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Evaluation of Upstream Value Chain Analysis in Oil Palm: Insights from Smallholder Farmers in West Region Malaysia

Wan Nur Syuhada Wan Ariffin
Faculty of Plantation and Agrotechnology, Universiti Teknologi MARA, 40450 Shah Alam, Selangor. Malaysia

Fazleen Abdul Fatah[*]
Centre of Postgraduate Studies, Faculty of Plantation and Agrotechnology, Universiti Teknologi MARA, 40450 Shah Alam, Selangor. Malaysia
Faculty of Plantation and Agrotechnology, Universiti Teknologi MARA, Jasin Campus, 77300 Merlimau, Melaka. Malaysia

Abstract

This study aims to analyze upstream marketing channel selection by farmers, determining cost and return involved, and major problems faced by all actors at West Region Malaysia. The objective of this paper is to identify the upgrading opportunities in Malaysia's oil palm value chain. A survey was carried out among 156 oil palm independent smallholder farmers (ISHF), 4 middlemen, 5 collection centres and 2 millers who were selected randomly in Johor state which is among the largest independent smallholders in the region and data were collected based on structured interviews. Cost Benefit Analysis and Margin Analysis have been used as the empirical strategy. Farmers' socio-demographic characteristics, selected marketing channel, cost benefit analysis, and marketing margin have been used as main explanatory variables. Results indicate that most of oil palm independent smallholders chose marketing channel with highest Net Present Value (NPV) and Gross Marketing Margin. The motivations driving the purchasing or selling of fresh fruit bunches or FFB were: high quality of FFB, competitive price, low marketing and transportation costs. The results indicate that there is a margin for the value chain to upgrade their products while staying competitive. A strong and great market access is essential to support wider knowledge, distribution and information among the marketing channels. In addition, a joint action of value chain stakeholders is needed to exploit these opportunities.
Keywords: Value chain analysis; Marketing channel; Oil palm; Cost benefit analysis; Marketing margin.

1. Introduction

Agriculture is one of the most important sectors in Malaysia's economy and has contributed about 8.9 to the national Gross Domestic Products (GDP). According to the Department of Statistic (2017), in 2015, oil palm was the largest GDP contributors to the agriculture sector which has accounted for 46.9% of the total GDP followed by other crops (17.7%), livestock (10.7%), rubber (7.2%) and forestry and logging (6.9%). Compared to other crops production, oil palm has produced the highest fresh fruit bunches in 2015 by producing 98,344.1 ('000 tonnes) followed by paddy 3,322.0 ('000 tonnes), natural rubbers 722.1 ('000 tonnes), kenaf dried stems 11.6 ('000 tonnes) and cocoa beans 1.7 ('000 tonnes). The demand of palm oil has also increased over the past decade as compared to other vegetables oil and sunflower oil (Belai *et al.*, 2011).

The oil palm smallholders are divided into two categories which are organized and independent smallholders. Both of the smallholders are responsible in producing high quality Fresh Fruit Bunch (FFB). Independent smallholders are growers who cultivate oil palm in a small scale without any direct assistance from the government, organizations or private companies. Although independent smallholders may receive support through extension services, they are not bounded to any particular mill (RSPO., 2010). Thus, as they are in small-scale production entities, they are becoming less efficient and unproductive (Rahman *et al.*, 2008). However, independent smallholders play significant roles in the development of agricultural sector due to their large cumulative size.

The value chain in oil palm industries starts with the perspective of the farmers to produce the standard quality oil that is demanded by the customers, as well as the characteristic of products that is in demand and the value is being shared along the chain to produce the demanded products. Generally, the Malaysian oil palm value chain consists of two levels which are upstream and downstream. According to Vermeulan and Goad (2006), independent smallholders may sell their FFB either through the dealers or directly to the local mills. In the downstream level, the process then continues from the refineries to the shipping and finally to be exported to other countries.

However, this industry has a complex value chain both in upstream and downstream levels (Figure 1.0). The upstream level of oil palm industry consists of Independent Smallholder Farmers (ISHFs), collection centres, dealers and millers. This complex process started from cultivating the oil palm seedlings in the plantation, harvesting of fresh fruit bunch by the farmers or producers, collecting and transporting FFB from independent smallholders to the dealers and finally to the millers to be processed into crude palm oil and palm kernel. Due to the complex value chain in the upstream level, several issues which are related to the management of the fresh fruit bunch between the channels have arisen.

*Corresponding Author

Since independent smallholders are not bounded to any plantation scheme, they produce lower production of FFB and lower quality crop. Rahman, *et al* (2008) stated that Malaysian independent smallholders are inefficient as compared to other producers due to smaller plot size, poor agricultural practices such as improper use of fertilizer, low seedling's quality and harvesting unripe FFBs. Moreover, independent smallholders often depend on FFB dealers or middlemen to buy and transport their produces to the mill (Nagiah and Azmi, 2012). Therefore, independent smallholders are affected by crop price fluctuation risk. They are often lack of bargaining power and did not know the prices that will be paid to them.

Mills have monopsony purchase on independent smallholders. Although the price is determined by MPOB, some millers resorted to dirty tactics to downgrade the fresh fruit bunch or mixing the lower grades of FFB with higher grades so they could pay less to the independent smallholders. This creates losses towards independent smallholders as they received lower income although their FFB quality is high.

FFB dealers or middle-men are responsible for several operations in oil palm industries for the post-harvest handling of FFB such as collecting, storing and transporting the FFB. They are responsible to deliver harvested FFB to the mills within 24 hours to retain the fruit's freshness. Improper handling method can cause bruising of FFB, thus will lead to the infection of microorganisms in FFA content. The production of FFA could degrade the crude palm oil quality which could also reduce the smallholders' income.

As the price paid for their crop is not guaranteed, independent smallholders tend to cultivate their crop in improper way (Nagiah and Azmi, 2012). They also tend to harvest unripe FFB which consequently creates loses towards farmers as dealers will pay them for low extraction rate (OER). As a result, mills will tend to reject the FFB from independent smallholders. All of these elements will not only affect the farmers' income due to lower prices but also other issues due to the actors along the oil palm value chain.

To date, current studies conducted on value chain in Malaysia focused mainly on the actors in downstream level. For example, studies conducted by Pachecho *et al.* (2017) on the palm oil global value chain in Malaysia and Indonesia focused more on downstream processing in order to fulfill market demand around the globe. However, studies related to value chain at upstream level in oil palm industries are still limited. This is important since many traits that are valued by end consumers are directly or indirectly defined by the actors along the upstream value chain. These activities include quality improvement, timely delivery and innovation that are often directly linked with the upstream actors including independent smallholders, FFB dealers and mills. Improvement in the upstream value chain helps to improve efficiency and reduced waste. Therefore, it is worthy to conduct an upstream value chain analysis of oil palm to establish better understanding of activities as well as to identify value added or profitability created to the product along the chain.

Figure-1. Value Chain of Palm Oil from Plantation until Shipping. Source: MPOB. (2013)
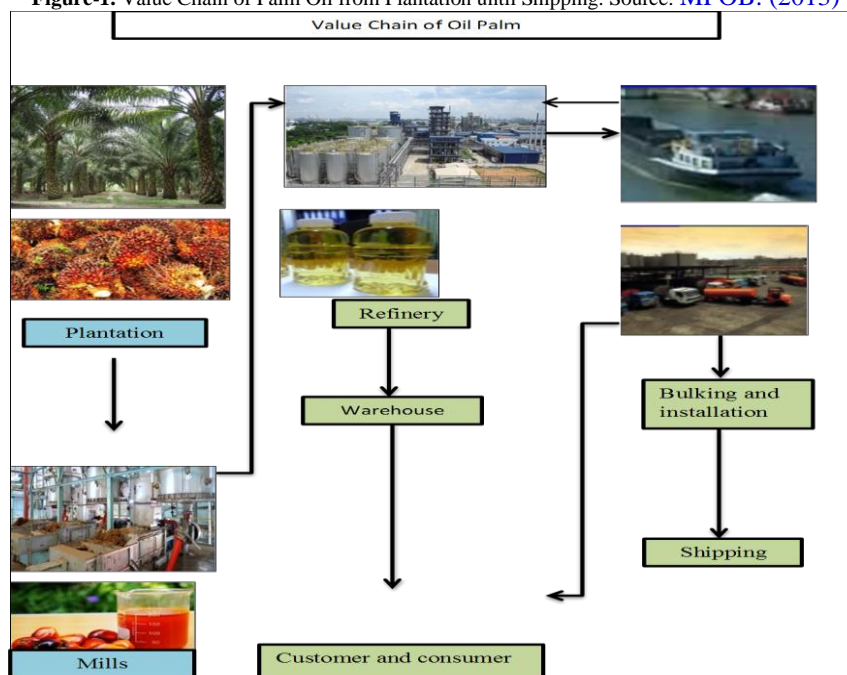
2. Literature Review

The concept of value chain was introduced by Michael Porter in 1985 in his influential book entitled "Competitive Advantage". Value chain concept is a general-purpose concept which can be used by companies to examine all the activities performances and to determine the costs and profits. The main goal of using value chain concept is to maximize the value to the end user with minimise cost as possible and therefore increase the company profit. Porter M. divided the value chain of activities into primary and secondary (support) activities, as shown as in Figure 2 below:

Figure-2. Porter M.'s Generic Value Chain. Source: Tools (2017)
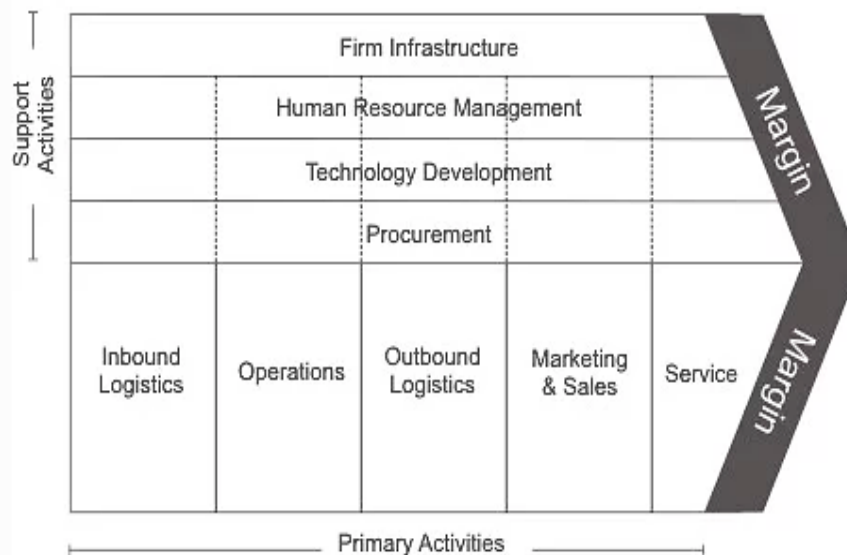
Value chain has recently been widely used in generating business idea. Value chain has also been defined in many ways by many authors throughout the time. Kaplinsky and Morris (2000) defined value chain as "full range of activities that are needed to bring a product or services passing through the intermediate phases of production to distribute to customers and final disposal after use". In 2003, Gibbon P. stated value chain as the full range of activities that adding value to the product and is needed to the product or service through different stage processes. For example, production, procurement of raw materials and other input, collection, physical modification, transportation of product and response to demand of customer. Berne (2007) defined value chain as determining each set of economic cost along the channel in order to identify the value added and the significance of the different actors.

The added value chain in the oil palm industry is divided into two categories which is upstream and downstream. In the upstream level, the main products are the crude palm oil and effluent which is waste product from oil palm mill. According to Belai et al. (2011), the cost for CPO production is about RM 2,100 per metric tonne and sales market price is about RM 3,300 per metric tonne. Therefore, he stated that the margin in the upstream level is good. However, the oil palm fruit price differs and has been an issues in the upstream level. This is because the FFB prices offered are vary based on the quality or set by individual in collection centres. According to Nureize and Watada (2009), the criteria to determine FFB quality are ripeness, attached fruitlets, detached fruitlets, colour, surface and condition of the FFB. Therefore, the price is difference according to their quality grades. Azahari Ramli, et al (2018) in his study stated that Grade A FFB with 19% of oil extraction rate (OER) was worth RM 729 per tonne, Grade B FFB with 18% of OER worth RM 662 per tonne and Grade C FFB with 17% OER worth RM 662 tonne per hectare.

Value chain actors is defined as individual that is involved directly in the product's trading, starting from suppliers of input, producers, traders, processors, wholesaler, retailer and buyers (Lunndy et al., 2004). Actors in value chain work under certain limitations and opportunities such as access to resource, intra and inter firm linkages, availability in technology and market. Moreover, the profit margin in the value chain activities can be determined through cost and returns at every stage by combining factors such as availability and quality transportation, storage and finance. The main value chain actors in the oil palm upstream levels are smallholder oil palm producer, intermediate collection centres, FFB dealers and millers.

There are several studies related to oil palm value chain in different countries. Glenday et al. (2015) studied on the central Kalimantan's oil palm value chain identified the opportunities of the value chain in improving productivity, earning and sustainability through efficient resources management. Although, the value derived from the central Kalimantan is profitable, he stated that the value can be enhanced through increasing the land productivity in the upstream levels by practicing good agricultural activities, maximize the utilization of existing capacity in the downstream level and strengthening the organization and integration of actors.

Study conducted by Pachecho et al. (2017) stated that majority of smallholders are located in Sumatera where there are more established and mature plantation while fewer in Kalimantan where it is more dominated by industrial plantations. The gap between the smallholder and larger oil palm concession is small in most situations. However, there is a significant increase in medium-scale oil palm investors such as local elites and absentee landholders with sharecropping contract.

Based on a study conducted by Dallinger (2011), the result showed that the CPO output in Thailand is below the annual capacity of 2.5 million due to limited ownership of large plantation. The mill often relies on purchasing of the independent smallholder's FFB. In addition, there are also intermediaries that collect and transport the FFB from the farmers to miller. Although intermediaries reduce the cost of transportation of farmers, the FFB quality is reduced due to poor practices of intermediaries. In order to increase the weight of FFB, the intermediaries often water down the FFB, adding sand or soil which could deteriorates the quality of the FFB.

In Nigeria, the study of value chain analysis of palm fruit production and processing has been conducted by Onwumere and Onwusiribe (2014), revealed females with secondary education contribute highest in the palm fruit agribusiness operators. Although harvesting, cooking, digesting, clarifying, and extracting stages are found to be the value addition in the value chain, the main constraints that limit the participation of the chain were credit, farm size and education. Whereas (Hoyle and Levang, 2012) stated that Cameroon imported more than 50,000 tons of crude palm oil due to deficit production relation to local demand. Three major constraints of the poor production are due to the poor planting materials and inputs and poor harvesting method in the oil palm plantation.

Lastly, based on the journal entitled Palm oil value chain analysis in the Niger Delta by Bamidele and Thomas (2011), identified the major challenges in the Nigeria value chain are the low productivity of FFB yield by farmers which is below industry averages, high cost of input that faced by smallholder farmers, poor linkages between processors and farmers and limited knowledge of the best practices. Besides that, their poor processing technologies only extract 25% to 50% of oil content which means that 50% of oil is thrown away and only 50% are processed. He also suggested that the size of the overall value chain must be increase to improve the processing efficiency and increase the investment of the replacing upgrading oil palm varieties that content higher oil.

3. Materials and Methods

In this article, the researchers focus on three marketing channel that are expected to be selected by the independent smallholder farmers (ISHF) (Figure3). More specifically, the focus is on the analyzing the costs and return of selected oil palm upstream marketing channel, such as Net Present Value (NPV), Internal Rate of Return (IRR) and Benefit-Cost Ratio (BCR). It is assumed that the selection of the marketing channel was based on the profit. Moreover, the researchers also investigate the marketing margin of each actor in order to identify their profit.

Figure-3. The Conceptual Framework of Study
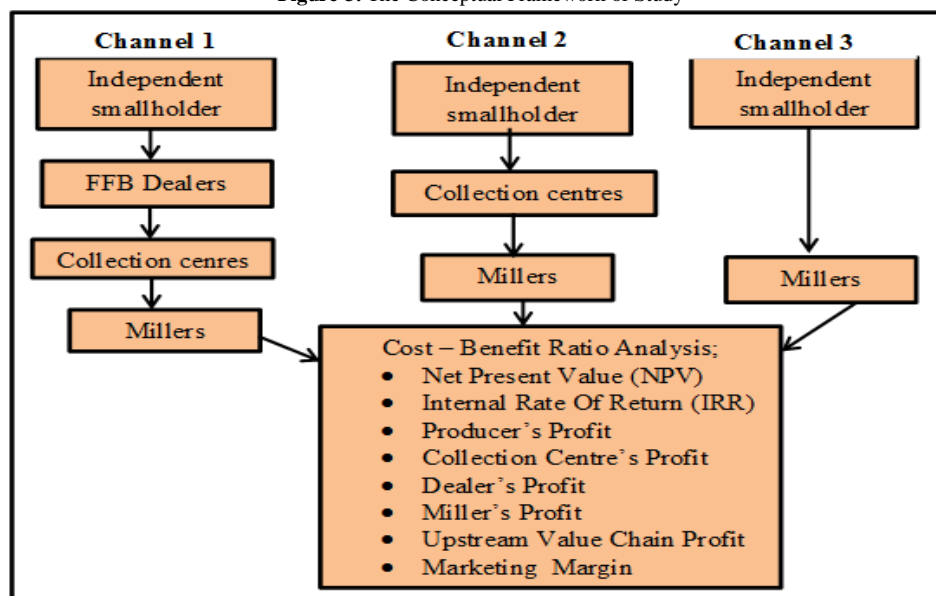
The sample size of the population was determined through Sekaran (2003). As the total population is 296, the total number of sample is 165. A simple random sampling technique has been used in selection of respondents' farmers for the study. After that, snowball sampling technique has been used based on the actors which farmers have selected to send their FFB produces. Snowball sampling method allows researchers to conduct a study that might be impossible to be conducted because of lack of participants or limited information of respondents.

Before the real survey is carried out, pre-test questionnaires are given to two experts, two academicians and two friends. The purpose of the pre-test is to ensure that the questions are understandable to the respondents. The study is based on primary data collection. The data was collected through questionnaire and interview in the upstream level value chain actors, starting from the independent smallholders, middlemen, collection centres to the millers.

The data obtained were analyzed by using software SPSS (Statistical Package for Social Science) to achieve the objectives of the study. Simple descriptive statistics, Cost and Benefit analysis and margin analysis were used in this study to evaluate the opportunity and the external costs of producing crude palm oil in the upstream level.

Cost Benefit Analysis or (CBA) of palm oil industries is used in this study in order to measure the financial profitability of each marketing channel. CBA is a systematic approach that is used to estimate the strength and weakness of alternatives options. However, CBA has certain limitation in terms of income distribution as the revenue generated by the independent smallholders and other actors are hard to predict and may be vary (Tools, M. (2017). CBA is determined by using the following formula.

Firstly, we calculate the Net Present Value or NPV using the following formula:

$$NPV = PV(B) - PV(C)$$

$$NPV = \frac{\sum t \, (Biat)}{(1+r)t} - \frac{\sum t \, (Cia,t + Cib,t + \dots)}{(1+r)t} \qquad (1)$$

Where PV(C) is the present value of the cost, Biat= Total annual revenue, Cia = Establishment cost, Cib = Annual salary, Cic = Annual pesticide use, Cid = Annual fertilizer use, Cie = Annual transportation cost, Cif = Annual Administration cost, Cig = Fuel, T = Time in years, r = Interest rate. If the NPV is positive, the marketing channel is profitable and should be proceed, whereas if the NPV is negative, the marketing channel is not efficient and should not be carried out (Boardman *et al.*, 2006).

The second formulae in calculating CBA is the Benefit Cost Ratio or B/C ratio which is used to determine the benefit received per unit cost of a project and as an indicator of the efficiency of investment in the project. If the B/C ratio is greater than 1, the benefit is greater than cost and thus activity in question is justified. If the B/C ratio is less than 1, the cost is higher than the benefit and should not be carried on. B/C ratio is calculated by using the following formula:

$$B/C = [\frac{B_0}{(1+i)^0} + ... + \frac{B_T}{(1+i)^T}] \div [\frac{C_0}{(1+i)^0} + ... + \frac{C_T}{(1+i)^T}] \qquad (2)$$

where B = Benefit, C = Cost, T = year, i = Discount rate

The third formula is the Internal Rate of Return or (IRR) which is a metric used in capital budgeting to measure the profitability and potential investments. IRR is a discount rate that used Net Present Value (NPV) of all cash flows from a particular project equal to zero. The formula is represented below as:

$$IRR = \sum (R_n - C_n)/ (1 + r)^n = 0 \qquad (3)$$

where R = Revenue, C = Costs, n = year, r = Rate of interest

In addition, the marketing margin (MM) percentage was calculated by using the following formula:

$$MM = \frac{Ps}{Sp} \, x \, 100 \qquad (4)$$

where MM = Marketing margin, Ps = Price spread, Sp = Sale price, Price spread = Sale price – Purchase price

Gross marketing margin was calculated by using following formula:

$$GM = Sp - Pp \qquad (5)$$

where GM = Gross margin, Sp = Sale Price, Pp = Purchase price

And finally, the Net marketing margin (NM) is estimated by using following formula:

$$NM = GM - TC \qquad (6)$$

where NM = Net margin, GM = Gross Margin, TC = Total cost

4. Results

Table 1 represents the socio-demographic characteristics of independent smallholder farmers. The age distribution of responding farmers showed that the number of farmers was dominated largely by 50 to 60 years old which is about 44% followed by age between 39 to 49 years old (21%). Most of independent smallholder farmers contributed into the plantation area after they are retired from the previous work such as in government sector.

The result in Table 1 also showed that the distribution of gender of responding farmers were largely dominated by male which is 156 (94.5%) were males whereas 9 (5.5%) were females. This proved that women participation in the oil palm cultivation is still very low as they mostly focus on their role as housewife without participating in local economic activities. In term of marital status, respondent farmers were dominated by married farmers which is 142 (86.1%) followed by single and divorced which accounts for 12 (7.3%) and 6 (3.6%) respectively. While the remaining were divorced farmers accounts for 5 (3.0%). From this result, we can see that most of the respondent farmers were married. This is because married farmers were able to share their workload through labour division as compared to single individuals.

The study also revealed that majority of the farmers' education level were secondary school which accounts for 82 (49.7%) followed by primary education and college diploma holders which is 40 (24.2%) and 22 (13.3%) respectively. The least number of the respondent farmers were illiterate which only 21 (12.7%). Moreover, most of the respondent farmers were considered as highly experienced farmers as majority of them contributed about 64 (38.8%) for 21 years experience and above. The least number of oil palm producers whose experience were between 1-5 years was only 17 (10.3%). These indicate that most of farmers have contributed into the oil palm sector for a long time and this experience may helpful in the fresh fruit bunch cultivation.

We can also observe that 54(33.0%) of the respondent farmers hold 0.20-3.21 hectares of oil palm plantation area followed by 46(28%) who hold 1.71-3.21 hectares. The remaining 43(26.0%), 17 (10.0) and 5(3%) of the respondent farmers hold of oil palm plantation land which account for 3.22-4.72 hectares, 4.73-6.23 hectares and 6.24 and above respectively. This means that majority of the farmers has small area of plantation area and can manage their own land by themselves or with minimum number of labour.

Table-1. Socio demographics of the respondents

Variables	Frequency	Percentage (%)
Age		
28-38	17	10
39-49	35	21
50-60	73	44
61-71	28	17
72 and above	12	7
Gender		
Male	156	95
Female	9	6
Marital Status		
Married	142	86
Single	12	7
Divorced	6	4
Widowed	5	3
Educational Level		
Illiterate	21	13
Primary school	40	24
Seconadary school	82	50
College/Universities	22	13
Working Experience		
1-5	17	10
6-10	24	15
11-15	25	15
16-20	35	21
21 and above	64	39
Land Holding		
0.20-1.70	54	33
1.71-3.21	46	28
3.22-4.72	43	26
4.73-6.23	17	10
6.24 and above	5	3

Source: Field Research (2018)

There were only 2 marketing channels that are preferred by farmers in this study which are; 1) From independent smallholders to middlemen to the collection centres and finally to the millers while the 2) second marketing channel is from the independent smallholders to the collection centers and then to the millers. Both independent smallholder and middlemen did not directly contact with the millers. This is due to a longer distance of plantation to the mill and the small FFB quantity produced by the farmers. They also need to pay high transportation cost as they need to rent lorries and pay for diesel costs.

Table 2 shows that the majority of independent smallholder farmers sell their FFB products to the collection centre which accounts for 150 (90.9) while the rest sell their FFB to the middlemen. Hence, we can see that all farmers sold their FFB to the middlemen and collection centres and they do not have any relationship with the mill. Table 3 shows that all middlemen bought FFB from independent smallholder farmers. This indicates that farmers are the primary supplier of Fresh Fruit Bunch. After that, all middlemen sold the collected FFB to the collection centres on the same day to avoid FFB from damages. From this table, we can also see that the middlemen have no direct relationship with the mill at all as none of them sell their FFB produces directly to the mill.

Table 4 represents the sources of FFB for collection centres in this study are from both farmers and middlemen. Then, all collection centres sold their products to the mill. We can see that collection centres have relationship with all actors in the upstream oil palm value chain. Thus, collection centres are the most important actors in transporting FFB to the mill in the upstream oil palm value chain. While Table 5 shows the response of miller, all respondent 2(100%) millers bought Fresh Fruit Bunches from collection centres.

According to the study, marketing Channel 2 (independent smallholder – collection centre- millers) showed the largest channel procured of oil palm independent smallholder farmers which accounted for 150 (90.9%) as compared to channel 1 which is only 15 (9.1%). From 150 farmers that choose channel 2, 115 (76.7%) of farmers choose to be paid through credit system at the end of the month while the rest 35 (23.3%) choose to paid through daily payment.

Table-2. Independent Smallholder Farmers Response

To Whom They Sell FFB	Frequency	Percentage (%)
Middlemen	15	9.1
Collection Centres	150	90.9
Mill	0	0
Total	165	100.0

Source: Field Research (2018)

Table-3. Middlemen Response

From whom they buy FFB	Frequency	Percentage (%)	To whom they sell FFB	Frequency	Percentage (%)
Farmers	4	100.0	Collection Centers	4	100.0
			Mill	0	0
Total	4	100.0	Total	4	100.0

Source: Field Research (2018)

Table-4. Collection Centres Response

From whom they buy FFB	Frequency	Percentage (%)	To whom they sell FFB	Frequency	Percentage (%)
Farmers			Mill	5	100
Middlemen	5	100			
Total	5	100	Total	5	100

Source: Field Research (2018)

Table-5. Mill Response

From whom they buy FFB	Frequency	Percentage (%)	To whom they sell FFB	Frequency	Percentage (%)
Farmers	0	0	Refineries	2	100
Middlemen	0	0			
Collection centres	2	100			
	2	100	Total	2	100

Source: Field Research (2018)

Table-6. Cost Benefit Analysis of selected marketing channel

CBA Analysis	Marketing Channel 1	Marketing Channel 2	
	Credit Payment Method	Credit Payment Method	Cash Payment Method
Benefit-Cost Ratio (BCR)	1.44	1.36	1.07
NPV (interest rate 4%)	RM490.67	RM620.35	RM54.13
Internal Rate of Return (IRR)	44.65%	36.12%	7.25%

Source: Field Research (2018)

Based on Table 6, the Benefit-Cost Ratio for all three options showed that all is more than 1 which means that all options give benefits higher than costs to all farmers. Among all options, the Marketing Channel 1 gives the highest BCR compared to Marketing Channel 2 (credit) and Marketing channel 2 (cash) with the value of 1.44, 1.36 and 1.07 respectively. This is because through marketing channel 1, farmers have low costs in terms of labour cost as middlemen provide a lower charge as compared to the farmers paying to individual harvester or workers for applying fertilizer and pesticides.

The Net Present Value (NPV) for all three options is above zero which indicated that value of farmers' revenues (cash inflow) if greater than is greater than cost (cash outflow). As all the NPV for all three options were positive, farmers get profit from their preferred marketing channel and can proceed with the investment. From all three options, Marketing Channel 2 (credit) shows the highest NPV at 4% followed with Marketing Channel 1 and Marketing Channel 2 (cash) with NPV value RM 620.35, RM 490.67 and RM 54.13.

Lastly, based on the Internal Rate of Return (IRR) in the table above, the Marketing Channel 1 shows the highest IRR which 44.65% followed by Marketing Channel 2 (credit) with IRR 36.12% and Marketing Channel 2 (cash) with IRR 7.25%. Highest IRR indicates that with the current interest rate, farmers are still able to get high rate of return (Bacha and Rodriquez, 2007).

Table-7. Summary of Marketing Margin of all Actors in both Marketing Channel 1 and 2

Actors Involved	Items	Marketing Channel 1	Marketing Channel 2	
		Credit Payment Mode	Credit Payment Mode	Cash Payment Mode
ISHF	Gross Margin (RM)	217.17	284.53	262.36
	% Gross Margin	58.12 %	64.5%	62.64%
	Net Profit Margin (RM)	152.49	219.85	197.68
	% Net Profit Margin	70.35%	77.26%	75.35%
Middlemen	Gross Margin (RM)	67.46	N/A	N/A
	% Gross Margin	15.29%	N/A	N/A
	Net Profit Margin (RM)	38.11	N/A	N/A
	% Net Profit Margin	56.49%	N/A	N/A
Collection Centres	Gross Margin (RM)	56.37	56.37	78.64
	% Gross Margin	11.33%	11.33%	15.80
	Net Profit Margin (RM)	50.50	50.50	72.24
	% Net Profit Margin	89.58%	89.58%	91.86
Miller	Gross Margin (RM)	90.00	90.00	90.00
	% Gross Margin	15.32	15.32	15.32
	Net Profit Margin (RM)	64.20	64.20	64.20
	% Net Profit Margin	73.33	73.33	73.33

*N/A – Not Available.
Source: Field Research (2018)

Based on Table 7, the summary for marketing margin analysis that was conducted before, regarding the three options; 1) marketing channel 1 (farmers sell to the middlemen using credit mode), marketing channel 2 (farmers sell to the collection centre through credit) and marketing channel 2 (cash), it can be seen that independent smallholder farmers get the highest gross margin through marketing channel 2 (credit payment mode) which was RM 284.53 (64.5%) followed by marketing channel 2 (cash payment mode) was RM 262.36 (62.64%) and Marketing Channel 1 was RM 217.17 (58.12%). Through this option, farmers also get the highest net profit margin followed by Marketing Channel 2 (cash) and Marketing Channel 1 which is accounted for RM 219.85 (77.26%), RM 197.68 (75.35%) and RM 152.49 (70.35%) respectively. From all this value, it can be concluded that farmers will get highest profit margin if they choose marketing channel 2 which is through credit payment mode.

The marketing margin for middlemen was only available for marketing margin 1 as in marketing margin 2; farmers sell directly to collection centres. From the table, the gross margin for middlemen was RM 67.46 (11.29%). The net profit margin for middlemen was RM 38.11 with the percentage of 56.49%. From all actors, middlemen get the lowest profit margin as the difference between average sale price and average purchasing price was the lowest among other actors.

In addition, collection centre in marketing channel 2 through cash payment has the highest gross margin compared to marketing channel 1 and marketing channel 2 through credit systems with the value of RM 78.64 (15.80%) and RM 56.37 (11.33%) respectively. The marketing margin for both marketing channel 1 and marketing channel through credit systems were same as collection centre pay to both actors through credit systems after one month FFB was sell to the mill. The net profit margin for collection centre through marketing channel 2 (cash) was also the highest which was RM 72.24 (91.86) and the other 2 options were RM 50.50 (89.58%).

Lastly, the marketing margin for miller was same for all options. Only collection centre is involved in selling FFB products to the mill so purchasing and selling price of miller were the same for all options. As we can see, the gross marketing margin for all options was RM 90.00 (15.32) while the net profit margin of the miller was RM 64.20 (73.33%).

4.1. Main Problems Faced by Independent Smallholder Farmers, Middlemen, Collection Centres and Millers

In upstream oil palm value chain, most farmers faced several problems such as in marketing and transporting their Fresh Fruit Bunch products which could affect their revenue and income. The problems that are faced by farmers in the oil palm upstream value chains are as follows:

Figure-4. Main Problems in FFB Production Faced by Independent Smallholder Farmers
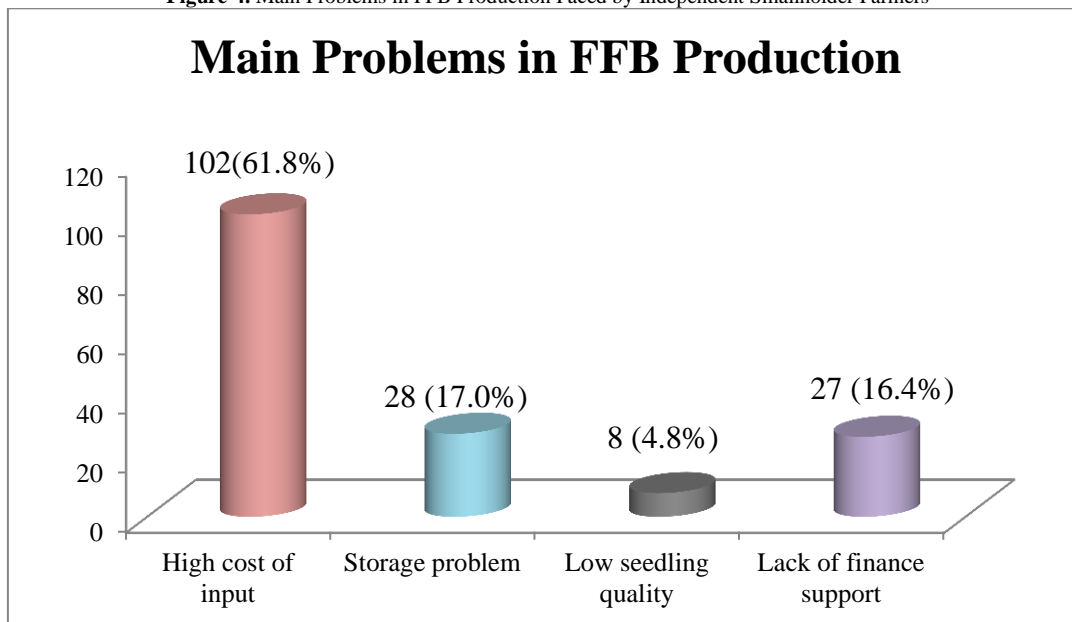
Based on Figure 4, 102(61.8%) of independent smallholder farmers said that high cost of input such as fertilizer and seedlings are the main problems in their FFB production. For example, the average price for purchasing fertilizers and pesticides are RM 161.52 and RM 79.33 respectively. As many as 28(17.0%) and 27(16.4%) farmers responded that they have storage problems to keep the FFB under shade after being harvested and lack of finance support caused them to give improper quantity of fertilizers. The rest of farmers 8(4.8%) said that their seedling quality is low. This occurred when farmers plant their own seedlings but do not have enough knowledge to manage them. Majority of farmers 112(67.9%) responded that unstable FFB price was the main problem in selling the FFB followed by 53(32.1%) responded that FFB price that was offered to them are low. The price of Fresh Fruit Bunch was unstable for every month. As a result, farmers face the risk of income instability and they are unable to manage their budget properly. Over budget might occur during the next month when market price for oil palm fall as their calculation for input costs was based on current price.

Farmers who reported that their main problem was low Fresh Fruit Bunches price stated that most buyers do not want to negotiate on the selling price with them. Buyers have monopoly the FFB price and have set up the price on their own. Farmers also believed that they can get higher income if buyers are willing to negotiate with them. Moreover, some of the farmers believe that market price transparency can help reduce both of these problems by providing price information which is accurate and relevant to farmers. Through market transparency, farmers are provided with information such as price for the next month, volume that is needed and quality of the fresh fruit bunch that is expected by the buyers.

Table-8. Problems Faced by Middlemen in Transportation of FFB

Problems	Response	Frequency	Percentage
Unstable price	Yes	3	**75%**
	No	1	**25%**
High transportation cost	Yes	4	100%
	No	0	0
Poor road infrastructure	Yes	1	25%
	No	3	75%
Shortage of truck	Yes	3	75%
	No	1	25%

Table 8 shows the problem faced by middlemen in selling their Fresh Fruit Bunches to the collection center. From 4 middlemen, 3 (75%) answered that their main problem in selling Fresh Fruit Bunches were unstable FFB price and 1(25%) answered that his problem was low FFB price. Having the same problem as the farmers, middlemen were not able to manage their budget properly due to price fluctuations. They might get higher in return for this month and loss for the next month.

As it is portrayed in Table 8, all of middlemen faced high transportation costs in transporting their Fresh Fruit Bunches produced. This indicated that, transportation cost was the major problem for middlemen. For the poor road infrastructure, 3(75%) answered that they have no problem with the issue of road infrastructure while the rest 1(25%) has some problems regarding poor road infrastructure. Lastly, most of the farmers faced shortage of truck in transporting the FFB. This condition led to delaying of FFB transportation which could degrade the quality of oil in the FFB.

The study has revealed that there were four main problems that was faced by collection center in the upstream oil palm value chain which include shortage of small lorries, high transportation costs, lack of suitable technology

for grading and lastly delaying in transporting FFB to mill (refer to Figure 5). For the shortage of small lorries, 4(80%) of collection center answer that they have shortage of small lorries that were used to collect FFB from farmers while 1(20%) answered that they have no problem regarding the transportation issue. Because of that problem, the FFB was not able to be collected on time due to the delay in transporting of FFB to mill were faced by 3(60%) of collection center while the rest 2(40%) managed to send their collected FFB on time.

Besides that, 5(100%) of collection centers stated that they were lack of suitable technology for grading the FFB. Lack of suitable technology for grading caused the grading process of FFB to be done in improper way. Due to that, they only grade FFB manually through observation of the FFB by looking on the physical characteristic such colour, weight of FFB and number of loose fruit.

Lastly, regarding the high transportation costs, 3(60%) of collection centers stated that they faced high transportation costs while the rest stated that they do not face high transportation costs. This is because transportation is the main activity for collection center. They highly use transport to collect FFB from farmers and assemble it at the collection center. Then, they need to transport the FFB to the mill.

Figure-5. Main Problems Faced by Collection Center to Ensure Quality of FFB
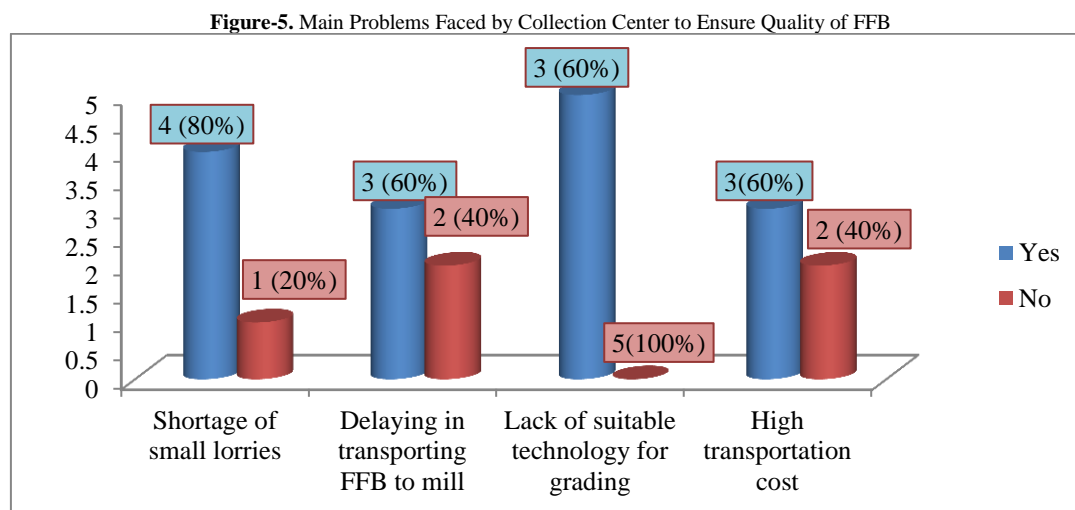
Based on the study that has been carried out, there are several problems that were faced by miller in the upstream oil palm value chain (Figure 6). The major problems faced by miller were lack of fresh fruit bunches or FFB supplied and low FFB quality received from the sellers.

All millers stated that they have problem regarding lacks of fresh fruit bunch supplied due to prolonged drought condition. Hot weather affects the production of Fresh Fruit Bunches as it prevents the flowering and fruiting of oil palm trees. Moreover, the quality of the FFB has decreased due to the delay of transportation by the collection center to the mill. Delaying transportation will increase the free fatty acid content and will affect the quality of oil in the oil palm. Miller also stated that, due to poor grading system by the collection center, as much as 4% in average were deducted from the total FFB collected by the collection center.

It was also reported that about 102(61.8%) of independent smallholder farmers mentioned that high costs of inputs such as fertilizers and seedlings were the main problems in their FFB production. For example, the average price for purchasing fertilizers and pesticides are RM 161.52 and RM 79.33 respectively. 28(17.0%) and 27(16.4%) of farmers responded that they have storage problems to keep the FFB under shade after harvested and lack of finance support that caused them to give improper quantity of fertilizers. The rest of farmers 8(4.8%) said that their seedling quality is low. This occurred when farmers plant their own seedling but does not have enough knowledge to manage them

5. Conclusion

This study analyses upstream marketing channel selection by farmers in oil palm value chain in Malaysia. The major actors in the upstream oil palm value chain were independent oil palm smallholder farmers, middlemen, collection centres and millers. Farmers sold their FFB produced to the middlemen or directly to the collection centre, however none of farmers sold directly their product directly to the mill due to a long distance between farms and mills as well as smaller quantity of FFB products. Although there were only two marketing channels, farmers have three options which include; a) farmers sell to the middlemen using credit mode b) farmers sell to the collection centre through credit c) farmers sell to the collection centre through cash payment mode. Cost Benefit Analysis (CBA) and Marketing Margin Analysis were used to determine which of all three options were the most profitable to farmers and which gives highest margin for them.

Based on this study, the following recommendations are drawn and should be taken into consideration by the all actors and researchers in the study area to increase actors' profits and literature regarding the upstream oil palm value chain.

Firstly, in order to get the highest profit margin, famers should choose marketing channel 2 through credit payment mode compared to marketing channel 1 and marketing channel 2 through cash payment mode. Middlemen and collection center must also be efficient in transporting fresh fruit bunches in the upstream level so that the

quality of the FFB can be maintained. A strong and great market access is essential to support wider knowledge, distribution and information among the marketing channels.

Secondly, the role of government is important to ensure low price input supplies such as fertilizers and pesticides. Most of farmers complained that they faced problems in buying input supplies due to high price. This has led to improper use of fertilizer and pesticides by farmers as they are lacking of source of fertilizer. Therefore, a joint action of value chain stakeholders is needed to exploit these opportunities.

Lastly, more research is needed to be done as it is difficult to gather information on value chain analysis in oil palm sector especially on the profit and return of marketing channel and the actors involved in the study.

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