

Oil palm plantation, smallholders and land settlement schemes in Papua New Guinea

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Abstract

Smallholders who cultivate oil palm under Land Settlement Schemes in PNG are suffering from low income and over-population. Under an oil palm project, introduced in 1967, smallholders were granted 99-year leases for a 6.0 to 6.5 hectares block of government land. This paper argues that the existing land leasing-system is a root-cause of problems. The lease system is a disincentive for the offspring of original block owners to leave the plantation area, which causes lower income due to the sub-division of oil palm blocks. However, if the lease-system is changed to a fully transferable ownership system, the situation might change.

Keywords: oil palm, land lease system, plantations, Papua New Guinea

Introduction

Oil palm, scientifically known as *Elaeis guineensis*, is a tree, whose natural origins are in West and Southwest Africa, specifically the area between Angola and Gambia. This tree produces fruits that can be processed to extract edible oils and fats for human consumption. It is now one of the commonest edible oils used in everyday foods, cosmetics and personal hygiene products. In Papua New Guinea (PNG), oil palm is a very important export crop. This crop earned about 56% of the country's total value of agricultural exports (OPIC 2015) in 2010. In 2010, oil palm earned about 56% of the country's total value of agricultural exports, which amounted to more than 1.22 billion in Kina. Total land under oil palm cultivation was 136,179 hectares and total production was more than 2.5 million tonnes. In terms of rural employment, this industry directly created livelihoods for about 23,000 small landholders, who supported about 190,000 people.

This outstanding achievement has encouraged the government of PNG to expand the industry further, which is seen as economically wise for two reasons. First, the world demand for palm oils and fats was trending upward progressively. The global palm oil consumption was 17.7 million tonnes in 1997, which increased to 52.1 million tonnes in 2012. The projected global consumption of palm oil in 2050 is 77 million tonnes (Palm Oil Research Statistics, 2014). This would mean that global demand for palm oil will increase by another 25 million tonnes in the next 38 years. Second, for environmental and other reasons, Indonesia and Malaysia - which together

account for about 85% of the world palm oil production - are showing restraints in their production plans.

In Malaysia, particularly in the country's east, the expansion of oil palm plantations has come under severe criticism from environmental groups and civil societies because the existence of orangutan (*Pongo*) habitats populating there has become endangered due to open burning and planting on peat soil. These protests resulted in government regulations to comply with the Roundtable on Sustainable Palm Oil (RSPO) plantation policies. Additionally, the government land conservation policy restricted oil palm plantations only on idle land or designated agriculture land. Compared to Malaysia, the Indonesian oil palm industry, which is much bigger, faces stiffer criticisms from the climate-concerned groups that include deforestation and destruction of carbon-rich peat lands. Thus, the government of Indonesia has imposed stricter restrictions on oil palm plantations. In order to satisfy these critics, the Indonesian government introduced a Malaysian-type RSPO, called Indonesian Sustainable Palm Oil, which monitors the practice of 'green policies' in oil palm cultivation. Additionally, the government announced a two-year primary forest moratorium, which has been in effect since 2011.

Given the above global situation concerning palm oil production and consumption, PNG has a fair opportunity for exploiting an increasing share of the prospective global market. To take advantage effectively of this opportunity, the government of PNG however ought to meet two policy requirements. First, as mentioned above, there is significant opposition to expanding oil palm plantations around the world including PNG. The reasons are both sensible and sensitive: Oil Palm cultivation has been causing major environmental and social hazards around the world, which include deforestation, habitat degradation, climate change, animal cruelty and indigenous rights abuses in the countries where it is produced on a large scale (One Green Planet, 2014).

Besides, the risks associated with oil palm cultivation, palm oil has also been proven dangerous for human health. Therefore, the government of PNG has an obligation to address these issues if it wants to make its oil palm expansion program sustainable – both economically and socially. Second, the oil palm expansion policy should be clearly linked with the country's rural poverty alleviation agenda, which requires orchestrating appropriate policies to establish smallholder blocks and attract rural people to operate those blocks. Currently, there are three types of smallholder blocks in the oil palm plantation industry - Land Settlement Scheme (LSS), Village Oil Palm (VOP) and Customary Rights Purchase Back (CRPB). Recent research highlights significant welfare issues in these smallholder oil palm programs (Anderson 2015; Bue 2013).

Naturally, smallholders' welfare issues ought to be appropriately dealt with if the oil palm plantation industry is to be made an effective partner in the country's rural poverty alleviation strategy. The three smallholder programs mentioned above basically differ in terms of operational rights on oil palm

blocks. The LSS has been established in alienated lands (acquired from customary landowners by Government, either for its own use or private development requiring a mortgage or other forms of guarantees), where smallholders have 99-year lease on their blocks. The VOP is operated by customary landowners, whilst the CRPB is organised on lands rented from customary land owners.

A closer look at the smallholder plantation program in PNG reveals that its most important feature is that the oil palm farmers do not have *ownership right* on the lands they are operating. What they have is called *operational right*. In other words, the smallholders' right on the oil palm blocks they are operating is not *transferable*. This tenurial right is consistent with the country's dominant land tenure system, popularly known as customary land. This is a system of property ownership in which a kin group or a collection of kin groups own lands as a natural possession. Individual members enjoy the rights to use these resources hereditarily according to the informal customary rules specific to the group (Elahi and Stillwell 2013). This land tenure system is polar opposite of individualised land tenure practised throughout the world, particularly in the industrialised West. In this system, the state theoretically owns all lands under its boundary, but in practice, this ownership right is exercised by individuals. Government guarantees and protects the titles of demarcated pieces of land registered to individuals, which allows the title holders to use this right in the way they wish: use the lands, lease or sell them. It is generally believed, and the economic progress around the world testifies, that this kind of property right inspires individuals to increase and accumulate wealth, which in turn leads to accelerated economic development.

This paper was conceived on the premise that the root-cause of economic problems, which the smallholder oil palm plantation program in PNG is grappling with, is basically due to the ownership issue. Because the smallholders do not have ownership right on the oil palm blocks, they cannot increase the size of their holdings even if they wish to. On the other hand, they do not want to abandon oil palm farming and leave the area, because they would then lose their use right of the blocks. Accordingly, this paper is specifically concerned with oil palm cultivation under LSS in PNG, for the issue we are discussing is more appropriate for the "*LSS system*" than any other smallholder oil palm programs.

The paper is organised such that the next section briefly discusses the history and structure of oil palm cultivation in PNG, then briefly narrates the governance structure of the oil palm industry. After that, the socioeconomic conditions of oil palm farming under the LSS scheme is analysed in order to unearth the probable causes of the smallholders' welfare loss and to recommend possible solutions. The concluding remarks are presented in the final section of the paper.

History and structure of the oil palm industry in PNG

Oil palm was first grown on PNG soil in the Rai Coast of Madang in 1894 by the Germans. In 1920, first observational planting were done in West New Britain Province (WNBP) and additional experimental plantings were established by the Germans in Popondetta, Oro Province (Koczberski, Curry & Gibson, 2001). However, the actual commercial cultivation began in the 1960's when the then colonial government approved a World Bank recommendation to establish two projects in the West New Britain province. The primary objective of this undertaking - which needs to be established to understand the importance of this crop - was to diversify agricultural production and to increase and stabilise the country's export earnings. The two areas selected for the projects were Hoskins and Biella, which respectively started plantations in 1967 and 1972. Between 1990 and 2011, the global production of palm oil and palm kernel oil has increased by almost fivefold reaching to 50 million tonnes.

These projects - guided by the already popular idea known as 'nucleus estate model' - were established in alienated lands in the provinces. Under this model, a palm oil processing plant was established in a strategically advantageous location in the area so that oil palm fruits could be brought to the plant economically. The production of oil palm was organised under two farming operation schemes. First, the processing plant company was made responsible to manage large oil palm estates, procure all kinds of planting materials, offer technical advice and conduct all kinds of marketing from buying fresh fruit bunches (FFB), processing and refining them to making palm oil and to finally selling them to foreign buyers. These oil palm estates were jointly owned by the company and the national government. Second, a scheme called "*Land Settlement Scheme*" (LSS) was created to parcel the alienated lands into 6.0-6.5 ha blocks and then leased to smallholders for a period of 99 years. Although all Papua New Guineans were eligible to apply for these blocks, the government encouraged villagers from over-populated areas to settle in this scheme areas.

The initial arrangements to create oil palm plantation projects, however fell short of the government's ambitious export diversification plan. Thus, after independence in 1975, the government decided to encourage customary landowners to adopt oil palm cultivation through a program called "*Village Oil Palm*" (VOP). Under VOP, local villagers were encouraged to establish 'two to four' ha of oil palm blocks on customary lands. To achieve this, the government extended loans for land development and other activities through the publicly owned PNG National Development Bank Limited (NDBL). Finally, a system of oil palm cultivation has developed in areas of high population/land pressure (esp. LSS areas), which is called "*Customary Rights Purchase Blocks*" or CRPBs. Under this system, lands in which oil palm is cultivated are not actually purchased, meaning there is no tenure conversion. The interested oil palm growers just buy the right to use the land. The land remains as customary land and owned by the traditional landowners. The access rights are documented through a Customary Land Usage Agreement. Therefore, oil palm cultivation in PNG is currently organised under four systems of operational management- large oil palm plantation estates operated

by a palm oil company, LSS blocks operated by long-term lease holders, VOP blocks operated by customary land owners and CRPBs operated by villagers without ownership rights. The following two tables contain information about the current state of oil palm operation and production in the country.

Table 1a: Distribution of oil palm hectarage in PNG in 2010: Inter province variation

Project Area	Company Estate	Smallholder Unit	Total
Hoskins (NBPOL, WNB)	35,427(44)	25,255(46)	60,682(45)
Popondetta (NBPOL, Oro)	8,892(11)	11,958(22)	20,850(15)
Milne Bay (NBPOL, Milne Bay)	11,306(14)	1,900(4)	13,206(10)
New Ireland (NBPOL, New Ireland)	5,689(7)	2,237(4)	7,926(6)
Ramu (NBPOL, Madang)	10,207(13)	260(00)	10,467(8)
Bialla (Hargy Oil Palm, WNB)	9,827(12)	13,221(24)	23,048(17)
Total	81,348(100)	54,831(100)	136,179(100)

Source: OPIC, 2015

Table 1a shows several pieces of information about oil palm cultivation in PNG that are extremely important to understand the nature of the country's oil palm industry. First, there are six oil palm plantation project areas located in five provinces- WNB, Oro, Milne Bay, New Ireland and Madang. But the distribution of plantation areas is very uneven. West New Britain alone accounts for 62% of the area. The next important province in terms of oil palm cultivation is Oro province (15%), followed by Milne Bay (10%). The project areas in the other two provinces are rather small. This information about the geographical distribution of oil palm cultivation is quite significant from the economic viewpoint. This is because it suggests that the government of PNG should seriously survey the soil and related climatic conditions in other provinces, if it is interested in expanding oil palm industry.

Second, based on ownership and operation, oil palm cultivation practices may be divided into two kinds- company estates and smallholder units. The total area of land under oil palm plantation in 2010 was 136,179, of which 54,831 ha or about 40% was under smallholder operation. This figure underlines the basic nature of oil palm cultivation in PNG. Although the economic viability of oil palm cultivation in PNG is largely dominated by the palm oil industries operating large estates, the importance of smallholder operation in developing the oil palm industry cannot be overlooked or underestimated. Given this broad division, there are great variations in the distribution of oil palm hectares within as well as between farming practices. Table 1a shows that 56% of company estates are located in WNB. Then the rest of the oil palm areas are fairly evenly distributed among other provinces, except New Ireland. Smallholder units, on the other hand, are basically located in two provinces – WNB (70%) and Oro (22%). A kind of diverse picture is observed about the

distribution of farming units within different provinces in Table 1b. Hoskins, Milne Bay, New Ireland and Ramu areas under company estates are bigger than those under individual operations. In fact, smallholder units are virtually non-existent in Ramu, although their presence is perceptible in Milne Bay and New Ireland. On the other hand, smallholders dominate oil palm farming in Popondetta and Bialla.

Table 1b: Distribution of oil palm hectarage in PNG in 2010: Intra farm variation

Project Area	Company Estate	Smallholder Unit	Total
Hoskins (NBPOL, WNB)	35,427(58)	25,255(42)	60,682(100)
Popondetta (NBPOL, Oro)	8,892(43)	11,958(57)	20,850(100)
Milne Bay (NBPOL, Milne Bay)	11,306(86)	1,900(14)	13,206(100)
New Ireland (NBPOL, New Ireland)	5,689(72)	2,237(28)	7,926(100)
Ramu (NBPOL, Madang)	10,207(98)	260(2)	10,467(100)
Bialla (Hargy Oil Palms, WNB)	9,827(43)	13,221(57)	23,048(100)
Total	81,348(60)	54,831(40)	136,179(100)

Source: OPIC, 2015

Finally, an important feature of oil palm cultivation in PNG, which demands serious attention from the policy makers, is that the industry has a duopoly-monopsony structure, with very unequal bargaining power. The New Britain Palm Oil Limited (NBPOL) has plantations in five locations and controls 83% of the total oil palm lands, while Hargy Oil Palms has plantations only in one area and controls only 17% of the oil palm operation.

The industrial organisation reflects features of both two-seller (duopoly) and one-buyer (monopsony) market structure. The duopoly feature is reflected by its dominant role as producers, while the monopsony structure is reflected by its sole-buyer feature within its own project area. This non-competitive structure has potential for causing both good and bad effects for the stakeholders. The non-competitive market structure may be used to exploit both smallholder producers and plant labourers, unless the industry executives are appropriately regulated. But, if they are properly regulated, this power structure can be used to expedite research activities, which would eventually improve productivity, diminish risk factors and finally render greater benefits to all industry stakeholders.

Table 2a: Distribution of smallholder's blocks under oil palm plantations (2010): Inter province variation

Project area	LSS	VOP	CRPB	Total
Hoskins	2,370 (46)	3,789 (31)	967 (97)	7,126 (39)
Popondetta	1,128 (22)	4,579 (37)	-	5,707 (31)
Milne Bay	-	786 (6)	3 (0)	789 (4)
New Ireland	-	1,405 (11)	-	1,405 (8)
Ramu	-	130 (1.0)	-	130 (1)
Bialla	1,679 (32)	1,648 (13)	31 (3)	3,358 (18)
Total	5,177 (100)	12,337 (100)	1,001 (100)	1,8515 (100)

Source: OPIC, 2015

Table 2a shows the distribution of smallholders involved in oil palm cultivation by both provincial and group shares. All three groups of smallholders are concentrated in WNB, which controls 62% of oil palm plantation. The province is the home of 78% of LSS, 44% of VOP and 100% of CRPB operators. Besides these fundamental facts, inter-provincial distribution of smallholder oil palm operators is quite interesting.

There is no LSS group in the other three provinces – Milne Bay, New Ireland and Madang – which means Oro is the other province in which LSS facilities have been established. As already noted, all CRPB smallholders are virtually located in WNB. All this suggests that VOP is the only program that is being organised in all the oil palm growing estates. This information and inferences are reinforced by Table 2b which shows intra-group variation in the distribution of smallholder oil palm producers. VOP members, who dominate oil palm cultivation in PNG by smallholders (67%), represent the majority in all projects areas, except Bialla, where the number of smallholders under LSS and VOP are basically the same.

Table 2b: Distribution of smallholder's blocks under oil palm plantations (2010): intra group variations

Project area	LSS	VOP	CRPB	Total
Hoskins	2,370 (33)	3,789 (53)	967 (14)	7,126 (100)
Popondetta	1,128 (20)	4,579 (80)	-	5,707 (100)
Milne Bay	-	786 (100)	3 (0)	789 (100)
New Ireland	-	1,405 (100)	-	1,405 (100)
Ramu	-	130 (100)	-	130 (100)
Bialla	1,679 (50)	1,648 (49)	31 (1)	3,358 (100)
Total	5,177 (28)	12,337 (67)	1,001 (5)	1,8515 (100)

Source: OPIC, 2015

Governance of oil palm industry in PNG

The next important information about the oil palm industry in PNG concerns its governance structure. For this purpose, four different organisations have been created namely (i) Oil Palm Industry Corporation (OPIC), (ii) Papua New Guinea Oil Palm Research Association (OPRA), (iii) Oil Palm Growers Associations (OPGA) and (iv) the Papua New Guinea Palm Oil Producers Association (POPA). Each of these organisations and their functions is briefly discussed.

Oil Palm Industry Corporation (OPIC)

The Oil Palm Industry Corporation (OPIC) is a quasi-government agency operating under the management of the Department of Agriculture and Livestock (DAL). OPIC is financed by collecting a crop levy from smallholder OP farmers, which is matched by the oil palm companies. Beside this regular fund, it receives grants from multilateral and bilateral aid giving agencies. Established in 1992, OPIC's main function is to provide extension services to smallholder oil palm producers, which include, among others, promoting improved farm management practices and training in modern oil palm production techniques. Additionally, it is responsible for liaising with the government, oil palm companies and other organisations involved in the industry. To facilitate OPIC's role, a Local Planning Committee has been established in each of the six project areas. This committee consists of the OPIC project manager and a representative from the local growers association, provincial government, plantation companies and the Oil Palm Research Association. The Committee meets regularly to discuss, plan and monitor the work of OPIC and to act as a forum for various stakeholders to raise various issues of interest or concern.

Papua New Guinea Oil Palm Research Association (OPRA)

As the name suggests, the Oil Palm Industry Corporation (OPRA), established in 1980, is responsible for conducting and coordinating research on oil palm production. It is a sort of consortium consisting of representatives from government, plantation companies and the smallholder sector. OPRA's main areas of research include agronomy (in particular soil chemistry and plant nutrition), entomology, smallholder studies, and plant pathology. The research underpins OPRA's major role in developing new technologies and farm management practices to improve oil palm production. The association also provides technical support and training to smallholders, extension officers and plantation company officers. OPRA's research output is in the form of academic and conference papers, technical reports and information bulletins for disseminating information throughout the industry. OPRA is financed by a smallholder and plantation crop levy, some government funding and many of its research projects are funded by external (largely overseas) research grants, e.g. Australian Centre for International Agriculture Research (ACIAR).

Papua New Guinea Palm Oil Producers Association (POPA)

The PNG Palm Oil Producers Association represents the interests of the milling companies. It liaises and negotiates with governments for positive support for the oil palm companies and the industry as a whole.

Oil Palm Growers Associations (OPGA)

Each project area has a smallholder Oil Palm Growers Association (OPGA), which represents the interests of smallholder oil palm producers to the industry bodies such as the companies, OPIC, OPRA and to National/provincial governments. The Chair of each grower association is a member of the OPIC Board and represents his/her association at Local Planning Committee meetings. Smallholder membership is voluntary and an annual subscription fee helps fund the associations. The extent of smallholder involvement in each association varies between project areas as well as over time. However, one factor that causes variation in smallholder membership is the misappropriation of the growers' association funds by the elected management (Curry *et al.* 2007).

Oil palm cultivation under land settlement scheme (LSS)

As mentioned above, the then colonial government approved the World Bank's recommendation to promote oil palm cultivation in the country through a 'Nucleus Estate' plantation program. This plantation project, established on alienated lands in two areas of the WNB province, designed two types of farming systems for developing the oil palm industry in PNG. First, large oil palm estates were established in each project area. Although these estates would be jointly owned by the palm oil company and the national government, the company was made responsible for operating plantation activities and marketing. Second, the remaining lands were to be parcelled into 6.0-6.5 hectare block and leased out to individual families for a period of 99 years (Koczberski, Curry & Gibson 2001). This project was later extended to Popondetta in Oro province. Table 2(a) shows that the LSSs do not exist in three of the six project areas- Milne Bay, New Ireland and Ramu.

To understand the problems and prospects of smallholders operating under LSS, two types of information are critically important. The first piece of information refers to oil palm cultivation, which includes, among others, smallholders' property rights in lands, their living conditions and production practices. The second piece of information basically involves Fresh Fruit Bunch (FFB) pricing- the method that palm oil industries use to determine prices of oil palm fruits sold by the smallholders. This paper will not investigate this second piece of information, because it deserves a separate analysis. The following discussion is mainly intended to examine the status of smallholders' property rights with some consideration about their lives and living conditions.

Smallholder's livelihoods under LSS Project

During the late 1950s and 1960s, the colonial administration opened up alienated public land for the voluntary resettlement of rural people living

particularly in over-populated areas along the north coast of New Britain. This approach was viewed as a major policy measure to improve rural incomes by increasing the production of exportable crops, ease population pressure in over-populated areas and finally bring unused or under-exploited land under cultivation (Hulme 1984). Although the program was open to all kinds of crops, it gave particular attention to oil palm cultivation.

In 1966, the administration concluded a contract with the British plantation company, Harrisons and Crosfield, to execute its plan. Under the agreement, the company established an oil palm estate and a processing mill in the alienated land located in Hoskins, WNB. Plans were also made to establish 500 oil palm blocks of 6.0 to 6.5 ha for 500 smallholders to grow oil palm. Out of this land, about 4 ha were allocated for an oil palm plantation and the remaining area was intended for food gardening. The total area of 500 blocks was divided into two administrative regions. Each region, containing approximately 130-320 blocks, was equipped with modern civic facilities including a central community centre with a primary school, health centre, agricultural extension office, designated market area, stores and recreational facilities (Hulme 1984).

It is now about a half century since the original settlers moved into the LSS project area. Naturally, it is a good time interval to examine both the problems and prospects of the project. An analysis of this sort would require information about the resources and circumstances that are affecting smallholders' livelihoods under the LSS project. The main kind of resource under the disposal of smallholders is land leased out by the government. Given the condition of oil palm farming under LSS, the smallholders have little possibility to increase the size of their blocks: The average block size, which was 6.07 ha in the beginning, has not changed over the years (Curry *et.al.* 2012). But other critical variables have changed significantly. First, each blockholder was supposed to allocate four ha of the block to oil palm cultivation and use the remaining land for gardening. Curry's study shows that the average size of oil palm plantation was 3.24 ha in 1975, which increased to 6.00 ha in 2010. On the other hand, land available for gardening purpose decreased from 2.83 ha to 0.61 ha². In other words, the smallholders have virtually converted their entire block lands into oil palm farming, leaving very little for food gardening. This empirical information seems quite consistent with common-sense expectations.

One obvious consequence of this development is that the smallholders have become overwhelmingly dependent on incomes from oil palm farming. This development has ominous implications for the family food security. More specifically, the smallholders have become preys to the vagaries of international edible oil markets. Figure 1 shows the nature of price fluctuations prevailing in the international palm oil markets. Although the prices are not inflation-adjusted, they do reveal the mode of palm oil market, which is common to all agricultural commodities traded in the private markets – nationally or internationally. The range of price varied from 192 USD to 1239 USD per metric ton. In other words, palm oil futures varied 5.45 times in

sixteen years in terms of the lowest price quoted. While the benefits of an upward swing in prices are shared both by the palm oil corporations and the smallholders, the brunt of a downward swing is mainly borne by the latter. This is because the fresh fruit bunch pricing formula, used to determine the smallholder's revenue from the sale of oil palm fruits, employs the world market price.

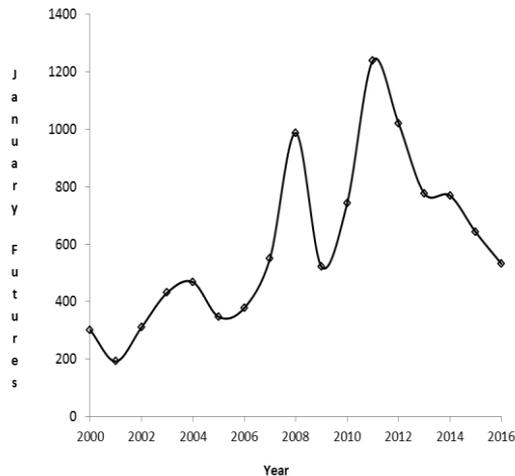


Figure 1: Oil palm price January futures from 2000-2016

Source: IndexMundi (2016)

Each month, the milling company determines what is called palm product value (PPV) by adjusting the prevailing world price for palm products. The adjustment factors include actual or rolling average freight, exchange rate and extraction rates to determine an FOB value per ton of fresh fruit bunch at the mill gate. The mill gate price is further reduced by fresh fruit bunch transport cost and various levies to determine the final PPV, which is then shared between the smallholders and the processing company. This division of PPV, called pay-out ratio, is 57:43, i.e., smallholders and milling company respectively receive 57 and 43 per cent of the PPV.

It may not be too difficult to see the smallholder's vulnerability in oil palm cultivation. Their risks are not subject only to the palm oil price factor, but several others including exchange and freight rates. The company is run by paid employees, whose incomes are fixed and rise progressively. This means that the corporation profit may rise or fall due to changes in demand and supply situations in the world palm oil market, but does not directly affect incomes of the corporation's employees or executives. However, the smallholders are directly affected by changes in the world palm oil market.

Second, the population in LSS project, which has now entered its third generation, more than tripled during the half century. The average family size in the LSS project used to be 5.9 persons, which has increased to 18.44 (Curry *et al.* 2012). This means that the LSS block of 6.0 to 6.5 ha, which used to

support a family of 6 persons initially, nowadays provides livelihood means for 18 persons. Given the location of the project area, the only economic activity available there is oil palm cultivation, meaning members of smallholder families have little alternative economic opportunities, which can help them earn extra incomes.

The issue has come under serious attention from concerned researchers (Koczberski *et al.* 2012; Koczberski and Curry 2005), who have taken a sort of livelihood approach from the perspective of food security. For example, Koczberski *et al.* (2012) conducted an in-depth research on the kind of economic opportunities available in the LSS Hoskins project area for the smallholder families; how they spend their time in different socioeconomic activities and what kind of food they grow in their block. The study shows that the LSS block-holders grow seven kinds of traditional foods in their gardens and the average area under food gardening has actually increased over time. The average area used for food gardening per block in 1975 was 0.37 ha, which increased to 0.44 ha in 2010; and the types of traditional crops grown in the family gardens include sweet potato, peanuts, Chinese taro, taro, yam, cassava and banana.

The two factors detailed above underline the nature of economic problems the polpalm smallholders are grappling with under the LSS project. Both factors need immediate and intensive attention if PNG's oil palm industry is to be made economically viable and socially desirable in genuine terms. The urgency to take this initiative is crystal-clear - PNG has unique potentials to grasp a sizeable portion of the burgeoning demand for palm oil in coming days.

The problem is multifaceted and hence requires multiple policy instruments to deal with it. However, there is one aspect of the problem that is absolutely related to the LSS program design. Land-to-man ratio in an area decreases when migration is less than enough to offset the effect of population growth on land. The history of humanity testifies that our ancestors had migrated from one place to another, from one continent to another, in search of better livelihoods. But the same is not happening in the LSS program. The reason is the nature of contracts smallholders signed with the government. The contract is a lease; it is not a transfer of ownership of a LSS block from the government to smallholders. If the lease-holders move out, they run the risk of losing the right to cultivate the block. The nature of the contract in the LSS program is thus a disincentive for original leaseholders to out-migrate. The economic phenomenon causing the situation may be described as follows: The lease is enjoyed hereditarily, which means the oil palm blocks will be shared by the original occupiers' offspring according to customary family laws. For the same reason, the male children, who share the lease hereditarily, have little incentives to move out of their blocks. Any male leaving the household risks the chance of losing the block's lease right. Smallholders' complaints about low income and the research findings testify that the above explanation is true.

However, if the existing leasing system is converted into a completely transferable ownership right, the situation might be different. Human beings

are selfish by nature – a truth that goes to the heart of economic theory. With ownership rights, the LSS block holders may pursue several steps toward improving their socioeconomic situations. First, it is a natural tendency in people engaged in different trades to try to expand their enterprise sizes. The same psychology may be expected from those who are operating oil palm plantations: Efficient and dedicated oil palm operators might want to increase the size of their blocks, while less efficient and less dedicated ones might want to leave the industry. This is a win-win situation for both. Second, those remaining in the industry might want to educate their children and make them ambitious to join the modern professions like medicine, engineering, banking, business and government jobs. Children born to oil palm operators would now have a choice to move out of the plantation and by that create greater income opportunities for their siblings. To sum up, the true human motive force may be unleashed if the exiting non-transferable leasing system is converted into a completely transferable land ownership system. This policy reform has the potential to reform the traditional tribal societies in rural PNG.

Conclusion

The LSS is a farming system for organising oil palm cultivation in PNG. The system was introduced in the latter half of the 1960's when the commercial cultivation of the tree-crop began in the West New Britain province. Under this scheme, each smallholder was given a block of 6.0 to 6.5 ha of government land on a lease for 99 years. The leasing condition means that the original block-holders can use the land hereditarily for generations, but cannot transfer this use-right to any non-family members. In other words, the LSS awarded smallholders use-right but transferable ownership-right on the block.

A time of about half a century has elapsed since the original smallholders moved in the project area, which means that the blocks are now being operated by a third generation of smallholders. During this period, the average family size has more than tripled from 5.9 persons to 18.4 persons per block. Given that the block size is fixed and there are little alternative economic opportunities available for the family members to earn extra income, the economic health of the smallholders has deteriorated dramatically. Although this socioeconomic problem is complicated and colossal, and therefore needs many policy measures to handle it, the leasing arrangement under which the smallholders operate these blocks seem particularly critical. More specifically, the use-right system introduced by long-term leasing of oil palm land is an effective disincentive for the offspring of the smallholders to move out of the project area and find alternative employment opportunities. This situation however might change dramatically if the land-lease system is converted into fully transferable ownership mode.

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