

## FARM AND OFF-FARM EMPLOYMENT IN RURAL THAILAND

Pascale PHELINAS

Thailand is still an agricultural country. The share of agricultural employment is high (57% of the labor force) when compared to the 12.5% share of agriculture in GDP. A major reason why agriculture has been able to retain most of the rural labor force has been the availability of new land. With growing population pressure, the rural population has migrated to many remote rural areas to open new land for cultivation. However, this pattern of growth can no longer continue because Thailand has now reached its land frontier. The closing of the land frontier will probably lead to a substantial decline in the share of agricultural employment since additional employment opportunities in agriculture are thought to be extremely limited. Nevertheless, although Thailand exhibits evidence of rapid growth in the non-agricultural sectors which has increased the non-farm demand for labor, the agricultural sector will, in absolute terms, remain the most important contributor to employment in the foreseeable future.

There are three main sources of agricultural labor in Thailand: family labor, exchange labor from other households, and hired labor. The predominant component of labor supply is that of work on the family farm, but a very important feature of the agricultural sector in Thailand is that almost all cultivator households, large and small, participate actively in the labor market as either buyers or sellers of labor services. Hired labor is generally derived from all households who tend to supplement their income through wage-earnings. The movement of rural laborers from agricultural work on their own land to wage-earning employment in the agricultural sector has increased very recently. There is a large and controversial literature on the origins of the creation of this agricultural laborer class, authors suggesting explanations in terms of population pressure on limited land, or in terms of negative effects of technological change on the social differentiation of the peasantry. In Thailand, this has occurred mainly since the closing of the land frontier, but the proportion of the rural population relying wholly on agricultural wage labor is still relatively small (10% of the agricultural labor force). Nevertheless, the ability of agriculture to create demand for agricultural labor is of importance since the incomes of these families depend to a considerable extent on agricultural wage levels and employment opportunities.

The majority of Thai people live in the rural areas with on farm activities as their main occupation. However, a rising proportion of rural households depends partly upon wage employment or on occupations other than operating farms as owners or tenants.

Multiple job-holding, temporary migrations of labor, and seasonal variations in the labor force participation are all known to be common in Thailand. This trend could reflect either or both of two contrary and opposing processes at work, usually described as "push" and "pull" factors. The most important "push" factor is the limited capacity the agricultural sector has to absorb labor due to rapid population growth on fixed land resources, which is forcing people to rely on wage employment to earn their life. In that case, seasonal involvement of rural households in off-farm activities may be one important way in which rural labor adjusts to the decline in agriculture labor demand during the dry season. The "pull" factors are related to the availability of attractive off-farm opportunities. It is argued that, in Thailand, the development of off-farm activities has been closely related to agricultural development and is not necessarily a sign of rural distress. The spread of new technologies in agriculture, even limited, have tended to increase the demand for agricultural casual labor, and the strong agricultural growth with the corresponding rising farm incomes have created a demand for nonagricultural rural enterprises.

This paper attempts to summarize the available evidence on agricultural labor absorption and on off-farm labor patterns based on data collected in the rice farming sector<sup>1</sup>. First, there is an examination of the factors responsible for the variations that were observed in family labor use as well as the potential that the rice farming sector carried in absorbing the growing labor force. Section two is primarily an analysis of the farm-level factors acting upon a greater use of hired labor. This is followed by a discussion on the main determinants of peasant household involvement in off-farm activities.

## **Family Labor Utilization Rates**

### The Household Labor Force

The field survey used a broad definition of family labor, so that every family member who participate in any way in the farm enterprise is included. According to the rules of the Labor Force Surveys in Thailand, young children under 11 years old are excluded. The data refer not only to the number of bodies, but also to the time spent on every activity (roughly measured by the number of days), and allow comparisons of the intensity of family labor use between households.

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1 - These data are based on the field survey conducted in 1991. A random sample of 300 rice farm households was constituted, divided into approximately equal sized sub-samples of 100 farm household in each of the selected provinces (Suphan Buri, Pichit, Roi Et).

Table 1. The Head of the Household

	Suphan Buri	Pitchit	Roi Et	All Provinces	Percent
Sex					
Male	84	86	90	260	86.4
Female	16	12	13	41	13.6
Total	100	98	103	301	---
Average Age	54	51	50	52	---
Average Number of Children	3.6	4	4.6	4.1	---
Education Level					
Incomplete or None	22	28	18	68	22.6
Lower Elementary	71	68	75	214	71.1
Upper Elementary	3	1	10	14	4.7
Secondary	4	1	---	5	1.7
Total	100	98	103	301	---

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Table 2. Composition of the Household and Family Labor

	Suphan Buri	Pitchit	Roi Et	All Provinces	Percent
Average Family Size	4.4	4.5	4.8	4.6	---
Family Composition					
Adult Male	175	171	192	538	39
Adult Female	191	190	199	580	42
Children	77	79	106	262	19
Total	443	506	497	1446	104.8
Average Number of Workers	2.6	2.8	2.8	2.7	---
Sex					
Male	138	144	136	414	49.7
Female	135	132	150	416	50.3
Total	271	275	286	827	100
Participation Rates					
Male	78.9	84.2	70.8	77	---
Female	70.7	69.5	75.4	71.7	---
Total	74	76.2	73.1	74	---

Source: CUSRI-ORSTOM Project, Rice Farms Survey

More than 85% of the heads of households are male and their ages range from 24 to 79 with a mean of 52 years (see Table 1). In general, the heads have achieved at least four years of education. This is due to the compulsory primary education decree in 1921 which required the children to attend school at least through the fourth grade. Higher grade schooling is very unusual and 23% of the heads did not attend school at all or left it before the end of the first four years.

Among the several factors that determine the use of family labor, the most obvious one is its availability. The relevant parameters in this case are family size, age and sex composition of the household labor force. The composition of the households is given in Table 2. The 301 households in this study totalled 1,380 members with the household size ranging from 1 to 10. On average, there are 4.6 members per household. Although the variation in farm size is high, the average number of family members varies to a much smaller extent from 4.2 for holdings less than 15 rai to 5.4 for holdings greater than 101 rai.

The labor force participation rates are defined as the percentage of the total household members 11 years and over engaged in the labor force. These participation rates are high (nearly 74%) compared with those of other South East Asian countries, especially for women. The relative contribution of men in the labor force is higher than women except in Roi Et: the rates for males and females are 78.9 and 70.7 for Suphan Buri, 84.2 and 69.5 for Pitchit, and 70.8 and 75.4 for Roi Et.

#### Scale of Production and Labor Absorption

##### *Farm Size and Labor Absorption*

Farm labor use in the family varies according to farm size and to a certain extent to the family composition. There is some variation in the labor force participation rates of family members, generally increasing with farm size, but the variation is quite small: the average number of family workers range from 2.3 for the smallest holdings to 3.3 for the largest ones and the average number of person-days from 452 to 711. This means that the number of family workers per farm increases much less than farm sizes, and hence produces the pattern of declining labor input per rai. The data in Table 3 clearly show family labor input per rai declining from 60 person-days to 6.6 person-days as holding size increases, so that the larger the farm the less labor intensive is its mode of production. This holds true for the whole sample and within each province.

The view that the very high per unit of land family labor figures for the smallest farms might be a statistical illusion must be discussed here. Some authors (Booth and Sundrum 1985) have argued that some family workers enumerated as working on the family farm would, in fact spend little of their time on the farm and a considerable amount in off-farm employment. They would be at best part-time workers participating in the family farm enterprise only at times of peak labor demand. We will examine later the 'off-farm' argument in more detail, but the data which measure actual labor input into the farm enterprise, in terms of labor-days, suggest that most family workers of small holdings do, in fact, spend more time on the family farm than workers of large holdings.

Table 3. Family Size and Family Labor by Landholding Size

	< 15 Rai	16 - 30 Rai	31 - 50 Rai	51 - 100 Rai	> 101 Rai	Total	Sample Size
Family Members	4.2	4.5	5	5.2	5.4	4.6	301
Family Workers	2.3	2.8	3	3.4	3.3	2.7	301
Average Person-Days							
Suphan Buri	374	606	598	960	300	537	100
Pitchit	432	561	603	753	720	596	98
Roi Et	500	634	701	---	1080	573	103
All Provinces	452	600	629	780	711	569	301
Average Person-Days per Rai							
Suphan Buri	40.9	29.9	16.7	16.1	3.0	29.8	100
Pitchit	46	29.3	17.5	14.5	6.6	24.9	98
Roi Et	74.4	29.2	19	---	10.3	53.4	103
All Provinces	59.9	29.5	17.7	14.7	6.6	36.3	301

Source: CUSRI-ORSTOM Project, Rice Farms Survey

#### *Land Quality, Cropping Intensity*

One obvious explanation of the higher per rai labor inputs into smaller holdings is that these holdings consist of better quality land, which is more profitable to cultivate intensively. The productive quality of land is difficult to assess both theoretically and empirically since there is a wide range of hard-to-measure criteria which can define it. Moreover, exogenous and endogenous determinants of soil fertility are difficult to separate. Improvements in the form of irrigation and fertilizer application can, for instance, affect the fertility of soil. Lack of appropriate data in our survey prevents any conclusion of the land quality differential among farm sizes.

Nevertheless, irrigation is an interesting proxy for the productive potential of land. Irrigation is usually considered as a precondition for multiple cropping, regarded as the most effective way of raising labor inputs per unit of land. The tendency for irrigated land to be concentrated in the smaller holdings is supported by the data in Table 4. The smallest holdings in Suphan Buri are almost fully irrigated while the largest ones have only 50% of the land irrigated, the corresponding figures for Pitchit are 74% and 65% respectively.

As availability of irrigation is a prime determinant of differences in cropping intensities, higher intensities will result with more irrigation. Cropping intensity is the number of times the same piece of land is cultivated during the year. If water is not available for the dry season, the land is left uncultivated, resulting in a cropping intensity of 100. The cropping intensity of the rice area shows a tendency to decline with

larger farm sizes once the size of 30 rai is reached. For farms of less than 30 rai, the intensity of rice cropping is lower despite higher percentages of irrigated area (Table 5).

Table 4. Percentage of Irrigated Area by Size and by Province

	< 15 Rai	16 - 30 Rai	31 - 50 Rai	51 - 100 Rai	> 101 Rai	All Sizes
Suphan Buri	99.2	96.7	98.4	86.3	50	97.1
Pitchit	74.2	72.6	69.1	52.6	65.4	67.4
Roi Et	0	0	5	---	0	1
All Provinces	40.8	66	60.1	57	53.8	54.4

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Table 5. Intensity of Rice Cropping by Size and by Province

	< 15 Rai	16 - 30 Rai	31 - 50 Rai	51 - 100 Rai	> 101 Rai	All Sizes
Suphan Buri	156	171	152	150	100	160
Pitchit	123	130	114	106	104	117
Roi Et	100	100	100	100	100	100
All Provinces	127	148	130	117	103	133

Source. Field Survey

However, even without being well irrigated, it is possible that labor input into small farms may be higher because small operators adopt a more labor intensive cropping pattern. This pattern is likely to take at least two forms: more focus on products using little land and much labor, and increasing intensity of cultivation of these products. It has already been noted that the cropping intensity of rice, one of the most labor consuming crops in Thailand, is closely related to the availability of irrigation. The percentage of total land operated under rice cultivation was then calculated for each size class. The results appear in Table 6. In areas where there are many opportunities in the choice of what to grow, the percentage of rice land is higher for small holdings than for large ones. In Roi Et, where these opportunities are almost non-existent, all the land of all holding sizes is cultivated with rice.

Table 6. Percentage of Rice Cropped Area by Size and by Province

	< 15 Rai	16 - 30 Rai	31 - 50 Rai	51 - 100 Rai	> 101 Rai	All Sizes
Suphan Buri	98.1	92.4	92.6	86.3	50	93.6
Pitchit	94.1	88.3	90.3	86.1	74	88.8
Roi Et	100	99.9	99.9	---	100	100
All Provinces	98.5	93.1	93.7	86.1	74.3	94.2

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Nevertheless, to the extent that both the percentage of rice cropped area and irrigated area begins to decline significantly in holdings over 50 or 100 rai, these factors cannot explain the sharp decline in numbers of workers per rai observed in the 16-30 rai

and 31-50 rai size holdings. Moreover, differences in cropping patterns and cropping intensities simply pose the problem in another way in the sense that the central question (why do the smaller farmers "choose" to apply more labor in these ways than the large cultivators) still has no answer.

*Tenancy, Dependency Ratio and the "Distress Factor"*

It has often been argued that farmers apply themselves and other inputs qualitatively better on their own land than on land leased in (Berry and Cline 1979). The evidence from the data has shown that the proportion of tenants tends to fall as holding size increases. Moreover, the inverse relationship between farm size and labor input holds true for each class of farmers (Table 7). Part-owner/part renter farmers have usually the lowest labor input while pure owner farmers have the highest one. It is thus by no means obvious that tenant farmers apply labor less intensively than owner-cultivators.

Table 7. Family Labor Input per Rai by Size and by Tenure

	< 15 Rai	16 - 30 Rai	31 - 50 Rai	51 - 100 Rai	> 101 Rai	All Sizes
Landlord-Owner	63.7	28.9	16.6	15.7	---	33.2
Owner	62.8	33.1	18.4	14.7	5.4	41.8
Owner-Tenant	40.5	22.6	19.9	14.5	8.2	22.8
Tenant	56.3	28.6	8.9	---	---	35.7

Source: CUSRI-ORSTOM Project, Rice Farms Survey

An interesting argument expressed in terms of incentive to work is related to the concept of the dependency ratio. The dependency ratio is given by the number of household members per adult equivalent family worker. For a given number of farm workers, the need to produce more per worker would increase as the number of household members that each worker must feed rises. Thus, a household's rice labor input must be positively related to its dependency ratio. In fact, the opposite relationship was observed. As the dependency ratio increases the labor input per rai tends to decrease for each size group. It is not clear why the supply of farm labor is negatively associated with the dependency ratio, but it seems that family workers burdened with a large number of dependents work less intensively on their own farms and spend more time in off-farm activities (cf. infra).

Among the factors that drive a small farmer to more intensive effort, the most important one may be his need for survival. There is a certain basic minimum of consumption that a poor peasant family has to have without which it cannot survive. Such a poor peasant family, depending on a small piece of land (and having no alternative sources of employment and income) is pushed by distress to apply labor more

intensively in order to secure supplemental output for survival. Some authors have argued that it is precisely intensive use of labor which has permitted the small farms to survive in the face of land and capital constraints (Berry and Cline 1979). In other words, it would be somewhat misleading to treat the phenomenon as one of scale: this phenomenon would be restricted to the small farm size groups which are subject to distress conditions.

Table 8. Family Labor Input per Rai by Size and by Dependency Ratio

	< 15 Rai	16 - 30 Rai	31 - 50 Rai	51 - 100 Rai	> 101 Rai	All Sizes
0	48.2	29.1	20.6	17.5	5.5	26.9
> 0 - 0.99	89.5	43.3	22.7	15.3	10.3	49.6
1 - 1.99	72.9	29.6	20.1	16.5	9.5	43.3
2 - 3.99	66.5	28.1	16.3	8.1	7.5	41.2
> 4	51.3	23.3	11.9	12	---	27.3

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Apart from the fact that distress conditions are hard to assess, there is the objection that a strong division between farms supposed to face distress conditions (small size, renting land, burdened with high dependency ratios) and the other ones was not observed. The inverse relationship between farm size and labor input appears in the data as a law that holds for all values of farm size.

### *The Market Imperfections*

To the extent that different factor prices imply different factor combinations, imperfections in land, labor and capital markets have often been put forward to explain why a larger family labor input is associated with smaller farms. That factor markets are imperfect is controversial because it asserts that small and large farmers face different input prices and the proof of such an assertion is difficult.

Since Lewis's article on surplus labor, a considerable literature has been generated on the question of a dual labor market in developing countries. Applied to the agricultural sector, the dual labor market arises from the alleged existence of two sectors, the "modern sector" hiring workers and maximizing profits while the "traditional sector" uses mainly family labor and maximize utility in a trade-off between output and leisure. To the farmer hiring in labor, the wage worker is a variable factor to be used up to the point where profit is maximized. To the small farmer, family labor is a fixed factor to be used to the point where its marginal productivity equals zero. Such a dualism lead to different shadow prices for labor to small "traditional" farmers who use mainly family labor and the large "modern" farmers who rely more on hired labor.

Family labor is valued at a lower implicit wage than that prevailing in the labor market, resulting in a more intensive application of labor on small farms.

The survey data do not appear to support the assumption that agriculture in Thailand is dualistic, but rather indicate substantial purchase and sale of labor by all farms regardless of the size. The main criticism here of the cheap family labor argument for the more intensive use of labor on the small farm in Thailand is the fact that small farms themselves hire labor and even derive income from employment of family members in other occupations. Given that 60% of small farms choose to operate their holdings with a mixture of family and hired labor, for the cheap labor argument still to hold it would have to be demonstrated that these farms value family labor at a lower price than hired labor.

Thus, the usual dichotomy of households by objective function (small farm households maximizing utility, large owners maximizing profits and using only hired labor) would appear to be not only counterfactual but less useful than distinguishing large and small farms according to whether they are net importers or exporters of labor services. The small farm household is by definition a net exporter of labor services while the large one is an importer of labor.

If the effective prices of land and capital are higher for small farms, they are likely to lead to higher labor/land ratios on small farms. The price of land may be higher for small farmers for two reasons. First small farmers usually buy smaller plots of land than larger farmers but small plots usually carry higher prices per rai than do purchases of large tracts of land (Phelinas 1993). Second, if land purchase involves borrowing, and because large operators have better credit ratings than small farmers, the conditions of credit will be more favorable for larger farmers, making the real price of land lower for them. However, this second argument is quite weak for the rice farmers sampled since most land purchases were financed by their own savings.

As most purchases of agricultural equipment are expected to be financed through the borrowing of funds, the price of capital is partly fixed by the interest rate charged by lenders. The survey data revealed that small holdings have limited access to any kind of credit and a high occurrence of loans from informal lenders while large farmers disproportionately benefit from institutional credit. Moreover, non-institutional lenders charge higher interest rates, give smaller loan amounts and for shorter periods of time than banks and cooperatives. The small farms lose their competitive advantage vis-a-vis larger farms, which will have better access to credit and can thus acquire the new inputs and agricultural machinery more easily. This in turn tends to encourage the substitution of capital equipment for labor on large farms.

## Technological Progress and Family Labor Use

### *Impact of Technical Change on Social Differentiation*

Among the most controversial issues with regard to technological change is its potential impact on the social differentiation of the peasantry. A major explanation of the emergence of agricultural laborers has been linked to the spread of new technologies. Since larger farmers would be better able to adopt newer and more efficient technologies than smaller farmers, the presence of a skewed distribution of holding sizes poses the danger of inequitable distribution of the gains from increased agricultural productivity. Small farmers, unable to compete against large farmers, would become part of a growing "rural proletariat" who find work on the farms of the successful large farmers. There are, thus, many who argue that technical progress may further exacerbate an already precarious situation for small farmers.

The argument partly holds true for Thailand in the sense that larger farmers are more likely to own farm equipment than farmers with small holdings. Because larger farms offer more collateral, they can more easily borrow to invest in new inputs and machinery and thus adopt new technologies faster than small farmers. There is a significant inverse relationship between the landholding size and the ownership of agricultural equipment: for example 86% of farms operating 100 rai and more have at least one power tiller and 71% have at least one water pump while these are owned, respectively, by 27% and 20% of farms operating less than 15 rai. Conversely, the use of intermediate inputs (fertilizer, herbicide, pesticides) is more neutral in its distribution inequality: in practice many of these inputs have been acquired disproportionately by the relatively smaller farmers.

Anyway, use of machinery does not necessarily require ownership. The data for machinery rentals tend to suggest that rental markets for agricultural equipment have strongly developed, especially for threshing equipment. Machine services are being made available on a contract basis to a wide range of both small and large farm units. Nearly 28% of rice farmers are using threshers whereas 2% of them own these machines, 6% are renting harvesters but none of them own one. The ownership of tractors is more widespread (58% of farmers) so that the proportion of farmers using tractors (63%) is not very different. Moreover, Thailand is a country with a relatively low incidence of agricultural laborers: 10% of the agricultural labor force is reported as wage workers in the Labor Force Surveys.

### *Production Technique and Family Labor Use*

The process of intensifying labor use in agriculture is greatly influenced by technological progress. Two types of technological factors can be distinguished: labor-using factors such as irrigation, higher yielding varieties, application of fertilizer, and improved cultivation practices; and labor-saving factors, consisting mainly of mechanization. The land-augmenting capital (irrigation) has a significant effect on the ability of the land to absorb larger amounts of labor. Hydrological technology enhances labor absorptive capacity by increasing cropping intensity and land under cultivation. Labor use will increase according to the increase in quantity to be harvested and threshed. Likewise, bio-chemical technology demands more careful water management and weeding and the resultant increase in output requires more labor in harvesting and post-harvesting operations. Conversely, the adoption of more efficient tools and equipment is said to lower substantially the need for labor. Mechanization in plowing operations, as well as in harvesting and post-harvest operations, should definitely reduce the need for labor. However, it is rather difficult to assess the contribution of farm machinery alone to employment because mechanization is often adopted in conjunction with the introduction of other inputs.

Table 9. Definition of Production Techniques

Number of Crops	Planting Technique	Use of Fertilizer	Mechanization of Ploughing	Mechanization of Harvesting	Production Technique	Sample Size
One	Broadcast	Yes	No	No	(1)	3
One	Broadcast	No	No	No	(2)	6
One	Broadcast	No	Yes	No	(3)	11
One	Broadcast	Yes	Yes	No	(4)	8
One	Broadcast	Yes	Yes	Yes	(5)	21
One	Broadcast	No	Yes	Yes	(6)	9
One	Transplant	Yes	No	No	(7)	29
One	Transplant	No	No	No	(8)	60
One	Transplant	No	Yes	No	(9)	29
One	Transplant	No	Yes	Yes	(10)	10
Two	Broadcast	Yes	Yes or No	No	(11)	34
Two	Broadcast	No	Yes	No	(12)	14
Two	Broadcast	Yes	Yes	Yes	(13)	35
Two	Broadcast	No	Yes	Yes	(14)	7
Two	Transp/Broad	No	Yes	No	(15)	6

In order to assess the extent to which different types of technological packages affect the family labor absorption meaningful production techniques were defined. Five criteria were considered because of their significant effect on labor absorption: the number of crops per year (as a proxy for irrigation), the use of fertilizer, the

mechanization of land preparation, the mechanization of harvesting, and the mechanization of post-harvest operations. This resulted in fifteen production techniques characterized by the different combinations of the criteria as shown in Table 9.

Table 10. Average Labor Input per Rai for Different Production Techniques

	One Crop/ Broadcast	One Crop/ Transplant	Two Crops/ Broadcast	Two Crops/ Transp/Broad
No Fertilizer/Mechanization	10.4	12	22.9	---
	(6)	(10)	(14)	
Fertilizer/Mechanization	16.5	---	29.8	---
	(5)		(13)	
No Fertilizer/Partial Mechanization	23.4	29.4	34.1	31.3
	(3)	(9)	(12)	(15)
Fertilizer/Partial Mechanization	29.2	---	34.4	---
	(4)		(11)	
No Fertilizer/No Mechanization	33.7	37.1	---	---
	(2)	(8)		
Fertilizer/No Mechanization	42.1	90.5	---	---
	(1)	(7)		

Source: CUSRI-ORSTOM Project, Rice Farms Survey

The family labor input associated with each production technique has been recorded in Table 10. The production techniques have been organized so that the intensity of labor use decreases from the upper left of the table to the lower right. The powerful impact of mechanization on labor inputs per rai is indisputable. Without machinery, harvesting is very labor-intensive. The activities in which the reduction of labor use are likely to occur are threshing and land preparation. The labor inputs per rai are dramatically cut as the level of mechanization increases whatever the number of crops and the planting techniques. Non-mechanized rainfed and irrigated farms used twice as much human labor than their mechanized counterparts. Double-cropping tends to raise labor inputs according to the level of mechanization. Rainfed non-mechanized farms used 80% to 120% more family labor than irrigated non-mechanized operators while irrigated non-mechanized holdings used only 20% to 40% more labor than their mechanized counterparts. The rise in labor use as a result of increased cropping intensity is thus partially mitigated by use of mechanization. The differences in labor absorption associated with a change in the planting technique are also striking: transplanting is usually associated with a rise of 10% to 25% in labor use.

## Factors Affecting Demand for Hired Labor

### Labor Exchange and Hired Labor: Some Definitions

Hired labor is usually divided into permanent labor and casual labor. However, this distinction is not relevant in Thailand since all wage labor is hired on a casual basis, be it daily or piecework. The bulk of the permanent labor force comprises members of the farm family. The data refer here to person-days work; there is thus no ambiguity regarding intensity of utilization as there is with data on numbers of workers.

Exchange labor is a form of traditional and reciprocal exchange of labor between neighboring households. The customary exchange agreement is that one household asking for hands from other households is obliged to return to them exactly the same amount of labor power which is measured basically in person-days. Exchange labor used to be important in Thailand, but is disappearing progressively in the areas undergoing technological change. Around 20% of the households surveyed in Suphan Buri and Pitchit called on exchange labor, but 60% in Roi Et. Those who did not exchange labor reported that this tradition has disappeared approximately 10 years ago.

According to farmers' answers, there are two main reasons for this dying out: the first and the most important one is related to technological progress. As the use of modern inputs became more intensive, and the flexibility in timing agricultural activities with double cropping lessened, the need for extra labor increased for every household at the same time, making labor exchange impossible. The second one is linked to the marked preference of workers for a remuneration in cash rather than in kind, especially in Roi Et. Thus, hired labor appears principally a substitute for exchange labor, which has generally occurred under the penetration of the money economy and the development of capitalistic relations of production in the rural sector. No distinction has been made between exchanged labor and hired labor and hired labor refers to the one being used for others regardless of the nature of the transaction, be it traditional or modern.

Hired labor is still very often confined within a village community or within adjacent villages: 62% of farms employ workers living in the same amphoe. The geographical mobility of workers is thus limited, especially in Roi Et and Pitchit where more than 80% of households call on casual labor within the same amphoe. Suphan Buri is the exception with 25% of farms hiring laborers from other changwats or even from other regions. Consistent with this distribution of workers' origin is the method of recruitment. While in Pitchit and in Roi Et most households recruit workers by themselves, 65% of farms in Suphan Buri call on middlemen.

Table 11. Recruitment and Origin of Workers

	Suphan Buri	Pitchit	Roi Et	All Provinces
Number of Households Using Exchange Labor	17	23	61	101
Number of Households with:				
Personnal Recruitment	34	84	48	166
Middlemen Recruitment	64	10	2	76
Number of Households' Workers from:				
Same Amphoe	40	80	40	162
Same Changwat	46	12	8	66
Same Region	24	3	---	27
Other Region	5	---	---	5

Source: CUSRI-ORSTOM Project, Rice Farms Survey

The differences in the nature of the external labor (exchanged or hired) used explain partly these differences. Given the reciprocal nature of exchange labor, it necessarily takes place between neighboring households. "Buyers" and "sellers" of labor are known to each other sometimes for generations and there is thus no need for any kind of middlemen to discuss the labor exchange agreement.

#### Patterns of Hired Labor Use in Rice Farming

The use of hired labor is quite extensive among rice farmers, whatever the size of the holding: 80% of households employ temporary workers, as it appears in Table 12. The percentage of farms employing workers vary little from one province to another and between first and second crop. Nearly 97% of households in Pitchit report the use of casual labor during the first crop season while the corresponding figures are 92% in Suphan Buri and 51.5% only in Roi Et. All households cultivating the second crop in Suphan Buri and Pitchit hire temporary workers while the households of Roi Et withdraw from labor markets due to the absence of a second crop.

The requirements of labor input in rice cultivation are variable at different stages of cultivation, depending on the method of cultivation. Casual labor is generally expected during peak season requirements and is often regarded as a complement to family labor. It might thus be expected that use of casual labor correlates negatively with the size of the permanent labor force. Farmers with little available family labor per rai have obviously the greatest incentive to hire workers (Table 13). Conversely, the larger the number of farm workers in the family, clearly, the smaller is the use of casual laborers.

Table 12. Percentage of Households Hiring in Labor

	Suphan Buri	Pitchit	Roi Et	All Provinces
<b>First Crop</b>				
Total Number of Households	100	98	103	301
Number of Households Hiring in Labor	92	95	53	240
%	92	96.9	51.5	79.7
<b>Second Crop</b>				
Total Number of Households	71	32	0	103
Number of Households Hiring in Labor	71	32	0	103
%	100	100	---	100

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Table 13. Number of Persons-Days Hired and Number of Family Workers per Rai

Family Workers per Rai	Suphan Buri	Pitchit	Roi Et	All Provinces
0 - 0.05	103	285	283	235
0.05 - 0.15	150	143	161	149
0.15 - 0.25	84	37	73	66
0.25 - 0.45	53	28	4	20
> 0.45	25	17	4	8

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Considering the sub-sample of farms hiring labor, the use of hired labor is the highest in Roi Et (175 person-days or 7.4 person-days per rai) and the lowest in Suphan Buri if we consider the absolute number of person-days (126): this result is consistent with the patterns of family labor use and confirm that the households of Roi Et are more labor consuming than the households in the other two provinces. Finally, hired labor input appears very much smaller than family input, which represents, on average, 83% of the total labor input (cf. Table 14 and 15 infra).

#### Scale of Farming, Land Tenure System and Hired Labor Use

As dependence on hired labor and its magnitude are, to some extent, a function of farm size, demand for hired labor depends on the scale of farming and land tenure arrangements. The evidence on hired labor input by holding size is shown in Tables 14 and 15. The number of hired workers per employing farm rises as farm size increases but at a decreasing rate: the absolute number of person-days increases sharply (from 59 to 312) with larger holding sizes, while the number of worker-days per rai tend to fall with larger farm sizes. Several writers (Feder 1985) have suggested that as holding size increase, the costs of supervision are likely to rise more than the marginal return of hired labor, especially if a hierarchy of paid supervisors is instituted. This should lead to declining hired labor input per rai. Labor input per rai falls away (from 4.6 to 2.9) as

holding size increase, but in Pitchit and Roi Et the hired labor ratios are at maximum for the middle-size farms and comparatively lower for both the smaller and the larger holdings.

Table 14. Hired Labor per Employing Farm by Landholding Size

	< 15 Rai	16 - 30 Rai	31 - 50 Rai	51 - 100 Rai	> 101 Rai	All Sizes
Person-Days						
Suphan Buri	63	140	176	234	---	126
Pitchit	28	77	161	231	397	140
Roi Et	82	210	245	---	---	175
All Provinces	59	133	189	232	312	142
Person-Days per Rai						
Suphan Buri	7.1	5.7	4.9	3.5	---	5.8
Pitchit	3.1	3.9	4.4	4.3	3.7	4
Roi Et	7.4	9.2	6.3	---	---	7.4
All Provinces	4.6	4.4	4.3	3.7	2.9	5.4

Source: CUSRI-ORSTOM Project, Rice Farms Survey

The percentage of the hired labor input in the total labor input rises from 7% for the smallest holdings up to 30% for the largest ones. Thus, as demand for hired labor is higher in larger holdings than in smaller holdings, the dependence on hired labor appears to be highest in those regions where farm sizes are large. In Pitchit where farms are quite large, hired labor adds, on average, 20.5% to the work done by the family, while in Roi Et, where farms are smaller, the corresponding figure is 14%.

Table 15. Percentage of Hired Labor in Total Labor Input by Landholding Size

	< 15 Rai	16 - 30 Rai	31 - 50 Rai	51 - 100 Rai	> 101 Rai	All Sizes
Suphan Buri	13.6	18.3	21.9	19.5	---	17.6
Pitchit	6.1	12.1	19.9	23.5	35.5	20.5
Roi Et	4.9	18.4	23.9	---	---	13.6
All Provinces	7.4	16.8	21.8	22.9	30.5	16.9

Source: CUSRI-ORSTOM Project, Rice Farms Survey

This brings us to the question of why small farmers who have far more family labor available per rai than larger farmers hire in further labor. First, rice cultivation requires supplementary labor resources regardless of farm size, necessitated by the ecology of rice cultivation itself. Hired labor is used to complement family labor in the critical periods of both the rainy and dry seasons when family labor is inadequate to perform all the required work within a limited time. Secondly, many operators of small holdings themselves wish to take advantage of outside employment in busy seasons, when casual wages are highest (cf. infra).

The view that the use of hired labor is extensive among the landlord-owners is not supported by the data. They have, in fact, the lowest use of hired labor whatever the size of the holding. Owner-tenant farmers tend to depend more on hired labor compared with any other class of farmers. The extent of hired labor use ranges from 5.4 person-days per rai for owner-tenant farmers to 3.1 person-days per rai for landlord-owner farmers. As the scale of operation increases, the use of casual workers shows an increase towards the categories of owner-tenants and tenants. Because there is a positive relation between the demand for hired labor and the size of holdings, large scale tenant farmers may use more hired labor than small landlord-owner or owner farmers, as is obvious from Table 16.

Table 16. Hired Labor Use by Tenure and by Size

	< 15 Rai	16 - 30 Rai	31 - 50 Rai	51 - 100 Rai	> 101 Rai	All Sizes
<b>Person-Days</b>						
Landlord-Owner	26	76	139	206	---	96
Owner	36	89	193	324	377	109
Owner-Tenant	48	230	155	88	225	156
Tenant	32	102	216	---	---	94
<b>Person-Days per Rai</b>						
Landlord-Owner	2.4	3.2	3.4	3.5	---	3.1
Owner	4	4.2	5.3	5.8	3.4	4.4
Owner-Tenant	4	9.4	4.3	1.8	2.2	5.4
Tenant	3	4.3	5.8	---	---	4.4

Source: CUSRI-ORSTOM Project, Rice Farms Survey

### Technical Change and Casual Labor Use

#### *Farm Productivity and Employment*

There are a number of reasons to believe that new technologies are helping to create a demand for labor. Technological change may increase agricultural production through the possibility of bringing more land into production, of increasing multiple cropping and of improving cultivation practices. Since extra production requires extra labor, employment of agricultural workers should expand more or less in step with output. Yet, how much of this demand will be met by family labor rather than hired workers is not clear and depends most critically on the size distribution of holdings, the method of cultivation and the use of machinery.

Table 17 shows the relative importance of various farm operations in terms of the demand for casual labor which they generate. Not surprisingly, demand for labor in rice growing is the highest in the harvesting stage. Land preparation is not as important a

task in terms of employment opportunity and casual requirements for land preparation fall a long way behind transplanting and harvesting. There is a specific pattern of casual labor use in each province, depending on the method of cultivation (especially for planting) and on the overall productivity level of the farms. Transplanting, which is the common practice in Roi Et, requires 105 person-days compared to 51 person-days where transplanting is mixed with broadcast sowing as in Pitchit. This latter method is widespread in Suphan Buri and there is little call on wage workers for this operation. Second, all the harvesting operations (cutting, assembling, carrying and threshing) have consistently the lowest hired labor input in Roi Et, where the yields are traditionally among the lowest in the country, and the greatest hired labor input in Suphan Buri, where the land productivity is the highest.

Table 17. Hired Labor by Operation

	Suphan Buri	Pitchit	Roi Et	All Provinces
<b>Number of Person-Days</b>				
Plowing	4	5	11	6
Sowing	2	51	105	44
Harvesting	55	66	50	58
Assembling/Carrying	45	7	3	21
Threshing	9	8	5	8
<b>Number of Person-Days per Rai</b>				
Plowing	0.3	0.2	0.6	0.3
Sowing	0.1	1.2	4.2	1.5
Harvesting	2.4	2	2.2	2.2
Assembling/Carrying	2.2	0.2	0.1	0.9
Threshing	0.4	0.3	0.2	0.3

Source: CUSRI-ORSTOM Project, Rice Farms Survey

#### *Choice of Production Technique and Casual Labor Use*

Table 18 shows the extent to which various combinations of improvements in production techniques affects the demand for wage labor. Irrigation is usually associated with increased land productivity. Double cropping, made possible by more irrigation and/or the spread of mechanical pumps should lead to a substantial increase in the demand for hired labor. Cropping intensity is found in the data to correlate positively with casual hired labor. Farmers in non irrigated areas who grow rice in the rainy season only use far less hired labor per rai (1 to 4.1 person-days) than farmers who grow rice in both rainy and dry seasons (3.7 to 7.4 person-days). Then, there is a marked difference in use of hired labor input between transplanting and broadcasting, broadcast rice requiring on average, half of the hired labor used for transplanting. Use

of fertilizer tends to increase labor requirements. A farm that applies fertilizer requires, on average, 30% more casual labor than farms which do not.

Table 18. Average Labor Input per Rai for Different Production Techniques

	One Crop/ Broadcast	One Crop/ Transplant	Two Crops/ Broadcast	Two Crops/ Transp/Broad
No Fertilizer/Mechanization	1	4.8	3.7	---
	(6)	(10)	(14)	
Fertilizer/Mechanization	3.7	---	5.5	---
	(5)		(13)	
No Fertilizer/Partial Mechanization	4.1	5	4.2	5.2
	(3)	(9)	(12)	(15)
Fertilizer/Partial Mechanization	3.9	---	7.4	---
	(4)		(11)	
No Fertilizer/No Mechanization	3.5	7	---	---
	(2)	(8)		
Fertilizer/No Mechanization		8.4	---	---
		(7)		

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Finally, there is a strong belief that mechanization contributes towards increasing yields as a consequence of more timely and higher quality soil preparation. But Binswanger (1986) demonstrated that mechanization leads directly to increased yields only in exceptional circumstances and usually substitutes for labor or, where they are in use, for animals. Both family and casual labor can be displaced by mechanization, but the most immediate impact is expected to fall on casual laborers to the extent that mechanization reduces labor requirements for tasks which traditionally provided them with employment.

The mechanization of rice farming operations strongly affects the use of hired labor. There is a marked negative relationship between farm machinery use and the amount of hired labor for cultivation. Within one planting technique, once the cropping intensity is constrained, mechanization results in a reduction in hired labor inputs. The amount of labor saved by mechanization varies according to the technique that the farmer employs. In the broadcasting group the reduction is 53% for rainfed areas and 68% for double-cropped areas. In the transplanting group the reduction is far less (14%) mainly because total pre-harvest labor use on non-mechanized farms does not differ much from that on mechanized farms as rice transplanters are not used in Thailand.

#### Agricultural Wage Rates and the Cost of Hired Labor

Among many other factors, the cost of labor can be expected to have repercussions on the decision to hire casual workers. A priori, the demand for hired labor must decline

in response to a wage rise. Data on agricultural wages in Table 19 are estimated from all members of the sample who reported having worked for wage employment in the agricultural sector. The data on hired labor costs, given the large range of units used for the different operations<sup>2</sup>, were too heterogeneous to form the basis of an evaluation of the daily agricultural wages. Non-agricultural wages are those reported by family members who were engaged in temporary non-agricultural activities in each province, as well as in Bangkok.

There is often a perception that labor costs in rural areas are massively lower than in urban centers. First, the data suggest that rural labor costs in Suphan Buri are higher than commonly assumed, especially when compared to non-agricultural wages in local cities. Conversely, urban wages in Pitchit and Roi Et are nearly double rural wages. Second, inter-regional wage differences in Thailand are quite large and the largest gradient is between the outer regions (North, Northeast) and the Central Plain: agricultural wages in Suphan Buri are roughly 1.5 times the level of Pitchit whereas rural wages in Pitchit are 15% higher than in Roi Et. The Central Plain thus appears as a higher-wage area for rural labor than the outer regions. There is then very little or no significant differential between men and women engaged in farm labor.

Table 19. Agricultural and Non-Agricultural Daily Wages

	Suphan Buri		Pitchit		Roi Et		Bangkok
	Agric.	Non-Agric.	Agric.	Non-Agric.	Agric.	Non-Agric.	Non-Agric.
Males	92	135	51	89	45	91	129
Females	78	71	53	116	45	118	76
All Workers	87	113	52	101	45	98	107
% of Farms Transplanting	0	---	41.8	---	96.1	---	---
% of Farms Using:							
Tractor	90.1	---	82.7	---	17.5	---	---
Thresher	47.2	---	34.7	---	3.9	---	---
Harvester	15	---	3.1	---	0	---	---

Source: CUSRI-ORSTOM Project, Rice Farms Survey

The extent to which less labor intensive techniques are adopted in rural areas must be a function of labor costs. The choice of broadcasting versus transplanting is an interesting case. It has been seen that transplanting requires much more labor than broadcasting. As the profitability of the two alternatives is a function of the cost of labor, the data show strong evidence of a shift towards broadcasting in response to

2 - The costs of ploughing and cutting were generally given per rai, the cost of assembling per sheaf, the cost of carrying per trip, the cost of threshing per ton etc...

higher costs of labor. There is a decline in the ratio of sample farmers transplanting rice from 96% in Roi Et to 42% in Pitchit and 0% in Suphan Buri.

Mechanization provides another example of a shift towards less labor intensive techniques due to the higher cost of labor. One of the motivations in substituting machines for human labor is a rising rural wage generally, induced by urbanization. Areas mechanized most extensively are in zones which are relatively highly developed, more urbanized and consequently have higher wage rates. This suggests that labor is in relatively scarce supply in these areas. The rate of adoption of agricultural machines is expected to be directly dependent on labor costs and rarely profitable in low-wage areas. The data confirm that the rate of adoption of tractors for land preparation, and of threshers and harvesters for harvesting operations has been very much faster in Suphan Buri, where agricultural wages rates are higher than in Pitchit and Roi Et, where the use labor is still cheaper than the use of machines.

## **Off-Farm Labor Patterns**

### Characteristics of Off-Farm Employment

#### *Farm, Non-Farm and Off-Farm Employment*

Although non-farm and off-farm activities have received considerable attention in the literature and among policy makers, they usually are a source of conceptual confusion. The main source of the confusion comes from the fact that off-farm employment is often viewed as work of a non-farming nature and is thus assimilated with non-farm employment. This view may result in very misleading conclusions when working members of rural households hold jobs away from the farm in the agricultural sector. Work is classified here according to two criteria, that is the branch of industry and the location of the job: on farm production of agricultural products operated and managed by the household is farm work, on farm production of non-agricultural products is non-farm work, off-farm work includes all work in agricultural as well as non-agricultural enterprises owned or operated by other households or firms. Another possible source of confusion is related to the status of a household member who migrates to look for employment. Only the members who are domiciled with the household are considered here in order to exclude permanent migrants who are domiciled elsewhere. Thus, off-farm employment must be predominantly casual.

Due to the seasonal nature of agricultural production, the rural labor force in Thailand is known to spend a considerable amount of time on off-farm activities. These activities have become a large source of income and employment for rural households in Thailand. According to the statistics of the Ministry of Agriculture, off-farm incomes

constitute on average 30% of total net income of farm households for the whole country; 41% in the Northeast, around 20% in the three other regions (North, South and Central Plain). Family workers who work on the family farm usually combine this work with a variety of off-farm jobs. It is generally during the slack season, when cultivator households have less work on their own farms, that they are more willing to hire out labor. Thus, unlike hired labor which may substitute for family labor, there is some degree of complementarity between the farm and off-farm employment.

#### *Branch of Industry and Location of the Job*

Off-farm work is widespread among rice farmers: 46% of farm households have at least one member who hold some salaried job outside the holding. This percentage is not very different across provinces but family workers spend on average more time in off-farm employment in Suphan Buri (149 days per worker on average) than in Pitchit (80 days) and Roi Et (137 days). Nearly 40% of family members who took jobs outside the farm worked off their holdings for three months or less, another 40% did so for 3 to 6 months, 20% only for more than 6 months.

Table 20. Off-Farm Activities by Province

	Suphan Buri	Pitchit	Roi Et	All Provinces
Number of Households without Off-Farm Income	55	50	57	162
Number of Households with Off-Farm Income	45	48	46	139
(%)	45	49	44.7	46.2
Number of Days Worked Off-Farm per Household	245	137	190	189
Number of Days Worked Off-Farm per Workers	149	80	137	119
Male	136	77	126	116
Female	177	82	157	124
Number of Workers Working Off-Farm				
Less than 3 Months	25	47	9	81
Between 3 and 6 Months	25	30	42	97
More than 6 Months	23	7	11	41
Total	73	84	62	219

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Off-farm work includes a wide variety of activities in manufacturing, services, commerce, construction and transport. Household member's occupations in off-farm jobs are shown in Table 21. The most important occupation is agriculture, which absorbs 40% of off-farm workers. Construction is the second most important occupation

with 19% of household members being engaged in this occupation. Manufacturing and transport are also found to provide many jobs to the household members who engaged in off-farm work while commerce and services are of minor importance. This repartition of workers among branches of industry call for some comments.

Table 21. Distribution of Off-Farm Workers by Branch of Industry

	Suphan Buri	Pitchit	Roi Et	All Provinces	Percent
Agriculture	32	39	5	76	40.2
Construction	14	15	7	36	19
Manufacturing	10	3	15	28	14.8
Transport	5	2	17	24	12.7
Commerce	2	6	4	12	6.3
Services	6	1	6	13	6.9

Source: CUSRI-ORSTOM Project, Rice Farms Survey

First, the paramount importance of agriculture as a source of off-farm activities suggest that policies which detract from agricultural prosperity may have a powerful influence on off-farm rural employment and incomes. Furthermore, labor intensive techniques of farming will be desirable to support the incomes of the farm labor force. Second, small manufacturing establishments are an important source of income and employment in rural areas. According to studies on rural industry (Biggs 1990; World Bank 1983), most of the firms that have been in the provinces have one or two specific reasons for being there. Either they process local materials, causing them to lose weight and become cheaper to transport, or else they produce simple items for sale in local markets. Examples of the first case are all agro-processing units which have to be located near the growing region. Examples of the second case are rural agricultural machinery manufacturers and the building industry. The nature of rural manufacturing which makes up the bulk of non-agricultural employment is thus quite specific and limited. Opportunities for greater participation of the rural labor force in off-farm industrial activities will probably have to wait for more manufacturing growth in secondary cities around the country.

One other striking feature of off-farm activities, according to their location, is the absence of concentration in Metropolitan Bangkok. It is obvious from Table 22 that the bulk of migration into a district is likely to originate from the immediately neighboring districts. Nearly 50% of family workers move within the same district and another 15% within the same province to find temporary jobs. Inter-province migration during the slack season is not very common. Nevertheless this general pattern of off-farm jobs location is altered for household members originating from remote regions where incomes are low and the rural economy is isolated. In these regions, that is Upper North and the most part of the Northeast, the scope for market exchange tends to be low and

rural industrial activities are therefore limited. Moreover, penetration of rural markets by urban-based products has led to the disappearance of traditional products previously produced in the household and increased the participation of rural households in outside labor markets. As might be expected it is Roi Et, the northeast province, most dependent on rainfed agriculture, with the lowest income levels and the fewest alternative employment opportunities in regional urban centers, where the seasonal outflow of labor to Bangkok is the greatest.

Table 22. Distribution of Off-Farm Workers by Location of the Job

	Suphan Buri	Pitchit	Roi Et	All Provinces	Percent
Same District	39	57	7	103	47.7
Same Province	18	6	8	32	14.8
Another Province	8	6	11	25	11.6
Bangkok	5	15	36	56	25.9

Source: CUSRI-ORSTOM Project, Rice Farms Survey

### Determinants of Off-Farm Labor and Labor Supply Behavior

#### *Composition of the Household and Number of Dependents*

The larger the number of working adults in the household, obviously, the more labor days there are available for hiring out. As shown in Table 23, the number of family members engaged in off-farm activities, the average number of days spent off-farm per household as well as per worker tend to increase significantly with a larger family labor force.

Table 23. Off-Farm Labor and Family Labor Force

Total Number of Family Workers	1	2	3	4	5	6
Average Number of Off-Farm Workers	0.4	0.5	0.7	1	1.6	1.7
Average Off-Farm Days per Household	100	136	206	210	332	600
Average Off-Farm Days per Worker	100	114	132	134	136	

Source: CUSRI-ORSTOM Project, Rice Farms Survey

It has often been argued that cultural and status constraints can prevent certain types of workers from offering themselves on the labor market. In particular, women may be reluctant to take up regular outside work because of interference with household tasks and the responsibility of child caring. Males would have a comparative advantage in off-farm work because of their ability to travel farther away from home and earn higher wages. The data suggest that females participate less in off-farm work than males: they represent 40% of off-farm workers while males represent 60%. However, females tend to spend slightly more time on off-farm activities (124 days) as compared to males (116 days) especially in the youngest age brackets. The allocation of time to

activities other than farm production tends to increase up to the 30-39 years age bracket and decrease afterwards.

Table 24. Off-Farm Labor and Composition of Family Labor Force

Age Class	Number of Workers	Percent	Average Number of Days per Worker		
			Male	Female	All Sex
11-19	2	0.9	13	---	13
20-29	39	17.8	88	101	95
30-39	55	25.1	128	152	138
40-49	52	23.7	124	130	127
50-59	33	15.1	113	100	109
60-69	23	10.5	97	66	86
70-79	2	0.9	82	---	82
All Workers	219	100	---	---	119
Male	131	59.8	116	---	---
Female	88	40.2	---	124	---

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Finally, there is a strong positive relationship between the number of dependents per family worker and the involvement of households in off-farm activities. The number of dependents per household tends to increase the extent of hiring out. Families burdened with a large number of dependents work less intensively on their own farms and have more time for hiring out.

Table 25. Off-Farm Labor and Dependency Ratio

	0	0 - 0.99	1 - 1.99	2 - 3.99	> 4	Total
Percent of Households with Off-Farm Activities	42.2	43.9	52.1	47.6	75	47.3
Average Off-Farm Days per Household	69	77	101	108	231	90
Average Off-Farm Days per Worker	44	51	69	80	115	59

Source: CUSRI-ORSTOM Project, Rice Farms Survey

#### *Farm Size, Land Ownership and Land Tenure*

Table 26 documents a widely observed phenomenon in agriculture, that is, as farm size increase the farm household becomes less involved in off-farm activities in terms of time allocated to these activities. Family members operating small holdings tend to spend higher amounts of time in non-farm occupations: farm operators in the small size classes reported off-farm employment of around 200 days per year, but those with holdings of more than 50 rai worked only 100 to 122 days. The proportion of family farm workers who take on work outside the holding falls as holding size increases which

might suggest that in the smallest holdings, a higher proportion of family workers are forced to seek work off the farm. Although there is a degree of relationship between farm size and the importance of off-farm income sources, this relationship is not as clear-cut as may originally have been expected. Off-farm work sharply declines as farm size reaches 50 rai, but does not vary significantly for smaller sizes. The size of the land cultivated by the household has, thus, a slight negative effect on market labor supply.

Table 26. Off-Farm Activities by Size of Holdings

	< 15 Rai	16 - 30 Rai	31 - 50 Rai	51 - 100 Rai	> 101 Rai
Percent of Family Workers Engaged in Off-Farm Jobs	26.8	30.5	27.7	10.4	20.2
Number of Days per Household	189	203	191	122	100
Number of Days per Worker	144	114	122	104	63

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Since access to land is the most important determinant of on-farm employment, land tenure is expected to affect the extent to which farm households participate in labor markets. It is not surprising to observe that the tenant farmers place more emphasis on off-farm work. As expected, the proportion of farms engaged in off-farm activities is higher, the lower is the share of the land owned in the total land cultivated by the household. Likewise, the percentage of family workers who take on off-farm jobs is a decreasing function of the amount of the land owned.

Table 27. Off-Farm Activities by Tenure

	Landlord-Owner	Owner-Tenant
Percent of Family Workers Engaged in Off-Farm Jobs	10.5	25.1
Number of Days per Household	236	179
Number of Days per Worker	207	117

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Another striking feature of off-farm activities is that upper class peasants tend to be urban workers rather than "lower class" peasants as shown by the distribution of workers by branch of activities and by land tenure in Table 28. Tenant farmers are agricultural laborers more often than any other class and the share of casual workers in agriculture decreases significantly from the class of owner-tenants to the class of full owners and to the class of landlord-owners. Moreover, tenant farmers tend to migrate shorter distances. Owner farmers are the category for whom long-distance migration, that is basically migration to Bangkok, is the greatest. Although this result is consistent with the pattern of distribution of workers by branch of industry, this might suggest a differential ability in non-agricultural labor, depending upon land tenure situation.

Relatively wealthy and probably more educated persons, who are likely to be the net buyers of labor, have a higher propensity to migrate longer distances and to acquire better jobs while the poorest migrate shorter distances with low opportunities of employment in non-agricultural sectors.

Table 28. Percentage of Off-Farm Workers by Branch of Industry and by Tenure

	Landlord-Owner	Owner	Owner-Tenant	Tenant
Agriculture	25	32	41.3	65.7
Construction	---	19	26.1	14.3
Manufacturing	12.5	16	17.4	8.6
Transport	12.5	17	6.5	8.6
Commerce	25	7	4.3	2.9
Services	25	9	4.3	---

Source: CUSRI-ORSTOM Project, Rice Farms Survey

Table 29. Percentage of Off-Farm Workers by Job Location and by Tenure

	Landlord-Owner	Owner	Owner-Tenant	Tenant
Same District	50	41.7	53	66.9
Same Province	50	10.4	12.2	22.7
Another Province	---	12.1	10.2	13.6
Bangkok	---	35.7	24.5	6.8

Source: CUSRI-ORSTOM Project, Rice Farms Survey

#### *Cropping Pattern, Cropping Intensity and Mechanization*

The willingness of farm households to supply labor for off-farm employment is in part influenced by whether such employment competes with farm work. Farmers in all areas use almost all their land in cultivation during the wet season. However, land utilisation during the dry season is very low or nonexistent (except in Suphan Buri) due to lack of water, which in turn contributes to very limited farm activity. Thus, the amount of labor farm families can supply to the labor market is partly determined by the length of the dry season. As expected, availability of irrigation water contributes to a more intensive cropping pattern and seems to discourage off-farm work. Farmers who grow only rice as well as farmers who grow rice twice a year have obviously less time to spend in off-farm activities compared to those who grow a mix of different crops or those who grow rice once a year (Table 30). The average off-farm labor days per household and per worker decrease significantly between rainfed and irrigated farms and between single-crop farms and multiple-crop farms.

However, it is often believed that mechanization is likely to strengthen the trend towards low labor absorption in agriculture and "push" workers released by machines to look for jobs outside the farm. This does not appear to be the case in this sample of rice

farmers. The use of agricultural equipment is not associated with heavier involvement of family labor in non-farm economic activities.

Table 30. Cropping Pattern, Cropping Intensity, Mechanization and Off-Farm Activities

	Rice Only	Rice and Other Crops	One Crop	Two Crops	Mechanized	Non-Mechanized
Percent of Family Workers Engaged in Off-Farm Jobs						
Suphan Buri	26.7	33.5	25.8	28.4	27.2	50
Pitchit	34.4	21.8	30.2	30	26	62.1
Roi Et	23.2	0	22.5	---	29.7	20.9
Number of Days per Household						
Suphan Buri	232	376	269	237	237	600
Pitchit	128	159	165	79	110	236
Roi Et	190	---	190	---	186	191
Number of Days per Workers						
Suphan Buri	146	166	175	139	144	300
Pitchit	81	85	94	59	71	124
Roi Et	145	---	145	---	126	150

Source: CUSRI-ORSTOM Project, Rice Farms Survey

#### *Attractive Off-Farm Employment and Wages*

One of the determinants of the extent of rural labor's involvement in off-farm activities is the availability of attractive off-farm employment opportunities. Additional work to supplement family income has been reported as the main goal for the vast majority of those who seek work outside the farm. The total hours of work spent by each household might depend largely on the existence of non-farm enterprises.

If the extent of off-farm employment is likely to be determined by the rural household's access to urban-type jobs, it must be closely related to their distance from urban areas. The present survey has not given sufficient information on the various "pull" factors that might have been operating on the village labor market, such as the conditions in nearby urban market centers or other prosperous villages. There is only a rough estimation of the distance of the village from local urban centers. Although proximity to urban areas is certainly an important determinant of time spent by farmers in off-farm employment, a remote location does not reduce it significantly, but it does lower the return of off-farm activities. It has been seen that wage employment is more important in Suphan Buri than in any of the other provinces surveyed. As to be

expected, this province is close to Bangkok, its villages usually close to towns, and off-farm employment opportunities in the non-agricultural sector are quite great.

Nevertheless, participation in off-farm activities is not limited by the proximity of urban centers. Agricultural development by itself helps to explain rural involvement in off-farm activities. Low agricultural productivity in the province of origin encourages out-migration to other provinces or to towns. In Suphan Buri and in Pitchit a large part of off-farm activities remains subordinate to the demand of farm households for agricultural labor both in the wet and dry seasons. Conversely, Roi Et has the lowest percentage of workers engaged in off-farm agricultural jobs because there is no labor demand in the dry season due to the lack of water. Given this regional imbalance, most rural households in Roi Et can participate in off-farm activities during the slack season by migrating to the cities.

Table 31. Off-Farm Daily Wages

	Suphan Buri	Pitchit	Roi Et	Other Provinces	Bangkok
<b>Males</b>					
Agriculture	92	51	45	115	---
Manufacturing	106	100	---	126	90
Construction	119	84	60	112	127
Commerce	100	---	---	200	---
Transport	189	100	55	200	164
Services	200	---	140	120	---
<b>Females</b>					
Agriculture	78	53	45	72	---
Manufacturing	83	---	---	120	122
Construction	100	---	---	---	85
Commerce	---	143	---	130	85
Transport	---	74	---	---	100
Services	---	---	118	---	102

Source: CUSRI-ORSTOM Project, Rice Farms Survey

It is often argued that rural labor is pulled into non-agricultural activities by higher wage opportunities in urban-type jobs. Wage rates in various activities need to be examined in order to provide some idea of the returns to wage employment in rural and in urban industries. Data on daily wages received by family workers are presented in Table 31 according to the branch of industry and the location of the job. In general, although the non-agricultural wage rates were found to be higher than the wage rates in agriculture, there is little wage differential between unskilled urban workers and agricultural workers in the Central Plain province. The wage rates in Suphan Buri appear to be higher than in any other province whatever the branch of industry. The differences among provinces in non-agricultural wages seem less pronounced than those

for the agricultural ones. Wage rates in Bangkok are surprisingly low compared to those prevailing in the provinces. This indicates the possibility that migrants from the Northeast, who represent 65% of workers migrating to Bangkok, in the sample tend to earn very low wages. Rural laborers coming from other provinces were found to earn higher wages than their counterparts from the Northeast whatever the branch of industry, and it is believed that these differences result from differences in education and experience.

If the wage response of labor supply is significantly positive, the greater the wage, the more the supply for hiring out will be. High urban wage in the destination place is expected to have a positive impact on the rural-urban migration, whereas high rural and urban wages in the origin province tend to reduce the flow of out-migration. Nevertheless, wages are believed to be less important in migration decisions for short distance migration than they are in inter-province migration because of the differences in the costs involved. The distribution of off-farm activities observed in the sample is consistent with the pattern of wages received. The large flow of migrants from Roi Et to Bangkok can be attributed to the large gap between agricultural wages in that province and the returns of migration to Bangkok. Conversely, in Suphan Buri, where agricultural and non-agricultural wages are high, most family workers found occasional jobs in the province.

### **Conclusion**

The influence of agrarian structure upon employment in developing countries remains an issue of considerable controversy. There is a substantial body of literature that investigates the theoretical relationship between farm size and the utilization of labor. This affects the extent to which the supply of land acts as a constraint on agricultural employment. The data collected from the field survey draw attention to the general tendency for per hectare labor input to decline as holding size increases. There is some evidence that a small, family farm structure could be more favorable for agricultural labor absorption than a structure based upon the concentration of land ownership into the hands of a small rural elite. The relationship between farm size and labor absorption is not due entirely to exogenous differences in land quality, but is also a result of differences in factor prices, which in turn lead to different combinations of input and output ratios. The results here tend to suggest that dualism in the capital market in Thailand is mainly responsible for this phenomenon.

Several factors were considered to affect demand for hired labor in Thailand. Labor demand was found to depend on such variables as the demographic composition of the labor-buying household, the size of the farm, the extent of irrigation, the cropping

pattern and the extent of mechanization of production. First, all farm households had to rely heavily on hired labor for the peak season activities of planting and harvesting. Second, a large part of the differences in casual labor use can be explained by differences in farm sizes. Third, investment in irrigation infrastructure has high employment effects. An expansion of the irrigated area would produce a substantial increase in the demand for labor. Fourth, it is clear that overall labor use per rai on mechanized farms is substantially lower than on non-mechanized, so the impact of more widespread machinery use per se would result in a high loss in employment opportunities.

It is difficult to determine whether the recent technological changes in rice farming have reduced the demand for hired labor in aggregate terms or not, for the kind and level of technological change varied from one place to another. By shortening the duration of the crop cycle and increasing the importance of timeliness of each operation, the new technologies largely used in Suphan Buri have increased the dependence of farms on hired labor whatever the size. Mechanization has been accessible only to some farmers, especially those in the Central Region and adjacent areas, and the diffusion of the combine harvester is still in its infant stage. Moreover, mechanization is often associated with double cropping so that the labor displaced by machines is reabsorbed in the cultivation of the second crop. In Suphan Buri, where the mechanization of agriculture is most advanced, its impact on employment is not much felt as testified by high agricultural wages. In summary, observations would suggest that demand for hired labor tends to be higher where agriculture is growing at a rapid rate and where the distribution of operational holdings is skewed in favor of larger farms. Conversely, demand for hired labor is less where agriculture has stagnated and where small farmers constitute an overwhelming majority.

The Thai rural labor force is highly mobile, particularly in the dry season, and quite active in migrating to other regions and urban centers. The extent of involvement of the rural labor force in off-farm activities is largely determined by four factors: the seasonality of agricultural labor demand, the social and demographic conditions of the labor-supplying household, its asset situation as reflected by the size of the farm, and the attractiveness of non-agricultural employment opportunities. The evidence from the field survey suggests that "pull" and "push" factors are at work. First, the involvement of farm households in off-farm activities is positively associated with the proximity of urban areas and, therefore, to the more attractive employment opportunities. Second, as many farmers supplement their on-farm income by working for neighboring households, any displacement of the demand for agricultural labor arising from policies which discriminate against agriculture will adversely affect off-farm rural employment and incomes. Third, an inverse relationship has been observed between farm size and off-

farm employment, suggesting that the latter has contributed importantly toward equalizing incomes across size classes of farms.

The relatively high growth rate of Thai agriculture, as well as its ability to absorb most of the growth of the labor force, has been achieved mainly through the expansion of cultivated areas. However, agriculture in Thailand is now in a transitional stage since there is no virgin land left for cultivation. The emphasis must be placed on the increase of agricultural productivity and this can be achieved only if new technology is available and is widely adopted. There is still much potential for raising output per rai and a very high potential gain in labor productivity although this may lead to little new employment creation in agriculture. It is unlikely that any achievable rate of growth in agriculture over the next decade will be able to generate enough new demand for the rural labor force to absorb the increments in that labor force. Nevertheless, non-agricultural employment is rapidly growing and the ability of other sectors to absorb significant numbers of persons displaced from agriculture is correspondingly consistent. Some authors (Biggs et al. 1990) argued that agricultural employment will decline, probably sharply in the 1990s, and that Thailand is likely to experience a tight labor market with rising real wages for unskilled labor and a need to transfer labor out of agriculture. When the labor market turning point will be reached, it will require and induce increases in labor productivity in agriculture, which will probably be achieved mainly through mechanization.

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