THE GOVERNMENTS OF MALAYSIA AND THE STATE OF JOHOR

W.P.

THE DEVELOPMENT OF MIXED ENTERPRISE HOLDINGS

WORKING PAPER

JOHOR TENGAH AND TANJONG PENGGERANG REGIONAL MASTER PLAN

1971

HUNTING TECHNICAL SERVICES LTD.

BINNIE & PARTNERS

OVERSEAS DEVELOPMENT GROUP
UNIVERSITY OF EAST ANGLIA

SHANKLAND COX OVERSEAS

183F MALAYSIA Johor Tengah.

W.P.

THE DEVELOPMENT OF MIXED ENTERPRISE HOLDINGS

WORKING PAPER

THE DEVELOPMENT OF MIXED ENTERPRISE HOLDINGS

CONTENTS

TABLES

WORKING PAPER

THE DEVELOPMENT OF MIXED ENTERPRISE HOLDINGS

1. Summary

The present Malaysian land development programme puts major emphasis in two areas; the opening of land for the landless, principally through the Federal Land Development Authority and other Group Settlement Act Schemes and the development of land in relatively large public or private sector enterprises or joint ventures between them. However many rural families are not landless and have some capital and skill which they can put to work. There is, of course, nothing to stop them applying for land on an individual basis, but this is a time consuming and rather difficult task. However, if the ambitious land development targets are to be met the skills and capital of these people of all races must be mobilised.

This working paper therefore looks at a number of types of holdings producing some combination of rubber, oil palm, tapioca, pepper, beef or dairy cattle and freshwater fish, which might be developed by individuals or families who have a modest amount of capital at their disposal or who could support themselves or be supported (e.g. a son by his father) during the initial years of development.

The paper then proposes a scheme based upon tapioca and oil palm nucleus estates for the Johor Tenggara area aimed at potential small scale developers of this type i.e. those with some capital. It is also designed, through the combination of estate with processing facilities and smallholders, to provide a market outlet and supporting services for the small producers. It is proposed that the scheme be developed over five years beginning in 1974 (or earlier if possible) at an estimated cost of $13 million.

2. Introduction

The Project Scope of Work indicated that "the study will cover the animal husbandry and fresh water fisheries development prospects, giving special attention to the possibilities for mixed farming in the smallholder sector." The results of investigations into the feasibility of a range of different activities have been summarized in Supporting Volume 6 and discussed in detail in Project Reports. While many production problems remain and need to be investigated, (see S.V.6), enough is known to suggest that several alternative activities other than rubber and oil palm will become profitable in the near future, particularly those based on cattle and fish. This paper attempts to review the feasibility of developing mixed agricultural holdings and outline a project that could be initiated within the Johor Tenggara area in order to test their viability.

In the context of this paper a "smallholding" is taken to be a holding of less than 100 acres as defined by the Rubber Fund Board, i.e. holdings other than those generally accepted as estates. The smallholding is thus not restricted to holdings of very small size such as typical of much of rural Malaysia (i.e. less than 10 acres and only requiring about one man to operate them) but will include holdings requiring a labour force which might or might not be within the capability of a given family, and extending up to 100 acres.

Major land development schemes such as those run by FLDA, have concentrated on the production of one major crop, normally rubber or oil palms. While the need or desirability of introducing other activities and of creating mixed holdings (i.e. small to medium sized holdings having more than one enterprise) has often been raised, satisfactory "solutions" have not been found. There are perhaps several reasons for this:-

(a) Plans need to be clearcut and the schemes easily managed. Thus the normal type of assumptions underlying a proposed scheme are often of the following type:-

(1) All settlers are landless and have no capital
(2) All enter the scheme at the same time
(3) Holdings are of uniform size e.g. 10 acres.
(4) Arrangements are included for employment of contractors for land clearance, and the planting of the main crop if this is a perennial

(5) Only one major activity is contemplated.

Given assumptions of this type the problem of assessing capital and management needs and monitoring progress is relatively straight forward. Management tasks are fairly clearcut and can be handled by relatively inexperienced men. If other activities are introduced problems multiply. Does one think in terms of each settler cropping 6 acres of oil palm, 2 acres tapioca, one acre of maize and groundnuts, half acre of fish ponds and half acre of pepper? Or does each choose for himself what he will do? Even if every settler does the same, formidable problems of phasing, organization of family labour, marketing and provision of capital are added to the management problem.

(b) Partly for the reasons given in (a) every potential developer is assumed to start in the same position i.e. with no capital. Many of the alternatives to rubber and oil palm have higher capital as well as management needs and this raise overall costs as well as increasing difficulties given the"no capital"assumption. However, this is by no means inevitably the situation. The majority of families do have capital resources. There are almost one million acres in Johor in smallholder agriculture (i.e. excluding estates) which at a conservative estimate must have a capital value of $500 million. In a small survey of rural households carried out by this project, 39 percent of Malays interviewed and 52 percent of Chinese said that they owned more than 5 acres of land i.e. that they owned fixed assets (excluding their house) worth $2,500 or more. In addition many rubber growers have an additional asset - their right to a sum of $750 per acre, to a maximum of $3,750*, from the Rubber Replanting Fund, to be applied to replanting their existing holding or developing new land in an approved scheme. The actual amount of capital available per household will obviously vary widely, but the problem remains the same - how to mobilize it effectively to assist in land development.

Similarly each household will be different in its size and composition and whereas some will only have the equivalent of about one man available for work, others may have up to 3-4 at some stages. This is one of the classic problems of the family operated enterprise.

This paper first discusses a number of types of mixed enterprise holdings and how they might be built up by individual

---

* or $250 per gross acre of their holding, whichever is greater.

families. Following this ways of establishing numbers of holdings of this type are discussed. Finally a scheme for a part of Johor Tenggara is proposed.

3 Types of Mixed Enterprise Holdings

The first two examples given in this section are discussed in terms of possible phasing of enterprise build up, estimating annual costs, revenues and loan repayments, given assumptions about capital and labour availability and soil suitability. The remaining examples are outlined as developed holdings, i.e. established for a number of years, indicating possible enterprise combinations and incomes.

3.1 Rubber and Beef Cattle

Assume the family situation is as follows:-

(a) Parents aged 45-55 - able to tap rubber
(b) One son available for agricultural work
(c) Own 5 acres of rubber with small house
(d) Own 5 cows plus bull - LIDs
(e) Rubber i.e. eligible for grant not yet replanted.

Immediately therefore the family has one member available to help develop a new holding. Such a family could fairly comfortably think in terms of developing twenty acres. While it may often be preferable to have the holding in one unit, with rubber in particular this is less essential as it is easy to travel to a plot, tap the trees and return with the latex. This development might therefore be viewed as being in two blocks, perhaps steeper land for rubber and the beef or other crops in lower areas nearer to water. It is assumed that the family's cattle are moved to the new holding and the enterprise built up from this base. Grazing is based upon a grass/legume mixture, probably guinea grass/centrosema which is relatively simple to manage.

The programme of development for this holding might be as follows:-

(a) Rubber:-

Year 1	Begin clearance by contractor.
Year 2	Clearance, burning, terracing, planting by contractor.
Year 3	Maintenance by operator - some casual help might be required.

Year 4-8 Maintenance - operator only.
Year 9 Start to tap rubber.

(b) Cattle;-

Year 2 Begin clearance by contractor.
Year 3 Complete clearance and burning by contractor. Plant guinea/centrosema. May - apply rock phosphate. Fence. Bring in own stock about August-September i.e. 5 cows plus calves with bull.
Year 3 Buy 5 young (3 weeks) calves e.g. from multiplication unit to run with own new crop of calves. Sell 5 semi-fat animals at 18 months - value $300 each. Buy 5 young stock - e.g. about 3 months old at $150 each.
Year 4 Sell 13 semi-fat animals - buy more calves at 3 weeks and 3 months of age. Buy 2 replacement cows.

Initially the 10 acres will be more than adequate to feed the stock carried and little fertiliser will be required, especially if the legume is satisfactorily established. Total stock can gradually be built up as fat animals are sold and larger numbers of young stock purchased. As funds become available, the breeding herd could also be expanded, so that by about year 10 it could comprise about 10 cows producing 20 semi-fat cattle per year. Annual costs would then run to about $100 per acre for fertiliser, maintenance, medication, etc plus $6 - 700 for young stock plus a similar net cost for purchase of breeding stock. The cash flow from this enterprise would run to $3,000-$4,000 per year.

With the initiation of tapping in Year 8-9 the labour requirement would rise to about 450 man-days per year. It would probably be most appropriate at this time for the parents of the family to sell their old house and land and move to the new holding. Since the old rubber holding no longer carries entitlement to replanting grants its value would be reduced e.g. to $400 per acre i.e. $2,000 in total. This could help reduce outstanding debts.

Table 1 shows the annual costs and revenues of a 20 acre holding developed in the way suggested above. After year 4 the operation has become more or less self supporting -

in fact funds are being ploughed back through increases in the cattle herd. The estimated loan account for the holding is shown in Table 2. Loan repayments in Years 2 to 7 are amounts receivable under the replanting scheme. Except for year 2 they do not do more than pay interest charges, but in total they allow total debt to be kept down to $8,500 at the maximum or $425 per acre ($340 per acre if the original five acres are included), which is a relatively modest level. Assuming receipts of $2,000 in year 8 - proceeds from sale of old land - the debt can be comfortably be paid off by year 12. From this point the enterprise should easily be able to yield a gross income of $6,000 per year. If the family labour force has grown there would be adequate funds to support further land development or investment in more intensive enterprises - the former is probably less risky and more advisable.

As an aid to this sort of development it might be desirable for the Rubber Fund Board, or other Agency, to be willing to buy for a reasonable price old rubber land on which replanting grants have already been paid. Most areas now contain a moderate number of individuals who have replanted or new planted rubber over the past decade or more and which is now yielding them a moderate income. Those with 5-6 acres of mature crop should be able to support themselves from it and develop another 5 acres or so. They could borrow from the fund to purchase old rubber land and redevelop it. If rubber were planted their debt at rubber maturity might amount to about $800 per acre which could easily be repaid over 10 years at about $120 per acre leaving a net income of $300-$350 per acre. Supervision of such replantings could be by the Replanting Board's field staff. A family with an expanding labour force could develop successive areas of such land.

In this particular example the allowances made for family living in the initial years are relatively small, about $50-60 per month. Actual requirements will of course depend upon family situation. Here it has been assumed that one individual would live on the new holding (or man plus wife) and that they could be subsidized to some extent from the old holding e.g. $20 to $30 per month. Once sales of stock begin to build up in year 5 they can support themselves from the new holding if desired.

TABLE 1 DEVELOPMENT OF 20 ACRE RUBBER/CATTLE HOLDING

YEAR	RUBBER Costs	RUBBER Sales	RUBBER Margin	CATTLE Costs	CATTLE Sales	CATTLE Margin	Total Margin	Family Living Expenditure & surplus	Balance includes loan repayments
1	1250		- 1250				- 1250		- 1250
2	3070		- 3070	1250		-1250	- 4320	750	- 5070
3	425		- 425	1800		-1800	- 2250	600	- 2850
4	300		- 300	1450	1500	+ 50	- 250	750	- 1000
5	450		- 450	2400	3900	1500	1050	1050	-
6	350		- 350	2800	4600	1800	1450	1450	-
7	350		- 350	3000	4500	1500	1150	1150	-
8	350		- 350	2300	4800	2500	2150	1500	650
9	500	1875	1375	2400	6000	3600	4975	2975	2000
10	350	3000	2650	2400	6000	3600	6250	4250	2000

TABLE 2 LOAN ACCOUNT OF RUBBER/CATTLE HOLDING

	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Net Expenditure	1250	5070	2850	1000								
Debt carried forward	-	1337.5	4983.5	7846.5	7860.5	8036.5	8224.5	8479.5	6237.5	4534.5	2771.5	761.5
Loan Repayment(1)	-	1750	500	500	350	350	300	2650	2000	2000	2000	761.5
Total Debt	-	4657.5	7333.5	7346.5	7510.5	7686.5	7924.5	5829.5	4237.5	2534.5	711.5	-
Interest at 7%	87.5	326	513	514	526	538	555	408	297	177	50	-
Total Outstanding	1337.5	4983.5	7846.5	7860.5	8036.5	8224.5	8479.5	6237.5	4534.5	2711.5	761.5	-

Note:

(1) Repayments in Years 2 - 7 are from receiots from Rubber Replanting Fund.

(2) Payment in Year 8 includes $2,000 from sale of old property.

3.2 Oil Palms, Tapioca, Goats and Pepper

This holding, assumed to extend to 20 acres, would require a greater labour force than the previous example, about the equivalent of 2½ men after the tenth year, plus the use of contractor labour for harvesting oil palms and tapioca. The following assumptions have been made in this exercise:-

(a) About 350 man-days of labour available from the family from year 2 onwards.

(b) Some contribution to living expenses e.g. $30 - $40 per month can be made from other sources.

(c) $4,000 can be raised from other sources - e.g. sale of existing land in year 2 or 3.

The assumed development programme is as follows:-

(a) Oil Palms. 10 acres planted under contract to central mill.

Year 1-2 Clearance and planting by contractors.

Year 3-4 Maintenance by operator - supervision by mill field assistant.

Year 5 on Maintenance by operator. Harvesting by contractor.

(b) Tapioca Initially 10 acres under contract to central factory.

Year 1-2 Clearance, destumping and cultivations by contractor. Planting and maintenance by operator. Supervision by factory.

Year 3 Harvesting by contractor. Cultivations by contractor. Maintenance of crop by operator.

This is continued until the cash flow from the oil palm enterprise builds up and the loan is reduced e.g. by year 9. Land is then taken out of tapioca and pepper and goat enterprises built up.

(c) Pepper. One acre planted in year 9 at a capital cost of $1,500. This alone will require 300 or more mandays after year 10 and thus timing assumes the availability of adequate family labour. This crop is well suited to use of female or child labour.

(d) Goats. An acre of grass (guinea/centrosema) is assumed to be planted in year 10 and 10 nannies and one billy

FIGURE 1. LABOUR REQUIREMENT

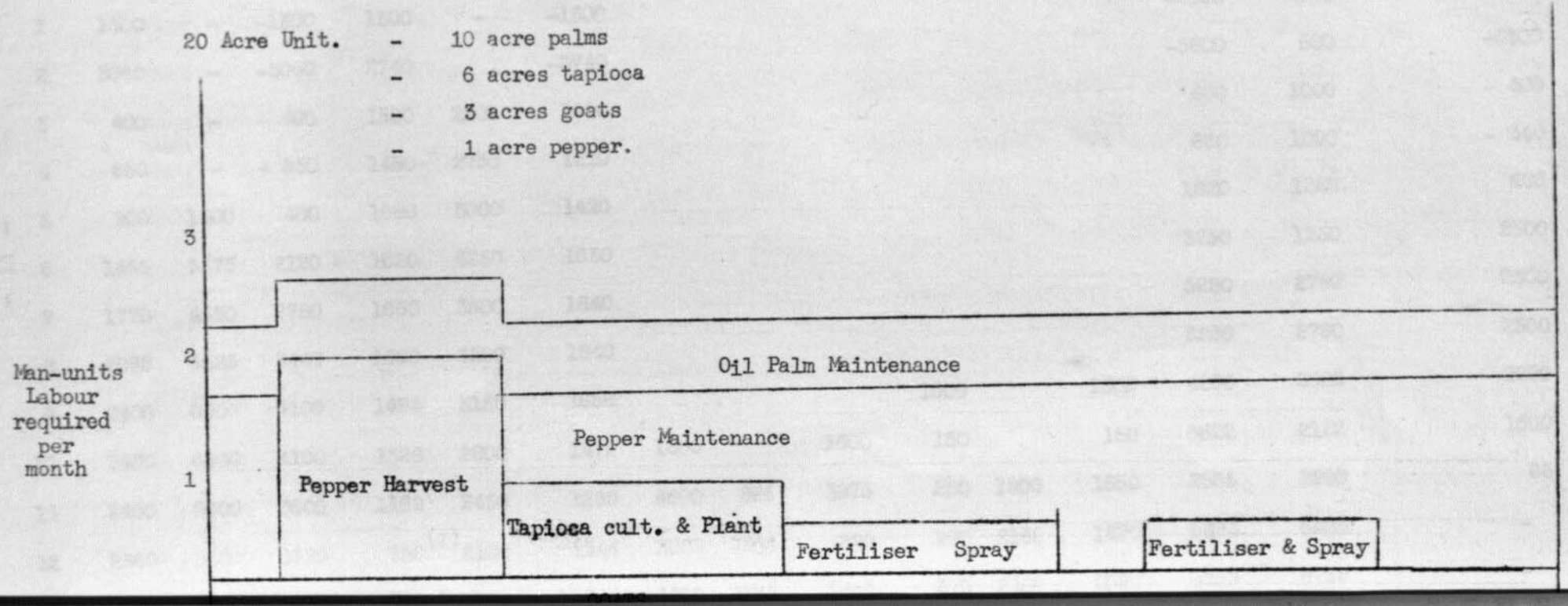

TABLE 3 DEVELOPMENT OF A 20 ACRE HOLDING

YEAR	OIL PALM			TAPIOCA			GC			PEPPER			Total Margin	Family Living Expenditure Surplus	Balance includes loan repayment
	Costs	Sales	Margin	Costs	Sales	Margin	Costs	Sales	Margin	Costs	Sales	Margin			
1	1300	-	-1300	1300	-	-1300							-2600	2000	-4600
2	3060	-	-3060	2740		-2740							-5800	500	-6300
3	400	-	- 400	1500	2500	1000							600	1000	- 400
4	550	-	- 550	1450	2750	1210							660	1000	- 340
5	900	1300	400	1580	3000	1420							1820	1220	600
6	1455	3575	2120	1620	3250	1630							3750	1250	2500
7	1770	4550	2780	1660	3500	1840							5280	2780	2500
8	2085	5525	3440	1660	3500	1840							5280	2780	2500
9	2400	6500	4100	1494	3150	1656				1500		1500	4256	2006	2250
10	2400	6500	4100	1328	2800	1472	1800		1800	150		150	3622	2122	1500
11	2400	6000	3600	1162	2450	1288	4800	825	3975	250	1900	1650	2565	2500	65
12	2360	5880	3520	756	2100	1344	2000	1344	250	290	2160	1870	6484	6484	-
13	2370	5760	3440	756	2100	1344	1700	3585	1885	310	2400	2090	8759	8759	-

(1) Replaced from external sources.

TABLE 4. LOAN ACCOUNT - 20 ACRE MIXED HOLDING

	1	2	3	4	5	6	7	8	9	10
Expenditure	4600	6300	400	340						
Debt carried forward	-	4922	12008	8997	9991	10048	8076	5966	3709	1561
Loan repayment	-	-	4000*	-	600	2500	2500	2500	2250	1500
Total debt	4600	11222	8408	9337	9391	7548	5576	3466	1459	61
Interest at 7%	322	786	589	654	657	528	390	243	102	4
Total Outstanding	4922	12008	8997	9991	10048	8076	5966	3709	1561	65

* Raised from external sources.

purchased. In addition a fairly simple building will be required and possibly a small pump to supply water.

In year 11 a further acre is developed, about 10 further nannies purchased. It would probably be useful at this stage to purchase a small two wheel tractor which can be used to cut and carry food and also for cultivations for the tapioca crop. This would enable one man to handle all the chores for 30 or so nannies plus young stock in half a day. An enterprise of this size would require about three acres.

The possible costs and revenues involved in the build-up of this 20 acre unit are shown in Table 3. The advantage of oil palm over rubber in such a situation is clear in that it generates a substantial positive cash flow after year five. Provided the family has funds available to establish a second enterprise and thus support itself for the five year period, debts can be paid off quickly and further expansion be undertaken at a fairly early date, see Table 4. In this case it has been assumed that $4,000 can be paid off in Year 3. In addition $2,000 has been budgeted in year 1 for house construction which could easily be eliminated - using a temporary hut at least till year 3-4.

At "maturity" i.e. averaged over a period of years but assuming no expansion, costs and returns, per year, on a holding of this sort might be as follows:-

Costs			$	
Oil palm (10 acres)	Average Replanting cost	=	175	
	Fertiliser	=	730	
	Harvesting Charges	=	1,050	
				1,955
Tapioca (6 acres)	Fertiliser	=	390	
	Sprays	=	72	
	Planting Material	=	30	
	Harvesting	=	300	
				792
Goats (3 acres)	Fertiliser	=	100	
	Grass establishment	=	60	
	Concentrate feed	=	180	
	Medication	=	60	
	Stock Purchase	=	100	
				700

Pepper (1 acre)	Fertilisers & Chemicals	=	200
	Sacks and Tools	=	80
			280
	Total Costs		3,707

Sales			$
Oil Palm	70 tons fruit at $60 per ton	=	4,200
Tapioca	84 tons at $25	=	2,100
Goats	10 nannies at $45	=	450
	57 fat goats at $55	=	3,135
Pepper	25 pikuls at $100	=	2,500
			12,385
	Gross Margin	=	8,678

The gross margin is thus approximately $8,700. Additional general costs have to be incurred to maintain the tractor, generator and water supply. These might amount to $2,100. In addition there may have to be some employment of casual labour at the period of peak labour demand during pepper harvest, (January - March). The best timing pattern would be to harvest tapioca by contractors in February - March and plant the new crop in May. Oil palm maintenance could also be kept to a minimum during pepper harvest and the whole enterprise managed with a labour force of three, see Figure 1.

The build-up rates and phasing taken in these examples are merely two of an infinite number of possibilities. What a family will actually do will depend upon its particular combination of expertise, capital, labour availability and interest. Three further examples are presented of the type of holding which might be developed.

3.3 30 Acre Holding, Oil Palm, Beef and Fish

Cropping pattern:

Oil Palm	15 acres
Grass	10 acres
Fish ponds	5 acres

Annual Costs		$	
Oil Palm	Average Replanting Cost	262	
	Fertiliser	1,095	
	Harvesting Charges	1,575	
			2,932
Beef	Pasture renewal	150	
	Fencing	50	
	Fertiliser	600	
	A.I. and Vet.	200	
	Concentrates	200	
	Stock Purchase	800	
			2,000
Fish	Pond Repairs	350	
	Fertiliser and Lime	500	
	Fish fry	780	
	Fish food	75	
	Casual labour	35	
			1,740
	Total Costs		6,672
Sales			
	105 tons oil palm fruit at $60 per ton		6,300
	15 fat cattle at $300		4,500
	3 cull cows at $400		1,200
	8 crops fish at $725		5,800
			17,800
	Gross Margin		11,128

A holding of this type would require about 450 man-days of labour i.e. 1½-2 persons, assuming that oil palm harvest was carried out by contract labour, and should easily be within the capacity of an average family. Overhead costs should be fairly low as no machinery would be needed, a pump for water supply might be necessary, although presumably the cattle could use the stream supplying the ponds.

4 40 Acre Holding, Oil Palms, Tapioca and Dairy Cattle

Cropping pattern:

20 acres oil palms.
10 acres tapioca.
10 acres grass dairy.

Costs		$	
Oil Palm	Average Replanting Cost	350	
	Fertiliser	1,460	
	Harvesting charges	2,100	
			3,910
Tapioca	Fertiliser	650	
	Sprays	120	
	Planting Material	50	
	Harvesting	500	
			1,320
Dairy	Pasture renewal	150	
	Fertiliser	600	
	Fencing	50	
	Concentrates	500	
	A.I. Charges and Vet.	150	
	Electricity and Water	500	
	Building Maintenance	200	
			2,175
	Total Costs		7,405

Sales		$
140 tons of oil palm at $60 per ton	=	8,400
140 tons of tapioca at $25 per ton	=	3,500
5,000 gallons milk at $1.50	=	2,400
3 cull cows at $450	=	1,350
		24,150
Gross Margin		16,745

This holding would require about 700 man-days of labour per year, with no marked peak periods assuming oil palm and tapioca harvesting and cultivations are done under contract. It could therefore require about 3 persons for operation. A skilled stockman would be needed to run the dairy herd, and he might cost $3-4,000 per year. Even allowing for this it would provide a very adequate family income.

3.5 40 Acre Holding. Oil Palm, Tapioca, Sorghum and Soya Beans

Cropping Pattern:

15 acres Oil Palms
8 acres Tapioca
16 acres Sorghums } 2 crops per year.
16 acres Soyabeans }

It is assumed that the short-term crops on this holding would be worked to the following rotation; tapioca, soyabeans, sorghum, soybeans, sorghum. Soybeans and sorghum are four month crops so given climatic conditions in Johor two crops are possible per year (see Working Paper on Short-Rotation Crops).

Costs		$	
Oil Palms	Average Replanting Cost	262	
	Fertiliser	1,095	
	Harvesting Charges	1,575	
			2,932
Tapioca	Fertiliser	520	
	Sprays	96	
	Planting Material	40	
	Harvesting	400	
			1,056
Sorghum	Seed	128	
	Fertiliser	1,200	
	Sprays	192	
	Harvesting	480	
			1,800
Soyabeans	Seed	128	
	Fertiliser	640	
	Sprays	192	
	Harvesting	480	
			1,440

Sales	$
105 tons oil palm fruit at $60 per ton	6,300
112 tons tapioca at $25 per ton	2,800
400 pikuls sorghum at $10.40 per pikul	4,160
224 pikuls soyabeans at $19 per pikul	4,256
	17,516
Gross Margin	11,588

General Costs	$
Machinery operating	2,000
Average capital cost	825
	2,825

It is estimated that the labour requirement for this holding-assuming contract harvesting of tapioca and oil palm would be approximately 500 man-days. The machinery costs included above are as estimated for a two-wheel tractor complete with a planter, ridger and small trailer. This would carry out the required cultivations for the annual crops. Harvesting of sorghum and soyabeans would be by contract combine harvester. Details of other sizes of holding producing short rotation crops are discussed in the working paper of that name.

3.6 Numerous other enterprises could also be considered which have not been included above e.g. poultry, pigs vegetables and fruits. Several of these, as well as grain and legume crops such as sorghum or soyabeans await work by MARDI on varieties, cultivation techniques etc.

4. Implementation

The above examples suggest the possibility of establishing agricultural small businesses comprising a range of enterprises and being worked predominantly (but not necessarily) by family labour. However, while technically plenty of land is available, not many enterprises of this type have appeared. This may have been partly because of the administrative difficulty experienced by individuals in obtaining land, and the concentration of public land development schemes on providing small plots for those with little or no land. Real or imagined marketing problems have also inhibited attempts, particularly by Malays, to start enterprises other than rubber or coconuts.

Relatively large areas of land, 160,000 acres in Johor have been alienated in Group Settlement schemes. A block of land is divided into uniform plots (usually 5-10 acres) for applicants who have little or no land themselves to be developed for a specified crop. Some of these schemes have been successfully developed, but many have fallen prey to a series of problems:-

(a) Often unsuitable land is alienated. Thus the land may be subject to flood or contain lateritic areas. Alternatively unsuitable crops may be specified, e.g. rubber on peat soils.

(b) To create uniform small plots a grid pattern is normally used but this may have little or no relationship to the lie of the land and individual plots may be dissected by gullies.

(c) Because readily accessible land has already been taken up available land has poor accessibility and usually none is provided.

(d) No assistance and usually little advice is given to the developers. This latter problem is usually a result of the fact that the schemes are run through the district land office whose staff have little time to check on progress of schemes, let alone assist.

(e) Because of lack of funds most developers have to combine their activities on their new plots with other income earning activities the plots have to take second place. Land clearance in particular becomes a major task in such circumstances.

(f) The need to earn an income and the inaccessibility of schemes particularly to schools inhibit settlers from moving to their plots. This makes the co-ordination of efforts e.g. to carry out construction of access roads or drainage ditches extremely difficult. It also greatly inhibit any extension contact between the settlers and the Agricultural Department.

The "Fringe Alienation Schemes" providing grants and loans to settlers on schemes of the above type were started in 1960, but these have been plagued by many of the same problems(1). Staffing has been inadequate, choice of land often poor, and participants have neglected plots because of the need to carry out other work. Political pressures have also often made effective scheme management difficult. Because of unsatisfactory results Johor has decided not to initiate any more of these assisted schemes.

Any proposed development scheme would have to seek to avoid the above problems. Within the project area the soil survey and subsequent soil, terrain and land used potential maps produced will reduce the likelihood of poor choice of cropping and the phased development programme of land development and road construction will reduce access problems. However most of the area is relatively remote from existing population centres and thus potential for development on a part-time basis is low. The remainder of this paper outlines a proposed project for an area in Johor Tengah for the development of mixed enterprise holdings.

---

(1) Tunku Shamsul Bahrin "A Preliminary Study of the Fringe Alienation Schemes in West Malaysia" J. of Tropical Geography 1968.

5. The Project

5.1 Introduction

The major activities recommended for immediate development in Johor Tenggara are rubber and oil palm. Investigations of other crops with the largest market potential i.e. grain and legume crops for livestock feeds, have indicated that they have a high element of risk until further research has been carried out by MARDI to identify suitable varieties and solve pest, disease and harvesting problems. No limitations exist on production of small livestock but cattle industry development will depend upon cross-breeding programmes to up-grade and multiply existing stock. The annual crop with greatest initial potential is tapioca.

Part of the area adjacent to the proposed new town in Johor Tengah has been recommended for development by FLDA. The remainder of the area is considered to provide the best immediate potential for the development of a mixed agriculture. It is recommended that such development be initiated as nucleus estates producing oil palm and tapioca. It is suggested that the prime movers to either a public agency such as MARA or SEDC or a joint private/public enterprise. This brief paper outlines the characteristics of the area, the suggested method of operation of the schemes and an estimate of the funds required.

5.2 The Area

In the development plan the area has been divided into three development units, Pengeli Kechil with a gross acreage of 4,000, Ulu Sebol 5,600 acres, and Ulu Chenas 8,500 acres. The total area is therefore 18,100 acres and about 16,000 is considered likely to be cropped. The units of Ulu Sebol and Pengeli Kechil consist primarily of Harimau soils. Virtually the whole of Pengeli Kechil and almost half of Ulu Sebol comprises land with slopes of less than six degrees and are considered to be suitable for annual cropping. The remainder of Ulu Sebol has slopes of six to twelve degrees and is suitable for semi-perennials or perennials. The Ulu Chenas unit has three distinct parts, a lower area of about 3,000 acres with slopes of less than six degrees lying between S. Pengeli and S. Chenas. This contains some swampy areas which may be drainable. The remainder of the unit runs up the southern

slopes of Bt. Jengeli and the Gunong Blumut massif. The lower slopes of 6-12 degrees comprise about 3,000 acres and are best suited to oil palms. The upper slopes in part are suited to rubber only and it is assumed that most of this area will be planted to this crop. The valleys of the S. Pengeli, S. Chenas and their tributaries in this area appear likely to contain a number of good potential sites for fish ponds.

The forest in Pengeli Kechil, Ulu Sebol and the extreme south of Ulu Chenas has already been logged. The bulk of the Ulu Chenas is scheduled to be the first part of the phased logging programme supplying the logging complex in the new town. Logging here is scheduled to be completed by the end of 1975. It has been recommended that the S. Sebol riverbed and those of S. Chenas and S. Pengeli be prospected for tin before development takes place. This will place a minor restriction on development.

5.3 Development Method

The major objectives in this area are to establish production on agricultural holdings with a variety of sizes and to create conditions in which development of mixed farming can take place if experimentation shows that it is suited to the environment.

Both tapioca and oil palm require processing for sale. Tapioca can be processed on a fairly small scale, but if production is to be established on the scale envisaged here processing facilities or a guaranteed outlet will have to exist before producers will come forward. The same applies to oil palm. It is therefore recommended that the following method be adopted:

- SEDC, MARA or some other public/private agency announce the establishment of estate production of tapioca and oil palm, about 2,500 acres of each, and the construction of attendant processing facilities.

- applications be invited from individuals of all races for contracts to supply these processing plants from land to be developed in the area from lots with a minimum size of, say, 20 acres (with a minimum of 10 acres for either main crop). A maximum holding limit e.g. of 100 acres might also be applied. Applicants should be able to put up some portion

e.g. 25 percent of the capital required. This type of opportunity is considered likely to appeal to those with existing agricultural holdings of 5 acres or more who are ineligible for further land under GSA type schemes and who are restricted by the market problem from opening up smallish areas of land for other crops, other than rubber. It is recommended that, if necessary, preference be given to bona fide farmers i.e. those who are now and will remain primary dependent upon agriculture for their income.

- successful applicants should be able to obtain loans from Bank Pertanian or commercial banks to cover costs of clearance and establishment. These loans would contain an element e.g. about $10 per acre per year to be paid to the "nucleus estate" for the purpose of providing overall supervision of crop development.

- initial land clearance and planting of oil palms to be carried out by contractors under supervision of the nucleus estate. Planting, maintenance and harvesting of tapioca and maintenance and harvesting of oil palm to be the responsibility of the operator subject to provisions under the production contracts.

Access to the area is initially somewhat restricted. A new crossing of the S. Sayong from the FLDA Kulai Complex is scheduled to be completed by the end of 1973. Initial land clearance is proposed for 1974/75 but could begin earlier if desired. The Ulu Chenas area will then be developed from 1975/6 onwards.

Initial development in Pengeli Kechil and Ulu Sebol could be broken down as follows:-

Tapioca Estate	2,500 acres
Oil Palm estate	2,500 acres
Mixed farms	3,600 acres
	8,600 acres

The relative proportions would depend on response from applicants. If it is inadequate initially to take up 3,600 acres the excess could be developed as part of the nucleus estates. These areas might be sold off later, as might the nucleus estate. If a large number of suitable applications is received, the size of the estates might be reduced.

Development in the Ulu Chenas area might be broken down as follows:-

Mixed farms	4,000 acres
Oil palm and rubber holdings (possibly estates)	3,500 acres
	7,500 acres

5.4 Costs

Costs and returns for oil palm and tapioca production have been discussed in detail in working papers on Oil Palm and Short-Rotation Crops respectively. The latter also discussed alternative methods of production and possible problems in some detail. This paper applies these costs to the situation under review.

a) Nucleus estates

It is suggested that clearance be spread over the period 1974-6, 2,500 in each year divided equally between tapioca and oil palm.

(1) Tapioca

Costs for the first seven years of operation are shown in Table 5. Table 6 shows expected sales, assuming an ex-farm price of $25 per ton of wet root.

These costs assume that casual labour is available at $3.50 per day for major field tasks of planting, manuring, spraying and harvesting. A supervisory and management staff and permanent tractors drivers required total 20. About 50,000 mandays of casual labour per year would be required when the scheme was in full production. If work was carried out by a permanent labour force, about 250 individuals would be required. This would increase costs by about $125,000 per year. Total net capital requirement over the period 1974-76 is $1.6 million excluding interest charges.

(2) Oil Palm

Total costs for a 2,500 acre oil palm estate, excluding processing and assuming a regular labour force are given in Table 7. Total capital requirement over the period 1974-79 is $3.1 million, excluding interest charges (see Table 8). No allowance has been made for housing other than for management it being assumed that they will be housed in the new town and

TABLE 5 TAPIOCA ESTATE - 2500 ACRES - ESTIMATED COSTS

Year	Land Clearance Buildings	Mach-inery	Planting Material, Fertili-sers etc.	Manage-ment	Wages	Housing	Tax. Ins. Office etc.	Survey Premium Rent	Total
1974	94	-	-	11	-	-	2	63	170
1975	525	119	53	36	62	40	10	20	915
1976	431	45	185	42	175	40	20	15	953
1977	2	45	200	50	212	2	20	15	546
1978	2	45	200	50	212	2	20	15	546
1979	2	45	200	50	212	2	20	15	546
1980	2	45	200	50	212	2	20	15	546

TABLE 6 TAPIOCA ESTATE - 2500 ACRES - REVENUE AND CASH FLOW (THOUSAND DOLLARS)

Year	Yield per acre(tons)	Total output (tons)	Revenue	Total cost	Cash flow
1974	-	-	-	120	-120
1975				915	-915
1976	12	15,000	375	953	-578
1977	13	32,000	812	546	266
1978	14	35,000	875	546	329
1979	15	37,500	937	546	391
1980	15	37,500	937	546	391

TABLE 7. OIL PALM ESTATE - 2,500 ACRES. COSTS (THOUSAND DOLLARS)

Year	Clearance Roads	Planting Material	Planting Charge	Fertilisers & Chemicals	Labour Maintenance	Labour Harvesting	Collection Costs	Management	Survey Rent & Premium	Other costs	Build-ings	Total Cost
1974	94							12	63	-	-	169
1975	281	131	150	6				63	77	12	50	770
1976	187	131	150	56	172			100	30	19	75	910
1977	124			119	321			100	30	25	25	754
1978	124			137	291	82	5	100	30	25	-	794
1979	-			137	251	201	19	100	30	25	-	763
1980				169	205	250	31	100	30	25	-	810
1981				190	172	269	39	100	30	25	-	825
1982				212	172	279	46	100	30	25	-	864
1983				225	172	283	50	100	30	25	-	885
1984				225	172	283	50	100	30	25	-	885

TABLE 8. OIL PALM ESTATE - 250 ACRES. REVENUES AND CASH FLOW

YEAR	Production (Thousand tons) f.f.b.	Price per ton $	Revenue ($ Thousand)	Cost ($ Thousand)	Cash Flow ($ Thousand)
1974	-	-	-	169	-169
1975	-	-	-	720	-720
1976	-	-	-	920	-920
1977	-	-	-	754	-754
1978	5.0	69	345	794	-449
1979	18.75	67	1,256	763	493
1980	31.25	65	2,031	810	1,221
1981	38.75	64	2,480	825	1,655
1982	46.25	63	2,914	864	2,050
1983	50.0	62	3,100	885	2,215
1984	50.0	61	3,050	885	2,165

that this will be paid for by the employees whose wages ($130 per month or above) are assumed to contain a rent allowance. Total employment would be approximately 190.

Revenues rise to almost $1.25 million 1981. These have been projected for expected oil and kernel prices allowing $25 per ton f.f.b. for processing and transport charges.

TABLE 9. NUCLEUS ESTATE PROJECT - TAPIOCA OUTPUT (Thousand tons wet root)

Year	Estate	Smallholders	Total
1976	13.7	9.5	23.2
1977	28.7	19.9	48.6
1978	31.2	31.3	62.5
1979	33.7	43.7	77.4
1980	36.2	47.5	83.7
1981	37.5	50.3	87.8
1982	37.5	52.2	89.7
1983	37.5	53.2	90.7
1984	37.5	53.2	90.7

Tapioca Processing

If the above 2,500 acre scheme, plus half the area proposed for mixed farms were planted to tapioca this would mean a total acreage of 6,300. Assuming yields rising to 15 tons per acre on the estate and 14 tons per acre for small producers, this would mean a total of about 90,000 tons per year of roots for processing at peak production (see Table 9). If the crop is shown to be profitable additional quantities of roots are likely to be available by the early 1980's from the Sembrong and S. Kachur areas of Johor Tengah and also from outside the project area.

Figures given by FAMA(1) quote the capital cost of a plant producing tapioca pellets with an annual capacity of 504,000 pikuls of roots (30,000 tons) at $480,000. While there are probably some economies of scale it would not seem unreasonable to allow $1.5 millions for a plant of 90,000 tons capacity. This might be constructed in 3 phases in 1976, 1978 and 1980 depending upon the build up of production.

(1) FAMA 'Tapioca Chip Processing in West Malaysia' K.L. 1970.

Oil Palm Processing

If half the "mixed farming" area is planted to oil palm in addition to the "nucleus estate" and a further 2,000 acres in Ulu Chenas the total acreage will amount to 8,300 acres. This would require a processing capacity of about 20 tons f.f.b. per hour (see Table 10). Such a mill will cost approximately $3.25 million. It is understood that an area of approximately 6,000 acres is being developed to oil palm immediately west of the S. Pengeli. It may be reasonable to process fruit from this area in the new town. Mill capacity would have to be increased to approximately 35 tons per hour. Neglecting this possibility phasing could be as follows:-

1980	10 tons	-	cost $2.0 million
1982	10 tons	-	cost $1.2 million

(3) Capital Requirements

Capital needs for these two nucleus estates (in terms of negative cash flow) plus processing facilities are shown in Table 11.

b) Small Mixed Holdings

The method of establishment of these holdings has been discussed in section 5.3. Based on estimates made in Section 3.2, the net cash expenditure excluding housing cost by the operator of a 20 acre holding starting in 1973 divided equally between oil-palm and tapioca might be of the following order:-

Year	Net Expenditure Total	Per Acre
1974	2,600	130
1975	6,300	315
1976	400	20
1977	340	17
1978	-	-

It has been suggested in Section 5.3 that approximately 7,600 acres might initially be developed in small holdings of this type. If this area is developed evenly over 4 years beginning in 1974 total net expenditure by the farmers would be approximately as shown in Table 12.

TABLE 10 NUCLEUS ESTATE SCHEME. OIL PALM OUTPUT AND PROCESSING REQUIREMENT

Year	Output (Thousand Tons ffb) Nucleus Estate	Smallholders	Other	Total	Processing Requirement (Tons ffb/hr)
1978	2.5	1.9		4.4	1.1
1979	9.4	7.1		16.5	4.1
1980	15.6	13.8	4.0	33.4	8.4
1981	19.3	21.8	11.0	52.1	13.0
1982	23.1	29.5	14.0	66.6	16.7
1983	25.0	33.7	17.0	75.7	18.9
1984	25.0	36.6	20.0	81.6	20.4
1985	25.0	38.0	20.0	83.0	20.8
1986	25.0	38.0	20.0	83.0	20.8

TABLE 11 NUCLEUS ESTATES. CAPITAL REQUIREMENTS, (THOUSAND DOLLARS)

Year	Oil Palm Estate	Oil Palm Factory	Tapioca Estate	Tapioca Factory	Total
1974	169		120		289
1975	770		915	250	1935
1976	920		578	350	1848
1977	754			250	1004
1978	449			250	699
1979		1000		250	1250
1980		1000		150	1150
1981		600			600
1982		600			600
Total	3062	3200	1613	1500	9375

TABLE 12. MIXED HOLDINGS - NET CASH EXPENDITURE

Year	Expenditure (Thousand Dollars)
1974	247
1975	845
1976	883
1977	916
1978	669
1979	71
1980	33
	3,664

Thus the total involved would be of the order of $3.7 million. How much of this would have to be met by borrowing cannot be estimated, but might be in the region of $2.5 to $3 million. Given the overall viability of the scheme and the element of supervision built into a contract arrangement it is felt that operators in a scheme of this type would be well suited as potential borrowers from commercial banks and that the bulk of the capital requirements could come from this source.

5.5 Supervision

Based on a minimum holding size of 20 acres, there would be a maximum of 360 farmers involved in the development of 7,200 acres. Initially it will almost certainly be advisable to provide for a higher level of extension effort than is ultimately likely to be required. It is suggested that an initial staff of three be appointed to work with both crops. This should comprise a more senior man of Agriculture Officer level with several years of extension experience. He could be supported by two young men with training at least to the Certificate of Agriculture level but who would probably have little field experience. This group should be able to cope with the whole area as development expands. In the longer term 1 field man should be able to work with3-400 farmers.

5.6 Economic Evaluation

The value of this project as an agricultural enterprise (i.e. excluding processing facilities) to the Malaysian economy was assessed valuing unskilled labour at $40 per month. Total

costs for the nucleus estates and mixed farms are shown in Table 13 including the value of operators' labour at $40 per month. Table 14 shows the value of the output from the 12,600 acres of tapioca and oil palms valuing outputs at the farm gate. The resulting cash flow at resource values is estimated in Table 15. This yields an internal rate of return of 26 percent. It should be remembered however that no infrastructural costs have been included as it has been assumed that access will have been provided for the adjacent new town and the forestry operations.

TABLE 13 NUCLEUS ESTATE SCHEME - TOTAL COSTS AT RESOURCE VALUES (THOUSAND DOLLARS)

Year	Tapioca Estate	Oil Palm	Mixed Farms			Total
			Cash Costs	Operators Labour	Supervision	
1974	93	59	152	24	19	347
1975	698	477	388	115	38	1716
1976	725	607	646	206	57	2241
1977	424	438	817	298	76	2053
1978	424	453	872	365	76	2190
1979	424	494	766	365	76	2125
1980	424	540	855	365	76	2260
1981	424	564	952	365	76	2383
1982	424	596	1037	365	76	2498
1983	424	615	1098	365	76	2578
1984	424	615	1142	365	76	2622
1985-95	424	615	1163	365	76	2643

TABLE 14. NUCLEUS ESTATE SCHEME - TOTAL REVENUES (VALUED AT FARM GATE - THOUSAND DOLLARS)

Year	Tapioca			Oil Palm ffb.			Total
	Output ('000 tons)	Price ($/ton)	Value ($'000)	Output ('000tons)	Price ($/ton)	Value ($'000)	($'000)
1976	23	25	581	-	-	-	581
1977	49	25	1217	-	-	-	1217
1978	63	25	1565	4	65	286	1851
1979	77	25	1936	16	64	1024	2960
1980	84	25	2094	29	63	1852	3946
1981	88	25	2196	41	62	2548	4744
1982	90	25	2244	52	61	3202	5444
1983	91	25	2267	59	60.4	3545	5812
1984	91	25	2267	62	59.8	3684	5951
1985	91	25	2267	63	59.2	3730	5997
1986	91	25	2267	63	58.6	3692	5959
1987	91	25	2267	62	58.0	3590	5857
1988	91	25	2267	61	57.4	3484	5751
1989	91	25	2267	59	56.9	3380	5647
1990	91	25	2267	58	56.3	3277	5544
1991	91	25	2267	57	55.7	3175	5442
1992	91	25	2267	56	55.2	3075	5342
1993	91	25	2267	54	55.0	2992	5259
1994	91	25	2267	53	55.0	2902	5169
1995	91	25	2267	52	55.0	2855	5122

TABLE 15 NUCLEUS ESTATE SCHEME - CASH FLOW
(THOUSAND DOLLARS)

Year	Costs	Revenues	Cash Flow
1974	347	-	-347
75	1716	-	-1716
76	2241	581	-1660
77	2053	1217	- 836
78	2190	1851	- 339
79	2125	2960	835
1980	2260	3946	1686
1981	2383	4744	2361
82	2498	5444	2946
83	2578	5812	3234
84	2622	5951	3329
85	2643	5997	3354
86	2643	5959	3316
87	2643	5857	3214
88	2643	5751	3108
89	2643	5647	3004
1990	2643	5544	2901
91	2643	5442	2799
92	2643	5342	2699
93	2643	5259	2616
94	2643	5169	2526
95	2643	5122	2479

6. Conclusions

If this initial scheme is successful similar methods could be used to develop other units in the Project Area, particularly those containing a fairly high proportion of land with slopes of less than six degrees enabling annual crops to be grown. However as the examples given in Section 3 show such conditions are not essential to the development of mixed enterprise holdings. Once it has been shown that this sort of development can be carried out it should be possible to extend to a wider variety of holding sizes and enterprise types entailing greater risks.

In the area around the new town farmers will undoubtedly move out of tapioca into other more intensive enterprises as they become established and pay off their debts, but supplies could be made from new developments elsewhere if the crop is still viable. The resulting agriculture will be broadly in line with the government's aim of creating a diversified agriculture, encouraging the growth of viable small businesses, and speeding new land development. It should be re-employed, however, that developments of the type outlined in this paper are not designed for the landless. It is assumed that they will continue to be catered for by programmes of the FLDA type. It is designed for those of all races who already have a small agricultural business, or have some capital, and who wish to become more firmly established.