# The Indonesian Oil Palm Industry

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ABSTRACT

*This paper reviews the past development and prospects in the 2000s of Indonesian oil palm production, noting the rapid expansion of the sector up to the late 1990s and fast growth of private estates and smallholdings. It examines the organization, performance and constraints of chief sub-sectors, indicating relatively low costs of production on estates and even lower costs on smallholdings. It considers the nucleus estate and* plasma *smallholding development as unexpectedly successful, despite needs for further improvement.*

*The paper views the main current constraints as scarce development capital, inefficient deployment of labour and other resources, poor technological levels, and problems over land acquisition and security. It nonetheless sees a slow improvement occurring, where this could be accelerated by government support with credit and extension, especially for smallholdings. Given such help, the industry should renew its expansion and become the world's leading oil palm producer.*

## INTRODUCTION

Oil palm in Indonesia grew fast over the closing decades of the twentieth century, becoming a prime component of the Indonesian and global oils and fats scenes. Thus in the early 2000s, Indonesian palm products contributed 1.5%-2% of the country's gross domestic product (Biro Pusat Statistik, 2001), while national crude palm oil (CPO) output comprised over 30% of total palm oil production in the world as a whole.

This paper is based on a study of Indonesian oil palm producers in 2002 (the Study)[1]. It first examines background statistics, proceeding to scrutinize the arrangements and performances of estates, smallholdings, and

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[1] The Indonesian study is part of a global study of oil palm and its products, co-ordinated through the Australian National University in Canberra and undertaken in conjunction with institutions in countries concerned.

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supporting services. It reviews costs of production, technology use, the politics of the industry, and land and security issues. It closes by recapitulating factors affecting the future of the sector.

The 3.2 million hectares planted with oil palm in 2000 (*Table 1*) were chiefly in Sumatra, with recent expansions into forested parts of Riau, Jambi, and South Sumatra, as well as into West Kalimantan and South Sulawesi. Most oil palm was developed by Indonesian interests, although by 2002, there were over 600 000 ha of private estates owned by foreign and largely Malaysian companies.

The rapid development was triggered by much higher returns from oil palm than other crops, government's provision of low-cost capital for expansion and easy availability of land. The first factor remained important in the 2000s despite price declines in 2001, being assisted by the massive rupiah devaluation from 1997. But severe capital constraints persisted after the financial crisis, while new land became difficult to access and operational security was diminished with political changes.

The biggest segment of Indonesian oil palm in the new century was the 1.6 million hectares under private estates, which had expanded rapidly in the 1990s (*Table 1*)[2]. Smallholdings with 1.1 million hectares came after private estates, with most units being part of *plasma* areas associated with nucleus estate developments from the early 1980s[3]. Each *plasma* smallholding covered 2 ha, and often accessed central processing facilities. The area of smallholdings also included 300 000 ha on individual farms, comprising privately planted parcels of 1-3 ha selling fresh fruit bunches (FFB) to estate factories or other mills.

Finally, the public estates (*perseroan terbatas perkebunan nusantara* or PTPN) included 0.5 million hectares of oil palm, planted on some of the 13 giant national PTPN which had several plantation crops[4]. Oil palm production on Indonesian estates was in fact dominated by big private and public concerns each controlling tens of thousands of hectares, although there were smaller private units. The rapid planting of oil palm on private estates and smallholdings from the mid 1990s was reflected in their high immature shares of 47% and 39% in 2000 (Direktorat Jenderal Perkebunan, 2001).

The average yields of CPO in 1998 ranged from 2.5 t per mature hectare on smallholdings to 4.4 t on public estates (*Table 1*). The latter were better managed but were also in peak production years and had often planted oil palm on fertile lands acquired long ago. It is interesting, indeed, that regional estate yields collected during the Study suggested those in drier more newly opened places like South Sumatra were no lower than levels in older locations with higher rainfalls. This is probably one reason why overall average yields of FFB/ha have not changed much. Average extraction ratios have fallen, however, with 20% in 1998 contrasting with higher levels 10 years previously when there were less smallholder crops.

The downstream development of Indonesian palm oil is less than in Malaysia. Installed refinery capacity in the early 2000s could nonetheless handle all national CPO output, and 85% of Indonesian palm oil exports were processed oils. Most domestic CPO consumption of 2.9 million tonnes in 2000 was for cooking oil, although oleochemicals, soaps, margarines and other cooking accessories were produced. Indeed, Indonesian palm oil usage, which included some exports, comprised 3.5 million tonnes of edible and 0.8 million tonnes of non-edible items (*Table 1*). Total exports of refined and crude oils in 2000 were 4.1 million tonnes, with main destinations being India, the European Union and China. When vegetable oil prices were higher, the Indonesian Government subsidized domestic cooking oil consumption by taxing palm oil exports, but has not done this since the late 1990s[5].

Over 1.2 million labourers worked in Indonesian palm oil production and processing in the early 2000s. Since husbands and wives often operate together, about five and a half million people were directly supported by the industry[6]. The combined value of wages and perquisites per worker ranged from about Rp 400 000 to Rp 1 600 000 per month (RM 170 to RM 690)[7],

[2] Baskett *et al.* (2002) interestingly record the experiences during this period of one large foreign private estate company.

[3] Nucleus estates each comprise an *inti* area, which is integral to the commercial estate operation and is established with special low-cost capital provided by government. The estates in return, and again with low-cost capital, develop a surrounding *plasma* of 2 ha smallholdings. This development follows the *bapak angkat* concept, where big concerns are seen as responsible for supporting smaller ventures, and where government exercises pressure to this end.

[4] These companies were originally Dutch concerns and were nationalized in 1957. They had selected the best lands for their operations.

[5] The downstream development of Indonesian palm products and environmental implications of oil palm production and processing will be addressed in later papers based on the Study.

[6] The labourer to land ratio in Indonesian oil palm production in 2002 may be estimated as 1:3, giving 1.1 million workers for the 3.2 million planted hectares of oil palm. There are 100 000 additional workers engaged in processing and downstream activities (Private communications, 2002), bringing the total workforce to 1.2 million. Assuming the average family size of workers is five persons, that half the workers are husband-wife teams supporting three other people and that the balance are single workers supporting four other people per family, the number of people dependent on the industry is 5.4 million.

[7] Supposing RM 1= Rp 2330. Perquisites mainly involve supplies of rice and provision of housing.

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**TABLE 1. AREAS, PRODUCTION AND YIELDS OF OIL PALM IN INDONESIA (1970-2000)**

| Items | 1970 | 1980 | 1990 | 2000 |
|---|---|---|---|---|
| Planted Areas ('000 ha) | | | | |
| Private estates | 46.7 | 88.8 | 463.1 | 1 620.8 (47)* |
| Smallholdings | - | 6.2 | 291.3 | 1 052.8 (39)* |
| Public estates | 86.6 | 199.5 | 372.2 | 501.1 (15)* |
| Total | 133.3 | 294.6 | 1 126.7 | 3 174.7 (39)* |
| Product. CPO ('000 t) | | | | |
| Private estates ** | 69.8 | 221.5 | 788.5 | 2 657.5 (3.29)*** |
| Smallholdings | - | 0.8 | 377.0 | 1 503.4 (2.48)*** |
| Public estates | 147.0 | 498.9 | 1 247.2 | 2 056.5 (4.44)*** |
| Total | 216.8 | 721.2 [691]**** | 2 412.6 [2 120]**** | 6 217.4 (3.32)*** [7000]**** |
| Domestic Cons. ('000 t) | n.a. | n.a. | 1 265[+] | 2 945 |
| Exports ('000 t) | 156.6 | 502.9 | 815.6 | 4 140 |
| | | **Edible** | **Non-edib.** | **Total** |
| Usage 2000 ('000 t) [++] | | 3 500 | 765 | 4 265 |
| | **Sumatra** | **Kalimant.** | **Sulawesi** | **Other** |
| Planted Areas, 1998 ('000 ha) | 2 396.3 | 602.2 | 122.9 | 53.4 |
| | **Upkeep** | **Fertilizer** | **Harvesting** | **Processing** |
| Estate Costs of CPO, 2002 (US$/t)[+++] | | | | |
| Indonesia | 19 | 39 | 25 | 19 |
| Peninsular Malaysia | 26 | 40 | 34 | 35 |
| | **Transp. to mill** | **Overheads** | **Depreciation[++++]** | **Total** |
| Indonesia | 19 | 27 | 47 | 195 |
| Peninsular Malaysia | 36 | 38 | 41 | 250 |

Notes: * Percent of planted area immature in 1998. ** Including 1 315 457 ha of local private estates and 93 677 ha of foreign private estates in 1998, but with the latter total having been enlarged through the purchase in 2001 by the Guthrie Corporation of some 350 000 ha in Riau. Foreign private estate yields were considerably higher. *** Figures in parentheses are t/ha (mature) of CPO in 1998. **** Figures in brackets are total production estimates by industry sources, and differ slightly from government figures. There is debate over the accuracy of official and other figures, but those presented here are judged broadly correct. [+]*Disappearance* rather than consumption. [++]Of palm oil by industry. Some edible and non-edible products are subsequently exported. [+++]Ex-mill. The figures given are estimated averages from the Study, with conversions to US$ at US$1 = RM 3.80 and Rp 9000. [++++]Straight line over 25 years for replacement of the stand, and shorter periods for replacement of machinery and buildings.

Sources: Direktorat Jenderal Perkebunan (2001); Private Communications (2002).

with the lower return being for weeders and the higher return for harvesters and skilled plant operatives.

## ORGANIZATION AND PERFORMANCE

### Estates

Oil palm production on Indonesian estates is usually arranged on traditional lines. Big local and foreign concerns are headed by a president-commissioner, reporting to a board of part-time commissioners concerned with overall policy matters. Daily management is undertaken by a president-director, operating with a board of people holding important positions in the company. The central administration comprises heads of departments, specialist visiting agents, consultants, and appropriate technical and clerical staff. Regional operations are organized in subsidiary groupings, each controlled by a local manager.

Individual production units are supervised by a manager or assistant depending on size, with conductors and mandores to supervise workforces. Some labourers are *karyawan tetap*, while others are hired through contractors for particular tasks. CPO mills normally have separate managers, with most mills serving several estates. Small locally owned private estates omit the higher infrastructure and follow the



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organization of individual units. Downstream operations within big companies also come under the central administration, where large units usually have special staff to arrange transportation, sales and exports and small units contract such activities out.

These arrangements, which evolved over 100 years and resemble those of Malaysian counterparts, have underpinned successful production and manufacturing. They may be regarded as both effective and adaptable to change, securing key economies of scale. Hence, Indonesian estates have been able to raise adequate development capital, marshal and effectively apply new technologies, and open land and process crop at relatively low costs. Yet individual company performances have differed hugely, as illustrated by recent examples.

Thus, in raising capital, some private estate companies - big and small, and local and foreign - had overgeared borrowings before the 1997 financial crisis, including those in foreign currency. They could barely repay debts inflated by rupiah depreciation, and often appeared near collapse[8]. Other companies, in contrast, conservatively drew most or all capital for investment from profits, with only small borrowings. They easily weathered the crisis, albeit facing the general capital constraints and reducing their new plantings. But by 2002, the constraints were lessening and larger planting investments were being considered.

Again in new technology use, some estate companies successfully applied advances in controlled situations, greatly improving yields and quality. Other companies persisted with old-fashioned regimes, securing indifferent outcomes. Respecting the latter, managers and labourers per hectare of crop were widely divergent, reflecting big differences in operational efficiency and greatly influencing expenditure levels. Most estates nonetheless seem likely to survive as profitable enterprises, although this may entail restructuring and take-over by other interests.

**Smallholdings**

The organization of smallholdings is radically different to that of estates, although *plasma* smallholdings are initially developed in the conventional estate structure. Hence, the *plasma* are planted by contractors, who sometimes contract designated settlers as workers.

Once palm oil production begins, however, separate *plasma* parcels are allocated to settlers, who operate them personally or hire others. But overall management remains under the nucleus estate until development costs and interest are recovered through subtracting 30% from smallholders' factory processing returns; this deduction covers not only loan expenses but also costs of harvesting, transportation and fertilizer. When costs have been repaid some years after production commences[9], *plasma* smallholders receive their *hak milik* or titles to land, and an elected co-operative takes over service provision. Yet nucleus estates may still be contracted to perform some tasks, including processing.

The outcomes of *plasma* arrangements have been surprisingly successful, given their rapid implementation and gigantic scope, and associated difficulties of selecting settlers, teaching inexperienced farmers, and handing power to co-operatives. Certainly numerous problems face this vast initiative, as discussed by Wahyono *et al.* (2000). Complications have arisen, for example, from misdirected selection producing unsuitable settlers[10], persisting low technological expertise, poor performances of participants, and mismanaged co-operative operations. While unsuitable settlers often depart after gaining titles and selling lands to more progressive farmers, solving the other problems is harder and demands help from government and other parties.

But hundreds of estates and hundreds of thousands of smallholders nevertheless participated in establishing a large *plasma* area, and despite setbacks a slow learning-by-doing is apparent[11]. Government encouraged estates to develop *plasma* through giving them access to subsidized capital for expanding their own *inti* areas[3]. These *inti* comprised about one-third of the total *inti-plasma* extent, covering some 250 000 ha within the total planted area on private and public estates in 2000 (*Table 1*). Further nucleus estate development in the 2000s was constrained by shortage of capital,

[8] Even reputable private companies, like Bakrie Plantations (local) with 17 000 ha of oil palm and Lonsum (foreign) with 27 000 ha, had difficulties, both reporting large losses in 2000. Bakrie Brothers Sumatera Plantations (2001) recounted an unsatisfactory financial condition owing to rupiah depreciation, while Lonsum (2001) indicated a significant forex loss due to the sharp depreciation of the rupiah against the US dollar. Yet despite continuing debt, the two companies have been restructured and appear to be doing better. In Bakrie's case, indeed, the loss in 2000 was linked to problems in the non-plantations segment of that conglomerate.

[9] The period of repayment depends greatly on soil fertility, ranging from five years in West Sumatra to 10 years in Riau and 14 years in Central Kalimantan.

[10] These people had political connections with the nucleus estate and other local officials undertaking selection, thus exercising influence in gaining parcels for themselves.

[11] This is the process whereby farmers, once started at a low level with a new technology, progressively improve their utilization. They do this as they perceive the advantages and acquire necessary skills.

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but further expansion under this mechanism was desirable and seemed likely to be profitable.

The organization of individual oil palm smallholdings is like that of traditional small farms. These holdings do not possess the scale economies of their *plasma* counterparts, which resemble those of estates, and cannot accordingly secure private credit for planting[12]. This together with their scarcity of cash and characteristic inability to distinguish improved materials means they periodically purchase a few cheap but low yielding *dura* seedlings from small private nurseries. They produce crops of low yield and quality, selling them at poor prices to local mills.

Such circumstances argue for official and other outside interventions in providing credit and technical advice, and in improving the nature of planting materials. Doing this could much enhance output and quality and have high social returns[13]. But even without this, independent oil palm smallholders responded strongly from the mid 1980s to what they saw as profitable oil palm cultivation. They together with smallholders from the *plasma* continued to plant new individual areas of oil palm in the 2000s, actively harvesting crops at prices which in 2001 fell to as low as Rp 100 (4 Malaysian sen or just over US 1 cent) per kg FFB collected on-farm.

**Other Institutions**

The chief government institutions servicing Indonesian oil palm include the Directorate-General of Estate Crops (*Direktorat Jenderal Perkebunan*). This is involved in policy formulation and controls the oil palm research institute (*Pusat Penelitian Kelapa Sawit* or PPKS) undertaking research and development, and the Plantation Crops Advisory Service (*Dinas Perkebunan*) helping smallholders. Other official agencies include the Ministry of Industry and Trade which formulates marketing policies, and the Department of Statistics which assembles oil palm data.

A major non-government institution is the Indonesian Oil Palm Producers' Association (*Gabungan Pengusaha Kelapa Sawit Indonesia* or GAPKI), bringing together public and private estates and co-operatives responsible for half the total oil palm estate and *plasma* smallholding area. GAPKI represents the national and international interests of members, promotes palm oil, and, in principle at least, supports government policies. There are other producers' organizations promoting sub-groups such as the public and foreign-owned estates. The Indonesian Edible Oil Association (*Assosiasi Minyak Makan Indonesia* or AIMMI) represents the majority of palm and other edible oil producers and exporters. The All-Indonesia Association of Workers (*Syarikat Pekerja Seluruh Indonesia* or SPSI) aims to advance salaried and non-salaried employees through negotiations with government and employers. All these non-government bodies consult with regional and *kabupaten* governments and one another in determining minimum wages and conditions for different workers, as well as in formulating other policies for the industry.

Yet while these institutions would seem to cater for most industrial needs, there are numerous difficulties. Some employers feel inadequately represented, and many companies do not support any representative organizations. Some producer groups vie with one another, further undermining consensus in scenarios recalling conditions in Malaysia before establishment of the Malaysian Palm Oil Association. Certain bigger employers disregard standard wages, setting rates below those agreed with local governments and inciting worker strikes. Both government and other interests recognize that the current industrial structure cannot formulate effective overall policies, regretting the absence of the superior umbrella arrangement they perceive in Malaysia. Current circumstances are exacerbated by the capital scarcity, which seriously depletes funds available to government. This not only hampers planting, but also constrains research and development by the PPKS and advice from the *Dinas Perkebunan*.

Big employers unfavourably compare the situation with that during the New Order, when government exercised tighter control and often favoured their interests[14]. Smaller producers as well as workers support the recent political changes, but dislike the outcomes. The establishment in the 2000s of *otonomi daerah*, with associated lesser control from Jakarta, has complicated bargaining and decision-making which have largely moved to the sphere of local political and official interests[15]. This is manifestly a time

[12] The capital scarcity following the 1997 financial crisis and persisting into the 2000s was Indonesia-wide and unusual. Estates, which have both large assets and bargaining power flowing from their size, can normally secure credit at reasonable interest rates. Small farmers, on the other hand, do not possess such economies and have rarely if ever obtained private credit for oil palm (and other tree crop) planting. The three to four years elapsing up to maturity and the start of positive cash flows, as well as the poor perceived performance of such farmers, also generate uncertainty amongst lenders.

[13] This return incorporates the values of learning-by-doing, and of *spread effects* as other farmers adopt the improved technology.

[14] Then a telephone call to police or military could procure the rapid appearance of armed units to suppress troublemakers.



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of change, but adjustments are required to suit the needs of a modern industry working under more democratic conditions.

## COSTS AND NEW TECHNOLOGY APPLICATION

Estimated average production costs of estates in Indonesia and Malaysia in 2000 are shown in *Table 1*, denoting respective totals per tonne of CPO ex-mill of US$ 190 and US$ 250. These figures are averages from small samples and there is variation around them. The figures of Baskett *et al*. (2002), for example, denote lower costs in their Indonesian estate operations. But the averages in *Table 1* are judged to reflect actual circumstances quite well.

Most Indonesian costs are lower than those in Malaysia, especially reflecting lesser labour charges. But expenditures involving internationally traded elements including fertilizers are similar for the two countries, while depreciation entailing buildings and machinery is more expensive in Indonesia. Land costs and interest on capital are omitted, as are forwarding costs from mill to port, and these could add 15% to both country totals. Costs on *plasma* and individual smallholdings in Indonesia are likely to be much below the estate figures of *Table 1*, owing to lower opportunity costs of labour. That is confirmed by the willingness of smallholders to produce at very low prices.

There were still small profits for Indonesian estates at mid 2001 prices, which fell to US$ 200/t F.O.B. This was not true of their Malaysian counterparts, even after drastic cost cutting through reducing fertilizer applications. Currency exchange rates are important, where the huge Indonesian devaluation of the late 1990s benefited oil palm producers more than the devaluation in Malaysia. Yet renewed growth of the Indonesian economy in the 2000s means further devaluation is unlikely, while real labour costs continue to advance. Although producers from both countries did well at the higher prices of US$ 350/t in mid 2002, the long-run price levels relevant to investment decisions will assuredly be lower.

Indonesian producers hence need to raise their profitability through improving yields and quality, and by enhancing efficiency and other technology use[16]. Estates not adjusting will hardly survive in the longer-run, and be overtaken by more progressive players. Good prospects exist of bettering labour use, where hired estate workers frequently work less than paid for and have low productivity. Hence, observations in the Study denote Indonesian harvesters garner 1.5-2.0 t per person per day, compared with 2.0-2.5 t in Malaysia, while the average Indonesian labour intensity of one worker per 3 ha contrasts with a Malaysian figure of one per 12 ha. The problems in Indonesia are being addressed by increasingly sophisticated estate managements, with one initiative being replacement of *karyawan tetap* by contract workers, providing better flexibility although less loyalty. There are also strong possibilities of improving yields through superior planting materials (Lubis *et al*., 1995), albeit over many years. There are speedier possibilities of raising output quality, notably through installing modern milling machinery and improving input control.

Paradoxically, the Indonesian sub-sector with most scope for longer-run improvement are smallholdings with their large technology gap and possibility of utilizing methods common on estates. There is opportunity too for improving the role with *plasma* smallholdings of co-operatives[17]. While learning-by-doing is contributing to some advances, more can be achieved through providing extension. Indeed, experiences elsewhere, and especially with smallholder rubber in South India, have shown how extension activity can successfully overcome smallholder difficulties of the nature described[18]. But such efforts only achieve major results over a long period, and in India entailed sustained advice and help over more than half a century.

## POLITICS, LAND AND SECURITY

The 1998 departure of President Soeharto and subsequent beginnings of democracy signalled radical changes in official tree crop development policies. While oil palm and other crops were still seen as critical employers of labour and generators of income, the roles of estates and smallholdings were now perceived differently. Although estates remained suitable for farming existing lands and undertaking downstream

[15] This also involves tax problems, since central taxation continues without the previous passing back of revenues to the regions. Regional governments are forced into collecting local taxes to support development, further raising tax burdens on companies.

[16] Many promising new technologies were in the pipeline, including as one amongst many a bio-fungicide providing apparently complete resistance to *Ganoderma* root disease (Pusat Penelitian Kelapa Sawit, 1999).

[17] Managing co-operatives often performed badly, with poor administration and corruption reducing participant profits. But some co-operatives worked effectively, and given support from nucleus estate managements and the Department of Co-operatives much progress could be secured.

[18] One outstanding example of such support is the independent rubber smallholders of Kerala, for whom sustained and effective official extension over half a century has produced a sub-sector with the highest rubber yields in the world (Barlow, 1997).

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development, most planting on new land was viewed as better effected by smallholders. Such planting should indeed be geared to the welfare of those concerned.

This change was reflected in government directives for new planting (Direktorat Jenderal Perkebunan, 1999). While estates could act as contractors in developing fresh lands, they needed to pass control to smallholder co-operatives within a decade or so. It also appeared that in the modified political conditions, estates no longer received the same official respect and priority. These alterations were reinforced by the move to *otonomi daerah*, delegating official decisions to *kabupaten* and other regional levels. The consequent weakening in estate influence is well illustrated by large rises in real wage rates of labourers over the last few years.

**Land and Security**

Interacting with these political alterations, numerous conflicts have arisen over land ownership. This is especially where lands were acquired and planted by estates during the New Order, often without consulting traditional owners whose areas were forcibly taken. Such owners want to retrieve their parcels, which have been improved by oil palm planting[19]. The consequent confrontations and disruption are also used by other less reputable local interests, who seek to profit from the weakened estates and acquire lands for themselves.

These changed circumstances mean estate owners and others wishing to acquire new lands in the 2000s should proceed through careful checking and agreement with local owners, ensuring that areas can remain under estate control for at least the life of trees to be planted. Getting official authorization alone is insufficient, and is likely to lead to later difficulties. Reflecting this uncertainty, many estates underplant young trees in old oil palm stands near the ends of their productive lives. This lessens the possibility of outsiders claiming cleared areas temporarily free of planted crops.

Security has been a further major dilemma during this period, with an overall average of 5%-10% of estate crops being stolen at night in the early 2000s, especially from areas near villages and public roads. Regular workers are rarely involved, and most thieves are outsiders. Even smallholder *plasma* trees are affected, under uncertain law and order where police and local officials are sometimes connected with the robberies. Crop losses were highest in the late 1990s, but fell with rising employment and stricter security. The latter includes retaining special staff, improving liaison with local communities, contracting local police units and surrounding affected borders with 3 m x 3 m trenches hard to cross[20]. The need for security raises production costs by some US$ 5/t within the *overheads* of *Table 1*.

## CONCLUSION

Indonesian oil palm expanded rapidly from the early 1970s, reaching 3.2 million hectares in 2000 and featuring large extensions of private estates and smallholdings (*Table 1*). These developments much increased the incomes and living standards of all involved. But the late 1990s, financial crisis and coming of democracy meant that growth slowed, with the chief problems being capital scarcity, land disputes and lesser security.

Most Indonesian estates have operated successfully over the years, benefiting like Malaysian counterparts from economies of scale in raising capital, applying new technologies, opening land and processing output. Yet some companies caused difficulties for themselves through overborrowing in the early 1990s, while others did not adjust to emerging changes. Given restructuring, more accessible capital, and the adoption of improved technologies, however, the majority of enterprises seem likely to remain profitable. Widespread further estate expansion on new lands is debatable, however, where official policy provides for their doing this only as contractors to smallholder cooperatives.

The huge expansion of *plasma* smallholdings vindicated the initially questionable nucleus estate scheme, despite relatively poor performances of constituent farms and managing co-operatives. The spread of independent oil palm smallholdings and the readiness of these and *plasma* holdings to continue producing at minimal prices denote these units are viable and likely to continue expanding their areas. But the low standards of smallholdings suggest that far more attention to improvement should be given by contracting nucleus estates and government extension services, with this being critical to raising performances. Such change, as well as further smallholder area expansion, will need to be spurred by official development capital, whose availability will depend in turn on a restored capital market. It should be realized as well that these improvements if adopted will impact smallholders slowly and that several decades of effort will

[19] Indeed, thousands of hectares were lost to such claims by the PTPN in particular.

[20] One large estate enterprise in North Sumatra was losing half its crop from an outlying 500 ha area of palm. It dug such a trench around the periphery, calculating it would be worthwhile if losses were reduced to 25%.

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be required for them to lift their performance substantially.

The structure of producer groups, workers' associations and government bodies servicing the industry appears to face difficulties under the altered conditions of modern Indonesia, with dilemmas in achieving satisfactory wage negotiations and formulating industry-wide policies. These problems again seem matters for government attention with some seeing establishment of an official umbrella body as a useful measure.

Average production costs of Indonesian estates are low compared to those in Malaysia, and modest profits were still made at the depressed prices of 2001. Indonesian *plasma* and independent smallholdings have particularly small costs, while all Indonesian producers have benefited more than Malaysian counterparts from exchange rate depreciation. Further drops in the rupiah seem unlikely, however, and emphasis should shift to improving the performances of estates and smallholdings where the latter have especially good prospects of advance.

The close of the New Order and onset of democracy weakened the position of estates, with an associated official promotion of smallholders in new land planting. Official decision-making also shifted from Jakarta to the regions under *otonomi daerah*, making for circumstances where labourers and small producers are often favoured. Conflicts occurred over land ownership, especially of areas taken forcibly during the Soeharto regime, emphasizing the need to properly consult owners and secure their agreement in course of acquiring land. There were, too, problems of security for estates, involving substantial crop losses and additions to security expenditures which still continue.

Despite these changes and problems, the prospects for Indonesian oil palm and its competitiveness in world markets seem excellent. Given a resolution of current difficulties and improvements in performance, the industry appears likely to renew its expansion and emerge as the leading supplier of palm oil on world markets.

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