Integration of Farming with Nonfarm Labor Employment Opportunities for Improving Income and Employment in Northeast Thailand

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ABSTRACT

The primary objective of this study was to appraise alternative uses of family resources for farm, nonfarm enterprises and off-farm work and their impact on production, employment and income of rural farm households in Khon Kaen Province. The study attempted to provide detail on household nonfarm and off-farm activities and their relationship to farm activities and examine their contribution to family income and their share of total labor utilization.

The data used in this study were obtained from the Rural Off-Farm Employment Assessment Project in Thailand and from a supplemental survey conducted in Khon Kaen Province, Northeast Thailand for the Agricultural year 1980/1981. A poly-period linear programming model was developed to represent farm households within three different farm size groups for both rainfed and irrigated areas. The model contained the usual farm enterprises consistent with the major enterprises actually found in the study area. In addition, major nonfarm enterprises and off-farm employment opportunities were included in detail to test the complementary and competitiveness of farm, nonfarm enterprises and off-farm employment. The model specified an objective function to maximize net farm household income subject to land, labor, capital, subsistence needs and other constraints. Some of the findings of the study are as follows: (1). The composition of enterprise mix suggested by the programming solutions for the rainfed and irrigated farm households with every farm size class demonstrated the possibility for both rainfed and irrigated farmers to combine farm, nonfarm enterprises and off-farm work to achieve maximum net family income under existing family resource constraints with subsistence and living expenditure requirements. (2). Three common nonfarm enterprises of sericulture, silk weaving and sticky rice container making were recommended in the optimal plan for the rainfed farm households, whereas cotton weaving, mat making and basket making were recommended in the optimal plan for the irrigated farm household. (3) In the optimum solution, every farm size class of the rainfed and irrigated farm household, had some members (both males and females) with off-farm work. Without these farm employment opportunities, both rainfed and irrigated farm household would be worse off because their family net income and employment would decline substantially. Conversely, with the assumption of more off-farm employment opportunites the rainfed and irrigated farm household would have substantially higher family net income and employment. The model results also suggested that both rainfed and irrigated family labor always enthusiastically respond to an off-farm work offering a wage ranging from 24 to 35 baht per day (or more).

I. Problems and Need for the Study

Thailand, like other developing countries undergoing the process of economic development, has development planning which is based on successive five year plan. Even though four five-year plan have been implemented to date, most Thai farmers, who are regarded as the backbone of the nation, still have relatively low income. In addition, widespread unemployment and underemployment also exist in the rural area due to lack of employment opportunity, including rapid population growth in the rural area and absence of off-farm

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employment opportunity. This has led to a higher level of rural and urban unemployment, including a substantial migration inter-regionally, and permanent moves, usually to Bangkok. It will create several problems such as urban unemployment, low income of unskilled urban worker, population congestion and other social problem.

Chuta and Liedholm (1979) provide empirical evidence of the important role of nonfarm activities in many developing countries such as Taiwan, Korea and Philippines, for expanding productive employment and earning opportunites in the various rural nonfarm activities as a means to overcome rural problems as mentioned above. Nonfarm activities are a source of not only primary employment but also secondary or part-time employment in rural areas. They have provided a source of employment for 30 to 50% of the rural labor force. Besides, nonfarm activities contributed from 22 to 70% of the total rural household income in those countries.

In Thailand, a study done by Charsombat (1978) indicates that the nonfarm activities provided about 36% of the total farm household income.

Based on the above evidence, the policies and programs of nonfarm activities in rural areas and market towns, including those engaged in small scale public work's activities appear to be be one of the more promising approaches for helping the Royal Thai Government (RTG) to increase income and reduce unemployment and underemployment in the rural areas.

Promotion of nonfarm rural enterprises sector, however, cannot be done indepently of the agricultural sector. Particularly in Thailand, where agriculture is the predominant economic sector, the expansion of the nonfarm rural enterprise sector must be intergrated with agricultural development. More specifically, the linkage or interrelationship between farm and nonfarm activities must be taken into account before the government will be able to design and improvemnet appropriate programs and policies for stimulating the rural off-farm sector.

Unfortunately, little research work has been done in Thailand to economically appraise farm and nonfarm combination of family resource, including its impacts on production,

employment and farm income of rural farm household. Lack of data and knowledge including inadequate research work in Thailand, has limited the ability of policy makers in identifying and developing appropriate programs and policy for stimulating rural farm and nonfarm enterprise development and enhancing the contribution of these to overall development, employment, and the reduction of rural poverty.

The primary objective of this study was to appraise alternative uses of family resources for farm, nonfarm enterprises and off-farm work and their impact on production, employment and income of rural farm households in Khon Kaen Province. The study attempted to provide detail on household nonfarm and off-farm activities and their relationship to farm activities and to study their contribution to family income and their share of total labor utization.

The data used in this study were obtained from the Rural Off-Farm Employment Assessment Project in Thailand (Onchan, 1979) and from a supplemental survey conducted in Khon Kaen Province, Northeast Thailand for the Agricultural year 1980/1981.

To fulfill the objective as mentioned above a poly-period linear programming model will be developed for representative farm households within different farm size groups (small, medium and large farm size[1]) of the rainfed and irrigated agriculture situation in Khon Kaen. In addition, simulation anaysis will be conducted with some assumed situations varying from the basic models to investigate their impact on enterprise combination, family labor use, income from nonfarm enterprises and off-farm work opportunities.

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[1]For the classification farm size, the farm households were arrayed according to the amount of their land area devoted to rainy season crops. Those which fall in the lowest quartile of this array were defined as "small farm". Those which fall in the highest quartile were defined "large" and the "medium" farms those which fall in the middle half of the array.

II. General Chracteristics of the Farm Hosueholds

2.1 Land Use and Farm Size

The land area operated by individual farm household ranged from 5 rai to 52 rai with a mean of 19.88 rai in the sample rainfed villages, and ranged from 3.0 rai to 45.8 rai with a mean of 17.26 rai in the sample irrigated villages. According to the definition of farm size used in this study, for the rainfed farm households there were 10 small farms with a mean of 6.33 rai of land area, 19 medium farms with a mean of 17.77 rai, and 10 large farms with a mean of 37.46 rai. For the irrigated farm households, there were 10 small farms with a mean of 5.39 rai, 18 medium farms with a mean of 15.45 rai and 10 large farms with a mean 32.36 rai. Most of the land operated by rainfed and irrigated farmers was used for growing glutinous and nonglutinous rice. Glutinous rice which is customarily the staple food for people in the Northeast was grown for family consumption but if there is excess it will be sold on the market. It is thus necessary for the households to grow enough rice for their family consumption for it is a disgrace to have to buy rice. Nonglutinous rice is consistently produced for commercial purposes. Small areas of vegetables were also grown, sometimes with supplemental water from swamps or shallow wells in the rainfed area. The orchard of the rainfed farm households was mostly for the growing of mulberry leaves to support their family industry of sericulture or silk worm rearing which is common in this area. For the irrigated farms where a double cropping of rice was normally found, some cash crop like tobacco and glutinous corn were also grown besides vegetables, but in a very small limited area due to their local limited market. It was observed that most of sample households of the rainfed farms use water buffalo to plow their paddy land whereas on irrigated farms the land preparation was performed by either water buffalo or a small machine tiller (two-wheel tractor) in both wet and dry seasons.

2.2 Family Composition and Labor Force

Within the rainfed farm households, the average size of household family member increased with the size of farm. The Households on large farms had a larger family size (7.1 person per family) than for medium farm households (5.7 persons per family) and for small farm households (5.6 persons per family). But this relationship between the family size and the size of farm operated did not appear to hold for irrigated farm households all farm size groups were found to have about the same number of persons per family. The average number of persons per family was 5.5 for small farms, 5.2 for medium farms and 5.3 for large farm size. The size of the family labor force also varied among the farm size groups and between the rainfed and irrigated farm households. Family labor force was classified as adult male, adult female (14 to 65 years old) and children (7 to 13 years old). For the rainfed farms, on the average, about 4 persons or 71 percent were in the labor force for the small farms, whereas the households with medium sized farm and large-sized farm had 5.7 persons or 80 percent and 5.6 persons or 79 percent of their family members in the labor force, respectively.

In the case of irrigated farms, the small and medium farm households had about 4.9 persons or 89 percent of their family members in the labor force, which is slightly larger than the family labor force of the large farm households having 4.4 persons or 83 percent of the family members in the labor force. For every farm size class of the rainfed farm households, on the average, there were more adult males than adult females in the family labor force, but the amount of child labor varied little among the farm size classes. However, the irrigated farm households averaged more females than males in their labor force for every farm size class. No causal relationship was implied here.

2.3 Land-Labor Relationship

For the rainfed farm households, the ratio of land to labor force increased with farm size whether computed on the basis of number in the family labor force or on the basis of adults in the family. The land-labor ratio was 3.0, 4.5 and 7.9 rai per adult for the small,

medium and large farm size, respectively. This suggests that the labor may be in excess supply on small farms and in short supply on the large farms as far as meeting crop labor requirements are concerned. Indeed, the indication of excess labor on small farms and labor shortage on large farms was even more pronounced on irrigated farms where the land per adult worker is 4.2, 4.1 and 8.8 rai for the small, medium and large farm, respectively.

2.4 Family Income Sources and Farm Size

In the case of rainfed farms, farm enterprises provided the primary source of family net income for the medium and large size farm, while the most important sources of family income for small farm size was off-farm work. Farm income sources accounted for 44, 42 and 27 percent of the total family net income for the large, medium and small farms, respectively. This demonstrated that the net farm income proportional to total net income was positively related to the operational size of farm. This would be explained in part by the fact that the major contributor to net farm income was rice production which was largely dependent on the amount of farmland. Thus, the household operating the larger farm was able to earn more income from farm enterprises than those operating smaller farms. Nonfarm enterprises (or cottage industry) generated a significant amount of net income for every farm size class in the rainfed area. The small and medium farm size were able to earn up to 21 percent of their total net income from cottage industry whereas the large farm households earned 19 percent of their total net income on the average. Off-farm work also made a significant contribution to the family net income for most of the rainfed farm households, especially the small farm size group. It provided 52 percent of the total family net income for the small farm household, while the medium and large farm households obtained 38 and 37 percent of their total family net income respectively from off-farm work. Again income obtained from off-farm work as well as farm income on the basis of a percentage of gross family income, seemed to show a close relationship to the farm size, but in the opposite manner. This was as one would expect because families on small tracts of land in the rainfed area, would find it difficult to utilize as much labor for farm production activities as was possible on the larger farms.

As expected the average family net income per household of the irrigated farm households was higher than the one of the rainfed farm households, since rice which was the major income earner can be grown twice a year in the irrigated area. Farm enterprise was the most important source of family net earning for all farm size classes of the irrigated farm. It provides 55, 76 and 84 percent of family net income for the small, medium and large farm households. Off-farm employment also played a significant role in generating income for farm families even in the irrigated area. It provided 45, 24 and 15 percent of total family net income for the small, medium and large farm households, respectively. Nonfarm enterprise provides some supplementary net income to families even on the irrigated farms, but in relative terms represented only 0.4, 0.2 and 1.4 percent of the total family net income for small, medium and large farm size, respectively.

2.5 Nonfarm Enterprises and Off-Farm Employment

There were four cottage industries of silk weaving, sericulture, sticky rice container and mat making found in the sample rainfed farm households, and 3 nonfarm enterprises of cotton weaving, basket and mat making in the sample irrigated farm households. In relative terms, silk weaving, sericulture and the making of rice containers were the dominant family industries for the rainfed farm households with more than a half of the total households engaged in them. Cotton weaving appeared to dominate the other two nonfarm enterprises, mat and basket making for the irrigated farms with 50 percent of the total households performing this enterprise. Hiring out farm labor to work in the crop field (rice and upland crops) was the most common off-farm employment opportunity found in both rainfed and irrigated farms, especially for the farm household which has a large labor force relative to their farmland. On the average, for agricultural field work, wages paid to male and female labor was approximately

equal, ranging from 2.8 to 3.5 baht per hour. To work as wage labor for many rainfed and irrigated farm households to the time of the major manufacturing and construction activities took place was evident. On the average, for these kinds of off-farm work, male labor was paid 4.36 baht per hour (or 35 baht per day) and female labor was paid 3.75 baht per hour (or 30 baht per day).

2.6 Distribution of Family Labor to Form, Nonfarm and Off-Farm Activities

The major findings of the family labor utilization to farm, nonfarm and off-farm activities were as follows:

(1) For all sample households, the important role of farm work as the percent of total family labor use increased with the size of the operational farm. In other words, there was more farm work to be accomplished on the large farms requiring the households with large farm size to devote more of their labor in farming than the households with smaller sized farm.

(2) When the matter of water availability was examined (rainfed farms vs. irrigated farms), the relative share of family labor in farm work for the irrigated farms was higher than for the rainfed farms.

(3) On the average of all sample households, farm work was dominated by adult males relative to adult females and children. Even on the basis of the average hours per person, the male adult involvement in farm work still increased with farm size and was higher on irrigated farms than on rainfed farms.

(4) The share of nonfarm work (cottage industry) proportional to the total family labor use for the rainfed farms was larger than for the irrigated farms because the farming activities were limited for rainfed farm households and income must be supplemented by engaging more in many varieties of cottage industry. It was also revealed that women in both rainfed and irrigated farm households play the dominant role in cottage industry.

(5) Children in both rainfed and irrigated areas demonstrated their certain role in cottage industry by sharing nearly 16 percent of total family labor worked in nonfarm activities. However, the role of children in nonfarm employment activities cannot be explained adequately from the data provided in this study. In the cultural setting of rural Thailand children are expected to develop basic skills and to avoid idleness whether or not their employment is regarded as profitable from a monetary standpoint. The role ot women in development has received increased attention in recent years. The role of children may also be an area more attention in research.

(6) The contribution of off-farm work proportional to total family labor use decreased as farm size increased for the total sample households as well as for both rainfed and irrigated farm households.

(7) About the same protion of both men and women time was allocated to off-farm work on the average of all households but varied markedly among farm types and farm sizes. As farm size increases, the share of one's time spent in off-farm work decreased for both males and females,and for both rainfed and irrigated farms. This demonstrated that farm labor needs to be first priority even when off-farm employment may exist.

(8) For all farms, the CV (coefficient of variation--the ratio of the standard deviation of the monthly average to the annual average of family labor use) was 0.30, 0.20, 0.24 and 0.17 for farm work, farm work plus nonfarm employment, farm work plus off-farm work, and the total labor utilization distribution, respectively. This suggested that off-farm employment contributed less to smoothing monthly labor use fluctuation than did the nonfarm (cottage

industry type) employment. In comparison, the CV of 0.19 for farm work on irrigated farms was less than the CV of 0.21 for employment from all sources on rainfed farms. This demonstrated one of the advantages of irrigation to open opportunities for a more uniform (less erratic) use of family labor than was possible on rainfed farms.

2.7 Household Consumption Patterns

The value of food expenditure proportional to the total expenditures for the rainfed farm houshold was higher than for the irrigated farm households because the rainfed farm households had relatively lower income than the irrigated farm households and would be expected to spend a large portion of their income on basic or staple food. The value of food expenditure proportional to the total expenditures for both rainfed and irrigated farms likewise decreased as farm size increased. Family nonfood expenditures in both relative and absolute terms were lower for the rainfed than the irrigated farm and were positively correlated with farm size.

III. The Farm Household Model

3.1 Linear programming which deals with the problem of optimum resource allocation among competing activities is used as the main analytical technique in this study. In matrix form the model can be formulated as follows:

$$\text{Maximizing} \qquad Z = C^T X$$

Subject to restriction

$$AX \qquad B$$

$$X \qquad O$$

Where

Z = objective function to be maximized

C = nxl vector of price and / or wage rate

X = nxl vector of activity level

A = mxn matrix of input-output coefficients

B = mxl vector of resource restictions

The purpose is to solve for the level of decision variables, X_1, X_2,.....X_n; which maximizes the objective function subject to the restrictions that no x shall be negative and that the X's shall satisfy the rest of resource constraints.

A linear programming model was developed to represent farm households with three different farm size groups for both rainfed and irrigated areas. The model contained the usual farm enterprises consistent with the major enterprises actually found in the study area. In addition, Major nonfarm enterprises and off-farm employment opportunities were included in detail to test the complementarity and competitivesness of farm, nonfarm enterprises and off-farm employment. The model specified an objective function to maximize net farm household income subject to land, labor, capital, subsistence needs and other constraints. The planning period covered one year, beginning with the wet season and continuing for 12 months through the dry season up to the beginning go the next wet season.

3.2 The Programming Result for the Rainfed Farms

The major findings of this part of the study may be summarized as follows:

(1) The composition of enterprise mix for rice, sericulture, silk weaving, sticky rice container making and off-farm work always appears in the optimal solutions for every farm size class. On the economic side, these results demonstrate the potential for rainfed farm households to combine farm, family industry and off-farm employment to attain maximum annual family net income under existing family resource constraints including average subsistence and living expenditure requirements.

(2) Regarding farm enterprise combinations, to attain the optimal cropping systems with full utilization of land, the rainfed farmers should produce glutinous rice up to the minimum level for family consumption needs and devote the rest of the land for commercial nonglutinous rice production splitting the planting into two periods in order to avoid or minimize a problem of a shortage in supply of labor.

(4) All available female labor for every farm size was fully employed and thus became a more limiting resource than male and child labor. This may reveal the significant contribution of rural women work to household income generating activities, in addition to the well known role of women in various nonincome generating activities, e.g. chores and child rearing.

(5). No hired workers were employed on the small farm households since their family labor was adequate to meet all farming activity requirements. Only a few men days of labor were hired-in on the medium farm households. The programming results also suggest that it may be necessary for the large farm household to hire in many hours of both male and female labor especially during the peak periods of rice production activities in order to meet the labor demand for the optimal cropping system.

(6) Mat making is always excluded from the optimal base plan for every farm size class of the rainfed farms because of its low level of income generated compared to other nonfarm enterprises under the given price and current technology. However, mat making became an economically desirable activity for the rainfed farmers in a certain period as it appeared in the new optimum solution assuming no silk weaving activities. This solution points out that mat making may become a viable alternative activity for the rainfed farm households if there is no skilled family labor to perform silk weaving activities.

(7) The results from the simulation analysis allowing two additional production periods for sericulture to be practiced demonstrate that it is feasible for the rainfed farm households to practice sericulture for the maximum of 6 times across the year if the mulberry production constraint is resolved. This implies that there is still room for additional cottage industries like sericulture to improve the household income in the rainfed area if production bottlenecks are removed.

(8) In the optimum solutions, every farm size class of the rainfed farm households, had some members (both males and females) with off-farm work. It would be economically desirable for the rainfed family members to work off-farm on a part-time basis if employment opportunities exist. Without these off-farm employment opportunities, the rainfed farm household world be worse off because their family net income would decline substantially as can be seen through the simulation analysis with no off-farm employment opportunities. This result conforms to the fact that many rural farm households have been engaged in off-farm work as their supplemental source of family income during the slack periods of farming activities.

(9) According to the results obtained from the simulation analysis with changed assumptions regarding off-farm employment opportunities, the important contribution of off-farm employment to family income and employment becomes very evident. Without both classes of the assumed off-farm employment opportunities, the rainfed farm household income and employment (especially men) would be much lower. Conversely, with the assumption of more off-farm employment opportunities, the rainfed farm households would be better off as their family

net income and the employment of their male labor would increase substantially. These results also suggested that rainfed family labor enthusiastically respond to off-farm work offering a wage ranging from 24 to 35 baht per day (or more).

(10) The effect of an increase in wage rates as a means to improve household income for rainfed farm households was examined. The programming solutions with assumed wage rate increase by 10 and 30 percent above the base model, demonstrated a substantial increase in household income. But increasing off-farm employment wages may cause a substantial short-run drop in the production of cottage industry especially sericulture because the households will switch their family labor from cottage industry to off-farm employment work.

(11) Without silk weaving activities, the rainfed farm households appear to be worse off, as their family net income falls below levels obtained in the base model. In addition, female unemployment which never occurred in the base model before became apparent in the situation of no silk weaving activities. More operating capital was also borrowed from the BAAC for rice production.

(12) Despite a drop of 20 percent in the average crop yield of rice from the normal level reported by the rainfed farmers, the programming solutions demonstrate that the rainfed farms would still be able to obtain enough family net income for saving (through the same optimal pattern of enterprise mix as found in the base model) to pay back all shortterm loans to BAAC. This result may be against the conservative view of commercial bankers who usually claim that to give loans to rainfed farms is very risky. Their position may be based more on the variability of income on rainfed farms than on the income level.

3.2 The Programming Results for the Irrigated Farms

Highlights of the programming results and implications for the irrigated farms in relation to existing conditions and constraints are as follows:

(1) The enterprise combination of glutinous rice, nonglutinous rice, tobacco, cotton weaving, basket and mat making, and part-time off-farm work always enter the optimal solutions for every farm size class. These results demonstrate the possibility for the irrigated farmers to combine farm, and nonfarm enterprises, including off-farm work to achieve maximum net family income under existing family resource constraints with subsistence and living expenditure requirements. The composition of enterprise mix suggested by the programming models are not far away from the one that the sample farm households usually do for income earning by engaging their family labor to farm (e.g., glutinous and nonglutinous rice and tobacco), nonfarm enterprises (mat making, cotton weaving and basket making) and off-farm work.

(2) All three common crops of glutinous rice, nonglutinous rice and tobacco are included in the optimal cropping pattern for every farm size class. However, in addition to these common crops, glutinous corn appears only in the optimal cropping system for the medium sized farm. Unlike the small and medium sized farms, the programming solutions suggest that it may be necessary for the large sized farm households to employ labor-saving technology, e.g., two-wheel tractor for commercial rice production.

(3) The programming solutions show the results that no capital was borrowed for the irrigated farmers with every farm size class. Under the given assumption of the models, the capital of the farm household is not a limiting resource, thus the marginal value product (MVP) of borrowed capital was equal to zero. This may suggest that the irrigated farm households could be self-financed as they have enough capital (cash) for spending on operating expenditures of rice production, plus the family consumption expenses.

(4) All wet season land was fully utilized for every farm size class. All available land was also fully utilized by small farmers in the dry season. However, for both medium and large farms, the available land was only partially used in the dry season because of inadequate irrigation water supply. Land was a more limiting resource for the small farmers as reflected by its highest MVP of land compared to the medium and large sized farms. Each additional unit of land at the margin allocates more value to the small farmers than would be the case for the larger size farms.

(5) Unlike the solutions for rainfed farming situation, male labor was exhausted, whereas some small amount of female and a large amount of child labor was unused in the optimal solutions for the irrigated farmers with every farm size. Because irrigation permits more cropping activities and since cropping activities utilize male labor, irrigated farms will utilize male labor more fully than is to be found on rainfed farms. Furthermore, only one family industry of basket making found in the irrigated villages can be performed by men alone. For females, their opportunities to engage in cottage industry of cotton weaving was assumed limited only in the dry season and also limited by the shortage of child labor in some periods for making mats, as pointed out earlier.

(6) The programming results suggest that it is necessary for both medium and large farm households to hire in both male and female workers for commercial rice production activities during the peak periods. While no hire-in labor is recommended in the optimal cropping pattern for the small farmers.

(7) Off-farm work by male and female family labor always enter the optimal solutions for every size class in many periods. These results point out that even under the well established crop intensification in the irrigated area, there is still room for family labor to engage in off-farm work. On the other hand, it is possible for male and female family labor to work off-farm on a part-time basis.

(8) It is economically possible to increase farm household income earned as well as family employment through intensification of cropping system with better irrigation system in the dry season as càn be clearly seen in the new optimal solution of the simulated situation assuming full irrigation water supply in the dry season plus the new alternative crop of tomato.

(9) For the irrigated farm households, the possibility for improvement of household income and the employment of family labor especially for women through the expansion of a viriable family industry like cotton weaving was very evident as can be seen through the simulation analysis of an assumed situation with year around cotton weaving activities.

(10) Without assumed off-farm employment opportunities, even the irrigated farm housholds would be worse off as their family income and the women employment substantially dropped.

Inversely, both family income and employment for women are increased with more assumed off-farm employment opportunities.

IV. Conclusion and Implications

The modelling analysis of farm household in both rainfed and irrigated areas in Khon Kaen Province have helped to provide improved insight into how rural village farmers utilize their resources. The programming results confirmed that a delicate balancing occurs in the use of resources, especially family labor, among farm, nonfarm and off-farm activities. Labor use patterns are complex as household respond to labor demands of farm work, and off-farm employment and wagewage opportunities. Labor use on nonfarm enterprises adjusts to the changes in demand for farm and off-farm work. Undoubtedly these nonfarm enterprises that also offer potential increases in returns to family labor. Eventually, they could become competitive with both farm and off-farm work. But since the timing of work of nonfarm enterprises or cottage industries is frequently more flexible than other types of work, farm and non farm enterprises will tend to be more complementary than competitive.

Finding of this study with regard to cottage industry or nonfarm enterprise indicates evidently that cottage industry has been previously understated in its contribution to rural farm households in terms of income generating activity as well as their contribution to rural household selfemployment. Cottage industry as well as some types of off-farm employment are a part of farm household's way of life along with farming even in the areas of more intensive farming systems with better irrigation. The role of men, women and children were found to differ among the type of enterprise and among activities performed within enterprise and also by the farming situation (i.e., rainfed or irrigated). For instance, silk weaving and sericulture found in the rainfed village are dominated by women, cotton weaving and basket making found in the irrigated village are dominated by women and men, respectively. These

kind of findings may be very useful in the design of rural development policies or programs aiming to alleviate rural poverty and employment. For instance, a promotion of either cottage industry or off-farm work in the rural areas may be considerable as one of the promising strategies to increase both income and employment in the rainfed area especially for the farm households with small farm size. In the case of irrigated farm households, the traditional approach with higher crop intensification may still be a more appropriate alternative for increased income and reduced unemployment.

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