

RECENT DEVELOPMENTS IN AGRICULTURAL EMPLOYMENT IN A KEDAH RICE-GROWING VILLAGE

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INTRODUCTION

A SURVEY of recent literature on agricultural employment in Southeast Asian rice-growing communities suggests that significant departures from traditional practices are accompanying the introduction of irrigation, double-cropping, and improved *padi* (paddy) varieties in the region. Firstly, farmers now try to use labor more efficiently to reduce the time needed for tillage, transplanting, and harvesting. Previously the use of many long and medium-term varieties planted at different times under a rainfed, single-cropping system staggered the demand for labor over a three-month period for each of the three labor-intensive operations. Once farmers switch to short-term *padi* varieties and a tight irrigation schedule, labor-saving practices are mandatory in the absence of a large seasonal addition to the labor force. Mechanization is the obvious solution; new types of labor contracts rewarding efficiency rather than simply participation are another.

Secondly, the use of more costly production inputs (including agrochemicals, land, irrigation water, and contractors and laborers) encourages farmers to use strategies which will reduce the share of output paid to non-family labor. Some farmers have not only found mechanization faster than hiring workers to do the task manually, but also highly competitive in cost terms, if not actually cheaper. There is also scope for paring labor costs by reducing the number of agricultural laborers (which facilitates closer supervision) and, in situations of intense competition for work, by reducing the level of remuneration.

Various studies indicate the importance of regional variations in the pattern of adoption, and effects, of labor-saving and cost-reducing employment strategies. Mechanization, particularly of the tillage phase, is gaining a popularity in Thailand [28],¹ the Philippines [15], and Peninsular Malaysia [6]. In Indonesia there has been scarcely any mechanization of farming [14] but tractors have become

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¹ J. C. Scott, personal communication (1979).

more numerous since 1975, particularly on the north coastal plain of Java [29]. Much more significant for Indonesia are changes in the type of harvesting implement and in the forms of labor contracts in many parts of Java.² These changes appear to have serious implications for the large population dependent on farm laboring work [8] [9] [18] [30].

The relative absence of trauma in Peninsular Malaysia may be due to a smaller proportion of rural households and individuals dependent on farm laboring for their livelihood. It is also related to the very rapid expansion of double-cropping, and therefore demand for labor, in the late 1960s and early 1970s. Finally, until quite recently mechanization has been applied primarily to the tillage phase [6] [16, pp. 68–69] [17]. Since this permitted double-cropping the net effect has been labor-creating.

Even so, Malaysia has not escaped from problems of adjustment to changing factor allocations. In Malaysia's largest double-cropped *padi* area, the Muda Irrigation Scheme of Kedah and Perlis, policy-makers find themselves on the horns of a dilemma. On the one hand, the encouragement of mechanization of additional farm operations has been mandatory to reduce the problem of severe seasonal labor shortage and the accompanying high cost of labor [25, pp. 10–12]. On the other hand, a long range employment plan for Kedah and Perlis [13] is of little immediate assistance in transferring those displaced from agriculture to nonagricultural jobs.

In encouraging mechanization the Muda Agricultural Development Authority assumed that, because farmers were a majority of the Muda population and farm laborers a minority, the benefits of added incomes to farmers would outweigh the costs of reduced employment opportunities [19, pp. 37–38]. The authority also assumed that the degree of mechanization would be "compatible with the employment requirements of the portion of the rural population who will continue to seek gainful employment as agricultural laborers" [19, p. 38]. Since the introduction of mechanized harvesting widespread reports of hardship suggest that the loss of employment opportunities affects rather a larger portion of the rural population than the 8 per cent identified as solely or largely dependent on employment as agricultural laborers and that the mechanization process has taken place independently of agricultural laborers' employment requirements.³

This paper examines the impact of mechanization and other recent changes in employment in one village, Kampung Asam Riang,⁴ in the Muda Irrigation Scheme. It looks closely at the different interest groups of villagers—the employees and the employers—so that the costs as well as the benefits from the changes

² In Java machine milling of rice in place of hand pounding has also taken place [10] [20]. However it is not strictly relevant to this paper which looks only at on-farm labor-saving or cost-reducing practices.

³ By 1980, 80–85 per cent of the Muda Scheme's off-season crop was mechanically harvested [11, p. 16].

⁴ Kampung Asam Riang is a pseudonym. It was studied in two periods of fieldwork, the first between October 1966 and January 1968 and the second from December 1977 to March 1978. Brief visits were also made in 1974, 1976 and 1979. The data for this paper were collected mainly in 1978.

TABLE I
SOURCES OF HOUSEHOLD INCOME: KAMPUNG ASAM RIANG, 1978

	Number of Households	Percentage of Households
<i>Padi</i> income households:		
Family farm only*	10	8
Family farm/farm labor	24	19
Family farm/off-farm work	11	8
Family farm/farm labor/off-farm work	38	29
Family farm/ <i>padi</i> land rental	1	1
Farm labor only	4	3
Farm labor/off-farm work	13	10
Farm labor/off-farm work/ <i>padi</i> land rental	1	1
Farm labor/ <i>padi</i> land rental	1	1
Farm labor/pension	1	1
<i>Padi</i> land rental only	1	1
<i>Padi</i> land rental/off-farm work	2	2
Non <i>padi</i> income households	16	12
Other households†	5	4
Total households	128	100

Note: Excludes remittances from outmigrants.

* "Farm" refers to rice farming and does not include gardening and other activities which take place within the confines of the house compound. "Off-farm" is used interchangeably with "nonagricultural."

† Comprises aged couples or single-person households with neither direct involvement in the *padi* economy nor engaging in any form of off-farm work. Although they live in independent houses and look after their own needs they receive support from relatives. The data were insufficient to indicate which households in the village, if any, provided support for aged relatives.

can be better appreciated. Although further in-depth village studies are necessary to demonstrate the variable dimensions of employment in the Muda scheme, this study provides a much needed insight into one of the most disruptive consequences of agricultural modernization in the Muda scheme to emerge since its inception in 1970.

I. KAMPUNG ASAM RIANG: A RICE-FARMING COMMUNITY

Kg. Asam Riang is a Malay village with 128 households and 633 persons (in early 1978). It has a more complex occupational structure than is usual for Malay *padi* farming villages in the Muda area, since many people employed full or part-time in an array of industrial and service occupations in and around the nearby Kedah State capital of Alor Setar [4]. Yet even in this almost suburban community 84 per cent of all households still obtain at least some income from *padi* farming, as farmers, agricultural laborers or landlords in receipt of rent (Table I). This is designated as the *padi* income group.

In the *padi* income group, there is a basic distinction between the eighty-four

TABLE II
DISTRIBUTION OF EQUIVALENT OWNED *Padi* LAND

Size of Farm Operated (Relong)*	Number of Households	Percentage of Households
0	20	19
0.1-1	14	13
1.1-2	23	22
2.1-3	14	13
3.1-4	5	5
4.1-5	10	10
5.1-6	6	6
6.1-7	4	4
7.1-8	4	4
8.1 and over	4	4
Total	104	100

Note: Excludes land rented out. Kampung Asam Riang farmers' own assessment that one unit of rented land is worth 0.7 of a unit of owned land is used to calculate the equivalent owned *padi* land.

* One relong=0.287 hectares.

padi farm operating households and the twenty landless, non-tenant farm laborer households. However, as Table I shows, households more often combine these two activities and nonagricultural occupations. Thus, while it is true that there are few households dependent on farm labor only, participation in farm labor, for wages, occurs in a very large number of instances (eighty-two households).

The extent to which a household is involved in agricultural labor is related to the access that a household has other more lucrative income-earning opportunities. If the family farm is large enough to meet all household members' needs, then there will be less motivation and possibly also less time to seek laboring work. Likewise if the household has a steady source of income from an off-farm source such as shopkeeping or factory employment, farm laboring work will be less necessary an adjunct to the other sources of income. In the absence of detailed data on household incomes for the whole village, it is not possible to estimate accurately the proportion of the farming population vulnerable to shrinking employment opportunities.

For the village as a whole, data on *padi* landowning, operation and occupations of past and present household members can be used to identify households which are likely to be adversely affected by labor displacing employment practices. Table II shows the distribution of equivalent owned *padi* land⁵ among the eighty-four farm operating households and twenty farm laboring households.

⁵ The "equivalent owned relong" is calculated on the basis that one relong of rented *padi* land is worth only five-sevenths of a relong of owned *padi* land. This equivalence is based on Kampung Asam Riang farmers' estimate that five relong of owned, or seven relong of rented, *padi* land is required for a "comfortable" (that is, more than bare subsistence) living for an average family of five persons. This compares with a pre-Muda scheme estimate of six relong of owned land and the (implied) equivalent of seven to eight relong of rented land (depending on the level of rent) reported for Kampung Padang Lalang in 1968 (M. Kuchiba, Y. Tsubouchi, and N. Maeda eds. *Three Malay Villages: A Sociology*

On the farmers' own calculation, the average family needs a minimum of five relog of owned *padi* land or its rented equivalent enough to be able to live comfortably. From Table II, only 18 per cent of *padi* farm operating and laboring households have enough *padi* land to meet their income requirements. While this calculation does not take into account differences in household composition, land quality, and farming skills, it provides a rough approximation of the degree to which the majority of households rely on income from farm labor and nonagricultural sources.

Since very few households obtain income from rents, and such income is relatively minor, it can be disregarded. The main sources of off-farm income are agricultural labor and various forms of nonagricultural work, especially that which brings in regular supplies of cash. Data on the occupations of household members, who are currently residing in the village, and outmigrants, who might possibly be contributing to the maintenance of their village relatives, suggest that at least 35 per cent of the 104 farm operating/laboring households are dependent on the income they receive from farm laboring and other intermittent village work opportunities in order to meet basic family needs. Twenty-nine of the farm operating households and seven of the laboring households are at risk. This assessment is a conservative one because remittances from outmigrants cannot be guaranteed, nor can the pooling of all income by family members residing in the village be assumed. Clearly the dimensions of the problem of labor displacement are much larger than previously estimated one by the Muda Agricultural Development Authority, especially when it is pointed out that Kg. Asam Riang enjoys much better access to nonagricultural employment opportunities than other villages more distant from Alor Setar.

As the total household income is all-important in determining the response of its individual members to employment opportunities, the household must be the basic unit of account. At the same time there are differences in employment patterns between men and women that could have significance for policy. A comparison of Tables III and IV shows that men are more active in non-agricultural work than women. Much of this work is found outside the village. Although young unmarried women are increasingly allowed to work outside the village when they have the education and opportunity, women's predominantly homemaking and child-rearing roles after marriage often restrict their mobility beyond the home when there are very young children to be cared for. Later the demands of the household routine permit at most absences of short duration. Thus the greatest opportunities for remunerative female employment lie within the immediate village area, in agricultural wage labor.⁶ The retention of suf-

of Paddy Growers in West Malaysia, Monograph No. 14, English Language Series, Center for Southeast Asian Studies, Kyoto University [Honolulu: University of Hawaii, 1979], pp. 70, 90).

⁶ Other opportunities include thatch-making, mat-weaving and cake-making but these pay very poorly in relation to the time expended, and are therefore only taken up when better-paid wage employment is unavailable. Shopkeeping pays well (it can return a net profit of M\$8-10 per day throughout the year) but requires more initial capital than most women have. Besides, the local market is already saturated by three shops in the village and others within easy reach.

TABLE III
OCCUPATIONS OF MEN 16 YEARS OF AGE AND OVER: KAMPUNG ASAM RIANG, 1978

	Number	Percentage
<i>Padi</i> income men:		
Family farm only*	28	14
Family farm/farm labor	47	23
Family farm/off-farm work	33	16
Family farm/farm labor/off-farm work	2	1
Farm labor only	9	4
Farm labor/off-farm work	3	2
<i>Padi</i> land rental only	2	1
<i>Padi</i> land rental/off-farm work	2	1
Other adult men:		
Off-farm work only†	39	19
Unemployed	6	3
Invalid or aged	7	3
Full-time students	26	13
Total adult males	204	100

* See Table I.

† Includes one pensioner.

TABLE IV
OCCUPATIONS OF WOMEN 16 YEARS OF AGE AND OVER: KAMPUNG ASAM RIANG, 1978

	Number	Percentage
<i>Padi</i> income women: ^a		
Family farm only ^b	8	4
Family farm/farm labor	54	30
Family farm/farm labor/off-farm work	6	4
Farm labor only	16	9
Farm labor/off-farm work	2	1
Farm labor/off-farm work/ <i>padi</i> land rental	1	1
<i>Padi</i> land rental only	1	1
<i>Padi</i> land rental/off-farm work	1	1
Other adult women:		
Household tasks only ^c	60	32
Off-farm work only	22	11
Invalid or aged	5	3
Full-time student	13	7
Total adult females	189	100 ^d

^a All occupations in this category are in addition to housework.

^b See Table I.

^c Includes some women who would otherwise be unemployed.

^d All figures are rounded numbers so that the sum of them does not make 100 per cent.

efficient female employment opportunities in villages should thus be given special consideration as long as there are inadequate employment opportunities for men to be able to support their families.

Men's needs can be met by creating a much wider spectrum of jobs outside

agriculture and outside the village. It is somewhat disturbing that men's opportunities for factory employment may in practice be limited by the preference of employers for a lower-paid, docile, but high-turnover labor force of young unmarried women, as recently documented in the Bayan Lepas area of Penang [7, pp. 7-8]. Employment of village males in factories is also limited by the concentration of manufacturing industry in a few favored locations. Apart from Alor Setar itself, Kedah's industrial development is centered on the town of Sungei Patani, about forty kilometers away and outside commuting distance. To be effective, efforts by the Kedah state government to provide employment in the manufacturing sector will have to be accompanied by a broadly-based labor force with a large male component and sufficient incentives to encourage firms to locate outside the established industrial areas.

The above overview of the employment structure of Kg. Asam Riang as a whole has paid particular attention to the delimitation of the groups most vulnerable to labor-displacing and cost-reducing practices in agriculture. The remainder of this paper will look more closely at one particular category of village households—*padi* farm operating households as buyers and sellers of agricultural labor. The analysis is based on data collected in interviews of thirty-one of the eighty-four farm operating households in Kg. Asam Riang and refers to the 1977-78 main *padi* season,⁷ except where otherwise indicated.

II. INCOMES IN THIRTY-ONE FARM-OPERATING HOUSEHOLDS

Income data⁸ for thirty-one households operating *padi* farms in Kg. Asam Riang in main season 1977-78 provide a more detailed picture of the relative contri-

⁷ The thirty-one sample households are not strictly speaking a random sample of the eighty-four farm operating households in 1978. A strict random sample of forty households was interviewed on their farm management practices during the first period of field-work in 1967; the thirty-one households reinterviewed in 1978 constitute all of the original sample who could be contacted and who had remained as farm operators.

⁸ Incomes for the 1977-78 main season were calculated on the basis of a single interview and are thus not as accurate a measure as some other surveys in the Muda area provide. The components here are: net income from the home *padi* enterprise and other income.

Net income from the home *padi* enterprise was calculated by deducting the major farm expenses from the value of gross *padi* production. Gross *padi* production was valued according to the price of *padi* received by each farmer at the place where his *padi* was delivered to the buyer. If the *padi* was sold on more than one occasion, then the average price of *padi* was calculated. Rents which were paid in *padi* were also valued according to these principles. Farm expenses comprised labor and machine hire, petrol, *padi* land rental, seeds, fertilizers, other agro-chemicals, the religious tithe (*zakat*) and land tax. The value of wages paid to hired labor does not include the cost of feeding workers. No cost has been imputed to family labor employed on the home farm. Nor is there allowance for depreciation of equipment.

Other income included receipts from wage labor (*upah*), rents, poultry raising, fishing carpentry, shopkeeping, the sale of traditional medicine, wages from urban employment and periodic remittances. No allowance has been made for the value of farm produce retained for home consumption, except, of course, for rice, because estimates of this type are often too approximate to be of any use.

TABLE V
COMPOSITION OF HOUSEHOLD INCOMES, MAIN SEASON 1977-78

Percentage of Household Income	Number of Households Earning Income from:							
	<i>Padi</i> Farming	Agriculture Labor	Car-pentry/Fishing	Wages/Pension	Remittances	Rent	<i>Bomoh</i> */Shop-keeping	Other
0	2†	15	23	23	24	28	29	24
0-19	1	6	5	1	4	3	—	7
20-39	7	6	2	5	3	—	1	—
40-59	3	3	1	1	—	—	—	—
60-79	5	1	—	1	—	—	1	—
80-99	9	—	—	—	—	—	—	—
100	4	—	—	—	—	—	—	—

* Traditional village doctor.

† Households with negative incomes as a result of unusually low *padi* yields.

bution of the several different sources of household finance (Table V). The data indicate that only eighteen of the thirty-one households obtained more than 60 per cent of their incomes from the home *padi* farm, and that agricultural labor was most commonly resorted to as a supplement to *padi* income. However, Table V also shows that other income-earning opportunities, both in the village and outside it, are a significant alternative or supplement to *padi* farming and farm laboring.

Within the village, carpentry, fishing, and shopkeeping are popular adjuncts to farming. Outside the village, the development of manufacturing in the vicinity of Alor Setar has provided employment for some young residents. Another important source of income is remittances from relatives who have permanently left the village to work elsewhere in Malaysia.

All these additional sources of income may still be only secondary to *padi* farming. But their contribution can make all the difference between poverty (*kesusahan*) and a reasonably secure and comfortable existence (*kesenangan*). Income data allow the use of the policy-defined poverty level in Malaysia broadly to assess the extent to which receipts from *padi* farming alone provide families with an adequate standard of living, and, as a corollary, to assess the significance of supplementary sources of income.

The policy-defined poverty level in Malaysia during the first quarter of 1978 was M\$40 per person per month.⁹ Table VI shows that on the basis of receipts from *padi* farming during the 1977-78 season, half of the thirty-one households were below this minimal level. Some of these households would not be in the poverty category, were it not for a severe drought which reduced yields by about one quarter. When we allow for the drought, by lowering the poverty line to M\$30 per person per month, one-third of the sample households were still in the poverty category.

⁹ The figure of M\$40 is based on the 1970 official poverty line of M\$25 per person per month and an inflation level of approximately 60 per cent in consumer prices between 1970 and the first quarter of 1978 [22] [23].

TABLE VI
LEVELS OF MONTHLY HOUSEHOLD INCOME PER PERSON, MAIN SEASON 1977-78

M\$ per Person per Month	Income from <i>Padi</i> Farm		Income from All Sources	
	Number of Households	Percentage of Households	Number of Households	Percentage of Households
0-10	5	16	2	6
11-20	4	13	—	—
21-30	4	13	4	13
31-40	2	6	3	10
41-50	4	13	4	13
51-60	3	10	4	13
61-70	—	—	—	—
71-80	—	—	1	3
81-90	3	10	2	6
91-100	—	—	3	10
Over 100	6	19	8	26
Total	31	100	31	100

If the only source of income these households had were the home farm, they would be in dire straits. Table VI shows that the additional income from other sources helps raise six families above the M\$40 poverty line (seven families above the M\$30 poverty line). Most of these earn this additional income from agricultural wage labor, other opportunities being still too few to meet the need, or requiring the investment of capital in amounts which poor people do not have. It is against this background that the use of agricultural wage labor in Kg. Asam Riang in the 1977-78 season is analyzed in detail. The analysis will be confined to the five most labor-intensive activities in *padi* farming: tillage, transplanting, reaping, threshing, and transporting.¹⁰

III. AGRICULTURAL EMPLOYMENT IN KAMPUNG ASAM RIANG

Farmers in Kg. Asam Riang are net agricultural labor employers. This is to say, more households hire in labor (including mechanized equipment) than themselves hire out labor (Table VII), and they also spend far more on hiring in labor and equipment than they receive for the work they do on behalf of others (Table VIII).

The vast difference between the number of households employing and employed, and in expenditure and income, has perhaps only one exception, the unmechanized transplanting. For all other types of agricultural employment in Kg. Asam Riang, the statement (referring to the overall Muda pattern in 1974) that "labour costs can be looked on as largely transfer payments between farmers in the same economy" [19, p.37] is now a far too simplistic description of prevailing employment patterns.

¹⁰ People are occasionally employed for wages in other tasks such as weeding, spraying and fertilizing, but too infrequently to merit closer analysis. These tasks are normally carried out by members of the household.

TABLE VII
HOUSEHOLD PARTICIPATION IN AGRICULTURAL WAGE LABOR AND
CONTRACTING, MAIN SEASON 1977-78

Type of Wage Labor	Number of Households		Percentage of Households	
	Employing	Employed	Employing	Employed
Tillage (mechanized)	30	2	97	6
Tillage (buffalo)	—	2	—	6
Transplanting (manual)	15	11	48	35
Reaping (manual)	19	12	61	39
Threshing (manual)	18	8	58	26
Reaping/threshing combined (mechanized)	11	—	35	—
Transporting (various modes)	27	8	87	26
Any form of wage labor	31	16	100	5

TABLE VIII
EXPENDITURE ON AND EARNING FROM AGRICULTURAL WAGE LABOR,
MAIN SEASON 1977-78

Type of Wage Labor	Total M\$		Percentage of Total M\$	
	Spent	Earned	Spent	Earned
Tillage (mechanized)	5,863	786	28	12
Tillage (buffalo)	—	145	—	2
Transplanting (manual)	3,342	2,665	16	40
Reaping (manual)	3,442	1,285	16	19
Threshing (manual)	2,510	1,120	12	17
Reaping/threshing combined (mechanized)	3,681	—	17	—
Transporting (various modes)	2,294	696	11	10
Total	21,132	6,697	100	100

Note: Excludes value of food and tobacco provided to workers.

For the thirty-one households surveyed, 28 per cent of the labor costs¹¹ for the main season 1977-78 were payments to urban-based Chinese contractors (for mechanized tillage, reaping, threshing, and infield transportation), haulers, and rice millers (for transporting *padi* from the roadside to the mill). When we look more closely at the remaining 72 per cent of total cash expended on labor, it was by no means spread widely and evenly as earnings among all those Malay villagers who engaged in farm laboring. In the past, farming techniques were such that little capitalization was needed [3], so that lack of equipment put few people at a disadvantage in competing in the labor market.¹² This is not true

¹¹ While some of the Malays were no doubt employed by the Chinese, and their wages would remain within the village economy, there is also a number of additional, hidden, labor costs to farmers not included in the 28 per cent. Specifically, in some cases farmers did not know the cost of lorry transport to the mill which was allowed for in the price of *padi* they received.

¹² Even a poor farmer could obtain a buffalo by hire, with a discount for looking after it during the long months of the growing season.

of the capital-intensive, highly commercial double-crop rice economy of Kg. Asam Riang since 1971. The following analysis will try to show how certain households, because of their superior financial and landholding position in the village community, have been able to obtain a larger share of available employment opportunities than their less well-endowed colleagues. It will be apparent that not all types of employment are equally amenable to monopoly of any one group, because they vary in the degree of capitalization involved.

A. *Tillage*

Compared with former practice under the traditional single-cropping system, very few farmers nowadays are completely responsible for their own land preparation. On the contrary, nearly all engage contractors to carry out at least part of their tillage, whereas once they did the job themselves using their own or a rented buffalo. Tractors were used occasionally even in the 1960s, but became mandatory for all farmers in 1971 when the irrigation schedule restricted the time between crops to only six weeks instead of four months. The traditional buffalo ploughing took four to five days per relong (seventeen days per hectare) which was too slow, whereas tractor ploughing could be done in three to five hours per relong (eleven to seventeen hours per hectare), depending on the size of the tractor [21]. Other drawbacks were that buffalo tillage could not be begun before soil saturation, and that considerable effort had to be expended during the *padi* growing period in the collection of fodder and the care of the animals.

In view of all these drawbacks it is somewhat surprising that twelve of the thirty-one farm operators still used their own buffaloes in 1977-78 for final tillage and field leveling. They can continue some traditional practices because the present irrigation system is too rudimentary to enable adherence to the rigorous schedule originally envisaged. This enables the normal cash expenditure on tillage (M\$30-32 per relong or M\$102-109 per hectare for two rotations), to be halved, and reduces the amount of damage to the plough pan by the heavier four-wheeled tractors now most commonly used by contractors. Farmers can also use their buffaloes for a little contract ploughing (if less frequently than before), and for infield transportation of *padi* using a sled (*andur*) with runners or wheels. The decline in buffalo numbers has raised their value to about M\$1,000 a head for a mature female, still a considerable capital investment is worth guarding the trouble. Unlike tractors, buffaloes do not rapidly depreciate in value, and as they can be used for breeding they have a built-in allowance for replacement.

The possibilities for tractor-ownership are understandably less. The high cost of initial purchase and the necessity for constant expensive maintenance in which few farmers have skills [1, p. 48] deter from contract ploughing most unless they intend to use the machine extensively to earn cash. In Kg. Asam Riang, only three or four farmers presently own pedestrian tractors (two-wheeled) and these are used for contracting. These people appear to be fairly well-to-do farmers with sufficiently high credit ratings to be able to purchase machines on an installment basis. The two instances of tractor ownership among the thirty-

one surveyed farm households revealed not unusual histories. In the first case, the pedestrian tractor had been purchased for about M\$5,800 on an installment basis. When working properly, its owner had been able to make about M\$1,600 per season in net earnings from contracting. But after three years of constant heavy use, for which it had never been intended by the Japanese designers (Japanese farmers do not use their machines for contracting) it had become subject to mechanical breakdown, which halved previous earnings, leaving very little installment repayments of over and about M\$825 to be made each season. In the second case, where the pedestrian tractor was owned by a group of four households, the five-year old machine was no longer serviceable. To put it back into use, a repair bill of about M\$600 would have had to be met.

Only two villagers from Kg. Asam Riang have attended machinery operation and maintenance courses (*kursus jentera*) run by the Muda Agricultural Development Authority, and they are not from tractor-owning households. Some tractor owners employ local men as drivers, but very few Kg. Asam Riang men are engaged in this capacity.

The greatest part of the tillage in Kg. Asam Riang is done by Malay contractors, many of whom are businessmen rather than farmers although they live in villages. Of the thirty households who used contracts for all or part of their tillage during the 1977-78 season, eight employed contractors from Kg. Asam Riang itself; thirteen employed contractors from other villages in the same general area; and the remaining nine used Chinese contractors. In the 1960s, all contract ploughing was carried out by the Chinese. The present strength of Malay contractors in tillage is an encouraging sign that some restructuring of society has occurred in accordance with the Malaysian government's commitment to eliminate the identification of race with economic function [22, p. 7]. But in the Malay farm community itself, possibilities for contract tillage as an additional source of income are now restricted to a much smaller number of people than was the case when all tillage was done by less capital-intensive traditional methods. Notwithstanding the possibilities of earning income by buffalo ownership, as discussed above, the superior incomes to be gained through tractor ownership could conceivably contribute to a widening of income differentials. Much the same conclusions have been reached in studies of farm mechanization in other parts of Malaysia [16] [17].

B. *Transplanting*

Since transplanting is still done manually with very simple equipment (the forked stick or *kuku kambing* which costs only M\$2.50), in theory it should be possible for people from all strata in village society to participate in this activity. In fact participation depends on the availability of sufficient labor in the household, the size of the farm and the location of the constituent fields.

Transplanting demands a labor supply larger than that which can be provided by most farm households because it has to be completed in a short time in order to ensure the even growth of all plants in a field and to prevent losses from attack by pests and diseases. Furthermore a strict sexual division of labor de-

TABLE IX
LABOR MOBILIZATION IN TRANSPLANTING, MAIN SEASON 1977-78

Labor Mobilized from:	Number of Households	Percentage of Households	Amount of Land Operated (Relong)	Percentage of Land Operated	Average Area Transplanted (Relong)
Household only	4	13	9.5	7	2.4
<i>Derau</i>	12	39	73.0	38	6.0
<i>Upah</i>	11	35	80.6	42	7.3
<i>Derau+upah</i>	1	3	3.5	2	3.5
Household+ <i>upah</i>	3	10	24.3	13	8.0
Total	31	100	190.9	100	6.1

mands that the bulk of transplanting work be done by women. Ten women are needed to transplant one hectare of *padi* land in a six-hour morning. These women also uproot the seedlings from the nursery and bind them into bundles the previous afternoon. An additional four men or women do the heavier work of carrying the bundles of seedlings to the fields and distributing them to the women as they plant. Clearly the average household with just over one hectare of *padi* land and two or three working members is in no position to provide a labor force itself, especially a female labor force, and only the smallest of farms can be transplanted by using solely family labor (Table IX). Households can overcome this problem by resorting to labor exchange (*derau*) and/or the employment of wage labor (*upah*). In those cases that women are incapacitated by illness, pregnancy or the necessity to care for very young children, or that they are engaged full-time in other economic activities such as factory work or shop-keeping, the only possibility is *upah*.

A complicating factor in the mobilization of labor for transplanting is the dispersed nature of some farmers' fields. Where a parcel is very far from the house, say five kilometers or more, it can be awkward for the household labor force to divide its time effectively, both between close parcels and distant ones and between the demands of farming and the home. Women are already under considerable strain to meet their farming and domestic commitments during periods of peak labor demand, so that when the fields are both distant and of large size households are tempted to opt for the simple solution—*upah*—if they can afford to do so. The same applies to reaping. It is less true of activities like threshing and transporting harvested *padi*, as these are done by men, but even men can find the use of *upah* convenient when their farm is dispersed or when they have a full-time nonagricultural occupation. Table IX shows the methods by which thirty-one Kg. Asam Riang households mobilized labor for transplanting in 1977.

Derau used to be the most common method of mobilizing labor for transplanting in pre-Muda days [2, pp. 64-65] [4, pp. 87-88], but has now given way, in part, to *upah*. In Kg. Asam Rieng,¹³ *derau* may be described as a system of

¹³ Cf. Kampung Padang Lalang: see [24].

labor exchange in which each unit of labor taken to make up the required size of labor force must be repaid by an equivalent number of units as and when needed by each of the donors. The system works well if farms are not too large and if the transplanting period can be staggered, so that everybody's particular requirements can be met. Before the Muda scheme was implemented, transplanting used to take place over a two-month period, using *padi* varieties with different maturation periods. The more unified maturation periods of varieties now planted and the stricter scheduling of irrigation have reduced the scope for using *derau* especially in the case of large farms.¹⁴ Table IX shows that the average size of farms transplanted using *derau* was less than that of households opting for *upah*.

In the present situation, farmers take advantage of the scope for using *derau* because of the high cash costs of transplanting by *upah*. Wages for transplanting, as for other labor, have risen steeply since double-cropping was introduced: they are now M\$35 per relong (M\$122 per hectare) compared with M\$6-7 per relong (M\$21-24 per hectare) in 1967. *Derau* does not do away with cash costs entirely, as it is customary to provide good quality food to the participants. Recently, by mutual agreement, *derau* groups have eliminated, or reduced the scale of, this hospitality. This not only further reduces costs for everyone, but releases labor which would have been used for the purchase, preparation, and serving of food.

Some households prefer to have a less convivial and a more contractual labor relationship, claiming that under the *upah* system they get faster and better work because there are fewer excuses to talk and relax. *Upah* groups are paid by the area they transplant. The more the group transplants, the larger each member's share of the group's earnings (hence the name *syer* or share group). Share group participants work on each other's farms (the total cost of transplanting is reduced by the number of labor units contributed by the household of the farm concerned) and also undertakes outside work for nonmember households. In the latter case, the earnings are shared equally among all group members.

Membership of share groups is not limited only to those who need extra labor to carry out transplanting on their own farms. Landless and other households of dependent farm labor also participate, and they can earn extra shares by acquiring units of *derau* which have to be repaid, not on their own farm, but in the share group (this mixing of *derau* obligations with share contracts may be yet another reason for progressive reductions in the scale of *derau* hospitality).

In 1978 there were complaints in Kg. Asam Riang that share groups are becoming more exclusive in their membership, insofar as women from landless and very small-farm households are not being invited to join women from the larger landholding households. If this trend develops further, it will effectively mean that sharing will be contained within the more fortunate group of households who can reciprocate income earning opportunities in agricultural wage labor,

¹⁴ The scope for *derau* will be even further reduced with the improvement of the irrigation system now under way in Phase II of the Muda Scheme [26]. At present the time of arrival of water on individual fields varies so much (up to forty-two days) that operations can still be staggered over four to six weeks.

because their control of land gives them control over employment. Stoler [30] observed this situation very clearly in Kali-Loro, a village in Central Java. There, as in Kg. Asam Riang, it must be appreciated that the landholding women are not altogether culpable for their actions, as many are by no means well-off themselves, and this is one of the few ways they can still earn some cash to defray the high cost of production. A few can indeed afford to forego this extra income: only the decline of the village ethic stressing the need to pity the poor can explain their unwillingness to share remaining income earning opportunities.

Sooner or later even these will come under threat from the transplanting machine (which is still undergoing trials to evolve a type suitable for Muda conditions) or from the adoption of broadcasting, which has already been used in some southern areas of the Muda scheme with satisfactory results.¹⁵ If the practice of broadcasting spreads, it will further reduce the option for manual harvesting because of difficulties in moving around a field in which plants have been spaced at random.

C. Reaping and Threshing

Harvesting consists of two operations, reaping and threshing. If manual methods are used, the two operations are separate, whereas in mechanized methods they are carried out in the one operation.

As in transplanting, the traditional method of manual reaping demands very little in the way of equipment—only a small sickle-shaped harvesting knife with serrated blade (*pisau pengerat*) worth M\$1.50, which can be thrown away at the end of each season. The most expensive item for threshing is a wooden tub (*tong*) worth about M\$40. Into this a small ladder-like frame is fitted, against which the ears of *padi* are beaten to release the grains. A screen woven from pandanus or sewn together from polythene fertilizer bags deflects the *padi* grains back into the tub.

The alternative mechanized methods of reaping and threshing require a combine harvester. These can cost M\$148,000; even the down payment is minimum of M\$7,000. No villager in Kg. Asam Riang can secure anything like a loan of the size needed to purchase and operate a combine harvester,¹⁶ so it has been left to Chinese businessmen to provide the mechanized harvesting services. As far as could be ascertained in 1978, opportunities to earn money by brokerage—the organization of the work schedule for the Chinese contractors in return for a commission of about M\$2 for every relong (M\$7 per hectare) harvested by the machine—have not gone to any Kg. Asam Riang farmer.

The first occasion on which combine harvesters made an appearance on a large scale in Kg. Asam Riang was the 1977–78 main season, but even in that season they were used on 33 per cent of the area harvested by the thirty-one survey households. Cash earned from reaping wages by members of these house-

¹⁵ J. C. Scott, personal communication (1979).

¹⁶ A few very wealthy Malay landowners in the Pendang area about 20 kilometers to the south-east of Kampung Asam Riang are known to have obtained loans to purchase combine harvesters.

TABLE X
METHODS OF HARVESTING, MAIN SEASON 1977-78

Method	Number of Households	Percentage of Households	Amount of Land Operated (Relong)	Percentage of Land Operated	Average Area Harvested (Relong)
Manual only	20	65	111.9	59	5.6
Manual+mechanized	6	19	15.3 23.4	8 12	6.5
Mechanized only	5	16	40.3	21	8.1
Total	31	100	190.9	100	6.1

holds declined by 50 per cent between the 1976-77 and 1977-78 main seasons. The corresponding decrease in threshing wages was 34 per cent. Undoubtedly further losses will be sustained as the area harvested by machine increases. Table X summarizes the methods of harvesting employed in Kg. Asam Riang in the 1977-78 main season.

As in transplanting, the demand for labor during the harvest is greater than the individual household can meet. But there is an even greater concentration of labor demand for harvesting than for transplanting, because unharvested, ripe *padi* drops seeds and this causes losses. To harvest one hectare manually in the period between seven o'clock and noon requires thirty-five women and to thresh the same area requires fourteen men. The combine harvester can do the job in a few hours, with only a driver and three or four men to handle the 80 kilogram sacks as they are filled, secured, and taken to the bunds.

There is some difference in the cost of manual and mechanized harvesting, even when increased losses of grain and deductions at the mill for moisture content are taken into account in the case of the latter. The cost of manual reaping is about M\$35 per relong (M\$122 per hectare), and of manual threshing M\$30 per relong (M\$105 per hectare) or M\$2 per sack of *padi* threshed.¹⁷ Some food and drinks may also be provided as an inducement to labor but this is not a standard practice. The combined cost of reaping and threshing using the mechanized method is about M\$60 per relong (M\$175 per hectare), including approximately M\$10 per relong for securing the filled sacks and transporting them to the bunds. No food and drinks are provided. If we include equivalent manual costs of infield transport (approximately M\$11 per relong), then there is a difference of at least M\$16 per relong in favor of the mechanized option. This difference is sufficient to influence many farmers to use combine harvesters.

There are also advantages of using combine harvesters that are not cost related. They include speed of operations, which gives farmers a chance to rest before the start of the next season's operations and reduces the risk of spoiling by rain, and the convenience of not having to find laborers, which had been a constant worry in the past. Nor is there the need to provide refreshments to the workers. For large farmers especially, who have the most serious labor shortage,

¹⁷ Cf. M\$12 per relong or M\$42 per hectare for each operation in 1967.

TABLE XI
LABOR MOBILIZATION IN MANUAL REAPING, MAIN SEASON 1977-78

Labor Mobilized from:	Number of Households	Percentage of Households	Amount of Land Operated* (Relong)	Percentage of Land Operated*	Average Area Reaped* (Relong)
Household only	4	15	6.5	5	1.6
<i>Derau</i>	1	4	1.3	1	1.2
<i>Upah</i>	10	38	56.6	45	5.7
Household+ <i>upah</i>	11	43	62.8	49	5.7
Total non-mechanized	26	100	127.2	100	4.9

* Does not include area harvested by machine on the same farm.

TABLE XII
LABOR MOBILIZATION IN MANUAL THRESHING, MAIN SEASON 1977-78

Labor Mobilized from:	Number of Households	Percentage of Households	Amount of Land Operated* (Relong)	Percentage of Land Operated*	Average Area Reaped* (Relong)
Household only	5	19	7.8	6	1.6
<i>Upah</i>	13	50	76.9	60	5.9
Household+ <i>upah</i>	8	31	42.5	34	5.3
Total non-mechanized	26	100	127.2	100	4.9

* Does not include area harvested by machine on the same farm.

and whose field sizes can accommodate the machines, these advantages outweigh most disadvantages, and they have been most eager to mechanize harvesting completely (Table X). Disadvantages include the loss of *padi* through dropping and insufficient threshing [12, p. 50], the inability of the machine to harvest only ripe *padi* where a field was not ripened evenly, and the need to compensate neighbors whose *padi* has been spoiled in order to gain access to the field to be harvested.¹⁸ The greatest disadvantage of all, of course, is the reduction in employment. It is paradoxical that a few small farmers who themselves depend on this employment also approve and use the new technique, in Kg. Asam Riang as in other villages also [12, p. 50]. Farmers who use a combination of methods are those who have fields in distant locations, or a parcel smaller than the main section of the farm which cannot accommodate the combine harvester.

As with transplanting, manual harvesting is completed by mobilizing labor from a variety of sources (see Tables XI and XII) which are related to availability of family labor, farm size and location of field. Unlike in transplanting (compare Table IX) *derau* is scarcely used. This was the case even in 1967. Villages explained that the more variable field working conditions during harvest meant that the labor requirement for each participant could not be easily reciprocated. A second reason for the insignificant role of *derau* for harvesting is that

¹⁸ The cost of compensation is, however, met by the contractor. Of course, this is ultimately passed on to the farmer in setting the contracting charges.

harvesting is less staggered than transplanting. Thirdly, the need to conserve cash is less pressing with the immediate prospect of the sale of the crop.

Share groups, with or without the participation of household members, therefore do most of the manual reaping. As with transplanting share groups, the landholding women are exercising the increasing control over participation. If anything, it may be an even stricter control for reaping share groups, since manual transplanting has not had to compete with mechanization and the labor market is therefore less competitive at that time.

In threshing, there have been changes in the basis of payment in favor of farmers and younger laborers. The traditional basis is a fixed sum of money for a certain area threshed (now M\$30 per relong or M\$105 per hectare). This takes on account of variation in yield, nor does it take (differences in the contribution of the threshers) into consideration. The other basis of payment is output, assessed at the rate of M\$2 per sack threshed. The output basis reduces labor costs when yields are lower than normal, and it can also be used for reckoning individual rewards according to individual output. This in turn provides a stimulus to competition between the threshers, and results in a speedier completion of the job. A strong man can thresh six to eight sacks of *padi* a day, thus the younger and stronger men have been able to compete more effectively in the market for threshing labor. Only two cases of area-based payment for threshing were recorded among the thirty-one households for 1977-78. The lower than average yields (the average yield is fifteen sacks of *padi* per relong) because of the drought may have had some effect on this result.

D. *Transporting*

The lack of a good network of access roads and paved footpaths connecting Kg. Asam Riang, its fields with one another and the regional economy makes transport of the harvested *padi* both costly and time-consuming, the more so when the fields are distant from either the house or a road passable of lorries in all weathers, or both. Once the harvested *padi* has been put into sacks at the place where it is threshed, farmers are anxious to remove it without delay. Some goes to the house where it can be safely stored in a rice-barn (*jelapang*) until it is needed for consumption or the payment of the religious tax (*zakat*); the surplus is sold to rice mills and their agents. The marketable *padi* is taken to the roadside from where it can be collected in lorries to be taken to rice mills or their agents' depots. Some small consignments will be taken to the selling point by the villagers themselves.

Infield transportation is the most difficult phase in the whole transportation process, since the field is often still wet, especially during the off-season harvest. Traditionally the buffalo-sled (*andur*) and the bicycle have been used for infield transportation, but they are slow as they can carry only one or two sacks of *padi* at a time. Three enterprising Kg. Asam Riang farmers have improved their *andur* by fitting rubber wheels and if the field is not too wet this enables up to eight sacks to be carried instead of only two. This improved *andur* can be made for about M\$120.

Recently the combine harvester has taken over some infield transportation and it is not only faster but can only carry *padi* directly to a dry place. As already mentioned, this is a service included in the cost of mechanized harvesting. It has, however, further reduced employment opportunities.¹⁹

In some parts of Kg. Asam Riang, small lorries can enter to collect the *padi* sacks directly from the bunds. The laterite surfacing of canal banks has greatly reduced the remoteness of some farmers' fields from a modern transport network. In the other parts, bicycles still have to be used, but when paths are wide and dry enough, motor cycles can also do the job of transporting *padi* from the bund to the house or roadside. All households have bicycles and the majority have motorcycles, purchased second-hand or on an installment basis if they cannot afford the price of a new machine (M\$1,600). If the motorcycles are used to transport *padi*, more trips can be made than with a bicycle, the work is done faster and more money can be earned. Really poor households lacking a motorcycle or buffalo and *andur* are at a distinct disadvantage if this is the only work available.

After the *padi* has been delivered to the roadside, it can be collected by lorries to be taken to the rice mills. The lorries are operated by the millers or by private carriers who have a working arrangement with the millers. The Chinese have a monopoly over both milling and transport in this area, perhaps because it is so close to Alor Setar where most Chinese business is based. An attempt to give the rural Malays a stake in the transport business was made by establishing a lorry hire facility at the local Farmers' Association. So far it has only been able to run at a loss, because of the competition from established Chinese firms, and the satisfaction of farmers with the prompt service they provide [5, p. 9].

The transportation of *padi* is thus a very complicated matter involving the use of many different transport modes. The cost varies not so much according to modes but to the distance the *padi* is carried. For *padi* transported to the house, the cost per sack ranged from M\$0.40 to M\$2.00 in the 1977-78 main season. For *padi* transported to the road from the field and to the mill from the road, the costs were of a similar range for each leg. The fewer the modes and the shorter the distances involved, the smaller will be the total cost of the labor used in transporting.

Since these costs can be considerable, many households try to reduce the bill by doing part of the work themselves. The part most often done is the field-to-house sector, as shown in Table XIII. The field-to-road sector is normally done by *upah*. All transporting is done by *upah* if there is no man available in the household, or if the men are otherwise occupied. Unless the farm transportation network is upgraded, there should continue to be scope for villagers to continue field-to-house and field-to-road transportation for themselves or for other households.

¹⁹ Between the 1976-77 and 1977-78 main seasons wages earned by members of the thirty-one households from transporting *padi* declined by 46 per cent. Only part of this decline is attributable to the effects of a drought on the volume of *padi* sold.

TABLE XIII
LABOR MOBILIZATION IN TRANSPORTING, MAIN SEASON 1977-78

Labor Mobilized from:	Destination			
	House		Road or Mill	
	Number of Households	Percentage of Households	Number of Households	Percentage of Households
Household only	17	55	2	6
<i>Upah</i>	12	39	22	71
Household + <i>upah</i>	2	6	6	19
Undetermined*	—	—	1	4
Total	31	100	31	100

Note: Does not include infield transportation by combine harvester.

* Awaiting sale of part of crop at time of interview.

SUMMARY AND CONCLUSION

This paper departs from the usual employer-centered approach to the problem of employment in the Muda Irrigation Scheme in that it focusses on farmers as both employers and employees of agricultural wage labor. The employer-centered approach tends to differentiate farm-operating households from households who do not have *padi* farms and who depend primarily on agricultural wage labor. In fact, many farmers in Kg. Asam Riang are both employers and employees, so that the distinction between the two groups has little analytic value for assessing the impact of labor-saving practices on employment and welfare.

One way of looking more realistically at labor-saving practices from both employer and employee viewpoints is to compare expenditure on, with income from, wage labor in the one group of farm households. If expenditure greatly exceeds income, this suggests that there is dependence on a small group of people to carry out the labor-intensive operations. It is argued, in Kg. Asam Riang's case, that increasing capitalization of agriculture has limited the number of people in the village who can carry out their own farm operations and who can also undertake contract work for others. This is especially the case in tillage and harvesting. It would further appear that the severity of employment loss in harvesting has in turn prompted the imposition of more restrictive employment practices in those tasks which are still done by hand. Thus the income transfers, that used to take place as labor payments within the village economy, are now going outside it; and within the village economy, the transfers, that used to be made to a large segment of the population, are going to a smaller one. This could lead to a widening of income differentials.

One other problem of the new capital-intensive techniques not so far touched on but relevant to employment problems is that they permit larger areas of *padi* land to be farmed by the one household. This encourages landlords to repossess their land from tenants, and the more enterprising owner-farmers to try to increase the size of their holdings by renting additional parcels [1, p. 44]. Either

way, the pure-tenant group will be under pressure to relinquish their land and so increase the ranks of those dependent on farm labor. An additional possibility to compound the problem will be the prolonging of active involvement in *padi* farming by the elderly, with the result that their children who would once have become tenants of the parents while still in their working prime, will have to remain as laborers until they are well into middle age.

The current program of agricultural modernization in the Muda Scheme does not seem to be altogether consonant with increased distributive justice or so it would appear in Kg. Asam Riang. If both are to be obtained, the Malaysian Government will have to step up its program for providing additional non-agricultural employment opportunities. In the meantime, only a brake on mechanization can arrest the deterioration in the position of the poor laborers and farmers.

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