

OIL PALM INDEPENDENT SMALLHOLDERS' PERCEPTION ON OIL PALM RESIDUE UTILIZATION AND WILLINGNESS TO SUPPLY OIL PALM RESIDUE IN PERAK

IVAN LOW XIN-YI

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By

IVAN LOW XIN-YI

A Project Report Submitted in Partial Fulfilment of the Requirements for the Degree of Bachelor Wood Science and Technology in the Faculty of Forestry Universiti Putra Malaysia

DEDICATION

Dedicated to the memory of my mother, Jennifer Teh Chew Lian, who cares for my needs and guides my path to be successful and persevere in completing this task. Thank you for your love which made this journey possible. For my beloved family:

Low Ying Kow Joel Low Yan-Yi Eugene Low Yong-Yi Elysia Low Li-Yi

ABSTRACT

The advancement of green technology and strong government policies has sparked the interest to utilize oil palm biomass as a feedstock to various green products. Inclusion of independent smallholders is imperative to prevent jeopardizing the rural community to participate. This study investigates independent smallholders' perception and their willingness to supply oil palm residues. A total of 270 responses via face-to-face interviews were obtained at oil palm fresh fruit bunch collections centres. Chi-Square and Fisher-Exact analysis was conducted using SPSS version 23. The results indicated that majority of smallholders were aware of oil palm residue-based products and were willing to supply. The main motivational factor was financial economic return. Insufficient resources to harvest and transport oil palm trunk was found as the main barrier to supply residues. This study recommends the formulation of good harvesting system as well as the participation of fresh fruit bunch collection centres as the middleman to facilitate the harvest and collection of oil palm residues. Information from this study is useful to policy makers, financial institutions, and venturing investors to develop effective strategies upon establishing the oil palm residue-based industry.

ABSTRAK

Kemajuan teknologi hijau dan dasar-dasar kerajaan yang kukuh telah mencetuskan minat untuk menggunakan sisa kelapa sawit sebagai bahan mentah kepada pembuatan produk-produk hijau. Penyertaan pekebun kecil persendirian adalah penting untuk mengelakkan penjejasan masyarakat luar bandar untuk mengambil bahagian. Kajian ini menyiasat persepsi pekebun kecil dan kesanggupan mereka untuk membekalkan sisa-sisa kelapa sawit. Sejumlah 270 repons telah diperolehi melalui temu-bual bersemuka di pusat pengumpulan buah kelapa sawit. Analisis uji chi square dan uji Fisher telah dijalankan menggunakan SPSS versi 23. Keputusan menunjukkan bahawa kebanyakan pekebun kecil sedar tentang produk-produk berasaskan sisa kelapa sawit dan sanggup untuk membekal. Faktor motivasi yang utama ialah pulangan ekonomi kewangan. Sumber-sumber yang tidak mencukupi untuk menuai dan mengangkut batang pokok sawit didapati sebagai halangan untuk membekalkan sisa-sisa kelapa sawit. Kajian ini mencadangkan pembentukan sistem menuai yang baik serta penyertaan pusat pengumpulan buah kelapa sawit sebagai orang tengah bagi memudahkan proses pengumpulan dan penuaian sisa-sisa kelapa sawit. Maklumat daripada kajian ini akan berguna kepada pembuat dasar, institusi kewangan dan pelabur pengusaha untuk membangunkan strategi yang berkesan atas penubuhan industri berasaskan sisa kelapa sawit.

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APPROVAL SHEET

I certified that this research project report entitled "Oil Palm Independent Smallholders Perception on Oil Palm Residue Utilization and Willingness to Supply Oil Palm Residue in Perak" by "Ivan Low Xin-Yi" has been examined and approved as a partial fulfilment of the requirements for the Degree of Bachelor of Wood Science and Technology in the Faculty of Forestry, Universiti Putra Malaysia.

Dr. Norzanalia Binti Saadun Faculty of Forestry Universiti Putra Malaysia (Supervisor)

Prof. Dr. Mohamed Zakaria Bin Hussin Dean Faculty of Forestry Universiti Putra Malaysia

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LIST OF ABBREVIATION

AIM	Agensi Innovasi Malaysia
EFB	Empty Fruit Brunches
FFB	Fresh Fruit Brunches
FTOPT	Fungal Treated Oil Palm Frond
MIGHT	Malaysian Industry Government Group for High Technology
МРОВ	Malaysia Palm Oil Board
МТІВ	Malaysia Timber Industry Board
OPT	Oil Palm Timber
OPF	Oil Palm Frond
OPFF	Oil Palm Frond Fiber
SPSS	Statistical Package for Social Science
SRF	Slow Release Fertilizers

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CHAPTER 1

INTRODUCTION

1.1 Background Information

The oil palm tree (*Elais quineensis*) is the most important agricultural crop in Malaysia. Ever since the 1960's, the oil palm planted area has increased at a rapid rate and an estimated of 5.81 million hectares was planted in the year 2017 (MPOB, 2018). Likewise, the vast amount of land had driven the oil palm industry to generate large volumes of oil palm residues, an estimated of 83 million dry tonnes was produced in the year 2012 where 75% of the residues are oil palm fronds (OPF) and oil palm trunk (OPT) which were available in the plantation whereas the remaining 25% were empty fruit brunches (EFB), and palm kernel shells (PKS), mesocarp fiber (MF) produced by the mills during the oil palm extraction (Agensi Innovasi Malaysia, 2013). At the plantation site, OPF were obtained from harvesting of fresh fruit brunches (FFB) and pruning activities all year round whereas the OPT generated from replanting activities were harvested upon reaching its economic age, typically 25 to 30 years. However, these oil palm residues were conventionally left to rot otherwise burned in the plantation area, consequently, creates concerns over harmful pests, soil fungus pathogen (Ganoderma boninense) (Najmie et al., 2011) and environmental problems (Teoh, Don, and Fadzilah, 2017).

In recent years, the advancement of green technology and strong government policies has sparked the interest to utilize oil palm biomass for it has unique

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potential. The Malaysia Government's Economic Transformation Programme (ETP) visions to strengthen the utilization of oil palm biomass and enhancement of its related industry. In depth, the OPF and OPT has several downstream opportunities such as bio-chemical (e.g. bio-succinic acid, bioethanol), wood-based (e.g. bio-composites, sawn timber, paper), and renewable energy (fuel pellet, biodiesel, biogas), apart from its conventional use as bio-fertilizers (e.g. mulch and compost), soil conditioner, and feed for livestock (Malaysian Industry Government Group for High Technology (MIGHT), 2013). Progress in research and processing technologies that can convert these biomass materials into higher-value products would not only help in confronting oil palm biomass residues disposal issues but also drive the Malaysian future bio-economic growth.

The government has been proactive in providing continuous support to achieve growth of the oil palm biomass industry. Trending policies, strategies, programs, funds and incentives were formulated by the Malaysian ministries and government agencies to promote uses in oil palm biomass and investment into its value-added products (Ng, Lam, Ng, Kamal, and Lim, 2012). These include the Small Renewable Energy Program, the National Renewable Energy Policy, the National Biomass Strategy 2020, the Green Technology Financing Scheme, and the National Timber Industry Policy (Agensi Innovasi Malaysia (AIM), 2011, Ng et al., 2012). Under the National Biomass Strategy 2020, the Malaysian government has set target to position itself as a biomass hub, creating markets regionally and globally (MIGHT, 2013).

In addition to technological feasibility and supportive policy, securing sustainable supply of oil palm biomass residues is essential to ensure a successful biomass industry development (Pehlken et al., 2016). In this case, oil palm planters' participation in the biomass supply chain is necessary as to reduce supply uncertainties, particularly in rural areas where the biomass is generated. Oil palm planters in Malaysia were categorized into two major groups based on ownership scale namely, oil palm estate, managed by large private or government-linked companies and smallholdings, owned by either independent smallholders or managed smallholders that operate at smaller scale (i.e., less than 10 ha). The managed smallholders are characterised by the farming system which is regulated by government farming regulations while the independent smallholdings operate without direct assistance from government, organisation or any private company (Azhar et al., 2017). As of 2017, almost 61% of oil palm planted area in Malaysia is under private estate, state and government link companies, while managed smallholdings and independent smallholdings are responsible for about 22% and 17% of the plantation area respectively (Malaysian Palm Oil Board, 2018).

1.2 Problem Statement



Despite of the fact where the independent smallholders were to the production of oil palm plantations in Malaysia (MPOB, 2018), the amount of oil palm biomass feedstock generated from this land cannot be neglected and is essential for the sustainability of the biomass industry. As of 2011, there was an estimated 170,000 independent smallholders in Malaysia (Mypalmoil, 2012), a two-fold increase from just around 87,000 back in 2001 (Ismail, Simeh, and Noor, 2003). With the raising ownership of independent smallholders' in Malaysia, their involvement in the biomass supply chain is vital as to reduce supplies uncertainties, particularly in rural areas where the biomass is generated. Therefore, understanding the perception and willingness of oil palm independent smallholders to supply oil palm biomass is essential to the success of biomass industry.

A study by Chin et al. (2016) noted that the inclusion of oil palm smallholders in the biomass industry is imperative to prevent jeopardising the local socialeconomic development from the spill over effect of the expanding biomass industry. Furthermore, participation of the rural communities in the biomass supply chain has been claimed as an important social sustainability criterion for bioenergy system (Buchholz et al., 2009). Previous experiences in biomass-related projects showed that public acceptance and support is an essential pre-requisite to tackle and overcome society-related barriers in project development and implementation phases (Zyadin et al., 2015).

In the vein of sustainable and successful biomass industry development, issues on securing sustainable supply of feedstock have received ample research effort (Chin et al., 2016). Previous studies have shown that farmers may have different motivation that can affect their interest and decision to supply biomass including farmland characteristics, knowledge on biomass, farmers demographic background, benefits received from harvesting their biomass, and management priorities (Joshi and Mehmood, 2011; Altman and Sanders, 2012; Gruchy et al., 2012; Mooney, Barham and Lian, 2014; Tyndall,

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Berg and Colletti, 2011). It is important to note that although there has been a growing literature on farmers' willingness and motivation to supply biomass, limited studies have been conducted related to perennial crop, especially oil palm biomass.

1.3 Justification

This study is conducted to examine the perceptions of residue utilization and willingness to supply oil palm residues from the perspective of independent smallholders of Perak. This study will inform various stakeholders from the oil palm industry, government and financial institution and other relevant institutions and associations on the availability and potential of the oil palm residues from independent smallholders. In addition, effective policy, programs, incentives, can be formulated to foster stakeholders' involvement in the biomass related industry as well as to improve independent smallholders' socio-economic status and hence stimulate green economic activity.

1.4 Objectives

The objectives of this study are:

- To determine oil palm independent smallholders' awareness and knowledge on oil palm residue;
- To investigate oil palm independent smallholders' willingness to supply oil palm residue;
- To investigate factors that motivates and demotivates oil palm independent smallholders to supply oil palm residue;
- To examine oil palm independent smallholders' perception on oil palm residue industry;
- 5) To examine barriers and possible solutions of those barriers perceived by oil palm independent smallholders to supply oil palm residue.

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