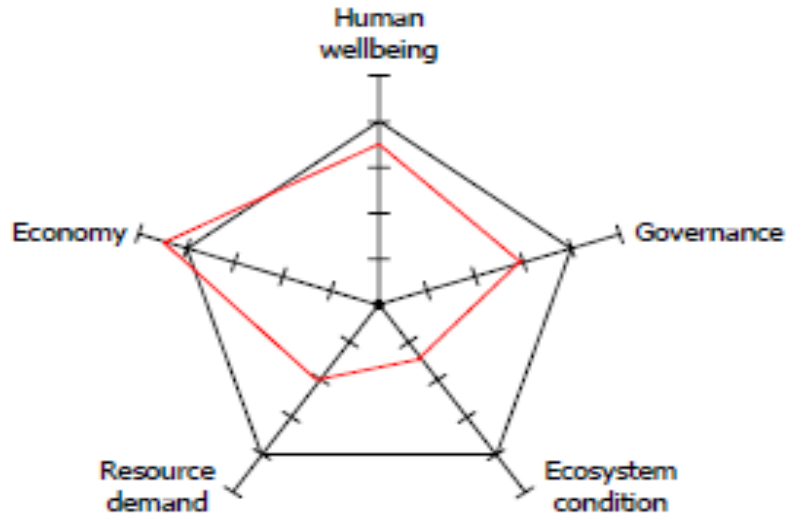
Brundland Definition

"Sustainable development is development that *meets the needs of the present* without *compromising the ability of future generations* to meet their own needs" (WCED 1987, 43).

Sustainability Principles

1. Commitment to transparency;

2. Compliance with applicable laws and regulations;

3. Commitment to long-term economic and financial viability;

4. Use of appropriate best practices by growers and millers;

5. Environmental responsibility and conservation of natural resources and biodiversity;

6. Responsible consideration for employees and for individuals and communities affected by growers and mills;

7. Responsible development of new plantings; and

8. Commitment to continuous improvement in key areas of activity.

Source: RSPO

Various forces arrayed against the sector
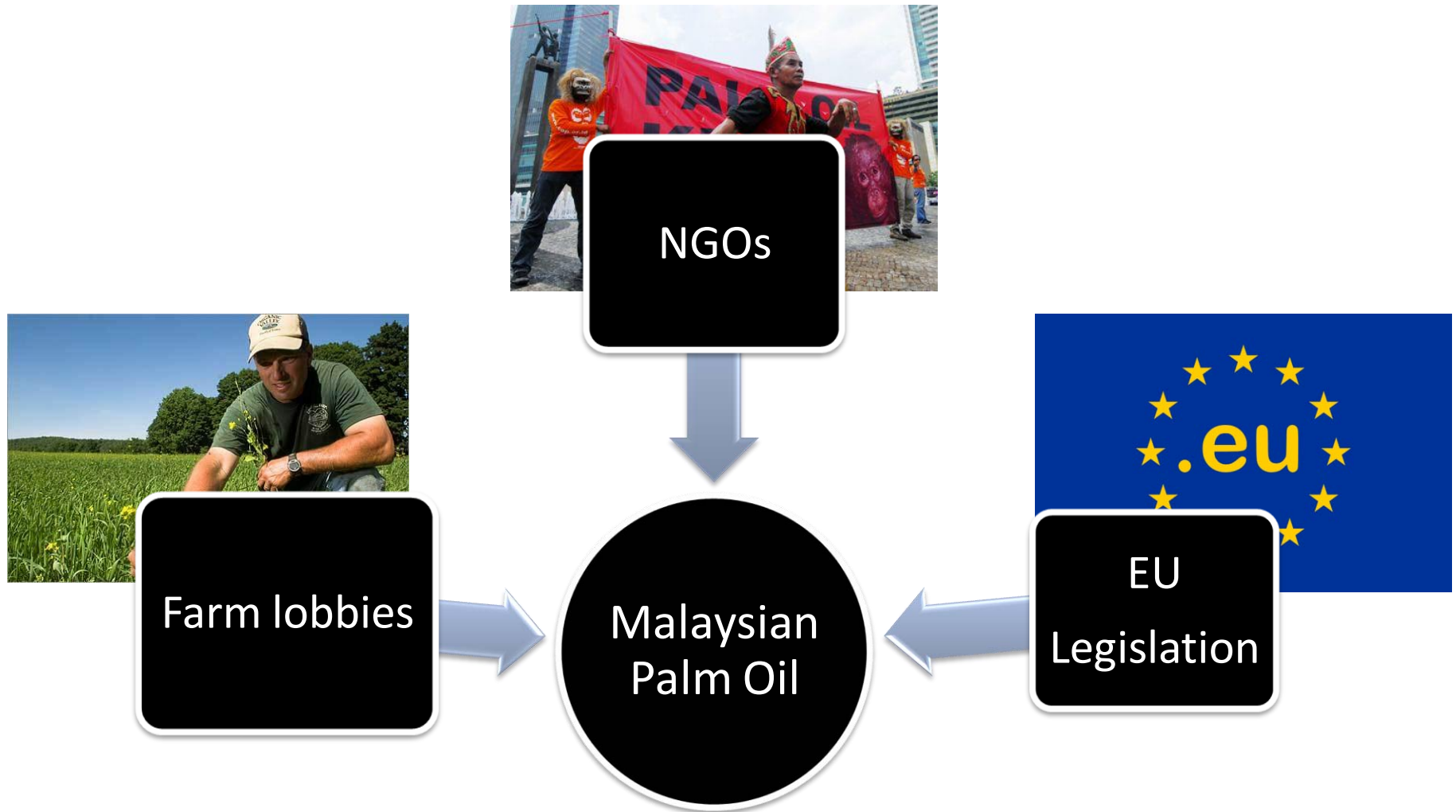
In such a scenario what if…

…the oil palm sector could improve its environmental credentials by managing land matters more sustainably?

This will help the global market accept this edible oil….

Objectives

❑ To analyse and relate variables (economic, social and environmental) that are important for production on agricultural land, and their impact on sustainability;

❑ To review the perception trends of palm oil plantations growth and production in Malaysia, and to see if they view those same variables as important;

❑ To derive important variables for the establishment of measurements for sustainable land resource management in the oil palm sector;

Literature Review: Analysis

Main Areas Covered	Focus
Environmental	Mostly Tropics and South-east Asia
Sustainability	Industry, especially agriculture
Social and Political	South-east Asia and Trading Nations
Economic Based	Agriculture and Commodities
Carbon Trade	American, Australian
Life Cycle Analysis	Vegetable Oils
Perception Study	NGO groups and Media report
Non-academic Palm Oil Citations	Websites and Internet based Reports

From the literature...

Need for sustainability: The need for reviewing Malaysian agricultural policies has arisen due to that fact that current agricultural practices in the country are found to be related to environmental, economic and social problems. This study is an effort to review the current Malaysian agricultural policies with regards to sustainability.

Review of Malaysian Agricultural Policies with Regards to Sustainability. American Journal of Environmental Sciences 4 (6): 608-614, 2008

Deforestation Issues: Palm oil Production has more than doubled in the last decade, now dominating the global market for vegetable oil. Most palm oil is produced on large industrial plantations, driving tropical deforestation in Indonesia and Malaysia. the harvested area of palm oil in Southeast-asia has tripled in just a decade. FAO, 2011

From the literature…

Building Trust, Governance and Integrity: in GHG Accounting and overcoming Issues. The success in tackling climate change relies heavily on the ability of the industry and other actors to comprehensively contribute to reducing GHG emissions with local and national adaptation prior adding their benefits towards the global mitigation objective, Weng et al. ,2010.

Divergent Paths of Actors and Policy Learning: A Comparative Study of the Oil Palm Systems of Innovation in Malaysia and Nigeria. tracing the trajectory of a natural resource industry which has demonstrated an immense capacity in transforming the economic fortunes of Malaysia., Boladale O. Abiola Adebowale (2009)

Literature: Critic and Research Gaps

Sustainability Issues:

The Roundtable Concept The formation of the roundtable concept has not been without criticism from various sectors.

Scientific Tools and International Standards: such as ISO are important in international trade because incongruent standards can be barriers to trade, giving some organizations advantages in certain areas of the world.

Lack of Data for Sustainability Challenges: There has been a perpetual need to meet the challenges that are met by growers and producers to implement practices that will make the production palm oil economically viable and sustainably acceptable.

Biofuel Production & Trade Matters:
Methodologies: The pathways (methodologies) that were set forth to determine values for palm oil as renewable fuels in both the land use change and mill operations are in question, as the assumptions made create gaps;

Importing barriers: Emission values used need consistency, and referencing to reputable work undertaken by the industry experts, and not reinventing of the wheel by non-industry players.

Emission Values: The year 2020 projections are unreal, with double accounting occur in emissions values.

Research Methodology (1): Tools of Analysis (Econometric Model: Linear Regression)

Dependent Variable: Production

Independent Variable: As per list on

Test run: Linear Regression for complete data, SSPS software

Data Source: Malaysian Palm Oil Council, Malaysian Palm Oil Board, Department of Statistic, Malaysia, World Bank Databank, International Monetary Funds Data, etc.

Time Frame: 1960-2011

Limitations: plantation data are more recent in nature and not as erratic, regular in its pattern. Lack in monthly information. Data that had gaps were only depicted in graphs for trend description.

Important Variable in the Industry

The quantitative data was narrowed 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: were given with the following consideration.
❑ Environment: Minimum Environmental impact
❑ Social: Maximum yield (fresh fruit bunch) with minimum energy input
❑ Economy: Best price for fresh fruit bunch and crude palm oil.

Choice of variables: were made as it was impossible to use all, and collection possibility
❑ According the sector, and its importance
❑ Define the variables;
❑ Literature review supporting;
❑ Defined by time and quantified.

Selected Variable in the Industry: Economic Sector

Economy: Best price for fresh fruit bunch and crude palm oil.

Defined: Can be quantified and capture in a time-frame for testing

Supporting literature: MPOB (2002-2011), World Bank (2012), Njoo (2001), Asari et al. (2011)

Economy Variables with Regards to Palm Oil Industry
Food production index (2004-2006 = 100)
Foreign direct investment, net inflows (BoP, current US$)
GDP (current US$)
HDI
Commodity price
USA$ exchange rate
Inflation rate
Product price
Export value
Biofuel price
FDI
USD $ exchange rate
MITI Investment
Industrial Production Index
Fresh Fruit Bunches (FFB) Yield Tonnes/Hectare (P. Malaysia)
Fresh Fruit Bunches (FFB) Yield Tonnes/Hectare (Sabah)
Fresh Fruit Bunches (FFB) Yield Tonnes/Hectare (Sarawak)

Selected Variable in the Industry: Environmental Sector

Environment: Minimum Environmental impact
Defined: Can be quantified and capture in a time-frame for testing
Supporting literature: World Bank (2012), IMF (2012)

Environmental Variables with Regards to Palm Oil Industry
Agricultural land (% of land area)
Agricultural methane emissions (% of total)
Agricultural nitrous oxide emissions (% of total)
Agriculture value added per worker (constant 2000 US$)
Agriculture, value added (% of GDP)
Annual freshwater withdrawals, agriculture
Annual freshwater withdrawals, industry
Annual freshwater withdrawals, total
Arable land (% of land area)
Arable land (hectares per person)
CO2 emissions (kt)
CO2 emissions (metric tons per capita)
Energy related methane emissions (% of total)
Improved water source, rural (% of rural population with access)
Improved water source, urban (% of urban population with access)
Renewable internal freshwater resources, total (billion cubic meters)
Terrestrial protected areas (% of total surface area)

Selected Variable in the Industry: Social Sector

Social: Maximum yield (fresh fruit bunch) with minimum energy input

Defined: Can be quantified and capture in a time-frame for testing

Supporting literature: MPOB(2002-2011), World Bank (2012), FAO (2012)

Social Variables with Regards to Palm Oil Industry
Local Labour (Peninsular Malaysia)
Foreign Labour (Peninsular Malaysia)
Local Labour (Sabah)
Foreign Labour (Sabah)
Local Labour (Sarawak)
Foreign Labour(Sarawak)
Total Number of workers employed during the last pay period
Wages (Agriculture Sector)
Health (mortality rate)
Mechanization
Potable water supply
Education (literacy rate)
Employees, agriculture, female (% of female employment)
Employees, agriculture, male (% of male employment)
Employment in agriculture (% of total employment)
Employment to population ratio, 15+, total (%)

Model Set-up And Justification

❑ The model: it was set up to show what was significant the production of palm oil in Malaysia (ton yield/year);

❑ Justification of variables used in the models: variable that had impact on the plantation sector was chosen, and these variables were quantifiable and had results in the time frame studied.

First Objective: Econometric Model

Njoo (2001)

$$price_t = \alpha + \beta \, price_{t-1} + \varepsilon_t$$

Data: 1987 to 1999
Method: Time Series

==

Asari et al. (2011)

$$production_t = f(area_t, price_t)$$

$$\ln(production_t) = \beta_0 + \beta_1 \ln(area_t) + \beta_2 \ln(price_t) + \varepsilon_t$$

Data: 1972 to 2008; Department of Statistics Malaysia and Malaysia Palm Oil Board
Method: Time Series

1ST ECONOMIC MODEL TESTED

Input
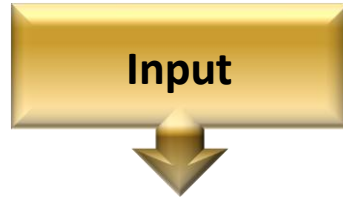
IPI
Commodity index
USA exchange rate
Government
Expenditure(Investment)

Output
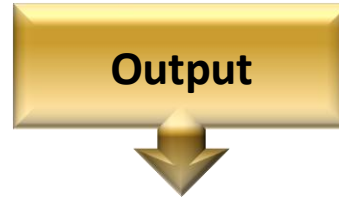
Production

Model

$$Production = \beta_0 + \beta_1 \ln(IPI) + \beta_2 Commodity + \beta_3 Currency + \beta_4 Investment$$

Economic Modeling
Importance of Economic Variables: Best price for fresh fruit bunch and crude palm oil.

Models Established and Tested

The 1st Model (**Economic Model**):
 Production = β_0+ β_1 *GDP* + β_2 *Government Expenditure* + β_3 *Exchange Rate*

The 2nd Model (**Planted Area Model**):
Production = β_0+ β_1 *Planted Area* + β_2 *FFB* + β_3 Yield (per hectare) + β_4 *Workers*

The 3rd Model (**Estates and Smallholders Model**):
Production = β_0+ β_1 *Estates* + β_2 *Smallholders* + β_3 FFB (per hectare) + β_4 *CPO*

The 4th Model (**Environmental Model**):
Production = β_0+ β_1 *Agriculture* + β_2 *Cropland* + β_3 Protected Area + β_4 *Forest Area*

Analysis & Findings: Methodology 1

The main findings from these tests were:

For the Economic Model: Malaysian GDP per capita and the Malaysia Government Expenditure were significant to the palm oil production in Malaysia;

For the Planted Area Model: Oil Palm Estates (planted hectareage) and Total Number of workers employed during the last pay period were significant to the palm oil production in Malaysia;

For the Estates and Smallholders Model: Total Planted Hectareage of Oil Palm (Estate Total Planted Hectareage of Oil Palm (Small Holders) were significant to the palm oil production in Malaysia;

For the Environmental Model: Forest Area and Agriculture land were significant to the palm oil production in Malaysia;

Research Methodology (2): Tools of Analysis (Perception Survey)

A survey covering oil palm producing, processing firms: the main stakeholders in Malaysia was conducted since March 2011.

Respondents: United Plantations Bhd, Hap Seng Consolidated Berhad, Kulim Malaysia Berhad and IOI Group Malaysia.

Survey Coding : the answers were coded and SPSS package was used to find correlations

Stakeholder Groups: Economic Sector (traders/manufacturers); Environmental Sector (NGOs and local communities and palm oil growers); Social Sector (NGOs/growers/ local community).

Number of Survey: 460 respondents

SPSS Software: Analysis Undertaken

Results: Stakeholder Perception
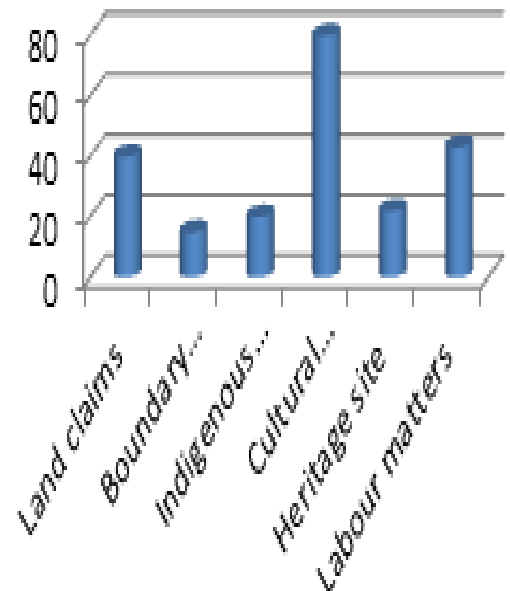
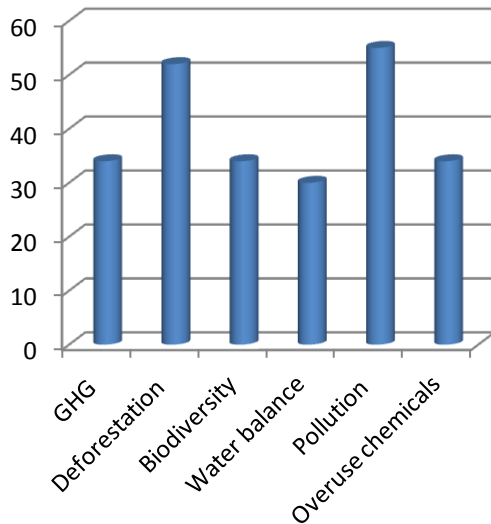**Stakeholders Importance**
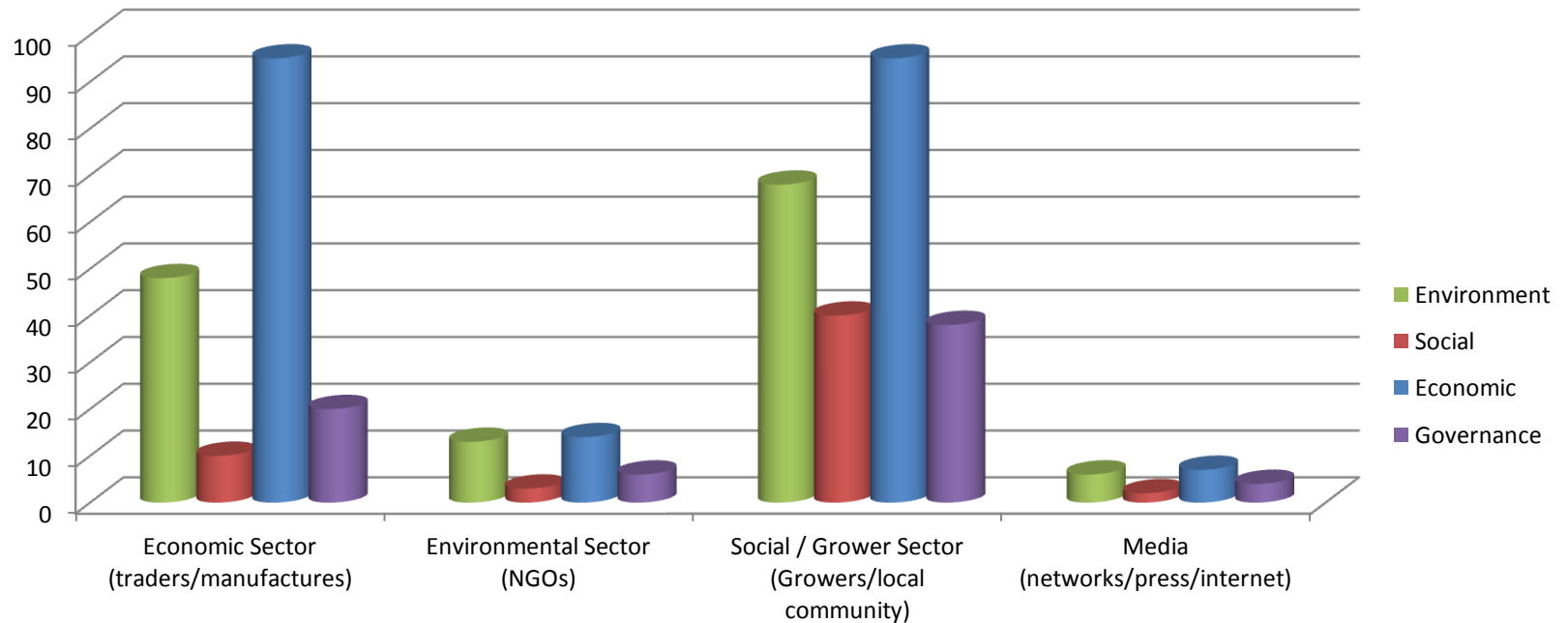
Results: Traders Perception
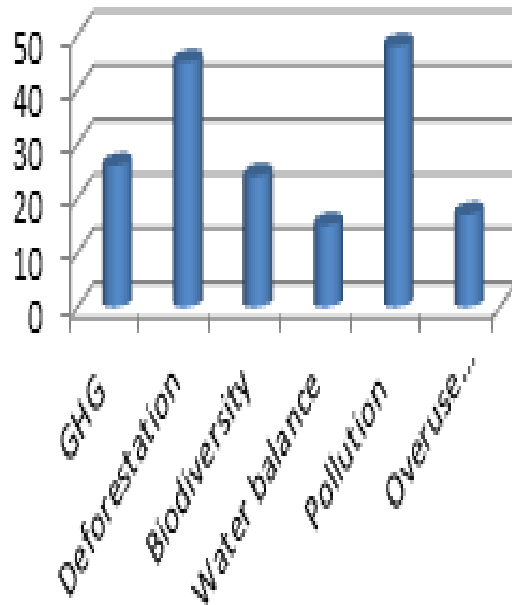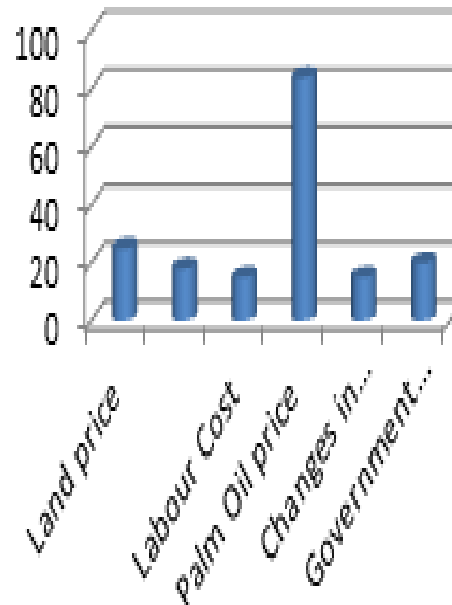
Result: Growers Perception
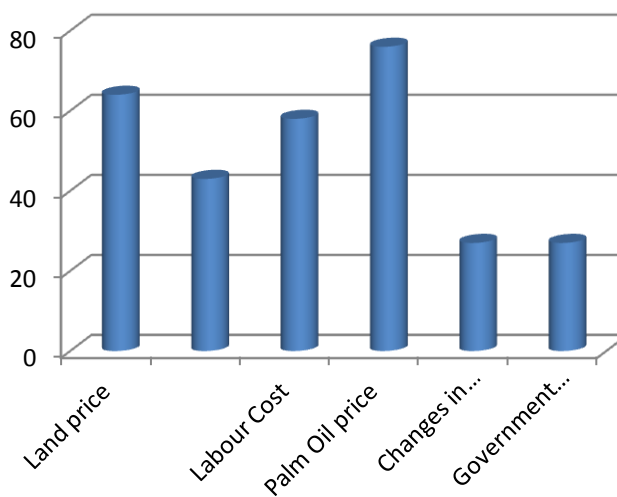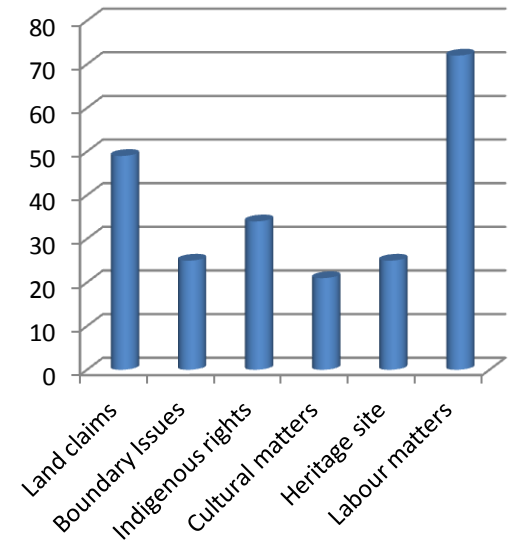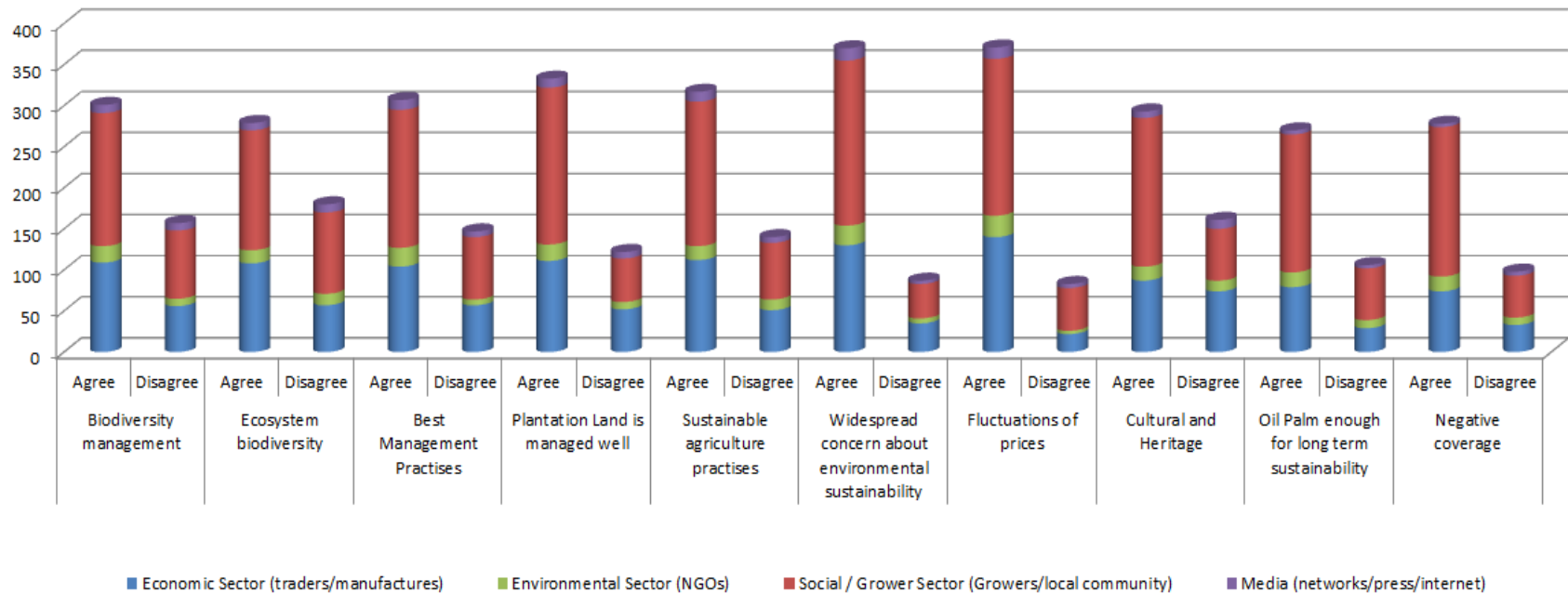
Results: Sectorial Awareness

SECTORIAL AWARENESS IN THE PALM OIL INDUSTRY

Results: Land Matters

Land Related Matters in the Palm Oil Industry
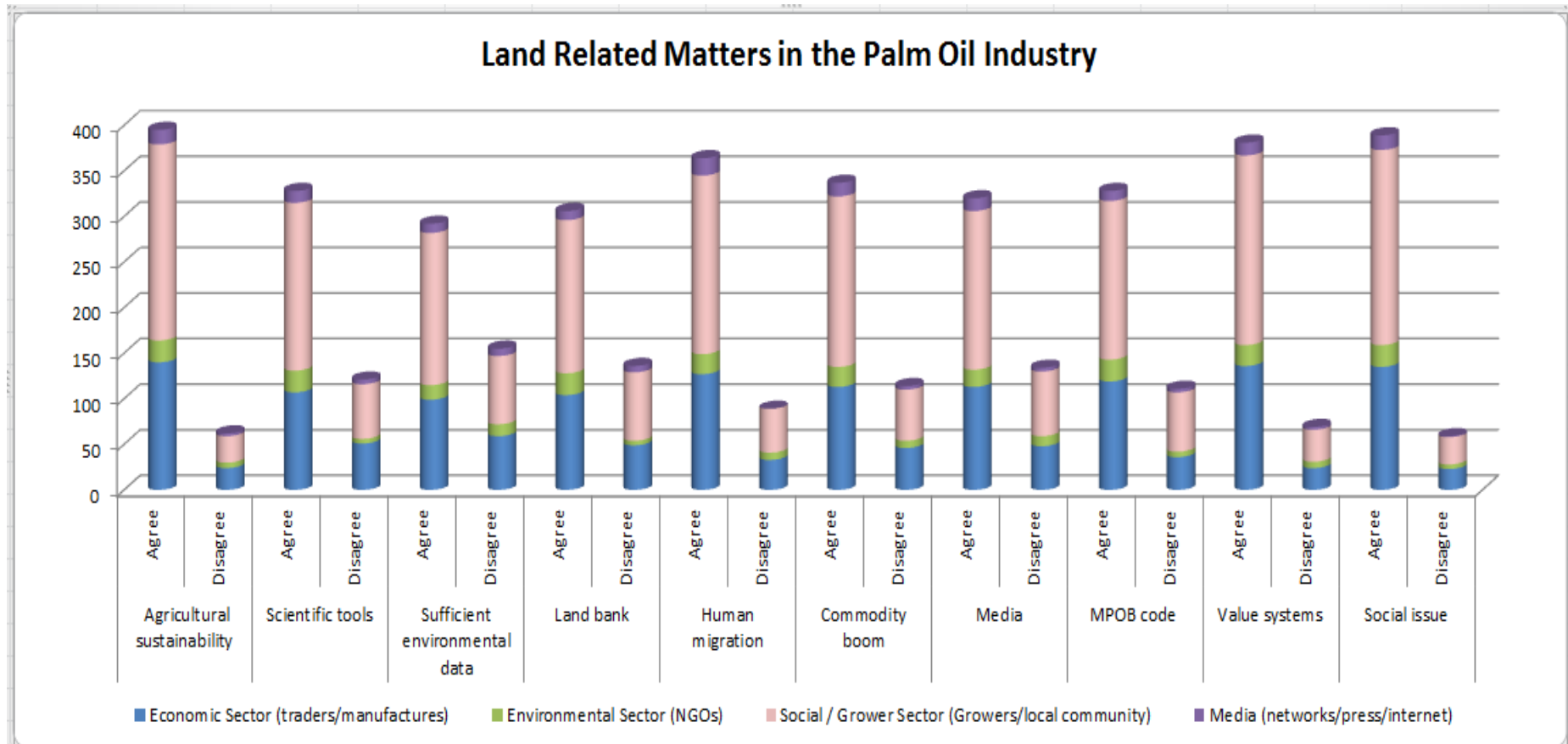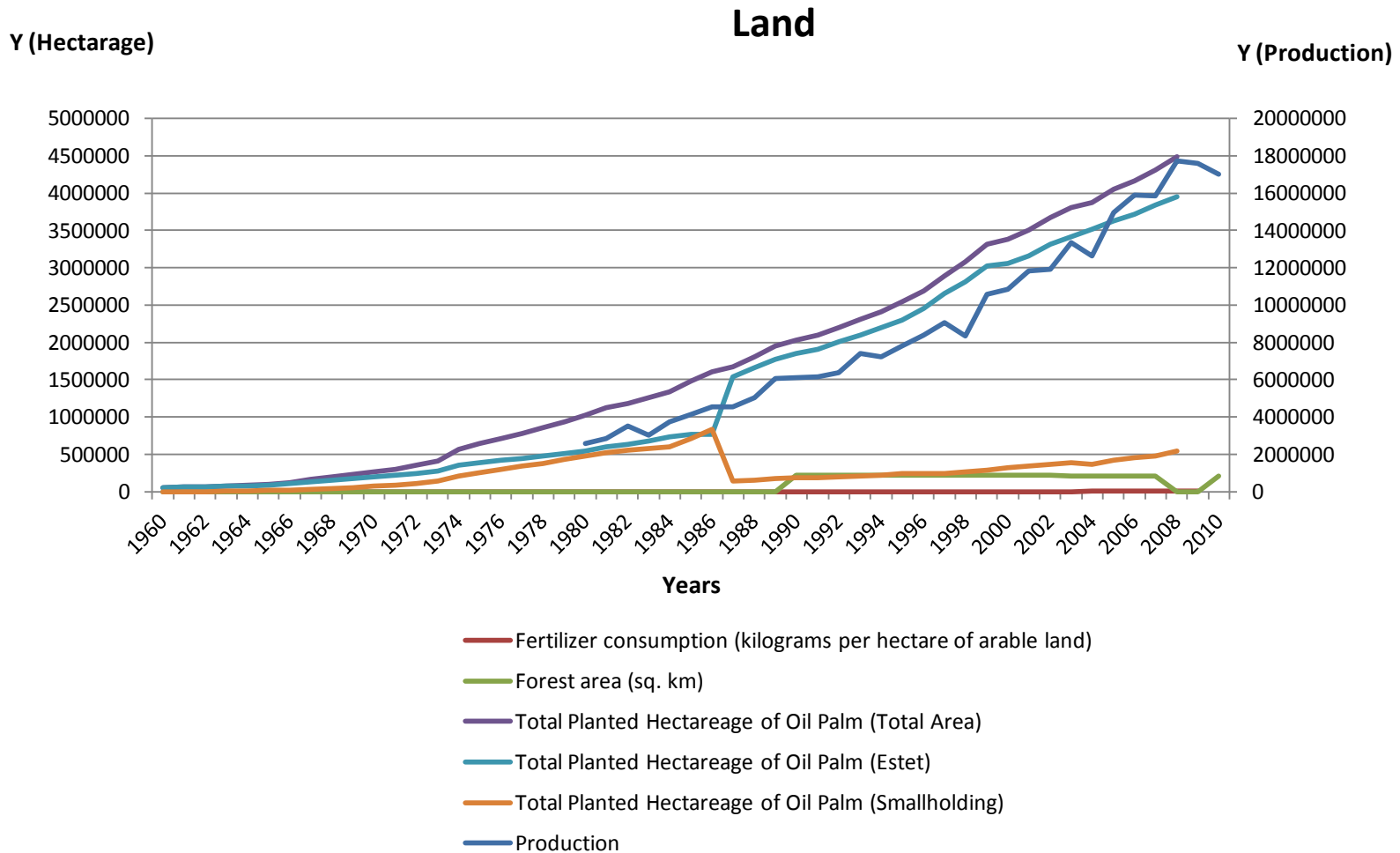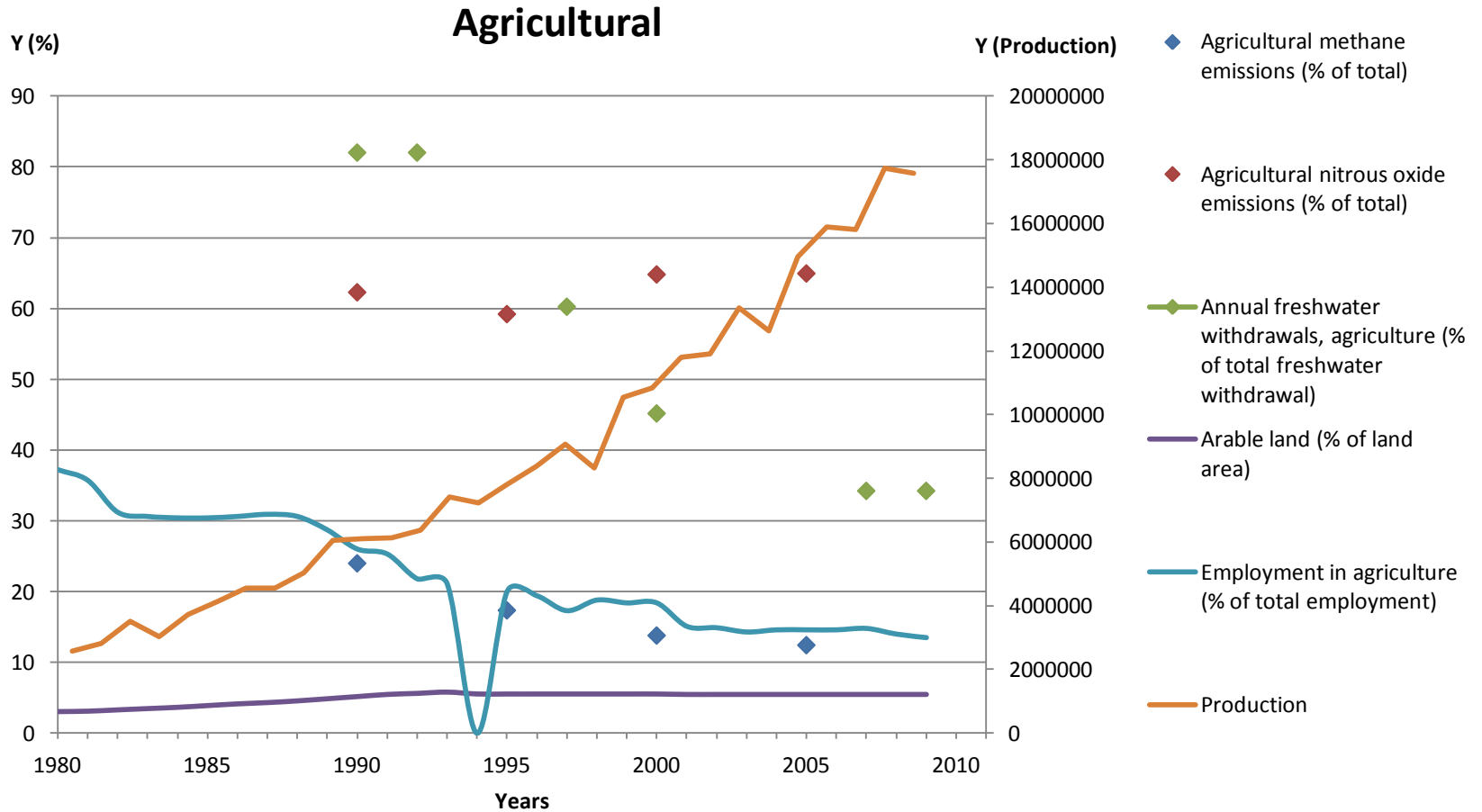
Analysis and findings Methodology 2

- Palm oil industry managers do not regard the same issues as important, when it comes to palm oil price. Deforestation, pollution and biodiversity assume lesser importance to them.

- Growers state that their companies are doing enough in the sustainability space. Yet the traders are not aware of several issues that arise.

- The Growers and Traders stated behaviour and perception does not tally with the view of NGOs, literature and third parties.

- Hence a gap exists between what the industry perceives and what is actually required for sustainability.

Graphic Explorations

Land

Y (Hectarage)

Y (Production)

Legend:
- Fertilizer consumption (kilograms per hectare of arable land)
- Forest area (sq. km)
- Total Planted Hectareage of Oil Palm (Total Area)
- Total Planted Hectareage of Oil Palm (Estet)
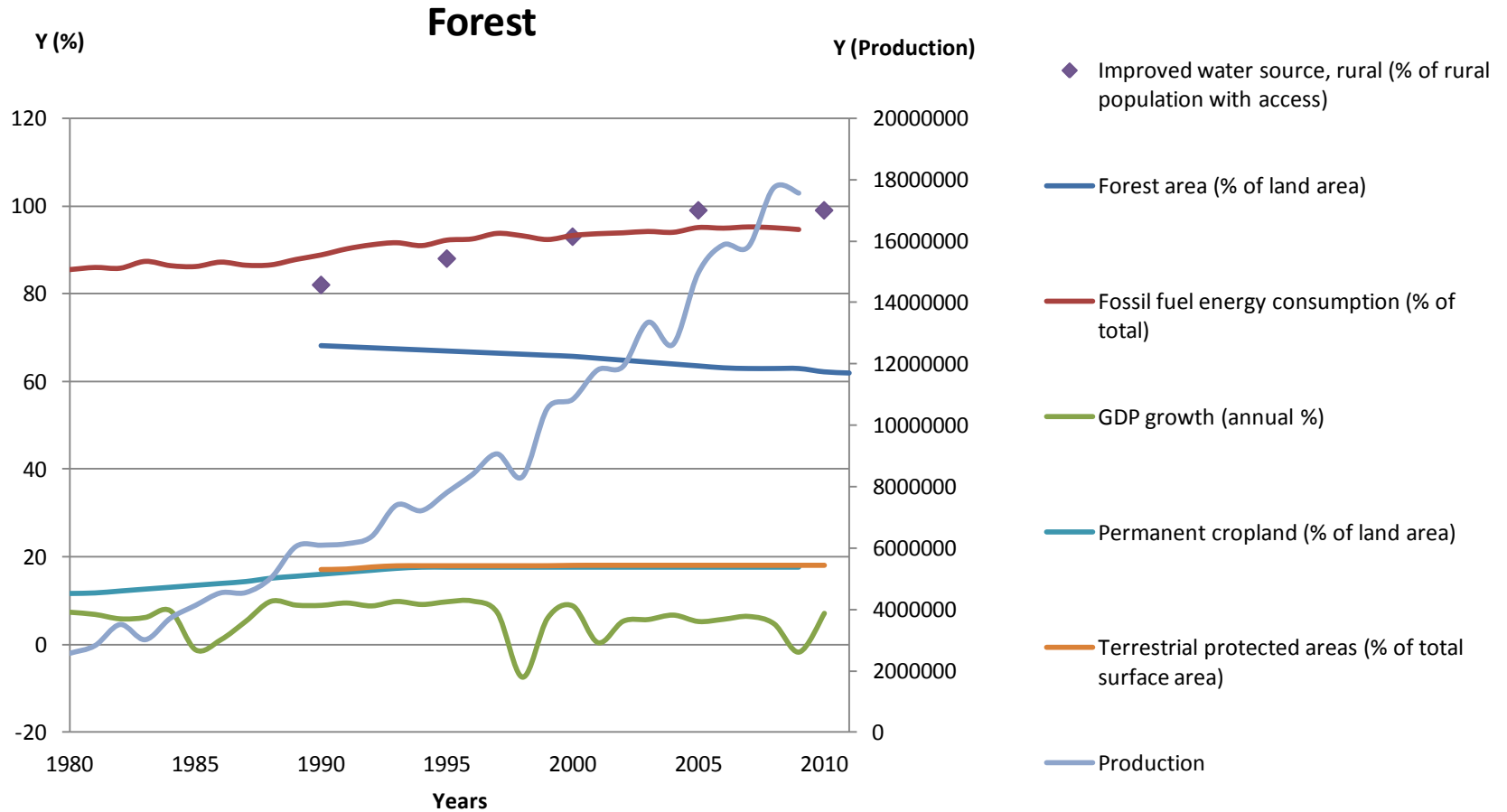- Total Planted Hectareage of Oil Palm (Smallholding)
- Production

Graphic Explorations

Graphic Explorations

Forest

Conclusion: Summary of Main Findings

From our study we can now say that for production purposes, we must consider the following empirical models:

The 1st Model (**Economic Model**):$Production = \beta_0 + \beta_1\ GDP + \beta_2\ Government\ Expenditure + \beta_3\ Exchange\ Rate$

The 2nd Model (**Planted Area Model**): $Production = \beta_0 + \beta_1\ Planted\ Area + \beta_2\ FFB + \beta_3\ Yield\ (per\ hectare) + \beta_4\ Workers$

The 3rd Model (**Estates and Smallholders Model**): $Production = \beta_0 + \beta_1\ Estates + \beta_2\ Smallholders + \beta_3\ FFB\ (per\ hectare) + \beta_4\ CPO$

The 4th Model (**Environmental Model**): $Production = \beta_0 + \beta_1\ Agriculture + \beta_2\ Cropland + \beta_3\ Protected\ Area + \beta_4\ Forest\ Area$

Conclusion: Relevant Implications

A sustainability model can now be constructed:

for *economic sector:* Malaysian GDP per capita and the Malaysia Government Expenditure were significant to the palm oil production in Malaysia;

for *the planted area variables*: Oil Palm Estates (planted hectareage) and Total Number of workers employed during the last pay period were significant to the palm oil production in Malaysia;

For **growers***:* Total Planted Hectareage of Oil Palm (Estate Total Planted Hectareage of Oil Palm (Small Holders) were significant to the palm oil production in Malaysia; *and*

For **environment**: Forest Area and Agriculture land were significant to the palm oil production in Malaysia;

Conclusion: Relevant Implications

There is also need to **bridge the gap between the 4 key groups of industry** stakeholders via data from this study, outreach and awareness campaign. The perception survey has clearly shown the difference in opinion amongst the stakeholders and also the lack of knowledge.

The need for **the government or the state to ensure balance growth via key agencies** e.g. MPOC, MPOB and MPOA is also apparent, especially in area of greater environmental awareness. Also to balance out the skewed view from 3rd party information expansion.

Thank you