

THE ECONOMICS OF INDIGENOUS COOPERATION:
A CASE STUDY OF WORK TEAMS IN PHILIPPINE AGRICULTURE

BY

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Thesis Submitted For the M.Phil. In Economics
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ABSTRACT OF THESIS

The primary objective of the thesis is to analyze, from an economic viewpoint, the determinants of cooperation among farmers in developing countries. In pursuing this objective, quite diverse but interrelated literature were reviewed: general economic theories of cooperation; property rights; origin and nature of the firm, and indigenous cooperation.

From the review of the literature seven factors were deduced as determining agricultural cooperation, with six of them affecting cooperation in general. The validity of these in determining cooperation among farmers was then tested by means of case studies and a sample survey.

First is the presence or absence of indivisibilities in productive inputs and/or processes. Second is whether timeliness in the execution of farm tasks is necessary. Third is the degree of elasticity of substitution among such inputs and/or processes. Fourth is the presence or absence of economies, whether size/scale economies or associational economies.

Fifth is the extent of transaction costs, which consist of search, information, bargaining, decision-making and monitoring costs. Sixth is the extent of inequality in the distribution of income/assets among the potential members of a group. And seventh is the kind of atmosphere that surrounds the exchange relationship.

Empirical research focused on Northern and Central Luzon in the Philippines. The most widespread form of indigenous cooperation in these two regions was the formation of labour teams to transplant and reap paddy. These were analyzed by means of a case study of two agricultural teams and a sample survey of twenty eight agricultural teams.

The results indicated that six of the seven hypothetical variables were operative. Indivisibilities were not a relevant factor because they were absent from the farm tasks involved. Nevertheless, this cannot be interpreted to mean that this variable would be irrelevant in other tasks such as irrigation.

Income/asset distribution was highly skewed but its potential for diminishing cooperation in the case of the two study teams was countered by the presence of other factors such as neighbourhood and kinship, which created a bond among members. However, it should showed up as a significant variable in the sample survey. As for the other variables, the results indicated that the existence of the labour teams and the degree of cooperation achieved were the result of (1) the necessity for the timely accomplishment of farm tasks; (2) a zero elasticity of substitution between labour and machinery; (3) the realization of both associational and scale economies; (4) low transaction costs; and (5) the existence of a non-calculative atmosphere.

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In any research endeavour, it is enough to hope that the results contribute in some small way to pushing the frontiers of knowledge, adding on to what others have contributed and making use of the help offered by still others. Research is thus truly a collective effort. This is summed up very well by Professor Wiles, who quotes St. Bernard of Chartres in the foreword of his book Economic Institutions Compared: "We are like dwarfs seated on the shoulders of giants. We see no more things than the Ancients and things more distant, but it is due neither to the sharpness of our sight nor to the greatness of our stature; it is simply because they have lent us their own."

Among these giants are those whose works are discussed in the following pages. Others are equally deserving of acknowledgement.

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January 1988

FOREWORD

This thesis has been the result of a long-standing concern with cooperative farming which began with my involvement in work among small farmers in Mindanao, in the southern part of the Philippines. Many of these farmers were poor, eking out a meager existence from small farms on both lowland and upland areas. I was curious as to why the poor farmers from the same village, or even those who were closely related or were household neighbours, did not band together to improve their livelihood.

The potential for such a coming together was present. For one, considerable numbers had attended a development seminar which was conducted in each village. In this seminar, the participants were required to live together in one place. At the end of the seminar, it was evident that a new bond had been forged among the participants, some of whom had hardly known each other previously, although they came from the same village. This bore fruit in some common "projects" such as preparations for the patronal feast of the village. More economic manifestations of cooperative behaviour which the seminar had fostered was membership in the municipal-wide credit union. However, in the domain of their main livelihood, which was farming, there was little evidence of this new bond.

Another indication of the existing potential for common action was the accepted folk wisdom that collective action

was more effective than individual action in tackling problems that faced the individual or the community. Such wisdom was contained in the popular saying about the use of a broom made from coconut palm fronds. Sticks from the fronds had to be tied together in order to fashion a broom. Hence, the saying arose that with one stick, a person could not sweep away the dirt on the floor, but with many sticks tied together, the job could be done quickly and effectively. Folk wisdom such as this was invoked in the development seminar.

At the time also, the example of the agricultural communes of China was popular in development circles in the Philippines which led me to wonder if the same could not be adopted by small farmers in a market economy.

All these factors together motivated me to look deeper into the factors that determine cooperative behaviour among small farmers. It is my hope that the results of this research will be useful to those who are engaged in organising the poor in the rural and urban areas, whether in the First World or the Third World, to undertake collective action to address the problem of their poverty.

CHAPTER 1. INTRODUCTION

1.1 Objective and Significance of this Study

The primary objective of this study is to analyze, from an economic viewpoint, the determinants of successful cooperation among rural people in developing countries. Since the rural sector encompasses the majority of the population of these countries, the results of this research could be of help in the development of this sector, making use of the most important resource a country has, namely, its people. However, in the course of pursuing this objective, it was discovered that this was not possible without studying the factors that go to affect cooperative behaviour or group action in general, whether in the context of a Third World rural village or that of a modern corporation. Hence, we begin this study with an analysis on a general level and then shift our focus to indigenous forms of cooperation in the rural areas of a developing country.

Interest in forms of cooperation has been aroused because of attempts by both government and non-governmental bodies to either collectivize agriculture and industry, or to organize rural people for various purposes such as viable productive enterprises. The drive to collectivize in the Soviet Union and China inspired similar programmes in Third World countries. In agriculture, we have the example of

the Tanzanian ujamaa. In industry, we have the labour-managed firms of Yugoslavia. Even in countries which are not avowedly socialist, there have been similar attempts. Israel's kibbutzim, which antedate the Russian Revolution, are well-known. Less well known forms of Israeli group farms are the moshavim ovdim and the moshavim shitufi. In the Philippines, which is the focus of this research, there has been the Samahang Nayan movement, a nationwide program which attempted to organize rural villages into pre-cooperatives and eventually into cooperatives. More recently, due to the advent of the Aquino government, interest has been revived in collective farming as an integrated part of agrarian reform.

International bodies, both governmental and non-governmental, which give development aid, encourage cooperative endeavours on the part of the beneficiaries. The International Cooperative Alliance (ICA), based in London, was formed in order to spread the gospel of cooperation and cooperatives. Various non-governmental organizations (NGOs) engaged in development work, whether based in First World or Third World countries, also favour the organization of urban and rural poor into cooperative bodies for various purposes.

This research was undertaken in the spirit of trying to assist those who are trying to decide whether cooperation

and cooperatives or collectives are to be promoted or not. Briefly, it attempts to uncover the basic factors that go to make for cooperation which provides the basis for cooperatives and collectives. The research will be successful if indeed these factors are isolated and identified. If they are so identified, then the disciple of cooperation can determine whether, in a given situation, they are present or not.

If they are present, then the organization of, say, a group of rural or urban poor into cooperative bodies could be more easily fostered as a result of the identification of these factors. If they are absent, then the decision could be taken to adopt an alternative strategy, say, to give development aid to individual households rather than to a group or to base a development strategy on individual households rather than on groups.¹

On the other hand, the opposite decision could be made, i.e., eventually to establish cooperative groups by taking steps to ensure that those factors conducive to cooperation become present. In any case, the isolation and identification of these factors is crucial.

¹ This follows the tenor of Apthorpe and Gasper's (1981) suggestion of how cooperatives should be evaluated, i.e. by being open to alternative ways of attaining the same objective and not being wedded to cooperativism/collectivism as an end in itself.

1.2 Methodology

The methodology used to identify and isolate the factors that affect cooperation is quite simple and straightforward. First, these factors are deduced from a review of quite diverse but relevant literature. Then the validity of these deduced factors are tested by means of case studies of two agricultural labour teams.

One team is engaged in both the transplanting and reaping of palay (paddy), but the team was studied in depth only during the harvest season. The other team is engaged only in the transplanting of palay. The two teams are located in two separate barangay (village) in two regions of the Philippines.

After compiling the case studies, the hypothetical variables are further tested by means of a sample survey of twenty eight agricultural labour teams in ten barangay of the two regions.

Indigenous or traditional forms of cooperation were chosen as the focus for testing the hypothetical variables rather than modern forms of cooperation, i.e., cooperatives. There are several reasons for this. First, at the time this research was undertaken, there did not appear to be many existing modern agricultural cooperatives in the regions accessible to this writer. In fact, it is an impression of this writer that few modern cooperatives exist in the

rural areas of the Philippines. Most of those that do exist and are successful are in urban areas and are composed of salaried employees, whether public or private, and small business entrepreneurs such as market stall holders.

Second, this writer was of the opinion that more could be learned about the factors that bring about cooperation by studying indigenous cooperation rather than modern co-operatives which were, in many cases, organized by external agents.

Third, there have been very few studies of indigenous cooperation from an economic point of view and a study such as this could make up for that lack.

Among indigenous forms of cooperation this writer chose to focus on agricultural activities because of interest in collective or group farming. In the localities which were studied, the most widespread and the most regular form of indigenous cooperation took place in the form of the organization of labour teams for various tasks in rice farming.

There was also indigenous cooperation in non-farming activities. These took the form of social security societies, i.e. death benefits, in one locality (San Ramon). In the other locality (Nagpandayan), the villagers organized themselves for the singing of the Passion of Jesus Christ during Lent. Neither of these activities, however,

were as widespread as the organization of labour teams mentioned above.

The two villages in which the case studies were done are located in Northwestern Luzon or Region 1, and in Central Luzon or Region 3 (see Map of the Philippines). They are the villages of San Ramon in the municipality of Manabo, province of Abra, and Nagpandayan in the municipality of Guimba, province of Nueva Ecija. Their choice was the result of several factors.

First, due to resource constraints and the unsettled peace and order situation in the southern part of the country, Luzon was chosen as the general area where the research was to be carried out. Second, the presence of two non-governmental organizations (NGOs), with whom this writer had contact were working in Regions 1 and 3. They had a good knowledge of the area and had also established rapport with the people living there. Finally, a brief summary using a structured interview was undertaken in 43 villages in Central Luzon. This was followed by a preliminary period of participant observation in both regions. Based on the results of the survey and participant observation, the two villages named above were selected.

Two villages were selected for in-depth investigation rather than one to increase the level of generality of the study and the conclusions arrived at.

REPUBLIC OF THE PHILIPPINES

Provincial and regional map

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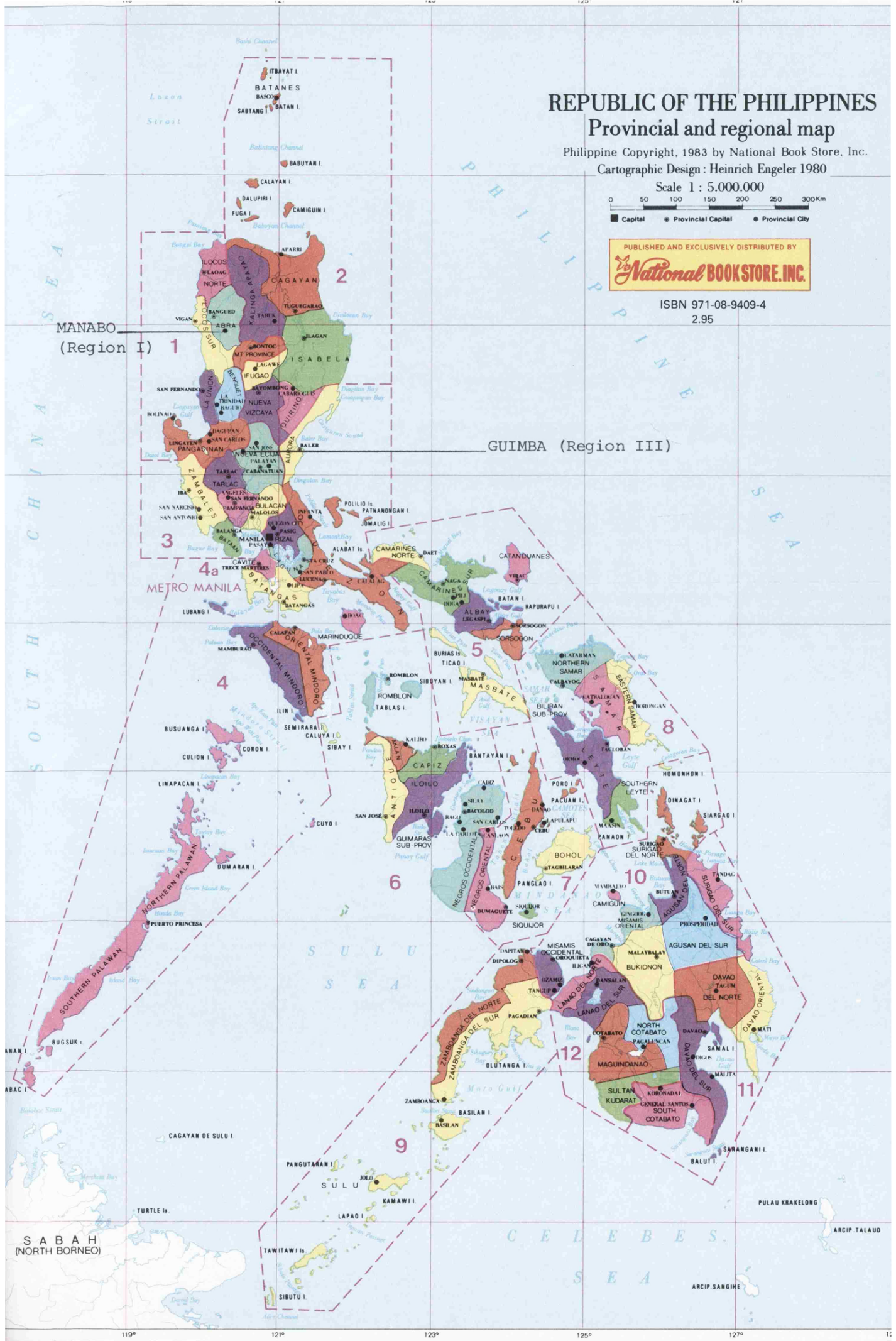
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The main period of participant observation was carried out from June 1983 to January 1984. The bulk of this time was spent in the municipality of Manabo which consisted of five population centres comprised of two barangays each. The focus was on San Ramon but regular visits were also made to the other villages, which were within easy reach of San Ramon.

Soon after the wet season transplanting in June, a random sample of sixty four farmers in Manabo were interviewed to inquire into whether or not they were members of land preparation and transplanting teams and the reasons for their decision. The sample was drawn from the membership list of the irrigators' association which encompassed almost all of the farmers in the municipality. The results of this survey are reported elsewhere (Francia 1988) and are recapitulated in Chapter four. The kabesilya of twenty three transplanting and reaping teams were also interviewed regarding the reasons for the existence of their teams, the number of member households, etc. The results of this set of interviews are also reported in the same article mentioned above.

One labour team in San Ramon was chosen for closer observation during the harvest season which took place from November 1983 to January 1984. Another larger team in San Ramon was also observed for comparative purposes.

The same methodology was carried out in Nagpandayan. However, the labour team chosen for closer observation was a transplanting team and was larger than a second team observed for comparative purposes.

It would have been ideal to have set up a control group of non-member households of cooperative labour teams, whether they were labour demanders or suppliers,² since this thesis attempts to determine how the choice between hired labour (individual action) and cooperative labour (collective action) is made as part of the objective of isolating the determinants of cooperation among farmers. However, it would have required an equally detailed investigation as that of the cooperative labour teams. This was not feasible, given resource constraints.

Moreover, without the existence of the labour teams, there would be no choice to speak of, except to hire labour or to resort to family labour. Very little information has been published about cooperative labour teams in the Philippines. It was hoped that, in spite of the inadequacies of this study, an understanding of the factors that affect cooperation among farmers in a developing country could still be achieved.

The results of the survey of 64 farmers, which included

²These terms are defined in Chapter Three.

both members and non-members of land preparation and transplanting teams, and the results of participant observation also gave a good idea of the reasons for joining or not joining an agricultural labour team. [^]Considering the resource constraints, it was felt that setting up a control group of non-members would not significantly add to the information already available.

Buttressing the decision not to have a control group of non-members¹ households was the fact that participant observation indicated that a relatively substantial number of village households in the research localities tended to be a member of a workteam for at least one farm task, whether it was land preparation, transplanting, weeding or reaping. This was borne out by the results of a random sample survey of thirty households in Nagpandayan, who were not members of a transplanting team. (Please see Table 5-5, p. 213). Forming a random sample of households who did not join any workteam at all would have not have been easy, given resource constraints.

In addition, in the preparation for the sample survey of agricultural labour teams, a number of barangay in the municipality of Guimba were investigated for the existence of such teams.³ It was found out that no teams existed in some of them. The information secured as a result of the

³There are sixty four barangay in Guimba.

above investigation also rendered the creation of a control group of non-member households less compelling.

For the sample survey, all the five population centres in Manabo were included. For Guimba, five villages, where agricultural labour teams existed, were chosen. Three are located in the north of the municipality and two, including Nagpandayan, are in the south. In the ten villages chosen, only transplanting teams were surveyed. The team was the unit of analysis.

For each team, a sampling frame was constructed based on information provided by the team leader or kabesilya⁴. Where the team was small, nearly all the member households were interviewed. Where the team was large, a random sample was drawn. To this was added the kabesilya's household. An exception was the case study team in Nagpandayan all of whose members, except four households who were not available at the time, were interviewed. As much as possible, the respondents for each member household included both spouses.

The survey was carried out in Guimba in October 1984, employing professional interviewers of the Development Academy of the Philippines (DAP) based in Metro Manila. The DAP is an agency of the Department of Education. For Manabo, the survey was carried out in November 1984,

⁴ From the Spanish cabecilla or petty leader.

employing public elementary school teachers as interviewers. A pre-test of the survey instrument was carried out in Guimba in September 1984. The results were analyzed by means of the ordinary least squares technique of multiple regression.

Simultaneous with the survey of transplanting teams in Guimba, structured interviews were also conducted on a randomly selected sample of 30 households in Nagpandayan who did not belong to a transplanting team. For Manabo, data from a random sample of households made in 1982 were available.

The monetary unit in the Philippines is the peso. The exchange rate *vis-a-vis* the U.S. dollar has averaged ₱20.00 to US\$1.00.

CHAPTER 2: A REVIEW OF THE LITERATURE

In this chapter, a review of the diverse but relevant literature is made as a first step toward identifying and isolating the factors which affect cooperation. The literature can be arranged into four categories: (1) economic analysis of cooperative behaviour in general; (2) the so-called property rights literature; (3) discussions on the origin and nature of the firm and (4) studies of exchange labor and other forms of indigenous cooperation in agriculture.

Before beginning the review of the literature, however, it will help to know how cooperation is defined and various types distinguished.

2.1 Definition and Types of Cooperation

Webster's Third New International Dictionary (1986) defines the verb cooperate as: "1. to act or work with another or others to a common end; 2. to act together : produce an effect jointly; 3. to associate with another or others for mutual often economic benefit."

Cooperation is defined as: "1. The act of cooperating, joint operation; common effort or labour; 2. Association of persons for their common often economic benefit, association in a venture the profits or benefits of which are shared; collective action for common well being or

progress; 3. Biological: a dynamic social process associated with organisms living in some degree of aggregation (as in communities or colonies) and characterized by sufficient mutual benefit to outweigh disadvantages (as competition) associated with crowding." The last definition (which looks at cooperation from the viewpoint of biology) can be applied to cooperation among human beings which is also a dynamic social process characterized by sufficient mutual benefits which outweigh the disadvantages associated with working together.

The International Encyclopedia of the Social Sciences

(1968) defines cooperation as:

"Joint or collaborative behavior that is directed toward some goal and in which there is common interest or hope of reward. Cooperation may be voluntary or involuntary, direct or indirect, formal or informal, but always there is a combination of efforts toward a specific end in which all the participants have a stake, real or imagined. At its higher intellectual levels cooperation involves reciprocity of intent as well as jointness of behavior, and it may even become an end in itself. There is no limit to the potential range for cooperation; it is to be found in groups as small as the dyad and as large as leagues of sovereign states.

According to the Encyclopedia, cooperation can be regarded as an ethical norm, as a social process, or as an institutional structure. As an ethical norm, cooperation is stressed in all major religious and moral systems. As a process, "Cooperation is central to the formation of type and to change in types. Closely related to competition,...

cooperative behaviour is one of the central mechanisms of the evolutionary process...." (pp. 384 - 5)

As a social structure, cooperation can be observed in organizations created for joint behavior toward a given goal. These structures "range in size from primitive hunting groups to modern insurance companies and in kind from criminal conspiracies .. to the World Health Organization... They are often religious, political and cultural in character as they are economic." (page 385)

To summarize the preceding discussion on the meaning of cooperation, there are three essential elements of cooperation. First and foremost, there is the commonality of interest, goal, or purpose. Without this commonality, there is no reason for an individual or group to act together with another.

Second, cooperation involves two or more individuals. One does not cooperate with oneself, one cooperates with others, with a group.

Third, cooperation involves joint action. Although, several individuals may have a common goal or purpose, the very commonality of the goal does not necessarily compel each individual to cooperate with others to obtain that goal. Each can attempt to do it by acting alone. For cooperation to occur, they must act together.

Five types of cooperation are distinguished by the Encyclopedia: automatic, traditional, contractual, directed and spontaneous. An example of automatic cooperation is the "unplanned cooperation between two groups (whether national, economic, religious, or racial) which may exist simply by virtue of an independently perceived threat to the security of each; such cooperation may be stimulated by action or threat of action by an outside group..." (p. 385).

Traditional cooperation is not regulated by instinct, volition or simple location but by traditional social norms. It is "one of the mores, as binding upon the participants as any other part of morality" (p. 385). Prime examples are the village community of Asia and Medieval Europe, and craft and merchant guilds the world over in ancient and medieval times.

In contractual cooperation, the terms are "specific and conditional upon the will of the participants or governed by legal sanctions, and they are precise both in terms of length of cooperation and of what is specifically required by the relationship. Contractual cooperation commonly increases sharply in historical periods during which the close ties of the traditional community are supplemented by the more individualistic and utilitarian ties of an open society." (page 385)

Examples of formal contractual cooperation given are

various types of cooperatives and profit-sharing plans while baby-sitting and car pools exemplify informal contractual cooperation.

The oldest and most universal form of directed cooperation is military organization. In the modern world, "large-scale business enterprise, labour unions, school system, and even religious and recreational organizations could hardly survive without the form of organization that arises from command or direction. The source of cooperation here is only incidentally or derivatively a common recognition of goal or a clear norm." (page 386)

Spontaneous cooperation is situational in character and constitutes the essence of relationships within the family, neighbourhood, play groups, and other close, personal forms of association. It is most common where there is a basis of amity and can contribute a great deal to the success of the directed type of cooperation.

The preceding discussion of various types of cooperation shows the application of the term to a wide spectrum of situations and groups. It should be noted that the various types can overlap. For instance, a business firm exhibits both contractual and directed cooperation.

Since the focus of this thesis is on indigenous forms of cooperation, a definition of what it means will be suggested here. Indigenous cooperation means that it was

initiated and developed by the people of a locality without the aid of an external agent. Non-indigenous forms of cooperation, by contrast would be introduced into a locality or group by an external agent. An example of the latter is the modern cooperative from the viewpoint of developing countries. In some instances, it was imposed by the State on local communities.

2.2 Economic Analysis of Cooperative Behaviour in General

A work which is relevant to the topic of this paper is that of Olson (1971). He gives his book the subtitle of "Public Goods and The Theory of Groups". By "public good" he means "an inseparable, generalized benefit" which must be available to everyone if it is available to anyone. More specifically, "the achievement of any common goal or the satisfaction of any common interest means that a public or collective good has been provided for that group. The very fact that a goal or purpose is common to a group means that no one in a group is excluded from the benefit ' or satisfaction brought about by its achievement... It follows that the provision of public or collective goods is the fundamental function of organizations generally..." [p. 15].

Olson then raises the question whether there is any relation between the size of the group and individual incentives to contribute toward the achievement of group goals. In other words, should a theory of groups

distinguish between large and small groups? In a large organisation, the individual member's efforts will generally not have a noticeable effect on the situation of his organisation, and he can enjoy any benefits brought about by the efforts of others even if he does nothing. This is the well-known free rider problem. This lessens the likelihood of a large group providing a collective good. In order to do this, it has to offer incentives, other than achievement of the collective good itself. These incentives Olson calls "non-collective" goods, or goods which can also be secured through individual action.

One example he gives later on in the book is the provision of social security benefits to members by labor unions in order to attract membership. Olson thus formulates the proposition that, outside of special incentives or coercion, large groups of rational, self-interested individuals will not act to further their common interests. However, small groups, by definition, would not have the same problem, and therefore would be more likely than a large group, to provide a collective good. Is this true?

Olson argues affirmatively. The gist of his argument is as follows: In a sufficiently small group, there will be at least one member whose share in the collective good will be greater than the total cost of the collective good. Therefore, even if he were to bear the whole cost of

providing the collective good, he would still gain. Would an optimal amount of the collective good be provided?

Yes, if the share of that individual in the marginal total benefits equals the marginal cost of acquiring more of that collective good. The acquisition of more of a collective good entails more benefits as well as more costs to the group. If the share of the individual (who stands to gain from the provision of the collective good even if he were to bear the whole cost) in the additional group benefits were equal to the marginal cost of such benefits, then he will provide the optimal amount of the collective good.

Thus Olson concludes that "some sufficiently small groups can provide themselves with some amount of a collective good through the voluntary and rational action of one or more of its members. In this, they are distinguished from really large groups" (pp. 32-33; underlining supplied). Again, on page 36, Olson concludes:

The most important single point about small groups in the present context, however, is that they may very well be able to provide themselves with a collective good simply because of the attraction of the collective good to the individual members. In this, small groups differ from large ones. The larger a group is, the farther it will fall short of obtaining an optimal supply of any collective good, and the less likely that it will act to obtain even a minimal amount of such a good. In short, the larger the group, the less it will further its common interests.

An example of a small group that Olson mentions is the North Atlantic Treaty Organization in NATO where a large country like the United States bears a "disproportionately" large share of the cost of collective defense, presumably because its share in the collective good is greater than the total cost of providing the good.¹

For groups in general, Olson states a necessary condition for the optimal provision of a collective good through the voluntary and independent action of the members. This condition is: The marginal cost of additional units of the collective good must be shared in exactly the same proportion as the additional benefits, for then, each member's marginal costs and benefits will be equal at the same time that total marginal cost equals total marginal benefits.

Size, for Olson, is thus a very important determinant of cooperative behaviour. Related to size are the "costs of organization" which consist of "the costs of communication among group members, the costs of any bargaining among them, and the costs of creating, staffing, and maintaining any formal group organization" (p. 47). The bigger the group, the greater are the costs of organization and the less likely that the group will achieve its collective good.

¹See also Olson and Zeckhauser (1966).

A shortcoming of Olson's work is its limitation to special interest groups such as labour unions, farmers' associations, professional associations, etc. operating in the United States. His theory of groups is geared toward explaining their existence, although he also uses it to evaluate economic theories of the state and of Marx's theory of class.

Olson does not explain the existence of "market groups" which are formed for the production of a good or service for sale in the market. He writes that the main concern of his study is the "group situation outside the market place" or non-market groups" (Cf. p. 27). Because of this focus, he comes to the conclusion that size is the main determinant of whether or not cooperative behaviour will take place, mentioning other factors only in passing.

Olson approaches the problem of cooperation using the calculus of marginal costs and marginal benefits. Another set of literature treats the problem of cooperation from the perspective of game theory which has the advantage of more adequately taking into consideration the fact that choices are inter-dependent.

The Prisoners' Dilemma is a now famous representation of the problem of cooperation. It not only elaborates on the free-rider problem but also predicts that non-cooperation will inevitably be the result of each player

pursuing his own individual interest even though cooperation would result in higher pay-offs for all players.

To borrow Collard's (1978) formulation of the Prisoners' Dilemma (and substituting present day letters of the alphabet for the Greek letters), *A* denotes a cooperative strategy while *B* denotes a non-cooperative one. With two players, the pay-offs are as in Table 2.1 (reproducing Table 4.1 of Collard).

Table 2.1 Pay-Off Matrix

		Player 2			
		: Strategy :	: A :	: B :	
Player 1		:	:	:	:
	: A :	: AA, AA :	: AB, BA :		
	:	:	:	:	:
	: B :	: BA, AB :	: BB, BB :		

Collard notes that it is the relative sizes of the pay-offs which determine whether a game is of the Prisoners' Dilemma type or not. Thus, in a Prisoners' Dilemma game, the ranking of the pay-offs for Player 1 are:

free rider's pay-off (*BA*) > cooperative pay-off (*AA*) > non-cooperative pay-off (*BB*) > sucker's pay-off (*AB*)

and symmetrically for Player 2. With this assumed ranking of pay-offs, selfish behaviour will drive both players to choose the non-cooperative pay-off (*BB, BB*).

However, if the ranking of the pay-offs for Player 1 (and symmetrically for Player 2) were

$$AA > BA > BB > AB$$

then cooperation will be chosen by both players. This is no longer a Prisoners' Dilemma but an assurance game. Because the payoff for cooperation is greater than the payoffs for other types of outcome for both players, Player 1 can expect that Player 2 will cooperate, and vice versa. Thus cooperation is assured. Unfortunately, Collard notes, the type of situation denoted by the Prisoners' Dilemma appears more common than assurance games.

If the Prisoners' Dilemma predicts that, in the situation that it describes, the players will choose non-cooperation (and thus make everyone worse off than if they choose cooperation), there is evidence that falsifies the prediction. Weintraub (1975, p. 37) points out that "many psychological studies have indicated that the Prisoner's Dilemma game, if played several times, leads to a determinate equilibrium which is likely to be 'group rational' [i.e. cooperation]." He also notes that public goods do get produced (albeit underproduced) in spite of the fact that their provision is typical of the Prisoners' Dilemma situation, i.e., the pay-off for free-riding is greater than for cooperation, and so on.

Collard suggests that altruism and trust explain why

the Prisoners' Dilemma is overcome. Altruism is embodied in the fact that each player gives a weight ν to the pay-off of the other player, i.e., the outcome to Player 2, is of concern to Player 1. Further, each player believes the other will cooperate with a certain degree of probability π . The necessary levels of ν and π , i.e., the level of altruism and trust depends on the difference between the cooperative pay-off and the free-rider pay-off. The bigger the free-rider pay-off relative to the cooperative pay-off, the greater the level of altruism and trust that is necessary to falsify the prediction of the Prisoners' Dilemma.

Collard further postulates that π is a function of "various factors, including whether or not he [the other player] has given an assurance of cooperation, my trust in human nature, his previous record of cooperation, our subscription to a common ethic and so on" (p. 39). He concludes:

People are able to make the imaginative leap to cooperative behaviour if they are aware of the social advantages of cooperation and if their self-interest is modified by an α -biased ethic. They are able to perceive that the temptation and sucker pay-offs are illusory and that the game really boils down to cooperation and non-cooperation. But if this is so, is it a matter of indifference to us whether cooperation is described in terms of (modified) pay-offs or ethics? The great and essential difference is that by retaining a pay-off structure in which the pay-offs are self-interested, as the basis, one is able to show how powerful the ethic has to be in order to secure cooperation. The economist, in his humdrum fashion, then feels able to predict for specific socio-economic situations whether or not spontaneous cooperation is likely. (pp. 43-44).

Axelrod (1984), however, argues that it is not necessary to assume altruism and trust in order to solve the Prisoners' Dilemma. The question he poses is: "Under what conditions will cooperation emerge in a world of egoists without central authority?" (p. 3). To answer the question, he runs computer simulations of iterated Prisoners' Dilemma, using different strategies submitted by various experts and hobbyists.

The result of the simulations is that a strategy of reciprocity (called *TIT FOR TAT*) is the most robust in leading to cooperation. It consists of the decision rule to cooperate first and then to reciprocate whatever the other player does in response. Axelrod states that a necessary condition for the emergence of cooperation is the existence of even small clusters of individuals who employ the strategy of reciprocity and who will discriminate between those who respond to cooperation and those who do not. Otherwise, if a world of unconditional defection is assumed, cooperation will never get started.

Yet he also says that "There is no need to assume trust between the players. The use of reciprocity can be enough to make defection unproductive. Altruism is not needed: Successful strategies elicit cooperation even from an egoist." (p. 174). In this last statement, Axelrod seems to have moved from the initial position in the game to a subsequent position where the use of reciprocity has had its

effect on egoists' responses.

The question still remains: What leads an individual to decide to cooperate first, and what accounts for the existence of "small clusters" of such individuals? It would seem that one would have to assume altruism and trust, and these cannot be explained by the science of economics.

Another necessary condition for the emergence of cooperation, according to Axelrod, is what he calls the "shadow of the future." This is the condition that the other players with whom one interacts will be around for an indefinite period of time and this fact will have a bearing on a player's response in the present. To quote:

For cooperation to be stable, the future must have a sufficiently large shadow. This means that the importance of the next encounter between the same two individuals must be great enough to make defection an unprofitable strategy when the other player is provokable. It requires that the players must have a large enough chance of meeting again and that they do not discount the significance of their next meeting too greatly. (page 174)

Finally, to summarise some of the points brought up earlier, a cooperative outcome to a Prisoner's Dilemma Game is more likely if (1) it is played repeatedly and (2) among the same group of players, in contrast with a one-off play of the game.

2.3 The Property Rights Literature

The property rights approach to economic analysis is so

named because of the importance it attaches to property rights assignments in the analysis of a given situation. A part of this literature discusses the establishment of property rights, including collective rights, which are the ultimate expression of cooperative behaviour. Other parts of this literature do not directly address the problem of cooperative-individualistic behaviour but touch on the subject and suggest some very important factors.

A major source of the property rights approach to economic questions is the discussion of externalities and how they can be "solved". An externality arises when some of the benefits (costs) that arise out of the actions of individuals or groups are appropriated by other individuals or groups. The usual example is that of a factory whose smoke pollutes the air. Initially, at least, residents living near the area bear the costs of the polluted air (e.g. increased incidence of respiratory ailments), and not the factory owner(s) who may not live in the area. In this case, a non-beneficial externality has been created. If no corrective action is taken, more air may be polluted than is necessary.

Coase (1960), in considering the problem of the polluting factory, writes that the liability (or conversely, the right to clean air) can be assigned, either to the owner of the factory or to the residents living in the vicinity. Previous solutions tended to place the burden on the factory

owner. Since the factory produces something useful and creates employment, curtailing the smoke by installing some device involves a cost, which has to be compared against the benefits derived from cleaner air. The residents in the vicinity of the factory are just as liable for the existence of the nuisance, *i.e.*, polluted air. They could move elsewhere, and they would if the benefits from moving were greater than the costs.

Hence, it would pay both the factory owner and the residents to strike a bargain, the result of which would be greater total wealth. This would happen if striking such a bargain were costless. But if no bargain is struck, it is because transaction costs exist, some of which may be prohibitive. For instance, the residents could come together and pay the factory owner to reduce smoke or to close down altogether, that is, the residents have to work together in dealing with the factory owner(s). But to determine what each resident ought to contribute, each individual's marginal utility for clean air would have to be specified. This means that some individuals may value clean air more than others, and so would have to contribute more. It is difficult to discover each individual's marginal utility, resulting in an incentive for the individual to understate it in order that he may contribute a smaller amount. Thus, cooperative behaviour is prohibitively costly in this instance.

Government regulation is another way of resolving the problem, *e.g.*, zoning regulations. But this, too, entails costs, *e.g.*, government bureaucracy. To evaluate these two "solutions", private bargaining versus government fiat, the proper procedure, according to Coase (p. 34) is to compare the "total social product" yielded by the two "social arrangements".

Another source of the property rights discussion was the attempt to make the theory of the firm more in tune with reality. In theory, the firm was regarded as a monolithic unit, pursuing one goal, namely, profits. In reality, a firm is made up of individuals who may have different goals. Furubotn and Pejovich's (1972) review of the literature distinguishes between two groups within the modern, capitalist corporation: the owners and the managers. The owners are the shareholders who have the right to appropriate the residual (profits) of the firm. However, where the ownership of the firm is widely dispersed, as is usually the case in modern corporations, the managers (qua managers, because they may also be shareholders) have an incentive to appropriate some of the residual for themselves in the form of bigger staff and offices, company cars and other perquisites.

The incentive for managers to resort to individualistic behaviour exists because of the high cost to shareholders of detecting, policing and enforcing profit maximizing

behaviour on managers, i.e. the principal-agent problem. Those who suspect the managers of non-cooperative behaviour may not have access to information that will prove them right. Even if they did, they would still face the costs of presenting such information to numerous other shareholders, and in an easily digestible form. Even if they succeed in doing this, they still have to convince the other shareholders that they are not engineering an opportunistic takeover themselves. Thus, the costs to shareholders of bringing about cooperative behaviour on the part of managers are high.

Conversely, the costs of individualistic behaviour on the part of managers is quite low since they cannot easily be exposed. At the same time the cost to them of cooperative behaviour is the perquisites which they would have to forego. However, they face a constraint in the form of the existence of a stock or capital market. Because of the existence of such a market, the shareholder who suspects management of appropriating the corporation's profits (which should be going to him) has the option of selling his stocks. The more the shareholders that do so, the more the value of the stock falls, leading still more shareholders to unload their shares, resulting in a downward spiral. The end result could be a takeover of the corporation by another firm, with the consequent replacement of managers, or the dissolution of the firm.

Furubotn and Pejovich overlook the fact that rank and file employees also resort to individualistic behaviour. Because monitoring costs with respect to employees such as secretaries, clerks, etc. are nonzero, they can also indulge in individualistic behaviour, e.g. appropriate office supplies for themselves, take a longer coffee break, etc. The extent to which they do so will again depend on the relative costs of such behaviour.

Another strand in the property rights literature is concerned with the creation of property rights (Pejovich, 1972). Marx and Engels were the first to argue that property rights are endogenously determined as a result of changing production relations. As capital becomes more and more concentrated, the scale of manufacturing grows even larger and machines have to be made bigger and bigger. This was thought to lead to the establishment of collective property rights since such large manufacturing enterprises could only be run by the State. Wiles notes that a Soviet-type economy (STE) encourages the use of large four-wheeled tractors and discourages the introduction of the small hand tractor since this would lead to the breakup of kolkhozi or collective farms into small, private farms (pp. 113, 140, 146).

An example of collective rights which were endogenously determined is the analysis of the open-field system in northern Europe by Dahlman (1980). Before inorganic

fertilizer was invented, European farmers relied on the manure from livestock (sheep and cattle) to grow grain. That they grew livestock for other purposes is, of course, evident, but the production of manure was one very important reason. In order to manure their fields efficiently and reap economies of scale, the villagers decided to graze or pasture their livestock as one unit on their arable lands during the off-season. This meant that, for a given length of time during the year, boundaries marking off individual farms were ignored and collective property rights were established over all arable land.

In order to make the arrangement work, a village committee was formed to oversee the common pasturing of livestock. Moreover the large fields were divided into smaller plots and the cultivator's rights were dispersed among these plots. This was done in order that not one cultivator would have the potential to secure greater benefits for himself by threatening to withdraw his large field from the common pasture, or totally with the other large cultivators for a similar purpose.

To quote Dahlman :

Large scale, communal grazing is desired within the context of land held in private ownership. Each owner must be persuaded to open up his land to grazing by others. By virtue of the increasing returns to land in grazing, this is the more important the more land the individual farmer controls, for the more he adds to the total grazing area. Yet the larger any one farmer, the

greater his bargaining power vis-a-vis the rest. The more land he controls, the more he can cause economic damage to the others by threatening to pull out of the communal grazing. This difficulty is inherent in the desire to combine private property with collective control. Its decision in the open field system, elegant in its simplicity, is scattering. ...What the scattering thereby achieves is the creation of an incentive for the farmer to participate in the collective decision-making and control necessary to regulate the use of the large grazing areas in both the commons and in the arable fields. (pp. 124-125)

Economies were also realized by having one herdsman or shepherd to oversee the flock, rather than a number of herdsmen or shepherds overseeing an equal number of smaller flocks.

Dahlman's original purpose was to explain why farmers in northern Europe in the Middle Ages tilled scattered fields for many years rather than consolidate their fields in one location by exchanges with other farmers.¹ However, his analysis indicates several costs and benefits of cooperative/individualistic behaviour. The need for cooperative behaviour (collective property rights) arose from two exogenous factors, namely, a very low elasticity of substitution between animal manure and other types of fertilizer, and the existence of scale economies that could result from cooperative behaviour. In order to maintain

¹Wiles (1977, p. 103) maintains that the scattered plots are explained by general risk insurance, e.g. to minimize the damage to one's crop brought by hailstorms or cattle breaking in, by noblemen's hunting parties, etc.

such behaviour, the distribution of assets in the form of land was altered by the breakup of large fields.

With respect to the first factor, if farmers had had access to inorganic fertilizer at competitive prices, it seems reasonable to suppose that they would have substituted such fertilizer for animal manure since the farmer could have applied the necessary quantity rather than depend on something over which he had little control. Another possible substitute would have been night soil, which has long been used as farm fertilizer in China. However, perhaps due to cultural mores, this may not have appealed to north European farmers as a substitute for animal manure. In either case, the elasticity of substitution between animal manure and both inorganic fertilizer and night soil was zero.

Given that the only source of fertilizer was animal manure produced by their livestock, the possibilities of reaping economies of scale by pasturing their flocks as one unit must have subsequently occurred to the villagers.

Since an adequate supply of grain was crucial, especially to tide one over the winter season, the costs of non-cooperative behaviour must have been relatively high, so high in fact that villagers with relatively large contiguous fields agreed to their dispersal. Thus, even, though transaction costs of organizing, bargaining and policing any agreement were positive, the establishment of

collective property rights over arable land and the cooperative behaviour it entailed was brought about.

2.4 The Origin and Nature of the Firm

Briefly, the firm is a group of resource-owners organized to use their resources jointly to produce any number of products and/or services. A discussion of the firm is relevant to the problem of specifying the costs and benefits of cooperative/individualistic behaviour since a firm involves teamwork or cooperation. Coase (1937) proposed that firms come into existence because, under certain conditions, they represent a more efficient way of organizing economic activity than the market.

A factor of production (or the owner thereof) does not have to make a series of contracts with the factors with whom he is co-operating within the firm, as would be necessary, of course, if this cooperation were as a direct result of the working of the price mechanism (e.g. the market). For this series of contracts is substituted one. At this stage, it is important to note the character of the contract into which a factor enters that is employed within a firm. The contract is one whereby the factor, for a certain remuneration (which may be fixed or fluctuating), agrees to obey the directions of an entrepreneur within certain limits. The essence of the contract is that it should only state the limits to the powers of the entrepreneur. Within these limits, he can therefore direct the other factors of production. (p. 391)

In addition, if a contract through the market is to be made for a long period of time, the contracting parties may find it difficult to fully specify the contract terms

because of the difficulty involved in forecasting. This would be especially true if the contract involved services. Thus it would be more economical to carry on the transaction within the firm where the direction of resources becomes dependent upon the entrepreneur.

Finally, Coase makes the point that "a firm will tend to expand until the costs of organizing an extra transaction within the firm become equal to the costs of carrying out the same transaction by means of an exchange on the open market or the costs of organizing in another firm" (p. 395).

Alchian and Demsetz (1972) argue that the firm comes into existence because of the existence of team productive activities in which the joint use of inputs leads to a larger output than the sum of the products of the separately used inputs. The example that Alchian and Demsetz gives is that of two men lifting heavy loads onto a lorry.

The joint use of inputs leads to problems of metering the marginal productivity of each input in order to reward each input owner accordingly and to match marginal product with marginal cost. If rewards (and costs) are not matched with marginal productivities, there is an incentive on the part of the input owner to shirk.

Because of the difficulty of measuring each other's marginal productivity input owners agree to leave the decision to one person, a monitor. In order that he, in

turn, will not shirk on his monitoring duties, he is given the right to claim the residual, after all costs have been paid (including the appropriate rewards to input owners) of the team's activity.

It is also essential that the monitor have the "right to alter individual membership and performance of the team" (p. 782). In order to discipline team members and thus reduce shirking, the monitor must have the power to revise contract terms of individual members. In order to meter marginal productivities, he must have the power to manage the ways by which inputs are used in team production.

Alchian and Demsetz claim that their theory of the origin of the firm "takes a step down the path pointed out by Coase." According to them, while Coase introduced the notion of transaction costs as determinative of whether a firm will exist or not, he does not consider the facts of team production, team organization, metering and shirking problems and the residual claimant status of the employer or monitor.

Alchian and Demsetz also bring into consideration technological developments which lower the cost of market transactions but at the same time expand the role of the firm. They cite the following example:

When the "putting out" system was used for weaving, inputs were organized largely through market negotiations. With the development of efficient central sources of power, it became

economical to perform weaving in proximity to the power source and to engage in team production. The bringing in of weavers surely must have resulted in a reduction in the cost of negotiating (forming) contracts. Yet, what we observe is the beginning of the factory system in which inputs are organized within a firm. Why? The weaver did not simply move to a common source of power that they could tap like an electric line, purchasing power while they used their own equipment. Now team production in the joint use of equipment became more important. The measurement of marginal productivity, which now involved interactions between workers, especially through their joint use of machines, became more difficult though contract negotiating cost was reduced, while managing the behaviour of inputs became easier because of the increased centralization of activity. The firm as an organization expanded even though the cost of transactions was reduced by the advent of centralized power. The same could be said for modern assembly lines. Hence, the emergence of central power sources expanded the scope of productive activity in which the firm enjoyed a comparative advantage as an organizational form. (p. 784).

Alchian and Demsetz then test their propositions by seeing whether they explain the different types of firms: profit-sharing firms, socialist firms, the corporation, mutual and non-profit firms, partnerships and employee unions. With respect to partnerships, these tend to arise in artistic or professional intellectual skills, e.g., law firms, because of the great difficulty of monitoring individual performances. Each partner monitors himself and therefore is a residual claimant. Because of the need for self-monitoring, "partnerships are more likely to occur among relatives or long-standing acquaintances, not necessarily because they share a common utility function,

but also because each knows better the other's work characteristics and tendencies to shirk" (p. 790; under-scoring supplied).

Williamson (1975) develops further Coase's consideration of whether a transaction will be mediated by the market or will occasion the need for internal organization. Transaction costs are the main consideration for him. If they can be reduced by the market, more than by internal organization, then there is no need for the latter. However, if originally, internal organization, i.e., the firm, were the more efficient mode but transaction costs increase because of increase in firm size, then organizational innovation can occur, as it has occurred, which can make the firm still a more efficient mode of handling transactions *vis-a-vis* the market. From this, Williamson draws the conclusion that the giant conglomerate firm is not necessarily less efficient than the market in allocating resources and suggests that antitrust policies should be formulated which keep this in mind.

The organizational form of productive activities evolves from simple to complex in response to increasing transaction costs. The simplest form is the worker peer group with no head and no subordinates. "These groups involve collective and usually cooperative activity, provide for some type of other-than-marginal productivity and income sharing arrangement..." (Williamson, pp. 41-42).

Three occasions are cited for the formation of peer groups. First is the existence of indivisibility in physical assets or in setting up information systems, with the opportunity for scale economies. Second is the opportunity for risk-pooling (insurance) "if such membership can provide income guarantees to buffer the effects of unanticipated contingencies in terms superior to that which market insurance can provide" (p. 43). Third is the opportunity for associational gains which are occasioned by "increased productivity among members of the group who feel a sense of responsibility to do their fair share... but, left to their own devices would slack off" (p. 44).

Whether the peer group will be formed or not revolves around the question of how successfully the group deals with transaction costs. In particular, because it is a peer group, there is no decision centre but rather an "all-channel network" exists where everything is communicated to everyone and joint decisions are reached. Bounded rationality sets a limit on the efficiency of such a network as group size increases. Bounded rationality is human behaviour which is "intendedly rational but only limitedly so" (Simon, 1961, p. xxiv). The limitations spring from "neurophysiological limits on one hand and language on the other. The physical limits take the form of rate and storage limits on the power of individuals to receive, store, retrieve, and process information without error...

Language limits refer to the inability of individuals to articulate their knowledge or feeling by the use of words, numbers or graphics in ways which permit them to be understood by others..." (Williamson, pp. 21-22).

Another source of transaction costs, opportunism, may be surmountable only by auditing members' performance and paying compensation in accordance with observed productivity ("experience rating"). But these measures violate the very meaning of a peer group. Thus, the group may break up.

However, the group does not necessarily have to dissolve. It can be transformed into a more complex form in which there is a decision centre and one individual is assigned the tasks of auditing and experience-rating. Williamson calls this organizational form "simple hierarchy".

On the other hand, a complex hierarchy evolves when a set of technologically separable work groups corresponding to the stages in the production of a final good, each organized as a simple hierarchy, merge into one firm in order to minimize transaction costs. This is known as vertical integration.

As firm size and the degree of vertical integration increase, transaction costs increase correspondingly, and new, still more complex organizational forms evolve in response. Thus there is the unitary form (U-form) of

enterprise which is appropriate for small to "lower middle-sized firms" turning out one product, e.g. oil, tobacco. It is the "traditional functionally organized enterprise" (p. 152). Its structure is illustrated in Figure 2-1 (which reproduces Figure 5, p. 134 of Williamson).

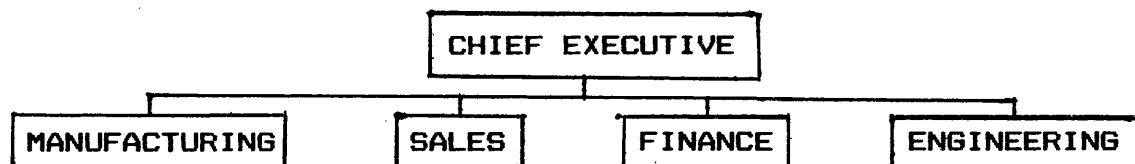


Figure 2-1. Structure of the Unitary Form of Enterprise

As the firm diversifies, the multi-divisional (M-form) organization emerges. Its structure is illustrated in Figure 2-2 (reproducing Figure 6, p. 138 of Williamson).

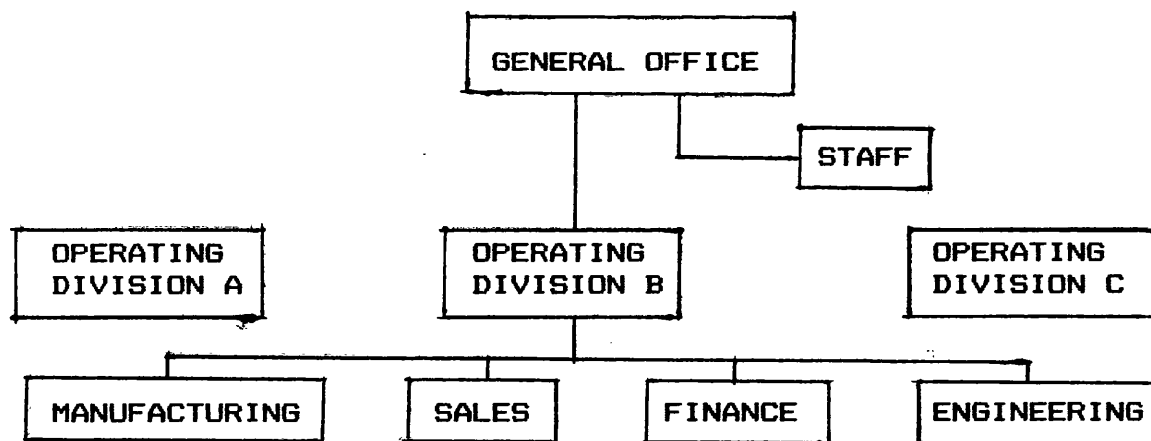


Figure 2-2. Structure of the Multidivisional Form of Enterprise

The advantages of the M-form over the U-form for the larger firm are stated succinctly by Williamson (pp. 137-138):

In relation to the U-form organization of the same activities, the M-form organization of the large, complex enterprise served both to economize on bounded rationality and attenuate opportunism. Operating decisions were no longer forced to the top but were resolved at the divisional level, which relieved the communication load. Strategic decisions were reserved for the general office, which reduced partisan political input into the resource allocation process. And the internal auditing and control techniques, which the general office had access to, served to overcome information impactedness conditions and permit fine tuning controls to be exercised over the operating parts.

Moreover, because of the extensive internal control apparatus that is part of the M-form, made possible by the separation between strategic (long-term) and operating (day-to-day) decision-making, the M-form firm can be regarded as a "miniature capital market" (p. 145) that can detect the divergence of managers' behaviour from the firm's overall goal of profit maximization more effectively than traditional capital markets.

Economic theory has taught that attempts by managers to "opportunistically promote their own goals at the expense of corporate profitability" would result in a devaluation of the firm's stock in the stock market. This was supposed to occasion a change of management, with those who perceived the lapse taking control of the corporation and quickly restoring profit maximizing behaviour. Thus we have the fiction of "frictionless" capital markets. Those who perceived the lapse in managers' behaviour cannot, in fact, take over quite so easily, as was discussed in section 2-2.

A final element which renders internal organization a better alternative to the market in mediating an exchange is what Williamson calls "atmosphere" or the provision of a satisfying exchange relation where the exchange process itself is regarded as an object of value (p. 38). The relevance of atmosphere arises when the question of the intensity of metering transactions arises. Individuals may choose internal organization over the market because there is greater flexibility in fulfilling the terms of an exchange.

In his discussion of the existence of indivisibilities in physical assets as well as in information systems as an occasion for the formation of worker peer groups, Williamson argues that such indivisibilities do not necessarily imply collective organization because, "technologically speaking, there is nothing that prevents one individual from procuring the physical asset in requisite size and contracting to supply the services of this asset to all of the members of the group. Similarly, there is no technological bar that prevents one individual from assuming the information gathering and dissemination functions..." (p. 42). What leads to collective organization according to Williamson, are the existence of transaction costs due to bounded rationality and opportunism. Therefore, the basis for collective organization in Williamson is transactional in origin.

However, it cannot be denied that without the existence of the indivisibilities in physical assets or information systems in the first place, there would be no incentive for collective organization where such inputs are essential for a particular activity in which individuals are interested. Moreover, if such indivisibilities occasion the formation of worker peer groups in a particular activity, there is no reason why it should be limited to the explanation of the existence of such groups only and not to the existence of simple and complex hierarchies involved in the same activity and which have evolved from the worker peer groups. In this instance, it can be said that the existence of indivisibilities are a necessary but not sufficient condition for collective organization.

Williamson does not restrict himself to discussion of the choice between market transactions and internal organization but goes on to discuss the choice between degrees of cooperation and non-cooperation within the firm. Thus he distinguishes between "consummate" and "perfunctory" cooperation where the former involves initiative on the part of an employee and the latter means minimal job performance (p. 69). An extreme case of non-cooperation by employees in a firm is industrial sabotage.

Leibenstein (1975, especially chapter 3; 1978) takes a close look at behaviour within the firm. According to him, because labour contracts cannot be completely specified,

there is an area within which both managers and employers can adjust their "effort levels" upward or downward. This fact gives rise to "X-inefficiency", accounting for a lot of the potential for development.

Traditional economic analysis has emphasized allocational efficiency, i.e., the condition which obtains when all resources are employed in their most productive uses. However, it has not considered the fact that, even when allocational efficiency has been achieved, efficiency gains can still be obtained by motivating resource owners to use their resources more efficiently by increasing their effort levels.

Such motivation can come from various sources such as competition, payment by results, organization, etc. Thus a manager or worker may possess knowledge which, when applied, can lead to greater productivity or higher profitability. The fact that he possesses such knowledge is not easily discovered by the others in the firm, including stockholders, who would benefit from the application of such knowledge. He may, however, divulge or apply such knowledge when competition from other firms increases or when the system of compensation is altered.

2.5 Indigenous Forms of Cooperation

In the preceding two sections, a brief review was made

of the economic literature in two areas which are related to the problems of specifying the determinants of cooperation. In this section are reviewed economic, sociological and anthropological studies of indigenous forms of cooperation, which is the immediate focus of this study. The open-field system can be viewed as an indigenous form of cooperation. The examples given in the literature below are of more recent occurrence.

2.5.1 Indigenous Cooperation in General

The aim of Galjart's (1981) paper is to address the issue of what use may be made of traditional cooperative organizations for modern productive purposes. He notes that the pooling of resources by rural groups "is nowadays not much less wide-spread than market groups". However, the individual in a traditional society will depart from traditional notions about equivalence and compare inputs with expected rewards. He concludes that "the decision to participate in joint efforts can be better explained in terms of equitable ratios of inputs and expected outputs than in terms of customary practice" (p. 10).

Galjart mentions the "frequent recommendation" that groups engaged in collective work should be small (ten to twenty persons) in order to exercise more effective "social control" over members' work. Also, deliberations are easier

to organize. However, in order to reap economies of scale, "higher level associations" can be formed.

2.5.2 The Labour Group

For Wong (1971), the existence of mutual aid teams or MATs in pre-Communist China were an example of how Chinese farmers efficiently utilized the scarce resources at their command. The labour MATs arose because of labour scarcity during the peak seasons in the wheat and rice regions, especially in the task of planting and harvesting. This scarcity could be dealt with by labour-saving devices, which would have meant greater capital investment and the introduction of new kinds of inputs, but which in fact did not occur. The rich and middle income farmers could afford to hire labour. The poorer farmers, who were the majority, had to "buy" labour with labour, i.e., labour exchange or jen-kung pien kung.

A deeper reason for the existence of labour MATs, according to Wong, was the necessity for a Chinese farmer to increase his "operational farm size" (pp. 339-340). It was found that a peasant couple, during the transplanting of rice, could only attend to a 0.7 acres of land (3,415 sq.m.), which was not enough to grow rice for family consumption, given soil fertility.² Since the Chinese farmer was generally capital poor, he lacked the equipment to extend his operational farm size, or he lacked the means

to be able to hire labour. Thus, he entered into labour exchange agreements.

To quote Wong:

In many areas in China, the amount of land a peasant could work on was limited by what he and his family could manage during the busiest peak. Paradoxically, his low labour productivity plus the climatic constraint defined the amount of land he could undertake to cultivate, even more than the overall constraint from the unfavourable man-land ratio in that area. Given the situation of limited technical substitution, his "operational farm size", which in this case is a function of the labour resources at his command, had to be small, sometimes even at a level lower than what was required for his survival. MATs were one way to help him to raise his "operational farm size" (pp. 339-340).

Still another reason for labour MATs was a "certain degree of increased efficiency through a limited process of division of labor in addition to the increased enthusiasm of people working in groups of their own volition" (p. 339). This also gave rise in North China to the formation of labour gangs called chakung or "poor peasants hiring out their labour to work the land of others in groups".

Wong also observes that MATs were popular because they were more informal than working for wages which entailed stricter monitoring. Such informality arose because membership was based on kinship and friendship, and on a more or

² Wong does not mention the farm size in this particular example but elsewhere in the article mentions that the median size of rice farms, based on a survey of 22 provinces, was 2.05 acres.

less equivalent social standing. These considerations reduced the risks of conflict that could arise if membership were selected on factors other than these.

In a footnote, Wong alludes to the small size of labour MATs: an "optimum crew" of ten for harvesting rice -- four reaping, four threshing, and two carrying grain from reapers to threshers -- and six or seven for rice transplanting.

In a study of group farming in South Korea, Reed (1979) focuses on transplanting teams for rice, which were the most widespread form of indigenous cooperation. In general, three types of teams existed. One type was the team formed by a farm household arranging for exchange labour with several other households, membership remaining unchanged for a number of years. The second type was that of the professional planters' contract work team who exchanged labour among themselves and hired out their labour to large farmers, both within their own village and in other villages. It was composed of small farmers and landless labourers.

The third type was the cooperative work team (CWT) whose members transplanted each other's fields but did not hire out their labour. The CWT usually encompassed 82.2% of the households in one village and planted 81.1% of village village and planted 81.1% of village farm area. They averaged 27.3 member households, with 38.5 transplanters per

day, 71.1% being female. They operated for three or four weeks, putting in 10 to 12 hours per day. Villages where CWTs were organized averaged 32.8 households in size, while the sample of villages studied had an average size of 47.3 households.

Employing discriminant analysis, Reed tested thirteen variables which would account for the existence of one of the three types of teams in a village. In one set of villages, four variables turned out to be statistically discernible. These were the man-land ratio, the number of village households, the percentage of households in the largest kin group and the degree of inequality. In a second set of villages, only the man-land ratio and the degree of inequality showed up as significant. His conclusions, in brief, were:

Cooperative workteams appear in villages where the labour shortage is moderate and inequality between households is low. Contract workteams, based on class relations, tend to appear in villages where the labour shortage is severe and inequality is high. Villages of different sizes and kinship structures form cooperative workteams, but strong kin ties and small village size seem to discourage contract teams even where the labour shortage is severe.
(p. iii)

Ziche and Salih (1984) discuss traditional communal labour in Sub-Saharan Africa, organized largely for agricultural field tasks but used also for non-farm tasks such as house construction, repair of communal wells and

village roads. Among all communal undertakings, the agricultural task of weeding uses up the most communal labour because it has to be completed in a relatively brief span of time (a few weeks) in order that yields will be optimum (p. 11).

Communal labour, however, is inefficient because it is undertaken primarily for non-economic reasons: "to strengthen cohesion of social systems, to aid weak or unfortunate group members; to work together in a sociable manner; to confirm or possibly enhance the prestige of those who call for communal labour; and to practice social equalization" (p. 7). The labour productivity per participant was found to be much lower than if each individual worked on his own. There were no "associational gains" from working together, i.e., no mutual stimulus to perform better.

Elaborating on the objective of working together in a sociable manner, the authors note the forms of enjoyment that accompany communal labour: "In many cases there is singing and dancing, or wrestling of young males, to be enjoyed after work has been completed for the day" (p. 14). Also, the one who called for communal labour provided large amounts of food and drink. In the case of communal labour for weeding one hectare, the host spends as much as one fifth of the yield (sorghum) per hectare for food and drink.

With increasing monetization, communal labour has been increasingly replaced by wage labour, partly because the latter can be recruited at will and dismissed for poor performance or if employment opportunities are lacking. However, with the use of money to pay for agricultural labor, the employer loses the opportunity to enhance his prestige by giving the generous amounts of food and drink involved in traditional communal labour, and he also loses any claim on the help of his fellow villagers in time of emergency.

Ziche and Salih also observe that traditional communal labour is practiced almost exclusively among primary groups based on kinship or neighbourhood because of the solidarity engendered within these groups. Sizes of communal labour groups in agricultural field tasks in the Sudan ranged from 17 persons per work day for harvesting sorghum, to 21 persons for cotton picking to 28 persons for weeding (Table 2, p. 18).

In the Philippines, Anderson (1981) examines exchange labour (ammo) in Northern Central Luzon. Ammo groups are formed for the agricultural field tasks involved in rice farming, most notably ploughing and harrowing and occasionally in transplanting and harvesting.

Among the circumstances that give rise to the formation of ammo groups are (1) labour scarcity during peak periods

of rice farming; (2) long turn-around time between crops since there is only one single rainfed crop; (3) shortage of cash; (4) the availability of draught animals or hand tractors and the unavailability of four-wheeled tractors for contract ploughing at a reasonable price; and (5) the tendency to regard farming as an exclusive occupation (implying the lack of non-farm employment opportunities due to relative isolation).

Membership in these groups tends to be based on "house neighbours or field neighbours who are kinsmen, friends or trusted neighbours who thus can be expected to uphold the contract fully and with whom one enjoys the companionship of work and afterwards, drinking, gossiping, and storytelling" (p. 20). Since the groups are used largely for ploughing and harvesting, they tend to be composed of males. In general, too, members tend to be of the same socio-economic status.

The advantages or benefits of being a member of exchange labour groups are (1) assurance of labour when needed; (2) assurance of good quality work; (3) cash conservation and avoidance of long-term debt; and (4) the benefits of companionship, fostering solidarity and rendering the task easier.

On the other hand, the disadvantages or costs of membership are (1) a serious commitment and a major

expenditure of time and energy; (2) loss of other income-earning opportunities; and (3) the need to maintain harmony within the group and with potential work partners.

Over time, certain factors have led to the decline of exchange labour groups. One factor is population growth, which has led to smaller sizes of farms, forcing cultivators to seek non-farm work to supplement their incomes and to resort to wage labour on their farms to economize on their own time. Another factor is the increase in the number of large tractors, beginning in 1971, which could be hired for land preparation (ploughing and harrowing) at reasonable prices. However, due to increases in fuel prices, these have become more expensive and has led to a re-emergence of exchange labour groups which use the carabao and hand plough.

2.5.3 Irrigators' Groups

Siy (1982) studied an indigenous organizational form for irrigation in Northern Luzon known as zanjera. Recent estimates place the number of zanjeras at 1,000 with membership ranging from 10 to 2,000 households, irrigating from one hectare to 1,000 hectares of rice land. These organizations had their origins in the late 18th and early 19th centuries, with those in operation today being established within the last fifty years or more, and evolving into rather complex structures. A typical zanjera

would have a president, vice-president, treasurer, secretary, foreman, work-unit leader and cook, and would be divided into several work groups composed of 5 to 20 members.

The most striking feature of the zanjera is the distribution of cultivated land among its members, who were each given an equal area of land in each section of the irrigation system. This ensured that members were not divided into upstream and downstream users with the consequent conflict between the former who would appropriate more than an adequate amount, resulting in the latter not getting enough water. In the absence of such a distribution of fields, there would be an incentive for the upstream users to underinvest in the system, i.e., not give their equal share of labor and material for system repair and maintenance, and overinvestment on the part of the downstream users.

In addition, a monitoring system was instituted through the meticulous keeping of records of materials contribution and work attendance, and through the imposition of fines.

Breakdowns in the zanjeras began to occur as a result of population pressure and the emergence of a market for land in the irrigation system. Due to the increase in population, original shares were divided among the offspring of an original shareholder, so that a new shareholder would not have his land equally distributed throughout the system,

giving rise to the distinction between upstream and downstream users. The same result occurred with the sale or lease of land to non-members.

In order to keep the zanjera intact, two measures were taken. The first was to try to screen new members in order to ensure that the organization's new membership would not shirk on their responsibilities. The other was to emphasize the rewards, both material and non-material, for nonshirking, i.e., by greater provision for food and drink, exchange of wit and gossip, etc.

Siy reports that nine zanjeras joined together into a federation in order to pool enough manpower and materials to build a brush dam on the river from which they all draw their irrigation water. No single zanjera, could build the dam by itself, which is washed away by floods at least once a year and has to be reconstructed each time.

The brush dam is over a hundred meters in length and spans the entire width of the river. To build it, from 500 to 1,000 persons are needed. Each zanjera is also required to provide a certain amount of construction materials. Construction of the dam usually requires three to five days. When weather conditions are not favorable, the work could last more than a week.

The federation also constructed the main canal leading from the dam to each lateral canal. It mobilizes all its

members three to five times a year to maintain and repair the main canal.

2.5.4 Marketing Cooperatives

Although not strictly a study on indigenous cooperation, Osuntogun's study (1972) of Western Nigerian marketing cooperatives of cocoa is relevant to the topic of this thesis because he tries to identify the factors that account for the success or failure of these cooperatives. His index of success/failure is the degree of loyalty of members to the cooperative.

The first problem Osuntogun faces is how to measure members' loyalty. He does this by devising a weighted index which combines the percentage of members who sell their produce through the cooperative and the percentage who pay their annual subscription.

Three explanatory variables are regressed on the index of loyalty, namely, the price paid for members' cocoa, the value of loans to members, and their participation in the cooperative which, in turn, is measured by an index of attendance at meetings.

Osuntogun's data come from the records of 45 cooperatives covering the period 1956 to 1969. Both time series and cross-sectional analysis of the data indicated that the price and social participation variables were

significant but not the value of loans to members. In particular, the cross-sectional analysis, utilizing a sample size of 45 cooperatives, yielded an R^2 of 0.40. No \bar{R}^2 was indicated.

2.6 Summary and Conclusions

2.6.1. Summary

This chapter has reviewed diverse but relevant literature regarding cooperation. The review has suggested the following factors which affect cooperation in general : (1) indivisibilities in inputs or processes; (2) the elasticity of substitution among inputs; (3) the existence of economies³; (4) transactions costs; (5) the distribution of income /assets; and (6) atmosphere. For agricultural activities, in addition to the above factors, the need for timeliness in the execution of work was cited.

In the property rights literature reviewed in section 2.3, the example of the polluting factory discussed by Coase suggests that it is the economic indivisibility of a natural resource such as air which gives the occasion for cooperation among the residents affected. If the residents fail to act jointly it is because of high transaction costs, which in this case means the difficulty of measuring each

³A shorthand term for economies of size/scale and economies due to associational gains.

resident's marginal utility of air on which to base a monetary contribution towards paying the factory owner to install anti-pollution devices.

Furubotn and Pejovich state that it is the degree of transaction costs, i.e. the costs of monitoring managers' behaviour within a firm, that determines cooperative behaviour on their part.

Dahlman suggests that the establishment of collective rights over arable land in the open field system was determined by the existence of economies of scale that would be reaped if the livestock of all the villagers were pastured collectively and that in order to ensure that this was done, large fields were divided into smaller plots, that is, that the distribution of assets among the villagers was made more equal. What he does not discuss but which is deduced from the situation, is the possibility of substituting other kinds of fertilizer such as night soil or chemical fertilizer (had it been invented at that time) for animal manure. Then collective rights over arable land might not have been rational. This factor is what is referred to as the elasticity of substitution among inputs. The existence of a village committee to oversee the whole affair meant that transaction costs existed and had to be dealt with.

In the review of the literature on the origin and nature of the firm in section 2.4 Coase (1937) argues that

the costs of bargaining and the cost of information can make the firm a more economical way of carrying out an economic activity than a market transaction. He refers to the interaction of the factors within a firm as cooperative and also refers to cooperation which is "a direct result of the price mechanism (e.g. the market)" (p.391).

Alchain and Demsetz add that monitoring costs, i.e. the difficulty of metering inputs in order to match rewards with marginal productivities, are also part of transaction costs which affect the choice between market transactions and setting up a firm. They hint at the existence of indivisibilities as the basis for team production in their use of the example of two men lifting a heavy load onto a lorry. Because of the indivisibility of certain inputs, these have to be used jointly, and hence gives rise to team production. They refer to this explicitly when they cite the shift from the putting out system of producing textiles to the factory system because of the development of efficient central sources of power.

Williamson continues in the same line as Coase and Alchain and Demsetz, introducing the idea of organizational changes in order for a firm growing in size to cope with increasing transaction costs. He also argues that the indivisibility of assets is one basis for the establishment of worker peer groups but that it is only a necessary but

not sufficient condition for collective organization. He introduces the notions of associational gains and of atmosphere as affecting cooperation. Finally, Williamson's discussion of perfunctory and consummate cooperation underlines the fact that even after an individual has chosen internal organization over market transactions, various degrees of cooperation and non-cooperation are still possible, even the extreme case of industrial sabotage. The degrees of cooperation and non-cooperation are also determined by transaction costs.

Leibenstein also refers to transaction costs, particularly monitoring costs, in explaining the existence of X-efficiency within a firm. He also writes of motivating resource owners to increase their effort levels, which is another source of X-efficiency.

In the review of indigenous forms of cooperation (section 2.5), Galjart, a sociologist, writes of the fact that much traditional forms of cooperation today is based on economic rationality. He cites the small size necessary for collective work groups to ensure better monitoring and minimize bargaining and decision making costs.

Wong cites the capital-poor Chinese peasants' inability to substitute capital for labour combined with his inability to hire labour, as a major reason for the formation of mutual aid teams. The other attractions of forming MATS

were: the achievement of economies of scale due to division of labour; associational gains due to working in groups; an atmosphere of informality, based on kinship, friendship and equivalent social standing. The latter implies a more or less equal distribution of assets.

In South Korea, village-wide cooperative work-teams existed where socio-economic inequality among households was low. Otherwise, contract workteams appeared whose members were the smaller farmers and landless labourers which would imply less socio-economic inequality among members. Strong kinship ties and small village size also encouraged the formation of village-wide CWTs, presumably because transaction costs would be low as a result. The villages where the CWTs existed were small, comprising 32.8 households on the average.

For Sub-Saharan Africa, Ziche and Salih mention that timeless in the weeding of sorghum was a consideration in the use of communal labour. Such groups were based on kinship or neighborhood which reduced transaction costs.

Anderson, in explaining the existence of land preparation teams in Northern Philippines, cites the elasticity of substitution between four-wheeled tractors and draught animals or small hand tractors as a prominent factor. Other factors were: timeliness (assurance of adequate labour when needed); transaction costs (basing the

teams on neighbors and kin so as to ensure contract fulfillment); atmosphere (companionship in work and merriment afterwards) and socio-economic equality.

Indigenous irrigators' associations in the northern Philippines have survived partly because of (1) low transaction costs through strict screening of members, meticulous record keeping, good organization, and the imposition of fines, and (2) congenial atmosphere through the provision of food and drink after work, the exchange of wit and stories, etc..

A federation of zanjeras was also formed because of the existence of an indivisibility in productive inputs, i.e. the need to construct a large brush dam annually and to construct and maintain a main canal to distribute the water.

A factor affecting cooperation which is not mentioned in the literature on property rights and the origin and nature of the firm but which is cited in the literature on indigenous cooperation is timeliness in the performance of farm tasks. This is mentioned by Ziche and Salih in explaining why much of communal labour in Sub-Saharan Africa takes the form of weeding sorghum since this task must be accomplished in a relatively brief time period. Anderson also cites it as a reason for the existence of land preparation teams in northern Philippines.

It is also to be noted that the literature reviewed on

indigenous cooperation relate to agriculture. Since agriculture is characterized by biological processes, farmers are very much aware of the necessity of timing the different farm tasks. Due to the relative scarcity of labour that occurs because farm tasks in capital-poor developing countries are labour-intensive, farmers resort to either hiring workers or joining an agricultural work team, depending on the advantages and disadvantages of each arrangement.

2.6.2. Conclusions

From the review of the literature, the term "cooperation" is used to refer to different situations. In general, it can refer to a market transaction between two parties, or it can refer to the joint effort of persons within the same organization. In a market transaction, both parties may be cooperating with each other to achieve a common goal, namely, the satisfaction of needs or wants.

However, in a market transaction, the particular need or want is different for each party. In an organization, the particular need or want is common to its members. Thus, in a market transaction, one party may need carpentry services while the other needs money to pay for hospital bills. In a labour union, the members are seeking higher wages, better job security, etc., that is, they have the same particular goals in common.

However, for the same particular goal that an individual has in common with others, it may be that two options are open : to achieve it on his own, or in concert with others who have the same goal. Action by the individual on his own may or may not involve market transactions. For instance a student reviewing for examinations may review alone or he may pay a tutor to assist him. He could also join a small review group made up of other students. On the other hand, collective effort in an organization does not involve any market transactions by definition. The organization, however, can enter into market transactions with non-members as in the case of Kibbutzim and cooperatives.

If an individual chooses to act alone, we will label this individual action. If he chooses to act in concert with others, we will call this cooperation in the narrower sense because he is after the same particular goal as the others. For convenience, we will refer to this as collective action. If an individual acts entirely on his own, i.e. without any market transaction being involved, we will label this "pure" individual action. If it involves a market transaction, there is a further choice to be made between cooperative and non-cooperative strategies. The former will also be referred to as cooperative behaviour and the latter individualistic behaviour. Market transactions will be called cooperation in a broad sense to

distinguish it from collective action, since both involve cooperation.⁴ Cooperation in the broad sense means that the parties to an exchange have the same general goal.

After having chosen collective action, one can think of cooperative and non-cooperative strategies as still being options for the individual, the existence of which depending on his experience within the group, which collective action necessarily implies. Collective action also implies some form of what Williamson calls internal organization, no matter how rudimentary.

The choice between individual action and collective action can be distinguished from the choice between cooperative and non-cooperative strategies not only in point of time. They can also be distinguished by the fact that, in the second stage, i.e. the choice between cooperative and non-cooperative strategies, the individual's choice is affected by what strategies the other (s) will adopt, whether it be in the context of a market transaction or of collective action. In the first stage, there are no interaction effects.

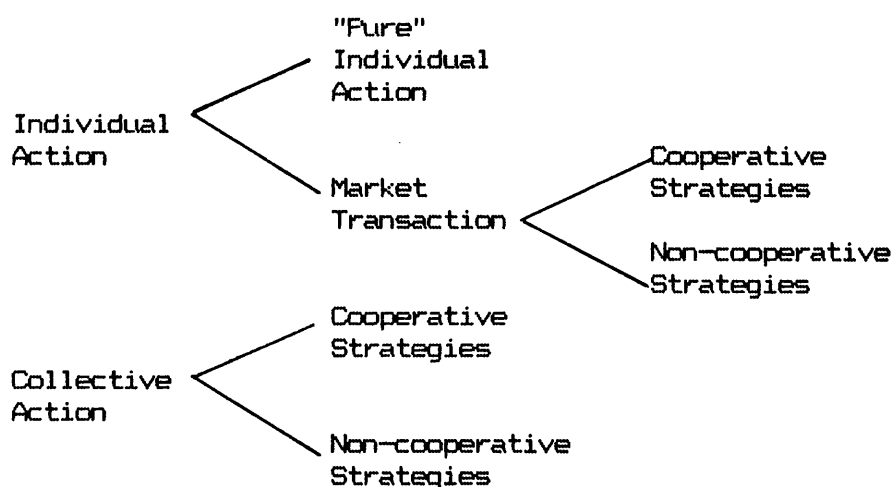
A further distinction between the two stages of choice is that some factors may not be immediately relevant in the

⁴One is hardput to think of examples where exchanges between two individuals with different particular needs or wants do not involve market transactions. We refer of course to economic exchange.

second stage. For instance, the existence of indivisibilities in inputs or processes may be the occasion for collective action but ceases to be an immediate concern to the individual once he has formed or joined a group. Of course, if the indivisibility is a necessary condition for the group's existence, then the group will dissolve if the indivisibility ceases. The same argument can be applied to the factors of the elasticity of substitution, the existence of economies and the timeliness of execution of farm tasks.

The factors of transaction costs, distribution of income/assets, and a non-calculative atmosphere are considered by an individual before he joins a group, and continue to be of immediate concern to him ever after he has joined the group because they immediately affect the quantity of his interactions with the other members.

The various choices open to an individual in seeking to achieve a goal he has in common with others are summarized in the following decision tree:



The main concern of the thesis is with the choice between individual action and collective action and within the latter, the choice between cooperative and non-cooperative strategies.

It can be deduced from the literature that one, several or all of the factors suggested above become relevant in affecting cooperation, depending on the particular situation being examined. For agricultural situations, it is assumed in this thesis, that timeliness in task execution is a factor which only affects agricultural cooperation and not non-agricultural cooperation with the remaining six factors affecting both types of cooperation.

Thus, within the context of agricultural cooperation, one, several or all of the seven hypothetical variables can be relevant, depending on the situation. The same can be said for the six variables in a non-agricultural situation. Thus, in the establishment of collective property rights over arable land in the open field system, the elasticity of substitution, economies, transaction costs, distribution of assets and presumably atmosphere come into play. The variables of indivisibilities in inputs/ processes and timeliness of task execution are not relevant. This is an example of agricultural cooperation. The case of residents cooperative to solve the problem of the polluting factory will be discussed in the next chapter as an example of non-agricultural cooperation.

It can also be deduced from the literature that again, depending on the situation being examined, the factors affecting cooperation become necessary but not sufficient conditions or they may become necessary and sufficient conditions.

Thus in the case of collective property rights over arable land, a zero elasticity of substitution between animal manure and night soil/inorganic fertilizer was a necessary but not sufficient condition. It was also necessary that the distribution of field sizes become more equal in order for cooperation to take place. But a more equal distribution of assets, although necessary, is not also sufficient by itself to ensure cooperation. This can also be said of the other factors relevant to the situation: existence of economies, low transaction costs, and a non-calculative atmosphere. Taken singly, each is in the nature of a necessary but not sufficient condition for collective property rights to be established over arable land. It is only when they are present together that the institution is established.

In the case of cooperative behaviour on the part of the top managers of a firm, only one factor is relevant and it is both a necessary and a sufficient condition, namely, low transaction costs.

The following chapter will discuss in depth each of these factors proceeding to utilize them in the analysis of

the findings of the two case studies on agricultural work teams in chapters Four and Five and in the analysis of sample of cooperative labour teams. In this manner, it is hoped that more light will be shed on the factors that affect indigenous cooperation and thus contribute to the economist's ability "to predict for specific socio-economic situations, whether or not spontaneous cooperation is likely" (Collard, p. 44).

CHAPTER 3: THE DETERMINANTS OF COOPERATION

3.1 Introduction

Having identified the factors that determine the choices between both individual and collective action and cooperative and non-cooperative strategies, this chapter will discuss these factors in detail. For simplicity, reference will be made to the determinants of cooperation only. They are postulated to be : 1) the existence or absence of indivisibilities in productive inputs and or productive processes; 2) the degree of elasticity of substitution among productive inputs and/or processes; 3) the existence or absence of economies of size and scale and associational gains; 4) transaction costs; 5) the distribution of income or assets among cooperators, and 6) the atmosphere governing the exchange relationship.

For agricultural cooperation, the literature suggests an additional factor namely, 7) the need for timeliness in the execution of an agricultural activity. This is discussed in this chapter since the next two chapters present case studies on cooperation in agricultural tasks. The ²timeliness in the execution of a task, however, may also be a factor which affects cooperation in non-agricultural situation⁵.

In the literature reviewed in the preceding chapter, a distinction was made between an assurance game and a

Prisoner's Dilemma game (Collard, 1978). It was argued that the latter type of situation will result in cooperation only if the individuals involved possess some degree of altruism and trust, the degree depending on the difference between the payoffs to cooperative and to individualistic behaviour. The question would then be if one were interested in seeing cooperation take place, what would bring altruism and trust about? The science of economics would appear to be ill-equipped to provide an answer.

In the case of an assurance game, where the payoffs to cooperative behaviour are greater than the payoffs to individualistic behaviour (or defection, as Axelrod would call it), the question can also be posed as to what would bring these about. Here, the science of economics is in familiar territory, and the attempt can be made to provide some answers. If answers are indeed provided, then some idea can also be had about turning Prisoner's Dilemmas into assurance games by means of influencing the factors which determine the respective payoffs. If a Prisoner's Dilemma situation cannot be turned into an assurance game, then the attempt can be made to reduce the difference between the payoffs, thus reducing the degree of altruism and trust necessary to bring cooperation about.

Regarding the choice between individual and collective action, it can also be said that this will depend on their respective payoffs. Put in another way, what are the

factors which affect the costs and benefits of cooperation?¹

It should be pointed out, however, that cooperation is not necessarily good in itself. Thus, criminals cooperating with each other in forming a drug syndicate is not in the public interest. The desirability of cooperation depends on the particular purpose involved. There are instances where a useful outcome can better be achieved by individual action. Paintings, poetry and musical compositions are a case in point (although some recent musical achievements and murals have been the result of group action).

3.2 Indivisibilities

Indivisibilities in physical inputs can arise because of purely technological considerations. A machine can be built in only one size because existing technology can do no better. An example is the first computer which was huge compared to the variety of sizes which exist today. Indivisibilities also arise because of purely economic considerations. For instance, while land is physically divisible, a farm household may not be able to continue farming if the area it cultivates falls below a certain minimum.

The externality that is the result of a polluting

¹Since we can think of the costs of cooperation as being the benefits of individual action/non-cooperation, and of the benefits of cooperation as being the costs of individual action/non-cooperation, we shall refer only to the costs and benefits of cooperation.

factory comes from the indivisibility of a resource. It could be the air or it could be the water in a river. Although air and water are physically divisible, they may not be economically divisible, i.e., it may not pay to separate the polluted from the clean air or water. Hence, parties who use the air or water in a specific location for different purposes have to cooperate in the use of these resources.

Indivisibilities also exist in some processes which are called overhead processes. These are processes which are necessary if any output is to be produced at all. Examples are the design of a new car or the typesetting of a book.

These indivisibilities mean that relatively large quantities of other inputs such as labour, which are used in combination with the indivisible input or process, are required in order to use that input or process efficiently, if at all. For manufacturing, Alchian and Demsetz cite the development of efficient central sources of power, i.e., large generators, which make team production more economical than the "putting out" system involving individual weavers. The new sources of power made possible bigger and better output, which meant more income.

While the "putting out" system involved cooperation between the capitalist and the individual weavers, the introduction of central sources of power brought the weavers and the capitalist together in one place and increased the

need for cooperation and coordination.

For agriculture, the study on the zanjera or indigenous irrigators association in northern Philippines showed that the basis for the organization of several zanjeras into one federation was the necessity to build a large dam and main canal. The size of these physical structures meant that no single zanjera could tackle the job.

In this connection, it is helpful to cite the experience of the collective ejido in Mexico. Under the ejido, the households of a village community owned in common the arable land, pasturage and woodland surrounding the village. However, cultivation and usufruct were individual. In 1936, collective ejidos were established in Laguna region, in Northern Mexico, which meant that the land was also cultivated collectively. The reason for this was that it was feared that parcellation of the land would destroy the gravity irrigation system (Wiles, p. 138). However, when small pumps and cheap wells were introduced, collective ejidos went into a decline (Eckstein, 1965, p. 145).

It is interesting to quote Wiles on this :

Mexican collectivization had above all a technological excuse, as we have seen : the fact of irrigation by river and ditch. This at that time made individual ejidos impossible. But much of the disaster the movement has subsequently undergone is due to the cheap well and pump.

Whole areas have reverted to individual farming just because of this - with the Banco Ejidal putting up the money. There are few more

brilliant confirmations of basic Marxism - except that technical progress has deconcentrated capital. The Soviet government would of course have refused to supply drills and pumps, as it has refused to supply small tractors. (p. 146)

3.3 Elasticity of Substitution

In order to produce a product or service, productive inputs have to be used jointly, but there is also a degree of substitution among them. Thus, up to a certain extent, labour can be substituted for machinery or, as in agriculture, fertilizer for land. The incentive for such substitution comes from the changes in input prices. The tendency would be to substitute units of a cheaper input for units of one which has become more expensive, while maintaining output. The limits to such a substitution arise from technological and budgetary constraints. In some instances, cultural rigidities come into play. The degree to which units of one input are substituted for units of another input in response to changes in their respective prices is defined as the elasticity of substitution (*sigma*).² If, for a one percent change in the ratio of their respective prices, there is more than a one percent

² The elasticity of substitution, *sigma*, is defined as:

$$\sigma = \frac{d(A/B)}{d(P_B/P_A)} \cdot \frac{P_B/P_A}{A/B}$$

where A = input A
 B = input B
 P_A = price of A
 P_B = price of B

change in the ratio with which they are jointly used, then σ is greater than one and there is a high elasticity of substitution between the two inputs.

The examples here are agricultural. In the case of the Soviet kolkhoz, the hand tractor is a substitute for the large, four-wheeled one and is more affordable. Soviet authorities discriminate against the smaller hand tractor since they feared its introduction would render small scale farming economical and lead to the break up of the large kolkhozi or collective farms since the latter would be a more rational set up if only larger, four-wheeled tractors were available.³ However, there are some farm situations in which the large tractor is more economical to use than the hand tractor, so that even in a free market, the hand tractor does not completely ease out the large tractor. This is true in the Philippines where rice farmers sometimes use the large tractor for ploughing and harrowing to shorten turn-around time⁴ and the hand tractor for the final

³ Kolkhozniks or members of the collective farm were restricted in their movement out of the farm. Wadekin (1977) reports that for a time they were not permitted to migrate. Wiles notes that they were not issued internal passports unlike other Soviet citizens. This created a high man-land ratio on the farm, making smaller tractors more economical. In contrast, in the U.S. tractors got bigger and bigger because of an increasing labour shortage on the farms, aided in part, by labour mobility.

⁴ Turn-around time in the context refers to the time period between harvesting of the previous crop and planting of the next one. The farmer would want to shorten this either because the rains have come earlier than expected, or he wishes to be the first to harvest his crop. Another sense of turn-around time is "dead" while machinery is turning around in a field after a pass.

leveling of the field before it is planted.

In case of the open field system in Northern Europe, the substitution of night soil for animal manure might have prevented the establishment of collective rights over arable land, even if one did not completely substitute for the other. In this case, it could be said that a cultural rigidity prevented substitution, resulting in σ being zero.

With respect to the MATs in pre-Communist China, Wong explicitly states that one of the circumstances that led to their formation was the absence of cheap labour-saving devices, which would have enabled the small farmers to hurdle the labour constraint during peak seasons of planting and harvesting. The decline in exchange labour groups in land preparation in the Philippines was attributed in part by Anderson to the increase in the number of large tractors available for contract ploughing. However, when fuel prices increased, leading to an increase in the hire price of the large tractors, there was an incipient resurgence of the exchange labour groups.

Thus, a second factor which affects the relative costs and benefits of cooperation is the elasticity of substitution. If σ is greater than one and if the substitution favours individual action, then the costs of such behaviour are low ceteris paribus, and correspondingly, the costs of

collective action are high. If the substitution favours collective action, then the reverse would be true.

3.4 Economies

By economies is meant a reduction in the unit cost of attaining a commodity or service that an individual wants to attain as a result of group or collective action. The sources of economies arising from group action can be considered under two aspects : technological and psychological.

The technological source of economies ^{is reflected in} ~~springs from the phenomenon of~~ the U-shaped cost curve which graphically depicts the law of diminishing returns in the short run and economies of scale in the long run. The former is known also as economies of size where factor proportions change as the amount of one input is increased, other factors held constant.

The psychological source of economies springs from modifications of behaviour as a result of working in a team rather than individually. Working in a team can be the result of adding more workers to perform a task which previously had been done by one person, keeping the quantities of all other productive factors constant. It is analogous to the concept of economies of size, with the difference being that the reduction in unit costs comes, not

from technological but from psychological considerations which will be discussed below.

3.4.1 Economies of Size and Scale

Although for purposes of empirical work, many economists prefer to apply production functions which depict constantly diminishing marginal productivity of factors, still there are those who admit the possibility of real world situations which indicate a range of rising and then falling marginal productivities.⁵ It is these latter conditions which are relevant for the discussion in this section regarding economies of size.

As more units of a variable input are combined with fixed quantities of other inputs to produce a good or service, it is possible that the marginal product of the

⁵ The CES and Cobb-Douglas production functions, which are widely used in empirical work, do not have regions of increasing marginal productivity (cf. Ferguson and Gould, n.3, p. 137). Nevertheless, this does not preclude the possibility of the phenomenon from occurring in the real world. Thus Stigler (1966, p. 128) in discussing diminishing returns, states that it is possible that there is an initial stage of increasing marginal product of the variable factor. Heady (1961, chapter 3) reviews a range of production functions appropriate for agriculture, including those where both increasing and diminishing marginal products to a factor are present.

variable input increases at first, reaches a maximum and then declines. However, diminishing marginal product does not mean that total output is falling. In fact, it may be rising, and so also with average product, which is total output divided by the total number of units of the variable input. A stage is reached where total output and average product also fall.

These results happen because some inputs are held constant in quantity, which leads to the distinction between the short-run and the long-run periods of time. The latter is defined as the time period where all inputs can be varied in the quantities employed.

The converse of rising, then falling, marginal and average products are falling, then rising, marginal and average costs. The latter, when depicted graphically, result in U-shaped cost curves. Thus, if an individual is contemplating carrying out an activity where certain inputs are fixed, the costs to him of doing it alone will be high. When he joins with one other person, unit costs will fall; if one more person joins in, then costs fall even further, and so on. These are known as economies of size.

The preceding discussion can be illustrated by a hypothetical example shown in Table 3-1.⁶ There are eight

⁶The example is borrowed, with modifications and additions, from Ferguson and Gould (1975, p. 131).

parcels of 5,000 sq.m. each, with varying numbers of workers, producing an agricultural output. For simplicity, we assume that no other inputs are involved. It can be seen that the marginal product of labour first rises, reaches a peak, and then falls as the number of persons working the same area of land increases. The same is true with average product, which is total output divided by the number of workers. On the other hand, marginal and average costs first fall, bottom out, and then rise, with the former falling and rising faster than the latter.

Marginal cost in real terms is simply the ratio of the additional worker to the additional output. Thus, for an output of 24 units, .071 units of labour are required to produce one additional unit of output.

TABLE 3-1 Hypothetical Example of
Diminishing Returns

Tract Number	No. of Workers	Land- Labour Ratio (sq.m./worker)	Total Product	Marginal Product	Average Product	Marginal Cost	Average Cost
1	1	5000	10	-	10.0	-	.100
2	2	2500	24	14	12.0	.071	.083
3	3	1667	39	15	13.0	.067	.077
4	4	1250	56	17	14.0	.059	.071
5	5	1000	71	15	14.2	.066	.070
6	6	833	83	12	13.8	.083	.072
7	7	714	94	9	13.1	.111	.077
8	8	625	94	5	12.1	.200	.085

Average cost in real terms is the ratio of the total number of workers to total output. Thus for the same output of 24

units, .083 units of labour are needed to produce one unit of output on the average. These results are usually attributed to the fact that each unit of the variable input labour, has a constantly diminishing amount of the fixed input, land, to work on. This is shown in the constantly diminishing land-labour ratio in column 3.

The relevant column to consider in Table 3-1 is the last column or average cost and the relevant entries are those for the second to the fifth tracts. The point is that because average cost has a U-shape, the individual is better off working with one or more other workers rather than tackling the job by himself.⁷

A simple example would be a group of university students reviewing together for examinations. Under certain assumptions,⁸ the cost of reviewing with a group is lower than if one reviews by himself from the physical fact of

⁷ It could be asked whether, in this particular example, the five workers are members of a cooperative team or whether one worker hires the other four. The answer is that the existence of economies of size are a necessary but not sufficient condition for a cooperative work team to be organized. Other factors, such as transaction costs, have to be taken into consideration. If the transaction costs of a cooperative arrangement are lower than that for an employer-employee relationship, then given economies of size, the workteam will be a cooperative one.

⁸ The assumptions are: (1) the members of the group are equally capable and industrious, and (2) the state of the art is given, i.e., no invention is available which enables one to review just as well as a group.

several heads being better than one. The use of the word "several" means that, intuitively, a study group should remain small to be efficient. A larger group will result in diminishing returns.

In the long run, all inputs in a productive activity are variable, and an increase in their quantities has been found to result in reduced costs in producing one unit of commodity or service that is the goal of the activity. Such economies are known as economies of scale. However, there is a limit to which volume can be expanded since it may not be possible to expand management equi-proportionally, leading to problems of coordination. This would result in diseconomies of scale. Depicted graphically, economies and diseconomies of scale also result in a U-shaped average cost curve.

One source of scale economies are indivisibilities in physical assets as well as in overhead processes. With respect to physical assets, current technology may limit the size of, say, machinery to a large one, so that as the volume of output is increased, unit costs decrease as excess capacity is used up. With respect to overhead processes,

the "setting up" cost of for instance, the design of a new car or typesetting of a book, are high. But as more cars produced or as more copies of the book are printed, these costs are spread out over more and more units, thus reducing unit costs.

A second source is specialization and division of labour. Instead of one person doing several tasks in the productive process, he can concentrate on one task which he does repeatedly due to the larger volume of output, resulting in increased efficiency. These were cited by Wong as one of the benefits of the Chinese mutual aid team in pre-Communist China.

A third source are financial economies realized through quantity discounts on the purchase of large amounts of inputs or through lower costs per unit of capacity when larger sizes of equipment are bought. The possibility of reaping financial economies through quantity discounts is a major incentive for the formation of cooperative consumer stores and farmers' marketing cooperatives all over the world.

A fourth source would be the statistical law of large numbers. For instance, inventories do not need to increase in proportion to sales because there is greater stability in the aggregate behaviour of large numbers of buyers.

3.4.2 Psychological Sources of Economies .

Members of a group or team interact among themselves and this leads to modifications of behaviour. When the group is small, such interactions can lead to efficiency increases. An example would be the natural reluctance of anyone to be considered the least productive member of a work group and the tendency for competition to arise. Williamson also mentions the sense of responsibility that comes into play in worker peer groups (which are relatively small) in contrast with working alone.

As the group or team grows in size, their efficiency declines, not only because of the physical factors involved in coordination or management but also because (1) of the increasing probability of including more members with diverse personalities and background which in turn increases the probability of conflict, and (2) the sense of responsibility is diluted by the very fact that the individual's actions will matter less and less in the total outcome as the group grows larger in size. This latter phenomenon gives rise to the free rider problem which Olson cites as the major reason why large groups will not succeed in promoting common interests or collective goods unless non-collective goods are also provided.

The role of these psychological factors has been recognized on both the level of traditional communal labour

and modern factory work groups. Ziche and Salih have mentioned the practice of the African Swazi people of placing hardworking members of a communal labour team beside lax ones and of organizing the team according to sex, in order to utilize the natural competition that they noticed arose between the male and female members (p. 9). On the level of the modern factory work group, the recognition of the psychological factors which arise in group work has led to the reorganization of the labour force in Japanese firms into small work teams, resulting in the well-publicized efficiency of the Japanese worker. These examples illustrate the concept of x-efficiency elaborated by Leibenstein.

A final psychological factor that comes into play when the individual joins a group rather than tries to achieve a goal on his own is the increased sense of hope or expectation of achieving that goal, which can lead to increased effort levels and efficiency. The role of expectations in influencing economic behaviour has received widespread attention in the so-called expected income hypothesis where it has been largely proven that expected income, rather than actual income, has determined levels of consumption and investment.

The increase in the efficiency of human labour that results from human interaction in a group can be called "associational gains", to borrow a term from Williamson.

Conversely, the decline in efficiency can be called "associational losses". Such losses are expected to occur as the group grows in size. However, due to organizational innovation, the work group can be kept small even though the entire organization grows in size, thus preserving associational gains.

The various types of economies discussed in the preceding paragraphs can be distinguished from each other for analytical purposes. In practice, it may be difficult to do so.

3.5 Transaction Costs

Any transaction or exchange between two parties involves certain costs. First, one has to locate those who would benefit from, and therefore be interested in, an exchange. Second, he has to determine whether the partner to the exchange can be expected not to fool him, i.e., trustworthiness. Third, some time and effort are required in order to come to an agreement with respect to the terms of the exchange. Fourth, monitoring has to be done in order to ensure that the other party keeps his part of the bargain or agreement.

In the example of the polluting factory given by Coase, he postulated that the transaction costs of cooperative behaviour on the part of the residents living in the area

would be prohibitively high, resulting in nothing being done to solve the problem of air pollution. In this particular case, the terms of the exchange, i.e., the amount of money each resident should contribute in exchange for clean air, could not be determined.

In the case of the non-cooperative corporate managers, the costs of monitoring their behaviour by shareholders were high, enabling the managers to pursue their own goals to a certain extent. This situation led to the recognition that the firm was not a monolithic entity but was made up of individuals who may not act in accordance with the goal of the firm, which is profit maximization.

In order to reduce the risk that the other party will renege, screening is done. Such screening can take various forms. Where there is a great deal of self-monitoring that is necessary (usually in peer groups), membership is based on consanguineal relations or on long standing acquaintanceship (as a result of being friends or neighbours) or on a combination of both. In case of a group marked by employer-employee relations (simple and complex hierarchies), screening is done by investigating the background of the prospective member, and consulting the experience of previous employers or associates by means of letters of recommendation and the like.

The screening of prospective partners to an exchange

and their subsequent monitoring involves information costs. If such costs are prohibitive, the exchange will not take place.

Monitoring costs are affected by altruism and trust as defined by Collard. If one is concerned for others who are partners to an exchange, and if he has some belief that they will cooperate, then he will keep his part of the bargain and do a better job of it than in the absence of altruism and trust. And so also for the other partners. Thus, less monitoring is required of the actions of the partners to an exchange, hence, reducing monitoring costs. The greater the degree of altruism and trust, the lesser monitoring costs are.

What Axelrod calls "the shadow of the future" also affects monitoring costs. If one partner to an exchange expects to continue to deal with the others in the future, then there is an incentive for him to cooperate, i.e., keep his part of the agreement, and thus less monitoring is necessary. The longer is the shadow of the future, the greater is the incentive to self-monitoring, and hence the lesser monitoring costs are.

The transaction costs of team work are reduced by keeping the size of the group small. In particular, the larger a group is, the greater is the probability of a free rider problem. However, where large group size brings on

other advantages such as economies of scale, transaction costs can be reduced by organizational innovations as pointed out by Galjart and demonstrated by Williamson.

To sum up, transaction costs are made up of (1) search and information costs; (2) bargaining and decision-making costs; and (3) monitoring costs. Thus, cooperation is determined, among others, by relative transaction costs.

3.6. The Distribution of Income/Assets

The distribution of income or assets as a factor determining cooperation is most prominently mentioned in the literature on indigenous forms of cooperation which involve peer groups. In organizations characterized by employer-employee relations, the employer would, by definition, be wealthier than his employees.

In the case of the open field system, which involved the whole village, inevitably there were inequalities in the distribution of assets in terms of field sizes. It was feared that these would lead to the bigger cultivators dominating the management of the system in their favour by threatening to pull out their fields from the communal grazing arrangement. (See p.45) If this happened, the small cultivators would see little advantage for themselves and would pull out, resulting in the break-up of the system.

As it turned out, the bigger cultivators agreed to break up their large contiguous fields in exchange for

fragmented, small ones. The cost to them of agreeing to such an undertaking must have been less than if they refused, resulting, perhaps, not only in diseconomies of scale but also in ill-will (which is a liability) towards them on the part of the other villagers.

With respect to indigenous labour groups that Wong and Anderson observed, members had the same socio-economic status. This worked toward the reduction of conflict among them.

It was a different story where the cooperative work teams of South Korea were concerned. Since they encompassed entire villages (although small, comprising 47.3 households on the average), there were bound to be inequalities in socio-economic status. Thus Reed observes that participation in meetings to organize the cooperative workteam (CWT) varied proportionately with farm size. Landless and small farmer households had lower attendance at these meetings because they had less voice in decisions arrived at. To quote Reed:

Conspicuously missing from the meetings in ... villages (with CWTs) were the landless households... and many of the poor farmers. In spite of the importance of the decision to these labour surplus households, their low status limits their participation in village affairs. This also turned out to be the case in the other sampled villages ... nonparticipation in the decision to form the CWT is inversely related to size. Thus, the evidence is that even in these more cooperative villages, economic class is a determinant in the level of participation in the village decision-making process. (p. 180)

Thus it was inevitable that a conflict between the larger farmers on the one hand, and the smaller farmers and landless households on the other, would occur after the CWT had been formed, in deciding the value of the labour unit on which remuneration was based, with each side favouring a different accounting system (pp. 185-196).

The phenomenon of village-wide CWTs itself was partially determined by the degree of socio-economic inequality existing in a village. Where this was low, CWTs made an appearance. Where it was high, contract workteams, made up of smaller farmers and landless households, made their appearance.

Thus the distribution of income/assets also affects the choice between individual action and collective action as well as between cooperative and non-cooperative strategies.

3.7 Atmosphere

A sixth factor affecting the relative costs of cooperative and individualistic behaviour is what Williamson calls "atmosphere". It arises in the context of the intensity with which transactions are metered, i.e., concern with an exact *quid pro quo*. To some, the exchange itself is an object of value and not simply a means to an end. Williamson contends that internal organization provides a less calculative atmosphere than market transactions, and

that among modes of internal organization, peer groups provide this better than hierarchies (n. 15, p. 258). Within groups where the employer-employee relationship exists, resentment is engendered where performance is too closely monitored, resulting in negative spill-over effects.

Wong refers to Chinese peasants' preference for exchange rather than wage labour because of the lesser monitoring that tended to come with the former. On the other hand, Ziche and Salih cite the increasing preference by African farmers for wage labour because it permitted them to exact a more efficient job performance against the general tradition of inefficient communal labour brought about by the stress on the social objectives of such labour, viz., to enhance prestige through generous provision of food and drink, assist weak or unfortunate group members, etc.

Castillo (1982), in her review of the literature on indigenous forms of cooperation in the Philippines, notes that a major factor that led to such cooperation was the fun the participants would get out of it, both during the work itself and after. Siy observes that zanjera leaders increased the provision for food and drink and emphasized the exchange of wit and gossip as a means of countering the increasing pressure for free-riding as a result of the increase in membership.

In the case of the indigenous exchange labour groups

cited above, it could be said that they produced a joint product namely the accomplishment of a particular farm task plus "fun", i.e. food, drink, gossip, etc.

Thus, the "atmosphere" surrounding an exchange is a factor which individuals take into consideration in choosing between individual action/individualistic behaviour and cooperation.

3.8 Timeliness

In the literature on indigenous forms of cooperation which are related to agriculture, one factor influencing the formation of exchange labour groups was the necessity of the timely delivery of services due to the biological characteristic of agriculture. Along with the other factors already discussed, timeliness is postulated to affect cooperation among farmers. In the following paragraphs, timeliness in specific tasks in rice farming is discussed in order to illustrate the concept.

Regarding timeliness in transplanting, De Datta (1981) notes that the optimum age for transplanting wet-bed seedlings is 20 to 30 days, depending on the variety. "Thirty-day or older seedlings recover more slowly than younger seedlings, especially if they suffer from too much stem or root injury during pulling. Such injuries reduce tillering, prolong maturity, and may reduce grain yield" (p.230).

Evidence available with respect to the necessity for timeliness in rice transplanting referred to deepwater rice (rice grown in 51 cm. to 5 to 6 meters of standing water). Experiments with improved varieties which were double-transplanted showed that grain yields increased along with seedling age, reached a peak, and then declined. (See Table 3-1.) It will be noted that, for IR5, yield declines by 18.9% if the farmer waits for five more days before transplanting (assuming experimental conditions closely follow actual field conditions). Even if he were alone, he could begin to transplant on day 50. However because of inadequate labour, the task would have to be spread out over a longer period, with increasing seedling age.

Regarding the task of weeding, De Datta (1981) notes one experiment with an HYV wherein optimum yields were obtained when one hand weeding was done 42 days after transplanting (DT) and when two hand weedings were carried out 42 and 63 DT. Yields before and after these peaks were lower. In the case of one hand weeding, yields fell drastically on 49 DT. (See Table 3-2). These figures would indicate the need for a timely delivery of weeding labour.

Regarding timeliness in reaping rice, studies of modern rice varieties show that, beyond a certain number of days after heading (when the rice grain begins to sprout), if the crop is left standing in the field, yields per hectare tend

Table 3-2

**Effects of Seedling Age in a Double-
Transplanted Rice Culture on Grain Yield**

Seedling age (days) in		
First seedbed	Second seedbed	Yield (t/ha)
<u>IR5</u>		
25	0	4.1
25	20	4.8
25	25	5.3
25	30	4.3
25	35	3.7
25	40	3.2
<u>Pelita I-1</u>		
25	0	4.3
25	20	4.8
25	25	4.8
25	30	3.7
25	35	3.2
25	40	3.2

Source : Noorjamsi, et.al. (1977). Cited in Bhattacharya and Vergara (1978).

Table 3-3

Effects of Time and Frequency of Hand Weeding
on Weeding Time and Yield of Transplanted IR8 Rice

IRRI, 1967 Dry Season

Timing		Time Required	Grain Yield
Number	(DT ^a)	(hours/ha.)	(t/ha.)
1	21	164	7.4
1	28	227	7.1
1	35	201	8.0
1	42	418	8.3
1	49	410	6.7
1	56	349	6.4
1	63	546	5.0
2	21 and 42	280	8.3
2	21 and 42	388	8.1
2	21 and 42	399	7.8
2	21 and 42	470	8.6
No weeding		-	2.4

^aDT = days after transplanting

to diminish. One study of the IR 8 variety indicated that, without nitrogen fertilizer a maximum yield of 4,799 kg/ ha was achieved 38 days after heading, but that this steadily diminished afterwards, dropping by 8.5% within 6 days.

With 30 kg of nitrogen fertilizer per hectare, average yield peaked at 5,610 kg 34 days after heading but fell by 9.5% within 10 days (Nanju, 1969). Thus, in order to

maximize his harvest, the farmer should accomplish reaping on the day that the optimum yield is achieved. If he spreads out the task of reaping over several days, he would suffer losses in yield. Thus, timeliness in the performance of the task of reaping is very essential to obtain maximum output.

3.9 Concluding Remarks

The preceding sections have discussed the factors which are postulated to be relevant in determining the choice between individual action and collective action and between cooperative and non-cooperative strategies. Six of the seven hypothetical variables would appear to apply to non-agricultural situations while all seven would be relevant to agricultural situations. The context may differ from international alliances to the modern corporation to indigenous labour groups. Depending on the situation, one or more factors may be more crucial than others; some factors may not come into play at all. But it is postulated that these factors cover the major variables that determine cooperation.

To illustrate how factors operate to affect cooperation, a non-agricultural example will be presented here since the rest of the thesis discusses agricultural cooperation.

In organizing residents for bargaining with the owner of the air-polluting factory, all factors discussed above are relevant. Theoretically, the residents could use gas masks which they can purchase and use individually. Thus, there would be no need for cooperation. In effect, the mask is a cheap way of separating clean air from polluted air, thus rendering the affected air economically divisible. Alternatively, the residents could agree to setting up "oxygen stations" in strategic points in the neighbourhood where each could periodically get a few deep breaths of clean air. However, this option would still require cooperation because of the "indivisibility" of the oxygen station, and all the other factors that determine the choice between cooperation and individual action would then enter into the picture.

Residents might decide that gas masks were too ungainly and unsightly to really be an economic way of overcoming the indivisibility of clean air from polluted air. They might also reject oxygen stations as a viable alternative because of high transaction costs, e.g., they would still have to come to some agreement regarding sharing the costs of such a station.

The next alternative would be to bargain with the factory owner. In doing so, the residents would have to consider transaction costs too, i.e., the time spent in organization, including coming to an agreement regarding

each resident's contribution in order to pay the factory owner to put in some anti-pollution device, and the means of collecting contributions. An incentive for cooperation would exist if a large number of persons were involved because this would reduce the contribution per person. At the same time, large numbers increase transaction costs unless organizational structure were designed to minimize these.

Wealthier residents could resort to individual action by installing their own air purifiers in their homes, e.g., air-conditioners operating the whole year round in tropical countries or only in summer in temperate zones. This would increase the per person contribution for those not as wealthy, discouraging them from cooperating. Or the wealthier residents might view it as their prerogative to dominate whatever organization is set up.

Finally, the manner in which the whole affair is conducted (determined to a large extent by the leaders), e.g., being too rigid or too lax in determining personal contributions and collecting them, could significantly affect the degree of cooperation exhibited.

In other situations, such as inducing cooperative behaviour from managers in the large modern business corporation i.e., profit-maximizing behaviour, only one factor (transaction costs) may be relevant, with all the others not coming into play at all.

3.10 Application to Indigenous Cooperation

In the course of specifying the determinants of cooperation, I have drawn on empirical investigations of indigenous forms of cooperation, usually in the rural sector of developing countries. Aside from other literature discussed in Chapter 2, an empirical study of indigenous cooperation was also undertaken with the end in view of determining what factors bring it about. In doing so, I employed the analytical framework developed above, testing whether the factors postulated are indeed relevant or not.

The focus of the empirical study is indigenous labour groups in agricultural tasks. In the Philippines, these seem to be the most widespread form of cooperation among rural residents. Investigations were carried out in two separate localities in Luzon.

In what follows, two case studies in two separate villages are presented, followed by an analysis of the results of a survey which was conducted in an attempt to generalize to a wider level than that afforded by the case studies.

Before discussing the case studies, it should be noted that the analysis is complicated by three realities. First, members in cooperative labour teams are made up of two types of households. First, there are those who have a

relatively larger farm area to cultivate for a given household labour supply. They are labour deficit households or labour demanders. They join the team primarily to secure adequate labour for farm tasks. Then there are members who are labour suppliers or have a smaller farm area. They join the team primarily for the wages they can earn. However, labour demanders are not indifferent to additional income in the form of wages. Labour suppliers also need adequate labour for tasks on their own farm. It is possible that some of the postulated factors may not be relevant in affecting the choice between individual action and joining the team for a certain type of household. Whether this is true or not will be discussed in the following chapters.

A second complicating factor is the fact that the team hires itself out to non-members. This fact can affect a farming household's choice between individual and collective action by, for example, reducing search costs for hired labour since the hiring farmer has to deal with a representative of the team only rather than many individuals. This aspect will also be noted where appropriate.

A third complicating factor is that a farming household can resort to a combination of labour arrangements for transplanting and reaping on its own farm, i.e. it can resort to both individual and collective action. This is

true in San Ramon and in Nagpandayan, although in the latter no data were collected as to the extent of the combination. Thus, cooperation in certain agricultural field tasks could be termed a "weak" form of cooperation versus a "strong" form of cooperation where a task is completely undertaken by cooperative labour such as the task of irrigation by river and canal (gravity irrigation). This suggests that the difference between "strong" and "weak" cooperation in field tasks might lie in the nature of the task, implying differences in the technological factors which affect cooperation.

One factor which seems to make for more "robust" cooperation in gravity irrigation is the fact that an indivisibility in inputs exists in the form of a dam and a main canal which is not present in the other farm tasks. Because of this, the management of a gravity irrigation system requires constant coordination among its users.

Aside from the nature of the tasks, there are also considerations of household labour supply which limit the amount of labour that a household can contribute to the pool of labour. A household will only receive as much labour, more or less, as it contributes, as will be shown in the case studies. This may not be enough to finish the task of transplanting and reaping in its fields.

Finally, in Chapter Two, a distinction was made two

types of choices; the choice between individual action and cooperation in the narrow sense (or collective action), and the choice between cooperative and non-cooperative strategies. In Chapters Four and Five, we will focus on both in the context of agricultural field tasks. In Chapter Six, the focus will be on the choice of strategies of cooperation and non-cooperation within the existing agricultural work team or what shall also be referred to as cooperative and individualistic behaviour.

CHAPTER 4: A PALAY REAPING TEAM

4.1 San Ramon

The barangay (village) of San Ramon¹ is located in the municipality of Manabo, some 438 kilometers by road north of Manila in the province of Abra. It is connected by a 2-kilometer dirt road to the poblacion (administrative centre) and had 307 households and an estimated population of 1,642 with an estimated household size of 5.35 persons in 1982 (CENDHRRRA, 1982). It is made up of two cultural communities: Itnoeg (also known as Tingguian) and Ilocano, with the former comprising the majority. However, Ilocano is the dominant language in Manabo and most Itnoegs in San Ramon are fluent in it. The Itnoegs are native to San Ramon, with the Ilocanos migrating there from the coast before World War II. The Ilocanos are lowland people who have long been Christianized while the Itnoegs, generally a highland people, have only been recently evangelized.

San Ramon lies in a river valley. The main industry is rice farming, with some 350 hectares cultivated during the wet season (June to December) and slightly less during the dry season (January to June). A gravity irrigation system was completed in Manabo in 1978, with an effective command

¹ Administratively, San Ramon is divided into two barangays, San Ramon East and San Ramon West. In reality, however, only the main street separates the two and for our purposes, are considered one.

area of 1,000 hectares, 10 km. of main canal, and 10 lateral canals of varying lengths. Some 95% of San Ramon farms are irrigated by the system.

Farm size averages 1.19 hectares, ranging from 0.04 to 4.50 hectares. These farms on the average are divided into 2.55 parcels per farm, with an area of 4,676 sq.m. per parcel. Regarding tenure status,² 64.5% own their farms, 34.2% are share tenants and 1.3% are lessees.

Traditional rice varieties are almost exclusively planted, growing taller and having a longer maturity period than the modern varieties. During the wet season, almost all farmers plant a non-glutinous variety for home consumption while during the dry season, the majority shift to glutinous rice, which commands a higher market price. While the majority apply fertilizer and pesticides to their crop, relatively small amounts are used. The use of weedicides is negligible. Yields of palay (paddy) per hectare were 2.52 tons (560 bundles) per hectare for the wet season.

The cultivation of palay in San Ramon involves a number of sequential processes which takes place over a period ranging from 152 days to 182 days for the traditional varieties (90 days to 120 days for the modern varieties).

² Farmers are considered owners if they own more than 50% of the land they till; similarly for share tenants and lessees. Sharing of the net produce is done on a 50-50 basis.

First, seedlings are grown in a small section of the paddy field. Then the rest of the field is prepared for planting by ploughing, harrowing and leveling. Transplanting of the seedlings takes place two to four weeks after they have been planted.

Fertilizers and pesticides are applied afterwards. Weeding is done after the rice plant has reached a certain height. After the palay has ripened, the stalks are cut and bundled and the bundles are dried in the field, or taken home where they are dried. After they are dried, the bundles are threshed by pounding, or by a foot thresher.

4.2 The Labour Market for Reaping

During the wet season harvest, which began in mid-November 1983 and ended in late January 1984, there were six palay reaping teams, ranging in membership from nine to thirty three households, or an average of 23.7. Based on a study of two of the teams, an average of 2.4 household members joined the team. All six teams were led by a kabesilya,³ who was female. These same teams engaged in transplanting earlier in the season (July to September). Members refer to their teams as grupo ti alluyon or mutual aid groups.⁴

³Cabecilla is the Spanish word for petty leader.

⁴Alluyon is Ilocano for mutual aid, used interchangeably with ammoyo. The Itnoeg bunggoy is used in the more upland areas of Abra.

Extrapolating from the data gathered from the in-depth study of the two teams, it is estimated that the six teams reaped an area of 120 hectares through team work and another 22 hectares by means of family labour, for a total of 142 hectares. Since the teams are also comprised of 142 households, one household in effect reaped one hectare. Assuming that the remaining 165 households of the village had the same capacity, another 165 hectares would be accounted for. This would still leave a lack of labour to reap 43 hectares (or less if allowance is made for non-cultivation of a number of fields).

In fact, there has been a recent influx of families from an adjacent municipality due to unsettled peace and order conditions. By the end of 1984, total households in Manabo had risen to 390, or a 27.0% increase since 1982. Up till then, cultivators in Manabo complained of a labour shortage during transplanting and reaping ever since the irrigation system had become fully operational.

The estimated area of 142 hectares reaped by member households of the kabesilya-led teams represents 42.7% of the total area reaped, allowing for 5% of cultivable area not being cultivated for various reasons. Since there were no other organized teams in San Ramon, it was presumed that, aside from the area worked by family labour, the remainder was reaped by means of individual contractual arrangements involving ad hoc exchange labour or ad hoc teams of hired labour.

Based on the data gathered from the in-depth study of one of the kabesilya-led teams (that of Itlang), it appears that there exists a forward labour market for reaping. Members of the team hired out the team's labour to other members and to non-members two months in advance of the reaping season on the average in exchange for a cash advance representing the estimated total wage. Forward wages were lower than spot wages, e.g. P.70 per bundle for labour contracted in advance compared with P1.00 or more per bundle at reaping time. The members who contracted out the team's labour in advance did so because of their need for cash to finance current expenses. They looked upon these cash advances as debts to be paid when the reaping season came around.

The creditors in turn advanced the sums necessary in order to ensure themselves of adequate reaping labour when the time came. Of the 43 forward labour contracts entered into, only two involved discounted wages. The rest were not discounted.

4.3 A Reaping Team

Itlang, 52 years old, was in her third year as kabesilya of a group of reapers during the 1983 wet season harvest. Previous to her kabesilyaship, another member of the group, also female, had been kabesilya for five years. Itlang is the wife of the barangay captain (highest village official) of San Ramon West.

The team is engaged in both rice transplanting and harvesting for two cropping seasons, which means that the team is active for eight months of the year. In the 1983 wet season transplanting, the team numbered 23 member households. During harvesting of the wet season crop, they numbered 18 households and during the 1984 dry season transplanting, the number remained the same. Thirteen households remained members of the team throughout the three seasons. Four households joined for two seasons. Two of these were members during the 1983 wet season harvest and rejoined in the 1984 dry season transplanting. One of the four households was politely asked to leave the group after the 1983 wet season harvest because of alleged frequent absences. Six households joined the team for one season.

The eighteen households that made up the reaping team for the 1983 wet season harvest was composed of 20 families with two households having two families each.⁵ One family member, usually either the father or the mother, was the primary member, being held responsible for contributing to the labour pool. Thirteen (65.0%) of these primary members were females, and seven (35.0%) were males. On the average, they had been in the team for 12 years. They ranged in age from 23 to 62, with an average of 42 years.

⁵An example (see Appendix 1) is the household of Ligaya. Her married daughter, Salia, and Salia's family, live with her but team members distinguished between Ligaya and Salia in their accounting. However, the two families had a common kitchen and meals. This was also true of the other household of two families.

Primary members were joined by other household members, ranging from one to five in number, with 1.8 other household members on the average. However, only the names of the primary members were listed as being present. There was no difference in the rights and duties of primary and secondary members other than that the former were held responsible for contributing to the labour pool.

Thus, the total labour force that the team could muster was 56 reapers. The ages of the other household members who joined ranged from 13 years to 65 years, with an average of 23 years. Two-thirds were male and one-third were female. Overall, 55.4% of the team's labour force were male and 44.6% were female.

The kabesilya arranged the schedule of reaping, informing the members regarding any changes. She also disciplined the members, gently remonstrating with those who were lax in their work, or who were tardy or absent. The only other position that could be considered an officer was that of bundler, who was always male.

Aside from seeing to it that bundles were of uniform size, the bundler had authority to tell members to add more palay stalks if he thought the bundles was too thin, or to hand in "clean" bundles by removing leaves and grass if he thought the bundle was being padded. In Itlang's team, there was no one member who acted as bundler but several young males took turns. On a good number of occasions, the

bundler would be a non-member whose field they were reaping.

Apart from having officers, the kabesilya claimed that the group met once during each season to discuss difficulties that arose. However, during the 1983 wet season harvest, the team held no meeting.

The workday would begin at 7:30 a.m. At 11:30 a.m. the team would stop for lunch after which they would rest. Lunch would be provided by the family whose field was being reaped. If the field were near the barangay, lunch would be served in the home of the host, after which members would take a siesta, either in the host's home or in their own homes. Complaints were made that members did not show up for work in the afternoon if they retired to their homes for siesta. Work resumed at 1:30 p.m. and went on until 4:30 or 5:00 p.m. Except for drinking water, no snacks were provided.

The team did not end each work day with festivities, nor did they similarly mark the end of the harvest season. During work, and especially during the lunch break, there would be jocular exchanges, gossip and occasional singing.

Usually, the team worked as one unit, working in one field in the morning, and moving to a different field in the afternoon. On the average, the work group consisted of 17 members, ranging from 2 to 32. The low number of reapers occurred at the tail end of the harvest season, when the other team members had already begun transplanting and the

fields still being reaped were an hour's ^{work?} work from the barangay. The group laboured for 62 days, uninterrupted except for three breaks of two days (when no work was available), one day (Christmas) and two days (New Year's Eve and New Year's day) each. (See Table 4-1). After this, they worked for three more days, but only in groups of two or four since the transplanting of the dry season crop had already begun. They reaped a total of 7,830 bundles, which is the equivalent of 14.00 hectares in area, and 35.2 tons in weight.⁶

In terms of geographical location, the work of the team might be considered as taking place in three concentric semi-circles, with the centre in the usual gathering place of the team indicated in the sketch map of Manabo.

The first semi-circle covers fields within 15 minutes walking time. The majority were reaped from mid-November to mid-December. The second semi-circle covers the fields within 16 to 30 minutes walking time which were largely reaped from mid-December to mid-January. The third semi-circle encompasses fields more than 30 minutes' walk and were usually reaped from mid-January to mid-February. Included among the latter are unirrigated fields since they lie above the main canal of the Manabo gravity irrigation system. The three concentric semi-circles correspond to

⁶ Assuming an estimated yield of 560 bundles per hectare and 4.5 kg. per bundle.

three general types of traditional seed varieties differentiated according to maturation period.

On the average, the team accounted for 52.7% of all bundles reaped on their own farms, with 28.7% reaped by hired labour and 19.4% by family labour. (See Table 4-2). This situation arose for two reasons. First, member households used the labour pool not only to try to accomplish the task of reaping their own fields, but to pay their debts previously contracted in money and in kind (usually rice), largely from non-members. This diverted the team's labour to other farms. To complete the task of reaping on their own fields, members had to resort to either family labour or hired labour. Secondly, even though they did not use the team's labour to pay off debts, a number of households did not have sufficient family labour to command enough exchange labour to reap all their grain. Thus, they resorted to family and hired labour.

The terms of the exchange were simple enough: to exchange equal amounts of labour in terms of bundles reaped. Actual field conditions were taken into account in calculating equivalences. Eight bundles reaped in a muddy field with shorter stalks were equivalent to 10 bundles reaped in dry fields with long stalks. A shorter stalk required more effort to reap as it meant bending down more.

A matrix showing the amounts of labour exchanged by

Table 4-1

San Ramon Reaping Team: Work Calendar, Man-Hours,
Distance of Fields and Bundles Reaped
Wet Season (November 1983 to January 1984)

Day No.	Date	Employment Category ¹	No. of Reapers	No. of Hours	Man- Hours ²	Distance ³ (Minutes)	Bundles Reaped
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Nov. 16	1	18	7	126	15	104
2	Nov. 17	2	16	4	64	15	101
	17	1	10	2	20	15	23
3	Nov. 18	2	16	6.83	109.28	15	99
4	Nov. 19	2	21	8.42	176.82	20	169
5	Nov. 20	2	17	3.5	59.5	20	83
	20	1	13	3.5	45.5	15	30
6	Nov. 21	1	17	4	68	15	57
	21	1	5	2.67	13.35	25	13
	21	1	10	2.5	25	25	22
7	Nov. 22	2	14	7.5	105	15	84
8	Nov. 23	2	20	7.33	146.6	10	156
9	Nov. 24	1	23	8	184	10	180
10	Nov. 25	2	15	4.5	67.5	15	70
	25	2	16	3.5	56	10	53
11	Nov. 26	2	22	2.5	55	10	62
	26	1	16	3	48	15	29
12	Nov. 27	2	13	6.83	88.8	20	70
13	Nov. 28	2	17	2.83	48.11	15	44
	28	2	19	1.58	30.02	5	26
	28	2	18	3.83	68.94	15	44
14	Nov. 29	2	17	4	68	20	49
	29	2	9	3	27	10	19
15	Nov. 30	1	31	3.5	108.5	10	74
	30	1	28	2.5	70	15	36
	30	2	27	1.5	40.5	17	33
16	Dec. 1	2	28	4.5	126	15	100
	1	1	23	2	46	10	30
17	Dec. 2	1	23	1.5	34.5	15	30
	2	1	31	6	186	10	184
18	Dec. 3	2	25	3.5	87.5	10	92
	3	2	20	3	60	10	63
19	Dec. 4	2	22	4	88	5	95
	4	2	11	3	33	10	36
20	Dec. 7	2	9	7	63	10	69
21	Dec. 8	1	22	6.5	143	15	135
22	Dec. 9	1	32	8	256	10	145
23	Dec. 10	1	30	5.75	172.5	10	115
24	Dec. 11	1	32	6.17	197.44	40	137
25	Dec. 12	1	21	6.17	129.57	20	97
26	Dec. 13	1	21	7	147	20	145

Table 4-1 (con't)

Day No.	Date	Employment Category ¹	No. of Reapers	No. of Hours	Man- Hours ²	Distance ³ (Minutes)	Bundles Reaped
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
27	Dec. 14	2	20	6.33	126.6	15	116
28	Dec. 15	1	16	5.43	86.72	15	77
29	Dec. 16	1	14	4.5	63	20	79
	16	1	8	4.5	36	20	44
	16	1	6	3	18	20	18
30	Dec. 17	1	24	7.5	180	20	193
31	Dec. 18	1	18	4	72	10	59
	18	1	14	0.95	13.3	12	16
32	Dec. 19	2	18	2.3	41.4	15	97
33	Dec. 20	2	20	1.5	30	15	50
	20	2	20	3	60	15	72
	20	2	10	1.5	15	20	27
34	Dec. 21	2	19	4.5	85.5	25	109
	21	1	9	1	9	20	12
	21	1,2	14	3	42	20	66
35	Dec. 22	1	19	4.3	81.7	10	100
36	Dec. 23	1	21	8	168	15	134
37	Dec. 24	1	14	7	98	20	89
38	Dec. 26	1	13	7	91	20	111
39	Dec. 27	2	19	4.3	81.7	15	57
	27	1	21	4.5	94.5	15	105
40	Dec. 28	2	16	7.5	120	12	114
41	Dec. 29	1	21	3.5	73.5	45	84
42	Dec. 30	2	16	5.75	92	20	102
43	Jan. 2	1	15	6.5	97.5	60	79
	2	2	15	7	105	40	96
44	Jan. 3	1	14	7	98	60	102
	3	2	8	7	56	40	56
45	Jan. 4	2	16	4	64	15	57
	4	2	16	5	80	25	84
46	Jan. 5	1	25	4	100	15	110
47	Jan. 6	1	29	6.5	188.5	35	162
	6	2	18	3	54	15	50
48	Jan. 7	2	21	3.75	78.75	20	97
	7	1	15	3	45	30	48
49	Jan. 8	2	14	3	42	15	82
	8	1	11	7	77	40	76
50	Jan. 9	1	14	6.5	92	60	92
51	Jan. 10	2	15	7.5	112.5	40	100
52	Jan. 11	2	18	7	126	45	103
53	Jan. 12	1	17	6	102	40	87
54	Jan. 13	1	16	8.5	136	25	100
55	Jan. 14	1	23	6.83	157.1	30	163
56	Jan. 15	2	24	7	168	30	195
57	Jan. 16	1	20	7.5	150	15	140

Table 4-1 (con't)

Day No.	Date	Employment Category ¹	No. of Reapers	No. of Hours	Man- Hours ²	Distance ³ (Minutes)	Bundles Reaped
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
58	Jan. 17	2	13	4	52	35	100
	17	1	15	4	60	45	90
	17	1	12	3	36	45	47
59	Jan. 18	1	15	5.83	87.45	20	54
60	Jan. 19	1	7	3.5	24.5	35	30
	19	1	6	3	18	40	27
61	Jan. 20	2	19	6	114	45	115
62	Jan. 21	2	2	6.5	13	60	15
	21	1	10	6.5	65	45	74
63	Jan. 24	1	2	7	14	60	9
64	Jan. 26	1	4	3.5	14	40	16
65	Jan. 29	1	4	6.5	26	60	24
66	Jan. 31	1	3	2	6	40	16
TOTAL			1,664	474.2		8,126.2	7,830

Notes : 1 1 - exchange labour; 2 - hired labour.
 2 Includes bundling and related tasks.
 3 From the team's neighbourhood in Barangay
 San Ramon West.

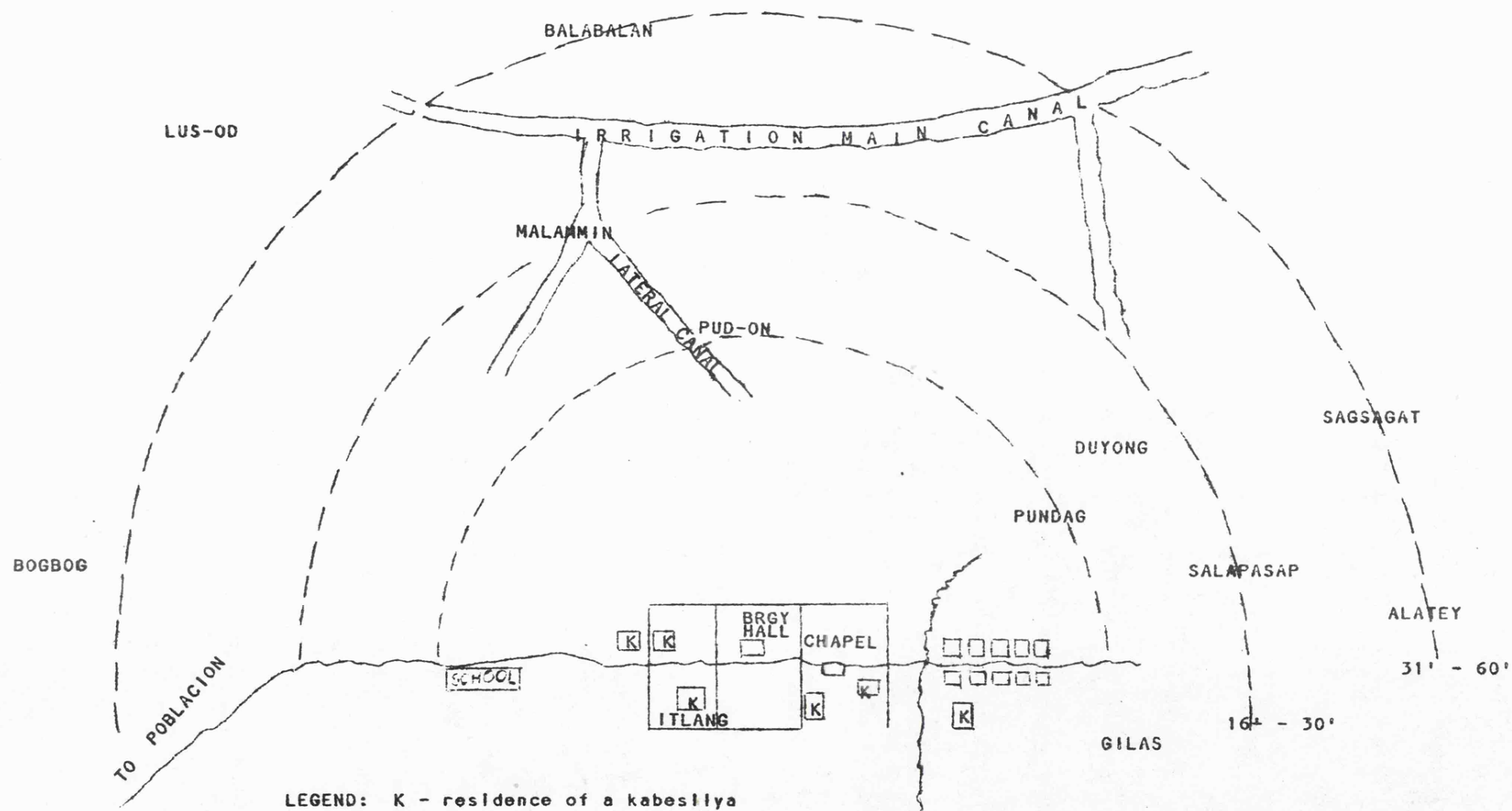


Table 4-2

San Ramon Reaping Team : Labour Supply
Debt and Labour Arrangement for Reaping, Wet Season Harvest
(November 1983 to January 1984)

Member Family	Labour Supply ¹	Own Harvest (bundles)	Debt (bundles)	%Own Harvest Reaped By		
				Exchange Labour	Hired Labour	Family Labour
Agmacan	2	605	120	33.4	65.8	0.8
Alfon	2	255	100	100.0	-	-
Bados	2	374	190	12.6	43.3	44.1
Dayapan	4	284	330	6.3	42.2	51.4
Dosing	2	613	-	42.2	39.5	18.4
Ellen	4	757	-	55.9	23.9	20.2
Flora	4	630	-	37.0	35.7	27.3
Ganayen	1	203	-	79.8	-	20.2
Itlang	5	474	500	95.8	-	4.2
Ligaya	4	50	705	-	-	100.0
Lourdes	5	657	-	93.6	4.6	1.8
Padaman	2	594	160	79.3	19.5	1.2
Palagtay	2	227	200	60.4	39.6	-
Roman	2	27	100	-	-	100.0
Romeo	2	211	335	47.9	15.6	36.5
Romy A.	2	403	100	45.9	40.7	13.4
Romy J.	3	490	-	39.2	28.6	32.2
Salia	2	210	550	-	100.0	-
Sianang	2	60	500	60.0	-	40.0
Tinay	4	892	-	48.4	14.6	37.0
TOTAL	56	8,016	3,890	-	-	-
AVERAGE	2.8	401	299.23	52.7	28.0	19.4

- Notes : 1 Family members who joined the reaping team.
2 Other parcels were not planted because they were located in an area which armed dissidents were known to visit.

each member family in terms of bundles is given in Appendix 1. It shows the deficit or surplus of exchange labour that each family has with respect to other families both individually and as a whole. The total amount of labour exchanged was 7,538 bundles. This figure includes credits to members who acted as bundlers. If the bundler did not belong to the family whose field was being reaped, this labour was considered worth a certain number of bundles reaped, depending on the highest number of bundles reaped by an individual member for that field. If, for instance, the bundler had been able to reap one bundle before turning to the task of bundling, and if the highest individual number of bundles reaped for that field that day was 9, then the bundler was credited with an additional 8 bundles.

The total of 7,538 bundles of labour exchange differs from the total number of bundles reaped by the team of 7,830 as given in Table 4-1, since the latter figure includes the bundles reaped by all members of the team, while the former excludes bundles reaped by a family for itself when the team reaped for that family.

Those member families who supplied more labour than they received were compensated in cash at P1.00 per bundle by each debtor family. For instance, the family of Bados (no. 3 Appendix 1) gave more labour (worth 50 bundles) than it received. The family of Agmaoan (no. 1) paid Bados P12.00 in cash to cover its debt. Similarly, all the other

families who ~~owned~~ Bados labour paid her in cash. Each family listed down the names, usually of the primary member, of those who reaped for it, and also recorded the number of bundles. The list served as a reminder of its debt to the other member families.

The group helped each other, not only to reap their own fields but to repay debts as well. The less well-off member families borrowed from the better-off ones, and from non-members as well. The practice has been for a member-family to contract debts individually, both in cash and in kind, before the harvest, by offering to reap an equivalent number of bundles in the creditor's field(s). When the harvest comes around, the team will help the member family redeem its pledge.

The team assisted twelve member families repay a total of P3,230 worth of debts outstanding, by reaping 3,511 bundles, or 44.8% of the team total. The average debt per family was P312.00, ranging from P100.00 to P705.00, incurred for an average of two months before they were repaid. Out of the 43 specific debts, only two carried simple interest rates which were 240% and 254.8% per annum, while the rest were interest-free since the creditors did not discount the wages advanced. Interest charges took the form of discounted wage rates of P0.70 and P0.714 per bundle compared to the market wage rate of P1.00 per bundle during the harvest season. On the average, a debtor family had

three to four creditors.

4.4 Results of a Preliminary Survey

Before examining in detail the determinants of membership in a reaping team, the results of a sample survey of sixty four farmers and of interviews with twenty three kablesilya from the five population centres of Manabo (Francia, 1988) will be discussed. The sample survey gives the reasons for a household's decision to accomplish a farm task through cooperative labour or through hired labour. The sample included non-members of agricultural work teams. The interviews with the kablesilya give the reasons for the existence of the cooperative labour groups.

The survey provided data on membership in land preparation and transplanting teams. For land preparation, 47.6% resorted to family/own labour, 29.0% hired labour, 9.0% used cooperative labour and 14.3% resorted to a mix of the three arrangements. For transplanting, 40.6% hired labour, 23.4% resorted to cooperative labour, 1.6% utilized family/own labour and 34.4 resorted to a mixed arrangement.

Of the total of 64 respondents, 29 (45.3%) resorted to cooperative labour either wholly or partially, while 45 (70.3%) resorted to hired labour either wholly or partially. For co-operative labour, the respondents were not asked whether the group had a kablesilya or not. For hired labour

too, no distinction was made as to whether the group was ad hoc or had a kabesilya.

The sixty-four farmer respondents were asked by means of an open-ended question, their reason for resorting to co-operative labour or hired labour in transplanting (Table 4.3). They indicate that budgetary constraints ("to reduce expenses") were the main reason (51 per cent) followed by the availability of family labour ("wife/children able to exchange labour").

On the other hand, family labour supply was the primary determinant of resorting to hired labour, as seen by combining "respondent not strong enough", "wife/children unable to exchange labour" and "children at school" which accounted for 70 per cent of all replies. Budgetary considerations ("cash available") were cited in only 15 per cent of all cases.

It is interesting to note that 7.6% of the hiring farmers hired labour in order to finish the work quickly, referring to the timeliness of task execution. However, this does not necessarily mean that hired labour better assures the farmer of timeliness than cooperative labour because the cooperative labour groups also hired out their labour.⁷

⁷In the course of the survey of kabesilyas, which followed that of the sixty four farmers, that it was discovered that kabesilya-led teams also hire out the labour of the group.

Table 4.3

Reasons for Co-operative and Hired
Labour in Transplanting
Wet Season 1983*

Reason given	Co-operating farmers	% of replies	Hiring farmers	% of replies
To reduce expenses	29 *	51.0	-	-
Cash available	-	-	12	15.2
Respondent not strong enough	-	-	16	20.2
Wife able to exchange labour	17	29.6	-	-
Wife unable to Exchange labour	-	-	23	29.1
Children able to Exchange labour	4	7.0	-	-
Children too young	-	-	5	6.3
Children at school	-	-	11	13.9
Tradition	6	10.5	-	-
To finish work quickly	-	-	6	7.6
Others	1	1.8	6	7.6
TOTAL REPLIES	57	100.0	79	100.0

* A number of respondents gave more than one reply. 29 and 45 respondents respectively engaged in co-operative and hired labour whether wholly or partially.

Probing deeper, respondents were asked what labour arrangement they would prefer in transplanting if there were no obstacles. Those who chose cooperative labour wholly or partially due to budgetary constraints were asked, "If the money were available, would you hire people to transplant rather than use ammoyo (cooperative) labour?" Almost half of the twenty-nine respondents said that they would still resort to ammoyo labour; fifteen or 52 per cent said they would rather hire labour. Similarly, those who chose hired labour arrangements either wholly or partially were asked, "If the obstacles to using co-operative labour were removed, would you resort to it?" Of forty-five respondents, thirty or two-thirds said yes, and nine said no, they would rather hire labour.

Most of the reasons given for preference for cooperative labour had to do with saving money (Table 4.4), while those for hired labour had to do with a desire for more leisure ("to have more rest" and "growing old").

Other reasons given for the preference for cooperative labour indicated that atmosphere ("cooperative labour enjoyable"), economies due to teamwork, and transaction cost ("cooperative labour easier to secure") were factors taken into account. For hired labour, opportunity costs were the next major reason, i.e. "to attend to other parcels/farm tasks", "to do other (higher income) work", and "to do housekeeping".

Table 4.4

Reason for Preferred Labour
Arrangement in Transplanting*

Reasons for Preference for	Co-operating farmers		Hiring Farmers	
	No.	% of all replies	No.	% of all replies
Cooperative Labour				
1. To save money	11	55.0	10	58.8
2. Co-operative labour enjoyable	6	30.0	4	11.8
3. Easier to secure	2	10.0	2	5.9
4. Tradition	1	5.0	2	5.9
5. Promotes unity/ teamwork	-	-	6	17.6
TOTAL	20	100.0	34	100.0
Hired Labour				
1. to have more rest	8	44.4	2	20.0
2. Growing old	1	5.6	5	50.0
3. To attend to other parcels/farm tasks	4	22.2	2	20.0
4. To do other higher income) work	3	16.7	-	-
5. To do house- keeping	1	5.6	-	-
6. Others	1	5.6	1	10.0
TOTAL	18	100.0	10	100.0

* A number of respondents gave more than one reason each.

By occupation, one half of cooperative labour consisted of farmers' wives, one-third of farmers and one-seventh of landless labourers (Table 4.5). For hired labour, farmers and farmers' wives still constituted the majority, although landless labourers, out-of-school youth [^]and students made up one third.

By sex, two-thirds of cooperative labour were female and one third was male. In contrast, for hired labour, there was a higher participation rate for males (56 percent) and a lower one for females (44 percent).

Table 4.5

Main Occupation of Members
of Transplanting Groups
Wet Season 1983

Main Occupation	: Cooperative Labour		: Hired Labour	
	No.	%	No.	%
Farmer	89	33.0	79	23.8
Farmer's Wife	139	49.6	146	44.0
Landless Labourers	39	14.4	74	22.3
Out-of-school Youth	6	2.2	25	7.5
Student	2	1.0	8	2.4
TOTAL	275	100.0	332	100.0

A survey was also conducted of the kablesilyas of the twenty-three cooperative labour teams in Manabo engaged in either transplanting or harvesting or both.

An open-ended question was addressed to the twenty-three kablesilyas : "What are the reasons for the group's existence?" The replies are given in table 4.6, with low transaction costs as the most frequently cited reason as evidenced by such replies as the existence of compatibility among members, the fact that the group was composed of neighbours and relatives, and that it was fairly managed.

Table 4.6

Reasons for the Existence of 23 Co-operative
Labour Groups

Reasons	No. of replies	% of all replies
To reduce expenses	12	27.3
Mutual help	7	15.9
Compatibility among Members	9	20.4
Neighbours/relatives	3	6.8
Good/fair management	6	13.6
Tradition	3	6.8
Labour scarcity	2	4.5
Income of Landless	2	4.5
TOTAL	44	100.0

The second and third most frequent reasons were financial saving ("to reduce expenses") and mutual help, implying the existence of economies.

4.5 The Determinants of Membership in the Reaping Team

4.5.1 Indivisibilities in Reaping

No large machines were employed in reaping. From this point of view, reaping in San Ramon did not involve an indivisibility. In fact, machinery of any size was not used, only a small hand tool called the rakkem, which is described below.

There is no indivisibility in the process of reaping either. It is a simple process of cutting the stalks of paddy and bundling them. It could be contended that because reaping has to be accomplished in a relatively short period of time and cannot be "divided" over a number of days in order to maximise output, that some indivisibility is present. However, such a phenomenon is better explained as the need for the timely delivery of reaping services rather than as an indivisibility in the reaping process. This will be discussed in the next section.

The absence of an indivisibility in the inputs used for reaping or in the process of reaping itself does not mean that this variable is irrelevant as a factor determining agricultural cooperation. It simply means that for the

particular farm task of reaping as practised in San Ramon, indivisibilities did not form basis for the organization of reaping team.

However, an irrigators' association existed for the whole municipality occasioned by the indivisibility embodied in the large dam built across the Ikmin river, the water being channelled through 1.1 km. of tunnel blasted through a mountain, onto a 19 km long concrete and earthen main canal which fed ten long lateral canals. The manabo farmers were organized by an external, non-governmental agency to build and operate the entire irrigation system.

4.5.2 Timeliness in Reaping

Evidence for the necessity of timeliness in the reaping of modern varieties of paddy was presented in Section 3.8. While similar studies for traditional rice varieties are not available, it can safely be assumed that they also reach an optimum yield which declines if left standing in the field after this. All of the members of the reaping team agreed that without the help of the team, they would not be able to avoid over-ripening of their crops, resulting in losses in output.

A member household has an average parcel area of 3,000 sq.m. with an average yield of 168 bundles. Each member household cultivated 4.05 parcels on the average. Also, each member household has 3 household members on the average

who engage in reaping, including the tasks of flattening the tall stalks, bundling and collecting the bundles. With an estimated capacity of 21 bundles reaped in a 7-hour day, the household can hope to finish reaping in 8 successive days on that particular parcel.⁸ There is an incentive for these to be successive days if the grains ripen at the same time. In contrast, the team can accomplish the task in 1.2 days, given their average size of 17 reapers (including bundlers) and a minimum capacity of 8.4 bundles per reaper per 7-hour day. If the household has one other parcel whose crop matures on the same day as the first parcel, then all the more would it have need of the services of the team.

San Ramon farmers say that if a crop is left standing in the field too long, the results would be (1) hardening of the rice stalks, thus rendering it more difficult to cut; (2) the grains more easily fall from the stalk because of over-ripening; (3) increased danger from pests and from grazing livestock, and (4) shattering of overripe grain when threshed and milled.

Thus, membership in the team provides insurance against the uncertainty of having adequate labour on hand for the timely execution of the task of reaping.

On the other hand, non-member households in San Ramon

⁸ A seven-hour day was chosen as the standard, based on data gathered from Itlang's team.

were able to secure timely delivery of reaping labour by advancing wages in the form of loans to member households of the six reaping teams. It was noted earlier that twelve member households of Itlang's team of eighteen contracted debts of two months before the harvest season. These debts were repaid by the team by means of reaping the fields of the creditors up to the amount of the debt incurred. Thus, a farm household with a good liquidity position could advance wages and thus insure the timely delivery of reaping labour without having to be team member.

However, because of the limited supply of labour, it was not always certain that a liquid farm household would be able to contract for an adequate enough amount of labor to perform the task of reaping within a brief span of time. On the other hand, membership in a reaping team would more certainly insure adequate labour.

This conclusion is borne out by experience in the village. On two occasions during the 1983 wet season reaping, I met a farmer and a farmer's housewife who were preoccupied with searching for people who could be hired to reap their fields. They did not belong to any reaping team. They were quite concerned that they had not been able to gather an adequate number of reapers in spite of the fact that they had offered a higher wage rate, up to double the current wage rate of ₱1.00 per bundle.

The need for timeliness means that an adequate labour force is necessary. Hence this sets a basis for group work in reaping.

Benefit/cost considerations of joining a team do not differ whether a household is a labour demander or supplier insofar as timeliness of execution of reaping is concerned. Average farm size for San Ramon households is 1.19 hectares (1.18 for members of Itlang's team). Assuming an average family labour supply of three reapers, the household is faced with the need for an adequate and timely labour supply for reaping.

In order to ensure the timeliness of task execution to both its members and to non-members, the kabesilya would break up the team into subgroups when necessary. Usually, the schedule for the next day was agreed upon at the end of the work day. If it happened that they were split into subgroups, they would go to Itlang's home to find out the schedule for the next day or Itlang would send word to each member household. The fact that most of them were residential neighbours reduced communications costs.

4.5.3 Elasticity of Substitution

The use of traditional varieties and the absence of straight-row transplanting in San Ramon prevents the use of

power-driven hand reapers currently manufactured.⁹ However, even small farmers using modern varieties and straight-row planting cannot afford the P18,000 (US\$900) reaper, plus operation and maintenance expenses. Their use of these machines in place of labour will depend on whether they can be hired or not and at what price, or on a government subsidized credit scheme to purchase them.

Reaping in San Ramon (and in Manabo in general) is done by means of the rakkem which consists of an iron blade 50 mm long partially embedded perpendicularly on a rounded piece of wood 80 to 90 mm. long and 20 mm. in diameter in the middle by tapering off towards both ends. (See Appendix 3). It is held in the palm of one hand with the blade coming out between the middle and the ring finger. Each rice stalk (tiller) is cut individually, closer to the top than to the bottom, thus making for a very labour intensive process. The use of the rakkem is linked with the practice of planting seedlings close together which renders it difficult to use a sickle to cut the mature crop.

The substitution of the sickle for the rakkem would reduce labour requirement for harvesting. In the 1982 CENDHRRA study of the Manabo Irrigation System, it was found

⁹At the International Rice Research Institute (IRRI) in Los Baños, Laguna, Philippines, in conjunction with the Chinese Academy of Agricultural Mechanization and Sciences (CAAMS). Please see Appendix 4.

that farmers used 45.2 and 40.4 mandays per hectare to reap the wet and dry season crops respectively. By way of contrast, in Central Luzon where the sickle is used, labour for reaping, bundling, hauling and stacking accounted for 24 mandays per hectare in both wet and dry seasons of 1978 under the tilyadora (or large mechanical ^{reaper?} thresher) system (Hayami and Kikuchi, 1981, p. 94).

The timeliness required in the task of reaping, combined with the labour-intensive technology involved due to planting practices, leads to very high demand for labour during the harvest season. This is aggravated by the fact of overlap between the reaping of the late maturing wet season varieties (bayag) and the transplanting of the dry season crop, which is also labour-intensive. Thus, the relative costs of not joining a reaping team which assures labour to the household when it is needed, are quite high.

4.5.4 Economies

There are several possible arrangements by which a San Ramon household can have its farm reaped, namely: (1) by family labour; (2) by hiring the kabesilya-led teams; (3) by hiring reapers individually to form an ad hoc team; (4) by joining a kabesilya-led team; or (5) by a combination of the foregoing, as in fact members of Itlang's team have done.

There is evidence that the kabesilya-led teams are more

efficient than family labour in reaping.¹⁰ Based on interviews with members of Itlang's team, the average capacity of a household of three reapers (husband and wife, both age 42, and one son, age 23) is 21 bundles for a seven-hour day, including labour for bundling and related tasks. This reduces to one bundle per manhour or seven bundles per manday.

The data in Table 4-1 shows that a team member reaped an average of .96 bundles an hour or 6.7 bundles per seven-hour day. However, the reality is that members did not all report for work or quit work simultaneously. Often individuals would arrive at the field after the bulk of the team had begun work and others would leave before the rest did. However, time began and time ended was recorded at the time when the majority of the team were present. Hence, the number of manhours reported in Table 4-1 overstates actual manhours and correspondingly understates labour efficiency. Field observations indicate that the efficiency of the team is higher, averaging 1.2 bundles per manhour or 8.4 bundles per manday.

¹⁰There was no significant difference between the relative efficiencies of cooperative and hired labour, based on data from the sample survey of 64 farmers. However, relative efficiencies between the kabesilya-led teams and ad hoc hired labour teams were not estimated because farmer-respondents did not distinguish between the two. Labour hired out by the kabesilya-led teams would be included in the data on hired labour in the survey.

The greater efficiency of the kabesilya-led team over family labour, however, is also available to non-members who lend money to individual team members. Thus, these households, who in effect hire the team, gain from the economies affected by the team and this acts as an incentive for the household not to join the team, ceteris paribus.

It is also possible that households who hire ad hoc teams enjoy a higher labour efficiency than if they were to join a kabesilya-led team. However, estimates of the efficiency of ad hoc teams are difficult to make because of the fact that the wage was a piece rate of ₱1.00 per bundle. The tendency of workers would be to report for work at different times, depending on how much income each individual wanted to earn. A number would report earlier than the rest in order to choose the part of the field which is easiest to reap. A similar difficulty with respect to estimating the labour efficiency of Itlang's team was mentioned above.

Data from the largest kabesilya-led reaping team (33 households) indicated an average of 1.086 bundles per man-hour for a seven-hour day or an average of 7.6 bundles per day. This also tends to be an understatement of the team's efficiency for the reason cited earlier. Unfortunately, field observations of this team were few and not enough to make a more accurate estimate. The impression, however, was that this team worked more quickly than Itlang's team and

this was probably due to the higher associational gains resulting from a larger number of reapers. It was observed that the group engaged in more banter than Itlang's team. Due also to the faster pace of the work, they were able to cover three to four fields in a day. The walking to and from the different fields provided a break in the monotony of the work. The average working group size was 30 persons.

Team members attributed the greater efficiency of the team over family labour to the associational gains from being part of the team. They referred to the competition that arises among them as each tries to reap as many bundles as possible in order to command more exchange labour. For some, the threat of being considered a slow worker who should not be on the team goaded them to a faster pace. Others referred to the banter, conversation and occasional singing which helped them bear the heat of the day, enabling them to work longer.

From another perspective, the scale on which each household was involved in reaping palay was increased by the fact of joining the team, since, in effect, the creation of the team consists in the pooling of its members' labour and a major portion of its farm land for reaping. A certain amount of specialization and division of labour takes place because of the choice of bundlers who are thought to be more capable of the job than others. The larger scale of reaping also results in greater expertise in reaping because of the

constant performance of the task.

The creation of the position of kabesilya can also be considered as part of the division of labour. However, as practiced in San Ramon, the kabesilya hardly did any supervision of each team member in the field which could increase efficiency. If any supervision was done, it was carried out by the bundler who could tell the individual reaper to increase the size or improve the quality of bundles reaped.

4.5.5 Transaction Costs

The sample survey of sixty four farmers in Manabo indicated that the transplanting groups, whether cooperative or hired, were composed mainly of kin (relatives and in-laws) and residential neighbours. (See Table 4.7) This indicates that both members and non-members of cooperative work groups attempted to reduce transaction costs by relying on kin and residential neighbours whom, presumably, they could trust to keep their commitment to show up on the appointed day and to execute the task properly.

Kinship among Filipinos in general creates a closer bond and a higher level of trust between two parties who are kinsmen than between those who are not. One who is a close kin will be more accomodating and can be relied upon more

Table 4.7

Relation of Transplanting Work Groups to Host Farmers
Wet Season 1983

Relation to Host Farmer	: Cooperative Labour		: Hired Labour ¹	
	: No.	%	: No.	%
Family	33	8.4	8	1.6
Relatives	104	26.6	148	29.7
In-Laws	85	21.7	88	17.7
Residential neighbours	115	29.4	140	28.0
Farm neighbours	10	2.6	6	1.2
Others	42	10.7	108	21.7
TOTAL	389 ²	100.0	498 ²	100.0

1 No distinction was made between ad hoc hired teams and kablesilya-led teams.

2 Greater than the number of persons in cooperative and hired groups because a number of workers transplanted for different respondents.

than one who is not.¹¹

For members (who are labour demanders) of an already established cooperative labour group, search costs for reapers would be nil compared to search costs for non-members, who are also labour demanders, since the latter would have to contact each household who was a labour supplier individually, assuming he were not hiring a kablesilya-led team. Of course, search costs to the non-member household would be less if labour suppliers came to him.

For team members who are looking for employers, i.e. they are labour suppliers, search costs would be positive but less than those of non-members who are also searching for employers. The former, since they can commit the labour of the whole team and thus cut down the search costs of hiring farmers, would more readily find employment than the latter who can only offer their own individual labour or that of their household.

For the 1984 wet season harvest, members of one of the reaping teams in San Ramon broke off and formed a new team

¹¹ Observing relationships in a Philippine town, Morais (1980, p. 100) says: "[There is] a norm which states that towards one's close kin, she/he owes support, trust, loyalty and special consideration, simply because that person is a close kinsman." Castillo (1977, p. 427) cites data which show that Filipinos will more readily assist kinsmen than non-kinsmen, assuming both are equally needy.

under a new kabesilya. Thus, there was a total of 7 reaping teams for the season. Membership in the new team was made up of households from the old team and from among recent arrivals from a neighbouring municipality. One of the reasons given for the formation of a new team was that member households lived in the same vicinity, which was the southernmost part of San Ramon and where the new arrivals set up their homes. The fact of living in the same vicinity reduced search costs of identifying and locating prospective members.

Monitoring costs would be higher for non-member households than for member households of cooperative labour groups in times of sickness or emergencies. The member household can rely on the team members to execute the task properly whereas non-member households would still have to monitor the hired group, unless he can rely on close kin or trusted neighbours to do it for him. More than one fifth of hired workers would be other than family, relatives, etc., and would presumably require closer monitoring of their performance than if they were kin or neighbours. (See table 4.7)

In what follows, transaction costs within the kabesilya-led reaping team of Itlang will be discussed.

Belonging to the same cultural community also helps to reduce transaction costs because of shared language and

values, so that one would tend to be more accommodating and trusting of another who is of the same culture. Such attitudes are enhanced in a situation of cultural diversity, as in San Ramon where there is a substantial minority of Ilocanos. Itlang's team is made up of 16 Itnoeg households, 3 mixed Itnoeg-Ilocano households, and one Ilocano-Visayan household. Four of the five remaining reaping teams in San Ramon in the 1983 wet season were predominantly Itnoeg, and one was completely Ilocano, although it was the smallest of the teams, with nine member households. The latter team is also referred to as the "Iloco" group. It is perhaps significant that the one member household not re-admitted into Itlang's team after the harvest season was the mixed Ilocano-Visayan household. Screening costs were also reduced by the fact that a number had previously worked on the same team.

Transaction costs within the team are further reduced by the fact that 10 out of 18 member households, or 55.6%, belong to one kin group. This dominant kin group centers around the household of Itlang, Ligaya, and Sianang, who are all sisters. A fourth household is headed by their widowed sister-in-law, and a fifth household by Itlang's son. In each of the remaining five households in the dominant kin-group, one of the spouses is related to either Itlang or her husband, Barga.

It is significant to note that the household not re-

admitted to the team after the reaping season was not related to any other member household and did not belong to the majority cultural community (Itnoeg), being Ilocano-Visayan. The reason given for the action was that the female spouse was frequently absent from work. An examination of the records showed that she had shown up for ten work days and reaped 37 bundles, or an average of only 3.7 bundles per day. However, her husband joined the team for 23 workdays and reaped a total of 167 bundles for an average of 7.26 bundles per day.

The selection of a leader, i.e., the kabesilya, reduces bargaining costs since she has the ability and authority to settle conflicts in the work schedule. For instance, two member households may want to use the labour pool on the same day, but the team has manpower sufficient only for one claimant. The kabesilya decides which claimant will be first attended to. Thus, the reaping team does not fit the definition of a peer group given by Williamson in the sense that the team as such does not settle conflicts by meeting together but delegates such authority to a chosen member. Here we have the beginning of simple hierarchy.

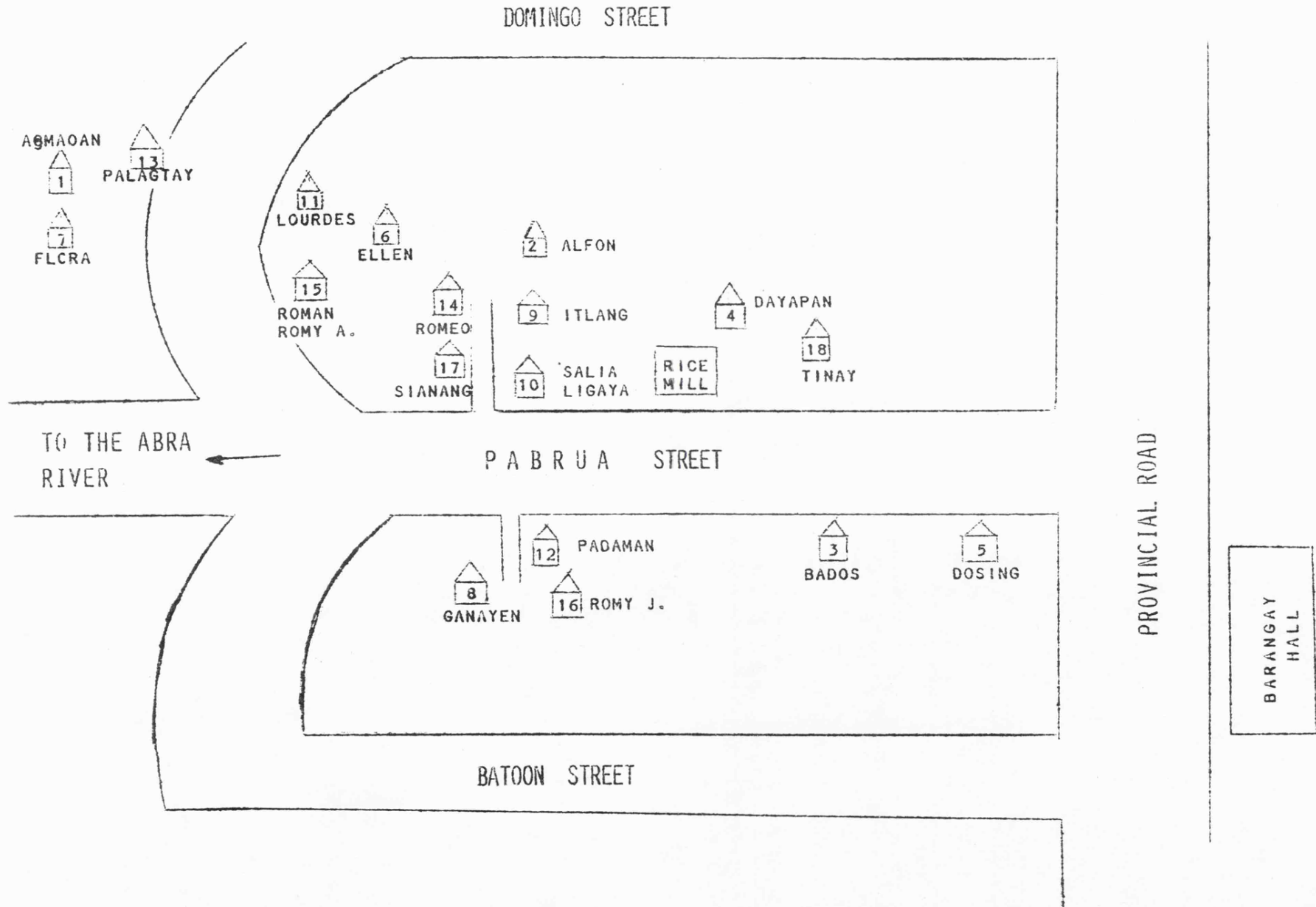
Itlang, the kabesilya, was chosen by members to act as such because of her ability to settle conflicts, and her diligence in reminding members about the schedule of work, independent of her status of being the wife of the barangay captain (the highest official on the barangay level).

Although she was only able to complete three years of primary education, she exudes quiet authority and was chosen by the group rather than appointed. Thus, her decisions and remonstrations -- she made few -- were well-accepted.

Information costs are reduced by the mere fact that member households are residential neighbours, all living in the same district of San Ramon, which is divided into five residential districts. (See the sketch map of residential locations of team members.) On the average, each member household was neighbour to 2.5 other members, or 13.9% of the team. Residential neighbour refers, not to member households who are literally next-door neighbours, but to proximity and accessibility. As indicated in the sketch map, Sianang (No. 17) is not a next-door neighbour of Alfon (No. 2) but only 20 meters of open space separate their homes, neither of which is fenced off, so that one can readily go up to their front doors which happen to be on ground level.

Team members also frequently meet in the rice mill (indicated in the sketch map) where they go to thresh and to mill palay. They also meet in the fields since 12 member households (or 60% of all member households) have a field adjacent to another member household's field.

Normally the kabesilya decides whose field should be reaped on the first day and passes on this information to



the team members through the network of neighbours described above. The schedule for the second day is determined at the work site or during lunch on the first day. Member households who are absent are informed by their neighbours or by chance encounters at the rice mill or along the streets of the barangay. The schedule for the third, fourth, etc. days are similarly set. Last minute changes in schedule are also easily relayed to team members because of their residential proximity and accessibility.

The team did not experience any difficulty due to miscommunications. However, the team of Atigan referred to earlier, a much larger, 33-member household reaping team, did experience some difficulties which were costly. On one day, the team walked for some 30 minutes over the rice paddies to reap a field which was presumed scheduled for the day, only to find out that the schedule had been changed, because the grain was not mature enough. After some grumbling, the team then went to the next field which was scheduled for that day, but which required another half-hour of fast walking, through under-growth and over paddies. Complaints from team members were heard regarding the time and energy needlessly spent.

Monitoring costs are also reduced by the fact of being residential and field neighbours, since these involves face-to-face encounters and reduce the incentive to be absent from work without a valid reason. One primary team member

quit the team after his fields had been reaped in order to engage in cattle raising, which was more lucrative. Although he offered to pay his remaining obligations in cash, team members felt he reneged on his commitment to them because of the difficulty of securing labour. Thus, subsequent encounters between him and other team members tended to be cool and uncomfortable.

In general, absenteeism was not a serious problem, although there were afternoons when the number of reapers diminished because of siesta-taking. This would occur when the field reaped in the morning was near the barangay, enabling the team to return to their homes for lunch or for a siesta. No fines were imposed for absences. On occasion, the team had to return to the same field the next day because of absences. Another reaping team, led by Gassip, imposed a fine of ₱10.00 for each day's absence.

If a member household cannot be present for the reaping of its field (s) due to illness or some other reason, the other team members will still accomplish the task, with ~~a~~ proper accounting. On the other hand, a hiring farmer or a member of his household has to be present to monitor the work of ^{the} ad hoc team.

Finally, monitoring costs are also reduced by the simplicity of the reaping operation itself, so that individual performance is readily observed and individual bundles are easily and quickly checked. Mention has been

made of the bundler monitoring for size and quality of bundles, which is done without much effort. Accounting is very simple and each member household can easily calculate whether it owes labour to other households or has labour owed it. The bundler lists down on a leaf from a notebook (or, occasionally, on empty cigarette packs or cartons) the number of bundles reaped by those present. When this is completed, he hands it over to the member whose field was reaped that day. The small size of the team, also renders monitoring easier.¹²

Over time, members know who among them are better reapers, discounting for age differences. These are the ones the team would desire to retain, replacing the slower ones with better workers. However, the team cannot be too selective, since it is in competition with other teams, and the size of a team can make it more attractive for prospective employers with relatively large farm areas and cash to spare.

4.5.6 Distribution of Income/Assets

The average annual total gross household income of the team was P9,048.00, with average per capita income of

¹² There were no team accounts for Itlang's team. However, the larger teams of Atigan had team accounts kept by the "secretary" of the team, who was female and had completed high school.

P 1,691.00¹³ This was derived from rice farming (69.7%), the cultivation and ~~sale~~ of mangoes and bamboo (16.6%), wages from farm work (7.3%), and swine raising (6.4%). It excludes remittances from family members living outside of Manabo, either within the country or abroad, and income from non-agricultural employment such as cattle-raising.

One household derived as little as 34.4% of its annual income from palay farming and as much as 45.1% from wages for farm work, whereas another household got 91.6% of its annual income from palay farming. The sale of mangoes accounted for as much as 58.2% of annual income for a third household.

Annual household income ranged from P3,637 to P15,661, while per capita income varied from P693 to P4,229, with a standard deviation of P1,088 for the latter. These figures indicate a relatively high degree of unequal distribution among member households.

Regarding assets, the average value per member household was P45,536, and on a per capita basis, was P7,520. Included are rice land (90.2 of total assets), livestock and work animals.¹⁴

¹³Based on 18 member households.

¹⁴Not included are fruit trees (due to difficulty of capitalization), the land area which they occupy and cornlands. However, the latter account for a very small proportion of total assets.

Half of the member households were share tenants, and half were owners. No member household was completely without land, but four households had only half a hectare or less to cultivate. The average farm size was 1.18 hectares. The largest farm area was 2.8 hectares. The majority (53.6%) of the parcels are located some 16 to 30 minutes' walk from the team's neighbourhood in San Ramon, while 32.9% are located some 31 to 60 minutes' walk, and only 13.5% are within 15 minutes' walk.

All the member households, except for two, had a carabao (water buffalo), used primarily for farm work and hauling purposes, with 9 households possessing two or more. Two households also had a horse each. Thus, on the average, a household possessed 1.7 heads of work animals. Except for a plough and a harrow, member households had no other large farm implements.

Value of total farm assets per household ranged from P 4,130 to P 130,325, while per capita assets varied from P 516 to P 18,013, with a standard deviation of P 6,541 for the latter. These data indicate a very high degree of inequality among member household in this respect, higher than that of income. The coefficient of variation for per capita income, i.e., the ratio of standard deviation to the mean, is 0.64 compared with 0.84 for per capita assets.

Despite the unequal distribution of income and wealth

among members, there was little conflict in evidence among them that might arise from efforts or wealthier members to dominate the group. The potential for conflict was more than balanced by other factors such as kinship or long standing acquaintanceship, which made for greater accommodation. Neither did Itlang, the kabesilya, make use of her political assets as the barangay captain's wife, to dominate the group.

However, in the larger reaping team headed by Atigan, wealthy members and non-members members tried to bribe the kabesilya to schedule their fields for transplanting earlier than the others.

4.5.7 Atmosphere

As mentioned previously, there were no festivities that marked the end of each workday or even the end of the reaping season. However, team members remarked that the atmosphere while at work was jovial, marked by banter and occasional singing. Members also remarked that there was an atmosphere of helpfulness that marked their relations. One instance already cited was that in the event of illness on the part of a member household on the day scheduled for its field, the team would still reap the field and they could be trusted to properly account for the bundles, even though no household member could be around to help oversee the work.

Another instance given is that of the faster reapers

(usually male) assisting the slower reapers (usually the female or older members) at the end of the workday by handing over their fractions of a bundle reaped in order to complete one bundle.

It was observed that members of ad hoc teams worked in separate parts of the same field and did not work together, whereas members of the two kabesilya-led teams started at the same place and moved through the field together. Thus one was characterized by the absence of team work while the other displayed the opposite.

4.6 Labour Teams for Other Farm Tasks

It was mentioned earlier that the six reaping teams in San Ramon also engaged in transplanting. However, the size of the teams would be smaller than their size during reaping because the latter is more labour-intensive due to the use of the rakkem. Another difference between the transplanting and reaping teams is that in the former, members would exchange labour in terms of time spent in transplanting. Thus, a member household could owe another 50.5 hours of transplanting labour. Debts are paid in both cash and kind. A fuller study of a transplanting team is given in Chapter 5. Although it is located in another region, it is postulated that the factors that account for its existence are the same factors which explain the existence of such teams in San Ramon.

Seven member households of the reaping team said that they belonged to land preparation (LP) teams totalling two, and three indicated they belonged to weeding teams, also totalling two. Of the two LP teams, one had a kabesilya, the other did not. Likewise, one of the weeding teams had a kabesilya (Itlang) and the other did not.

LP teams were small, having four to five member households on the average with as many team members (male). In the case of San Ramon's irrigated fields, the time constraint on land preparation is linked with the seedlings' age: when they have reached the optimum age, the field must be ready for transplanting. Individual field sizes are small (4,676 sq.m. on the average for the whole barangay) and can easily be prepared by a man-and-carabao team. However, because a farm household cultivates two to three parcels and in three different locations on the average, there is an incentive to pool labour and carabaos to accomplish the task quickly.

Another incentive for joining an LP team is the fact that a hand tractor, which is a substitute for the carabao and which can accomplish the task much faster, is beyond the financial capacity of the household. Even if this were not so because of government subsidized credit to purchase one or because hand tractors can be hired at competitive prices, the absence of feeder roads or paths wide enough to transport the hand tractors to fields beyond the side of the

provincial ^Cread discourages the use of one. Hence, land preparation is still a very labour-intensive process, lending itself to the formation of teams.

With respect to economies, associational gains resulting from a faster work pace and a lightened work burden also occur just as in the work of the reaping team, according to those who are in LP teams.¹⁵

Weeding teams, like LP teams, are also small, consisting of seven member households on the average, with as many team members of both genders. It is recommended that weeding take place within 30 days after transplanting palay in order to obtain optimum yields (Vergara, 1979 p. 187). Thus, there is greater flexibility in the time of weeding relative to transplanting.

Weeding is done entirely by hand in San Ramon. The use of weedicides or hand weeders, is completely absent. Thus, weeding is very labour-intensive.

The usual associational gains are present in group weeding as attested to by those who are in weeding teams,

¹⁵I witnessed one unusually large land preparation team at work in Luzon-Ayyeng, another barangay of Manabo, which is also the poblacion. There were 12 members, all male, with 12 carabaos ploughing a field in single file, in increasingly smaller rectangular patterns. It was evident, both during the work itself and during the noon-break that the men derived pleasure from working together. Not only did it enable them to finish the job quickly, but doing it in the company of others made the work less burdensome. The team did not have a kabesilya.

making it attractive to join one. No in-depth investigation of these teams was attempted in order to verify hypotheses with respect to the other factors which determine the cost of cooperative/individualistic behaviour. At the very least, it can be said that the fact of their existence means that, for those who joined, transaction costs were low.

4.7 Conclusions

Data from a sample of sixty four farmers in the municipality of Manabo, which included both members and non-members of cooperative labour groups, indicated that the main factors affecting the choice between hired and cooperative labour in transplanting were (1) household labour supply; (2) budgetary constraints; (3) atmosphere; (4) economies; (5) timeliness and (6) transaction costs.

The findings tend to confirm the relevance of some of the variables previously postulated. It also showed that household labour supply and budgetary constraints are the primary considerations. These are easily enough understood and need no further elaboration. Moreover, household conditions ~~are~~ would not suffice for understanding the factors that affect the choice between individual and collective action in farm tasks and that explain the existence of cooperative labour teams. Hence discussion focused on the other factors.

It would also seem, from the survey, that hired labour groups provided more timely delivery than cooperative labour since those who hired labour gave this as a reason while those who chose cooperative labour did not. However, no firm conclusion can be drawn since the hired groups included cooperative labour groups who hired out their labour.

Data from the survey also show that both members and non-members resorted to kin and residential neighbours for transplanting, indicating that both tried to reduce transaction costs. However, monitoring costs of hired groups could be higher because more transplanters in these groups were not family, kin or neighbour (21.7% in Table 4.7) than in cooperative groups (10.7%). Monitoring costs would be reduced if these hired groups are also kabesilya-led teams.

Interviews with twenty three kabesilya also confirmed that at least two of the postulated variables, namely, transaction costs (which were cited most often) and economies were relevant.

The data from the case study of the San Ramon team shows that the reaping team exists because of the congruence of several factors: (1) the necessity of a timely delivery of reaping labour due to the biological characteristics of an agricultural crop; (2) a low elasticity of substitution between machinery and labour, making reaping a very labour-

intensive task and combining with the need for timely delivery of labour to generate a peak demand for labour during the reaping season; (3) scale economies and associational gains arising from team work; (4) low transaction costs because of the presence of the kabesilya, membership based on ethnicity, kinship and residential neighbourhood, and the simplicity of the reaping task itself, requiring only elementary accounting and monitoring; and (5) a not too tightly calculating atmosphere.

All of the above factors must be present at the same time in order for the reaping team to exist. Each of them is a necessary but not sufficient condition for the existence of a reaping team. Thus if the first four factors are present but a tightly calculating atmosphere is prevalent, then the team will not be formed or if already existing, will tend to break up.

On the other hand, there was a high degree of unequal distribution of income and wealth among team members. However, this did not appear to lead to conflict within the group as it was more than offset by kinship and friendship.

The study of the Abayon team in San Ramon also indicated that, contrary to our hypothesis, the team existed in spite of the absence of indivisibilities in reaping. However, this does not necessarily mean that this factor is irrelevant in other agricultural tasks such as irrigation.

Based on the data in Table 4-2, one can distinguish labour deficit from labour surplus households. The labour demanders ~~based on~~ are those who did not incur debts in the form of wage advances. There were seven households in this category. The labour suppliers, the rest of the team, are those who secured wage advances. However, only two of these, Ligaya and Roman, easily solved the problem of with an adequate and timely supply of labour on their own farms since these were quite small. A third member, Salia, was concerned with adequate labour for reaping on her farm, but because she used her share of the labour pool to pay off her debts, she had to resort to hired labour.

Thus it would seem that, for most of the team, the factors postulated above as affecting the choice between individual action and collective action are relevant. For the two households who resorted to family labour, the need for timeliness in reaping and the fact of a low elasticity of substitution between the rakkem and the sickle or a mechanical reaper, would still be relevant because these are a necessary conditions for group work, without which there would be no employment opportunities. From the point of view of the fact that they have very small farm sizes, they would not be as concerned as other members with securing a timely supply of labour on their own farms. High transaction costs, dominance of the group by some, and a too calculative atmosphere would, of course, affect their decision to join the team or not.

CHAPTER 5: A PALAY TRANSPLANTING TEAM

5.1 Nagpandayan

Nagpandayan is the largest barangay in the municipality of Guimba, consisting of 382 households in 1984. Guimba lies 153 km. north of Manila in the province of Nueva Ecija in the Central Plain of Luzon and is reached by public transport in three to four hours. (See the Sketch Map of Nagpandayan.)

Nagpandayan lies 12 km. south of the poblacion or town proper and is divided into seven purok or districts stretching along four kilometers of road rather than clustered around a common center. Each purok is headed by a purok president. Residents have their homes on one side of the road and their farms on the other side or at the rear of their homes near a creek which travels the whole length of the barrio. The creek fills up during the rainy season from June to November but dries up in the dry season from December to May.

Nagpandayan had a population of 2,063 in 1984 with an average household size of 5.4 persons. Residents are largely Ilocano, descendants of migrants from Northern Luzon. They are also fluent in Tagalog, which is widely spoken in Nueva Ecija.

The primary occupation of Nagpandayan households is rice farming with an average farm size of 2.13 hectares divided into 1.64 parcels. Total cultivated area is

estimated to be 750.54 hectares.¹ Even those households who hold other jobs such as teaching in the Nagpandayan public school (elementary and high school) also farm a piece of land. Forty-four households are landless farm labourers, or 11.5% of all households.

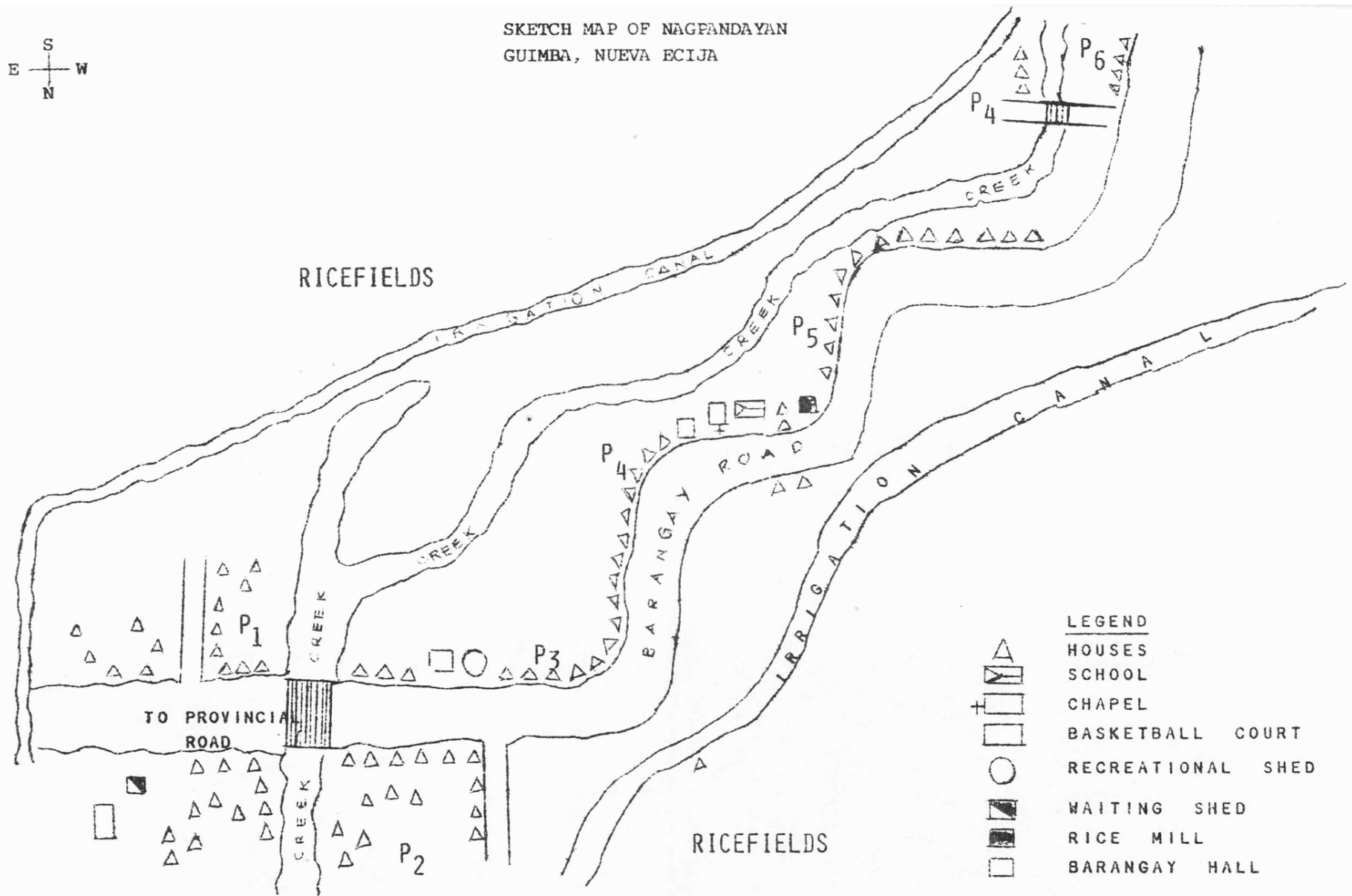
Average annual gross household income in 1984 was estimated to be ₱21,900, with per capita income of ₱4,500. The latter had a standard deviation of ₱2,653 and a coefficient of variation of 0.59, an indication of a highly skewed distribution. On the other hand, average value of farms assets was ₱33,900. Per capita assets were estimated at ₱6,900, with a standard deviation of ₱4,400 or a coefficient of variation of 0.63, also indicating that assets are highly unequally distributed.²

Previously, the land had been owned by several large landowners. However, these were purchased by the government and tenants were made amortizing owners. While the

¹ Based on a survey by the Ministry of Agrarian Reform (MAR).

² Although Nagpandayan is closer to urban centers such as the Guimba poblacion and Cabanatuan City than San Ramon, the value of farm land in the latter is higher. For instance, one hectare of favourably located irrigated farm land with ownership status had a market value of ₱70,000 in San Ramon, while one hectare of similar farm land in Nagpandayan went for ₱20,000. One reason for the difference is that irrigation water in San Ramon is much cheaper, being supplied by a large gravity system, than in Nagpandayan, where the buyer of land has to either purchase the existing irrigation pump or procure a new one, aside from shouldering fuel and maintenance costs. Another reason is the fact that the buyer has to assume responsibility for amortization payments on land acquired through the land reform program in Nagpandayan whereas land in San Ramon is generally unencumbered.

SKETCH MAP OF NAGPANDAYAN
GUIMBA, NUEVA ECIJA



- LEGEND
- △ HOUSES
 - ⊕ SCHOOL
 - ⊕ CHAPEL
 - ⊕ BASKETBALL COURT
 - RECREATIONAL SHED
 - ▨ WAITING SHED
 - RICE MILL
 - BARANGAY HALL

amortization is being paid, cultivators hold a certificate of land title (CLT). However, a number of the original beneficiaries have leased out their farms. More than one half of farm households are leasehold tenants, who pay a fixed rate, 35.7% are amortizing owners, one out of 14 are owner-cultivators and one out of 28 are share tenants.

Farming is primarily limited to one crop of rice during the wet season. Those with small pumps, drawing from underground water, used to be able to raise a second crop on a smaller area during the dry season. However, with increasing fuel prices, the number of those engaging in a dry season crop diminished. There were 73 small pumps reported in 1984, with one pump having a capacity of irrigating an average of two hectares during the wet season and a little over a hectare during the dry. Pump owners also irrigate adjacent fields for a fee of 10% of the crop.

Several years ago, the farmers of Nagpandayan with the help of the Farm Systems Development Corporation (FSDC), a government office, dug an earthen irrigational canal on both sides of the barangay (see sketch map) to bring water from the source of the creek to the rice fields. During the dry season, however, the creek dries up. An irrigators association was organized with the assistance of the FDSC and a large, four-wheeled tractor was given to the association, financed by a soft loan. The association however was not functioning well due to mismanagement.

In 1982, the National Irrigation Administration (NIA) installed a large electric pump near Purok 1 with a capacity of irrigating 40 hectares. The pump was provided to the farmers by means of a soft loan. A smaller irrigators' association was set up but also did not seem to be functioning smoothly. Members would not show up for communal work on the irrigation canals. This demoralised the conscientious members. Also, there was a problem of non-payment of irrigation fees which were needed to amortise the loan on the pump, and to operate and maintain the pump.

The combined total area irrigated during the dry season was estimated to reach 120 hectares, or 16% of cultivable area.

Only modern or so-called high yielding varieties (HYV) of rice are grown. The use of fertilizer and pesticides is widespread, while weedicides are used by relatively few farmers. Yield per hectare is 80 cavans of 46 kg. each (3.68 tons) on the average. Approximately 3/4 of the harvest is sold.

5.2 The Labour Market for Transplanting

In the 1984 wet season, there were three transplanting teams with a leader each who was also called kabesilya as in San Ramon. During the harvest season, only a portion of the membership of these teams continued to assist each other in reaping, exchanging labour among themselves but not hiring

out to other households. They would then have no kablesilya. The three kablesilyas found it more remunerative to contract for reaping and threshing on their own. Such labour was paid a share of the palay threshed, ranging from 1/9 to 1/8. This practice is called hampas.³ Two of the kablesilyas were landless and the third had only a very small area to cultivate.

The three kablesilya-led transplanting teams contained 39, 28 and 23 member households each. Two of them had been in existence for an average of five years and one was newly formed in 1984. All the kablesilyas were male. Because area planted in the dry season is drastically reduced, these teams are not active then. The three teams reside in Purok 1 and 2.

There is a fourth team which engages in both transplanting and reaping but which has no kablesilya. It comprises 16 member households and is active in both wet and dry seasons. Its members reside in Purok 5. By 1984, it had been existing for seven years. It previously had a kablesilya, but he moved elsewhere and no one else wanted to take his place because of the alleged difficulties of managing the group and disciplining the members.

Another kablesilya-led team was begun in Purok 6 in the

³ Meaning "to strike". Threshing is done by striking the palay against a small raised platform made of bamboo. The grain falls to the ground underneath and is collected.

1983 wet season but disbanded mid-way through the transplanting season because members were reneging on their commitments to the team. Its kabesilya was female.

The kabesilya-led teams transplanted their members' fields and also hired out team labour to non-members. The no-kabesilya team transplanted members' fields only.

The member households of the four transplanting teams constituted 27.7% of all households in Nagpandayan.

Extrapolating from the data provided by the in-depth study of one of the kabesilya-led teams, it was estimated that the three kabesilya-led teams transplanted a total of 255.3 hectares or 34.0% of total cultivated area in the barangay.

Unlike San Ramon, where wages were set by individual bargaining, wages for transplanting and other farm tasks for the 1984 wet season, except for reaping and threshing, were determined in a barangay council meeting on June 12.⁴ Aside from the six council members and the barangay captain, the three kabesilyas were present. The kabesilyas had asked that the wage for transplanting be increased due to increases in commodity prices following an official devaluation of the currency at the beginning of June.

⁴Transplanting wages were similarly determined in the large adjacent barangay of Manacsac where three transplanting teams existed.

Previously, daily wage rates (arawan) had been ₱12 per day for members and ₱14 per day for non-members. The council agreed to have only one rate and set this at ₱15 per day.

As for piece rates (pakyawan), the kabesilya-led team had been discriminating between members and residents of Puroks 1 and 2 on one hand, and non-members who were residents of other purok or of the poblacion on the other. For the former, the team had been charging ₱200 per hectare and for the latter, ₱220 per hectare. The council agreed to raise these to ₱250 and ₱300 per hectare, respectively.

Wages for ploughing by carabao were raised to ₱35 per day without meals and retained at ₱25 per day with meals. For the pulling of seedlings prior to transplanting, wages were kept at ₱3.50 per 100 seedlings.

There was also evidence, based on the in-depth study of one of the kabesilya-led teams, of the existence of a forward market for transplanting labour. Non-members advanced cash to the kabesilya to assure themselves of adequate labour when the transplanting season came around. The team, on the other hand, accepted the cash advances because of their need to fund current expenses. The case study, however, did not inquire into the details of such forward labour contracts such as how much in advance of the transplanting season they were contracted and on what terms.

5.3 A Transplanting Team

One team of transplanters was chosen for the case study presented here. The team is best identified by referring to its kabesilya, Felipe, 50 years old. He had been kabesilya for the past four years, taking over from his father-in-law, Esteban, who claims to have led the team for twenty years. The kabesilya, his wife Carling, and her younger married sister Miling (both of them helped in the record-keeping of the team) claim that the households that make up the present team are descended from the same households that had formed a team under Esteban.

Based on the work records kept by Felipe and his wife, there were 39 member households of the team in the 1984 wet season transplanting. Interviews of 35 households were made, with four being unavailable for interview.

Mean household size was 6.3 persons, with a range of two to eleven. The mean number of years a household was a member of the team was 7.4 years, ranging from one year to twenty years. The total number of transplanters in the team members was 26.9 years, ranging from 8 years old to 70 years old. The majority were female, making up 62.9% of the team, while 37.1% were male.

5.3.1 Employment and Income for the Team

The demand for the team's labour comes from two

sources. The first source is the demand of team members for transplanting labour on their own fields. The team members plant each other's fields on the basis of exchange labour. At the end of the transplanting season, a reckoning or tuwiran is made and any excess or deficit labour on a member's field is valued at the current wage rate, arawan or pakyawan, depending on the particular terms chosen by the member at the time of transplanting.

The second source of demand are non-members who need transplanting labour for their fields. The team distinguishes between prospective employers who are tagaloob (insiders) and those who are tagalabas (outsiders). The tagaloob are those who live in Purok 1 and 2, where the team members also reside. The tagalabas are those who live in the other purok of the barangay or outside Nagpandayan but with fields in it. The team did not transplant in neighbouring barangays.

The team was employed for 43 days and expended a total of 13,517 manhours of labour, transplanting an estimated 109.64 hectares (See Table 5-1). The number of non-members for whom the team transplanted was 25, for whom they expended 5,388 manhours or 43.4% of total manhours. The team spent less manhours on the fields of tagaloob (2,425 manhours) than for tagalabas (2,963 manhours).

Frequently, as can be seen in Table 5-1, the team was

TABLE 5-1

T
Work Calendar, Contract ^TPerms, Man-Hours and Wages
PALAY TRANSPLANTING TEAM
Wet Season, 1984

DAY NO.	DATE	EMPLOYER CATEGORY ^a	CONTRACT PERMS ^b	NO. OF WORKERS	NO. OF HOURS	MAN-HOURS	TOTAL WAGES (Pesos)
1	28 June	3	P	42	8	336	250.00
2	29 June	3	A	5	8	40	75.00
		3	A	6	8	48	90.00
3	6 July	1	A	40	8	320	600.00
4	7 July	3	P	31	8	248	217.00
		3	A	12	8	96	180.00
5	8 July	1	P	37	8	296	555.00
		1	A	9	8	72	135.00
6	9 July	1	A	37	8	296	555.00
		2	A	17	8	136	255.00
		1	A	34	8	272	510.00
7	10 July	1	A	33	8	264	495.00
		2	A	14	8	112	210.00
8	11 July	1	A	49	8	392	735.00
		1	A	9	8	72	135.00
9	12 July	1	P	22	8	176	211.20
		1	A	22	8	176	330.00
		1	P	5	8	40	42.50
		1	P	22	8	178	209.00
10	13 July	1	A	23	8	184	345.00
		3	A	21	4	84	315.00
		1	A	10	8	84	150.00
		1	A	21	4	84	315.00
11	14 July	1	A	30	10-4 ^c	40	450.00
					20-8	160	
		1	P	19	4	76	120.00
12	15 July	2	A	36	8	288	540.00
		1	A	11	8	88	165.00
		1	P	31	4	124	496.00
		1	A	2	8	16	30.00

DAY NO.	DATE	EMPLOYER CATEGORY ^a	CONTRACT (TERMS) ^b	NO. OF WORKERS	NO. OF HOURS	MAN-HOURS	TOTAL WAGES (Pesos)
13	16 July	1	P	16	8	128	₱ 320.00
14	17 July	1	P	35	4	140	500.00
		3	P	15	8	120	231.00
		1	P	16	4	64	150.00
15	18 July	3	P	42	4	168	620.00
		1	A	10	4	40	150.00
		1	A	3	4	12	45.00
16	19 July	2	A	18	8	144	270.00
		2	A	21	4	84	315.00
		1	A	3	8	24	45.00
		2	A	11	8	88	165.00
17	20 July	3	P	26	4	104	572.00
		1	A	21	4	84	315.00
		1	A	19	8	152	285.00
18	21 July	3	P	44	9-4 35-8	36 280	500.00
		1	P	14	8	112	105.00
19	22 July	2	P	43	8	334	322.00
		1	A	11	8	88	165.00
20	23 July	3	P	33	4	132	475.00
		1	P	17	4	68	198.00
21	24 July	1	P	42	4	168	315.00
		3	A	32	4	128	480.00
		1	A	6	4	24	90.00
		1	A	8	4	32	120.00
22	25 July	2	A	21	8	168	315.00
		1	P	14	4	56	145.60
		1	A	23	8	184	345.00
23	26 July	1	A	42	4	168	630.00
		3	A	36	4	144	540.00
		3	A	9	4	36	135.00
24	27 July	2	A	52	4	208	780.00
25	28 July	1	A	10	8	80	150.00
		1	A	25	8	200	375.00
		1	A	7	8	56	105.00
		3	P	21	4	84	105.00

DAY NO.	DATE	EMPLOYER CATEGORY ^a	CONTRACT TERMS ^b	NO. OF WORKERS	NO. OF HOURS	MAN-HOURS	TOTAL WAGES (Pesos)
		3	P	13	4	52	P 117.00
		1	A	5	3-4	16	75.00
26	29 July	2	P	19	4	76	76.00
		1	P	12	4	48	165.00
		1	A	8	4-4	16	
					4-8	32	120.00
		2	A	9	4	36	135.00
27	30 July	2	P	15	4	60	195.00
		1	A	11	4	44	165.00
		1	A	14	4	56	210.00
		2	A	20	4	80	300.00
28	31 July	2	P	7	4	28	133.00
		1	A	8	8	64	120.00
		1	P	33	4	132	495.00
29	1 August	2	P	33	4	132	400.00
		1	A	8	8	64	120.00
		1	A	7	8	56	105.00
		1	P	33	4	132	277.00
30	2 August	1	P	26	4	104	85.00
		2	A	10	8	80	150.00
		1	A	7	8	56	105.00
		1	A	7	4	28	105.00
31	3 August	1	P	11	4	44	120.00
		1	P	4	4	16	43.60
		1	A	14	8	112	210.00
		1	A	14	8	112	210.00
		2	A	16	8	128	240.00
32	4 August	1	A	7	8	56	105.00
		3	A	4	4	16	60.00
		1	A	23	8	161	345.00
		1	A	11	8	77	165.00
33	5 August	1	A	23	8	161	345.00
		1	A	21	4	84	315.00
		1	A	9	8	72	135.00
		1	A	5	4	20	75.00
34	6 August	3	P	13	4	52	250.00
		2	A	12	8	96	180.00
		2	A	10	8	80	150.00
		1	A	13	4	52	195.00

DAY NO.	DATE	EMPLOYER CATEGORY ^a	CONTRACT TERMS ^b	NO. OF WORKERS	NO. OF HOURS	MAN-HOURS	TOTAL WAGES (Pesos)
35	8 August	3	P	27	8	216	illegible
36	9 August	1	A	6	8	48	90.00
		3	A	28	8	224	420.00
		1	P	10	4	40	120.00
		1	A	2	8	16	30.00
37	10 August	1	A	16	4	64	240.00
		2	A	15	8	120	225.00
		1	A	6	8	48	
		1	A	3	8	24	45.00
		1	A	24	8	192	360.00
38	11 August	2	A	21	8	84	315.00
		1	A	13	6-4 7-8	24 56	195.00
		3	A	9	8	72	135.00
39	12 August	2	P	13	4	52	74.75
		3	P	19	4	76	170.00
40	13 August	1	A	7	4	28	105.00
41	14 August	2	P	6	4	24	54.00
42	15 August	3	P	35	8	280	595.00
43	16 August	3	P	34	4	136	404.60

^aCategories : 1-Team members; 2-Tagaloob; 3-Taga-labas

^bP - Pakyawan (area rate) : members and taga-loob P250/ha;
non-member P300/ha

A - Arawan (time rate) : P15/day per worker for all
categories.

^cTen members worked four hours each and twenty worked
eight hours each.

SOURCE : Kabesilya's records.

divided into two or more sub-groups. The largest work group was made up of 52 persons and the smallest of 2 persons, with a medium size of 16.1. On only two occasions did the team transplant fields adjacent to each other but belonging to different cultivators. The team would usually transplant fields which were located apart from each other.

In order to determine the actual wage to be collected under pakyawan, Felipe, Carling and Miling used a 50-meter length of abaca rope to measure the area transplanted. The task is facilitated by the fact that most fields are rectangular and flat. Wage payment by non-members are sometimes given in advance to the kabesilya. This is referred to as tampa. The kabesilya gives these to team members who ask for an advance.

At the end of the team's transplanting commitments, an accounting or tuwiran is made to determine whether a member household has a surplus (sahod) or a deficit (sayad). The actual settling of accounts is made individually and not as a group. Those who have a deficit (sayad) with the group are given until harvest time, usually three months away, to pay their debts plus 25% interest. This rate of interest is consistent with the usual interest rate on loans made available by informal credit sources within the barangay to purchase fertilizer. However, some lenders charged as high as 88.0% for three months, or 29.3% per month.

Records of the team's accounts were made available by Felipe and Carling. These were unorganized and consisted of bits and pieces of paper. After organizing them, it was discovered that they constituted the accounts of 32 out of 39 member households. Felipe and Carling could not locate the remaining records. It must be presumed that these accounts were settled and the records disposed of, since they were of no further value to Felipe.

The accounts of 32 member households are given in Table 5-2. Total income was ₱ 16,058.90 with a median of ₱ 389.25 per household and a range of ₱ 118.90 to ₱ 1,653.90. These figures exclude the kabesilya's fees. As kabesilya, Felipe charges a fee for his services. For team members and tagaloob, he charges ₱ 15.00 for the whole season which he collects only at tuwiran time. This fee is called tacder, which literally means "to stand". For tagalabas, Felipe charges a "porciento" of ₱ 10 per hectare if the team is hired on pakyawan basis, and ₱ 15 per day if arawan. For the 1984 wet season transplanting, the household of Felipe earned ₱ 1,193.50 in fees and ₱ 1,351.50 in wages. At the end of the season, he still had ₱ 38.50 owed him by the group.

To illustrate the transactions involved in Table 5-2, let us take the case of the household of Eutaquio (no. 4). Four of its members are on the transplanting team enabling them to earn ₱ 1, 271.00. Since they cultivate only 0.8

Table 5-2

Palay Transplanting Teams
Financial Records
Wet Season 1984

MEMBER HOUSEHOLD	CREDIT	DEBIT	SURPLUS (SAHOD)	DEFICIT (SAYAD)
1. Simplicio Sr.	₱ 809.25	₱ 700.00	₱ 109.00	-
2. Antero	222.50	129.20	93.30	-
3. Antonio	233.10	180.00	53.10	-
4. Eutaquio	1,271.00	1,168.85	102.15	-
5. Ernesto	305.00	196.00	109.00	-
6. Alejandro	357.40	340.90	16.50	-
7. Sixto	402.00	393.85	8.85	-
8. Vicente	473.82	443.20	30.00	-
9. Esteban	409.00	524.20	-	₱115.00
10. Marcelino	1,653.90	1,142.50	511.40	-
11. Fernando	380.90	355.90	25.00	-
12. Florencio	329.20	317.70	11.60	-
13. Guillermo	502.00	466.25	35.75	-
14. Julian	323.00	223.00	100.00	-
15. Francisco	142.00	110.00	32.00	-
16. Severino	1,085.20	1,069.60	15.60	-
17. Felipe	2,545.00 ¹	1,313.00	1,232.00	-
18. Fred	1,049.00	937.00	112.00	-
19. Rudy	397.60	424.90	-	27.30
20. Gerardo	338.50	346.20	-	7.30
21. Felipe	624.00	508.85	115.15	-
22. Juan	755.20	852.00	-	96.80
23. Jaunito	448.40	535.20	-	86.70
24. Larry	322.95	282.00	40.95	-
25. Leopoldo	282.50	250.20	32.30	-
26. Mariano	608.00	541.00	67.85	-
27. Aniceto	559.50	333.80	225.70	-
28. Mamerto	645.00	743.30	-	98.30
29. Ricardo	332.50	312.50	20.00	-
30. Simplicio	118.90	99.40	19.50	-
31. Leon	297.70	282.00	15.75	-
32. Feling	223.00	142.50	81.50	-

¹including fees.

SOURCE : Kabesilya's records.

hectares, they needed only 8 more team members to transplant their field for seven hours on 3 July (cf. Table 5-1). On the books, they were charged ₱ 120.00 (arawan rate) for the team's labour. In addition, they had not paid the tacder and had received wage advances of ₱ 1,033.85. Thus, at the tuwiran, they had a sahod of ₱ 102.15.

On the other hand, the household of Sixto (no. 7) cultivates 2.9 hectares and has two family members on the team. The team transplanted one of his fields with 24 workers (in addition to family labour) for one day (10 August) on arawan basis. He was charged in the books with ₱ 360.00 worth of team labour, ₱ 15 as tacder payment, and ₱ 18.85 cash advance. Against this, the household contributed labour worth ₱ 402, resulting in a sahod of ₱ 8.85.

Some households such as that of Leon (no. 31) paid a total of ₱ 1,634.20 in cash to the team for its labour on various dates since they cultivated 3.5 hectares and could not hope to exchange sufficient transplanting labour. Only Leon's wife (41 years old) and his son (15 years old), were the team members. They were debited ₱ 267 for the team's labour not paid in cash plus ₱ 15 tacder, and credited with ₱ 297.70 worth of exchange labour.

The case of Eutaquio exemplifies labour surplus farming households with a small total farm area (1 hectare

or less) who join the team primarily to augment their income. The advantages in joining the team instead of hiring out on their own is a reduction in search costs and in a greater probability of finding employment because of the greater efficiency of the kabesilya-led team over ad hoc labour as indicated in Table 5-4.

The cases of Sixto and Leon exemplify labour deficit households cultivating a relatively large total farm area whose primary aim in joining the team is to be assured of adequate labour supply at the proper time. This is not to say that labour surplus farm households are unconcerned about an adequate and timely labour supply and labour deficit households are not interested in extra income.

Assuming that all non-member households who hired the team have fully paid for their labour, total surplus should equal total deficit in Table 5-2. However, as mentioned earlier, the financial records of the team were incomplete and hence total surplus does not balance total deficit.⁴

With respect to contract terms, 34.7% of all transplanting commitments were done under area rates and

⁴The inclusion of the missing seven households would balance the books of the team. This means that each of these households had a deficit of ₱ 227.24 on the average. If the assumption is true that the records of these households were missing because they disposed of their debts early, then it is reasonable to assume that they are better-off households with larger farm areas and could afford to generate a large deficit.

63.3% were contracted for under area rates and 61.9% under time rates.

5.3.2 Size of the Team

There is an incentive, on the part of the kabesilya, to have a large group because he collects tacder per member household, and he can accept more transplanting jobs, thus adding to his own income because of more commissions. On the other hand, a large group requires more supervision and coordination, more paper work involved in keeping accounts on the part of the kabesilya. On the side of the team members, a large group means more employment since farmers want the job done quickly and they look for numbers. A large group could also earn less take-home pay if area rates are paid, since the amount earned is divided equally among those who work. To cite an example, on July 22, forty three team members transplanted a field which they estimated to be 1.29 hectares, on pakyaw basis for a whole day. They were paid ₱ 322, but when equally divided, each individual transplanter received ₱ 7.49 which was half of the daily wage. Felipe commented that there were too many transplanters for the field.

A new transplanting team of 27 member households was formed in 1984. It was partly composed of member households who broke away from Felipe's group. Ben, the kabesilya of

the new group and a former member of Felipe's group, said that the latter's group had grown too large, consisting of 49 households and 99 transplanners in 1983, resulting in lesser per capita income under area rates and in difficulties in the management of the group. On the whole, however, members of Felipe's group were satisfied with his management.

5.4 The Determinants of Membership in the Transplanting Team

5.4.1 Indivisibilities in Transplanting

Rice transplanting in Nagpandayan was carried out entirely by hand. No machinery and no hand tools were employed. Seedlings were passed on to the planters in bunches. They in turn, imbedded them in the mud of the rice field by hand, bending over rhythmically and moving sideways in a straight line until several rows of seedlings were completed simultaneously. Then the group would begin another set of rows.

Thus no indivisibilities arose in transplanting rice due to the use of large equipment or from the process itself. However, as in reaping, rice transplanting could not be "divided" over a number of days but completed in one relatively short time period if the maximum output was to be achieved. This phenomenon is more adequately explained as a

need for the timely delivery of transplanting labour than as an indivisibility, as will be discussed in the next section.

However, in the case of the task of irrigation, it was earlier described that two irrigators' associations existed in Nagpandayan occasioned by the fact that indivisibilities existed in the form of a long earthen canal in one instance and of a large electric pump in the other. The construction and maintenance of the irrigation canal required teamwork. Cooperation is also required in the use and maintenance of the electric pump and in the maintenance of the canals.

5.4.2 Timeliness

One benefit members derive from the team is timeliness in the delivery of transplanting labour. De Datta (1981) notes that the optimum age for transplanting wet-bed seedlings (a method used in Nagpandayan) is 20 to 30 days, depending on the variety.

Farmers in Nagpandayan who plant modern varieties generally transplant 30-day old seedlings. They estimate that yields would decrease from 80 cavans (3.68 tons) per hectare with transplanting taking place on day 30, to 70 cavans (3.22 tons) at the most if transplanting took place on day 32. This constituted a 12.5% decline in yields.

A farm household in 1983 had to cultivate one hectare of paddy in order to earn an annual income of ₱ 7,170, which

was estimated by the World Bank to be the poverty threshold for Region 3 (Agricultural Policy and Strategy Team, 1986, p. 51).⁶ In fact, of the 35 member households interviewed, ten had farm areas below one hectare, twenty one cultivated from one to six hectares, and four were landless. The average farm size was 1.69 hectares.

All farm households would be concerned, in varying degrees, with an adequate and timely supply of transplanting labour, depending on farm size and household labour supply. Even those with farm areas below the minimum, who would be labour suppliers, would have an incentive to join the team in order to assure themselves of sufficient and timely labour.

On the average, a member household provided only two transplanters to the team. Assuming that this is also its supply of family labour for transplanting and that it only cultivated half a hectare of paddy, it would still need 4.38 days for the two persons to complete the task.⁷ Efficiency losses due to fatigue would probably mean a longer time in finishing the work.

Again, the necessity for timeliness in the delivery of transplanting services is a necessary but not sufficient

⁶The minimum farm size of one hectare is based on the estimated poverty line for Region 3 and on farm records on gross income and farming expenses by three households.

⁷Based on the claim of farmers in the village that it would require a team of 15 to 20 persons to transplant one hectare.

condition for the existence of the transplanting team. Whether a farming household will be assured of timeliness by individual action or by collective action will depend on the other factors postulated. For instance, if search costs are reduced by joining a team so that one is not hard pressed to locate workers more than by resorting to hired labour, then the household will join the team.

The situation in Nagapandayan is complicated by the fact that the transplanting teams are also hired by non-members so that search costs for the latter are also reduced. However, membership in the team means priority in the execution of transplanting so that a team member is more assured of timely delivery than a non-member.

Members of the no-kabesilya team in Purok 4 said that one reason for the continuation of the team despite the absence of a kabesilya was the need to ensure a timely delivery of labour when the transplanting and reaping seasons came around.

5.4.3 Elasticity of Substitution

Transplanters in Nagapandayan use only their bare hands to plant palay seedlings. There are no mechanical transplanters in the barangay, although residents have seen them on display in the poblacion. The six-row transplanter designed and produced by the International Rice Research

Institute (IRRI) is operated manually and can cover 0.3 to 0.4 hectares in one day. (See Appendix 4.) It costs ₱ 2,400, still a considerable sum from the small farmer's viewpoint, in the absence of the availability of soft loans. This accounts for its non-adoption in the barangay. However, if a farmer did acquire one, it would still mean that transplanting of one hectare would be spread out over 2.5 to 3.5 days, resulting in non-optimum yields. To overcome this constraint, it would still be necessary to form a team of three persons with one mechanical transplanter each.

Apart from cost considerations, there were indications that farm households were reluctant to adopt the mechanical transplanter because this would mean a reduction in the incomes of many families as the result of their displacement by the transplanter. The transplanting season was, along with the harvest season, the time when a lot of employment was generated.

Taken together, the two aforementioned factors account for the low elasticity of substitution between mechanical transplanter and transplanting labour, resulting in a very labour-intensive process which in turn gives rise to the transplanting team.

5.4.3 Economies

In considering the economies that could be reaped by

membership in the transplanting team, we have to consider whether these also are available to non-members. If labour in the transplanting team is more efficient than under other arrangements, then those non-members who hire the team also benefit. Those who resort to ad hoc hired labour teams or to family labour would bear a higher cost.

Table 5-4 shows the relative efficiencies of transplanting team labour and ad hoc team labour measured in area per worker. The latter arrangement refers to hired labour which has been recruited individually by the hiring farmer. For labour paid on time rate basis, the transplanting team's labour is more efficient than the ad hoc team for all farm sizes. Only 38.1% of the transplanting team's labour was on an area rate basis. However, its labour efficiency was greater than arawan labour for all farm sizes.⁸

Farmers in Nagpandayan estimated that it would take 15 to 20 transplanter to finish one hectare in one day. Felipe claimed that his team requires only thirteen transplanter on the average, to do one hectare. However, when area rate terms are applied, occasionally there are more transplanter than necessary because of a lack of employment opportunities

⁸The Kabesilya's records uniformly indicated 4 hours or 8 hours, even if labour were paid on area rate basis. Hence there is a tendency to overstate actual mandays and understate labour efficiency. Nevertheless, it was still greater than the efficiency of labour paid on time rate terms. The sample of 30 households reported few cases of hiring pakyawan labour.

elsewhere.

The data in Table 5-4 indicate that the transplanting team employed 18.3 workers per hectare per day on the average under time rate, whereas the ad hoc teams employed 19.7 workers on the average under the same terms. On the other hand, it took 15.9 workers from the team to finish one hectare in one day under area rates.

What are the sources of the greater efficiency of the team's labour over ad hoc team labour? The fact that member households pool their labour and their land for transplanting increases the scale on which transplanting is carried out by each. However, except for the creation of the position of the kabesilya, no specialisation and division of labour occurs which has not already taken place in the task of transplanting, whether done by the team or not. For example, the task of pulling seedlings from the seedbed is done by other workers hired especially for the task whether a kabesilya-led team or an ad hoc team is employed for the main task of transplanting.⁹

The kabesilya, it can be said, specialises in the supervision of the transplanting as well as looking for prospective employers. The existence of a kabesilya is

⁹The pulling of seedlings requires special skills to prevent injury to them and thus reduce output. Hence farmers are willing to pay for such skills.

TABLE 5-4

**Labour Efficiency in Palay Transplanting
by Farm Size, Labour Arrangement and Contract Terms**

Farm Size	Labour Arrangement	Contract	Total Area (has)	Mandays	Ave. Labour Efficiency (sq.m./manday) ¹
.5 and less	Transplanting Team	Time Rate	7.0	154.0	454.5
		Area Rate	4.2	90.0	466.7
	Ad hoc Team	Time Rate	2.77	68.0	407.4
.51 to 1.0	Transplanting Team	Time Rate	18.12	376.0	482.0
		Area Rate	9.35	188.5	496.2
	Ad hoc Team	Time Rate	6.03	136.0	443.4
1.1 to 1.5	Transplanting Team	Time Rate	20.8	402.0	517.4
		Area Rate	6.28	113.5	553.3
	Ad hoc Team	Time Rate	6.49	132.0	491.7
1.6 to 2.0	Transplanting Team	Time Rate	14.4	222.0	648.6
		Area Rate	15.0	171.0	877.5
	Ad hoc Team	Time Rate	7.2	118.5	607.5
2.1 to 3.0	Transplanting Team	Time Rate	10.2	154.0	662.3
		Area Rate	4.29	58.0	739.6
	Ad hoc Team	Time Rate	5.1	89.0	573.0
All sizes	Transplanting Team	Time Rate	70.52	1,294.0	545.0
		Area Rate	39.12	621.0	630.0
	Ad hoc Team	Time Rate	27.59	543.5	507.6

¹ (column 3/column 4) x 10,000 sq.m.

Sources : Kabesilya's records; sample survey (n=30).

precisely the difference between a kabesilya-led team and an ad hoc one. As a result, there is greater supervision in the former, leading to greater discipline and hence, greater efficiency. For instance, as a result of Felipe's supervision, there is little horseplay among the young men and women in the work group.

Regarding expertise in transplanting gained as a result of constant "practice", there is probably a difference between a kabesilya-led team and an ad hoc team if it is assumed that the planters who make the ad hoc team only plant intermittently in comparison with the team members who transplant throughout the season.

There is an economy which is gained from scale which has little to do with transplanting efficiency. It has to do with the reduction in search costs for prospective employers. Because they have banded together, the job of finding employers is shouldered by one person, i.e. the kabesilya, rather than by each individual member. Although the kabesilya charges a fee of ₱ 15 for his services, this is probably low compared to individual search costs. And the fee is low because the kabesilya is searching for employment, not for one household only, but for a larger number, i.e. 39 in the case of Felipe's team.

In addition to the greater efficiency of transplanting labour, team members enjoy other economies which can be

translated into pecuniary terms. First of all, member households know in advance which member will be receiving excess labour since the labour-land endowments of each is known. Yet the labour surplus members who cannot afford it are not required to pay any cash until the tuwiran. Second, members are given preference over non-members in the schedule of transplanting, even if these latter are ready to pay cash. Thirdly, membership in the team increases the probability of their finding employment because employers find it easier to recruit labour through the kabesilya. They also know the reputation of the team for efficiency. In this respect, a team member would have a competitive edge over a non-member in the labour market.

Non-members who hire the team and who are residents of Purok 1 and 2 (taga-loob) also benefit from the more efficient labour of the team. In addition, they are charged a lower area rate than for non-members residing outside Purok 1 and 2 (taga-labas). On the other hand, the team will not transplant their farms unless they have the cash ready and they are accorded only second priority in the transplanting schedule of the team. Thus, there is a greater possibility of less-than-optimum timing of transplanting, resulting in yield reduction.

The taga-labas who hire the team also benefit from the more efficient labour of the team. However, labour costs may not be lower because they have a higher area rate

compared to members and taga-loob. Also, the team will not work for them unless they have ready cash. Worse than the taga-loob, they are accorded third priority in the work schedule.

The associational gains from teamwork, which team members also mentioned, are in all probability greater than the associational gains reaped from ad hoc teams. This is deduced from the fact that households who form ad hoc teams work apart from each other, in different parts of the field, as was observed. There is not bound to be much sense of responsibility for other transplanter nor much natural competition. This is stating, in effect, that ad hoc teams hardly have any teamwork.

5.4.4 Transaction Costs

As mentioned in Chapter 4, the ethnic homogeneity of a labour team reduces transaction costs among team members. With respect to Felipe's team, 37 out of 39 member households are Ilocano while in the remaining two, one spouse is Ilocano and the other is Tagalog. However, the younger member households speak fluent Tagalog, which is the dominant language in Nueva Ecija.

Another factor reducing transaction costs is kinship among members. In the case of Felipe's team, only eleven households or 28.2% of all member households constituted the

largest kin group. Felipe's household, through his wife, is part of this group. On the average, a member household was consanguineally related to 4.9 other member households through either or both spouses.

Unlike the San Ramon reaping team, the Nagpandayan transplanting team did not choose Felipe as kabesilya. The job was handed down to him by his father-in-law. Nevertheless, the group accepted his authority. They were satisfied with his performance in general because they said that he was himself an efficient and fast worker, he was able to control the group, he readily passed on wage advances to team members and he knew how to schedule the work.

As in the San Ramon reaping team, the existence of a decision centre cuts down on bargaining and decisionmaking costs. The kabesilya sets the work schedule after receiving the requests for labour from members and non-members alike. He divides the team into several sub-groups when necessary in order to accommodate as many farmers as possible. When this is done, he assigns his two sisters-in-law and his two sons, depending on the number of sub-groups, to bring the sub-group to the worksite, to list down those who are present and to supervise the work.

The kabesilya also reduces absenteeism and work-shirking by his control over the group. At 4 a.m. on a work

day, he goes to the members' homes, blowing a whistle to rouse them up. At 6:30 a.m. they are assembled at a junction near his home, and they all proceed to the worksite. All begin work and end work at the same time. Felipe sees to it that there is no excessive playing around by young men and women in the team. He lists down those who are present.

The group meets at least once before or during the wet season transplanting. One topic discussed during the 1984 meeting was the need for higher wages due to devaluation-related inflation. The group decided to seek higher wages from the barangay council.

Transaction costs, particularly information and monitoring costs, are also reduced by the fact that team members are residential neighbours. All the member households live in Purok 1 and 2 which are compact and adjacent to each other. (See sketch map of Purok 1 and 2.) However, their homes are scattered throughout the two purok as indicated by the fact that on the average, a member household is a neighbour to 2.7 other member households. On the other hand, residential neighbourhood is reinforced by the fact that a member household is also a field neighbour to 1.1 other member households on the average. Fortunately for Felipe, he has three sons whom he uses as messengers in the event of a change in work schedule.

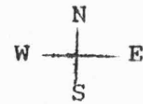
In general, farmers prefer to contract for arawan labour because it is more easily supervised. Delaying

tactics or a slower pace of work are easily spotted. Transplanting done on an area rate basis (pakyawan) is accomplished more quickly but is open to subterfuges. Pakyawan labour has the opportunity of transplanting seedlings wide apart in the middle of a field where the subterfuge is not easily discovered. The employer-farmer is loath to go to middle of the field because of the danger of trampling on seedlings already transplanted, whereas seedlings incorrectly spaced by the side of the dikes are more easily discovered. Excess seedlings are easily trampled underfoot in the mud of the field.

Felipe, the kabesilya, however, claimed that the quality of work of the team is high, regardless of whether area rate or time rate terms prevail. Informal conversations with several non-members who hired the team confirmed this and the teams records also showed that these non-members hired the team for the two successive transplanting seasons of 1983 and 1984 on an area rate basis, indicating satisfaction with work performance.

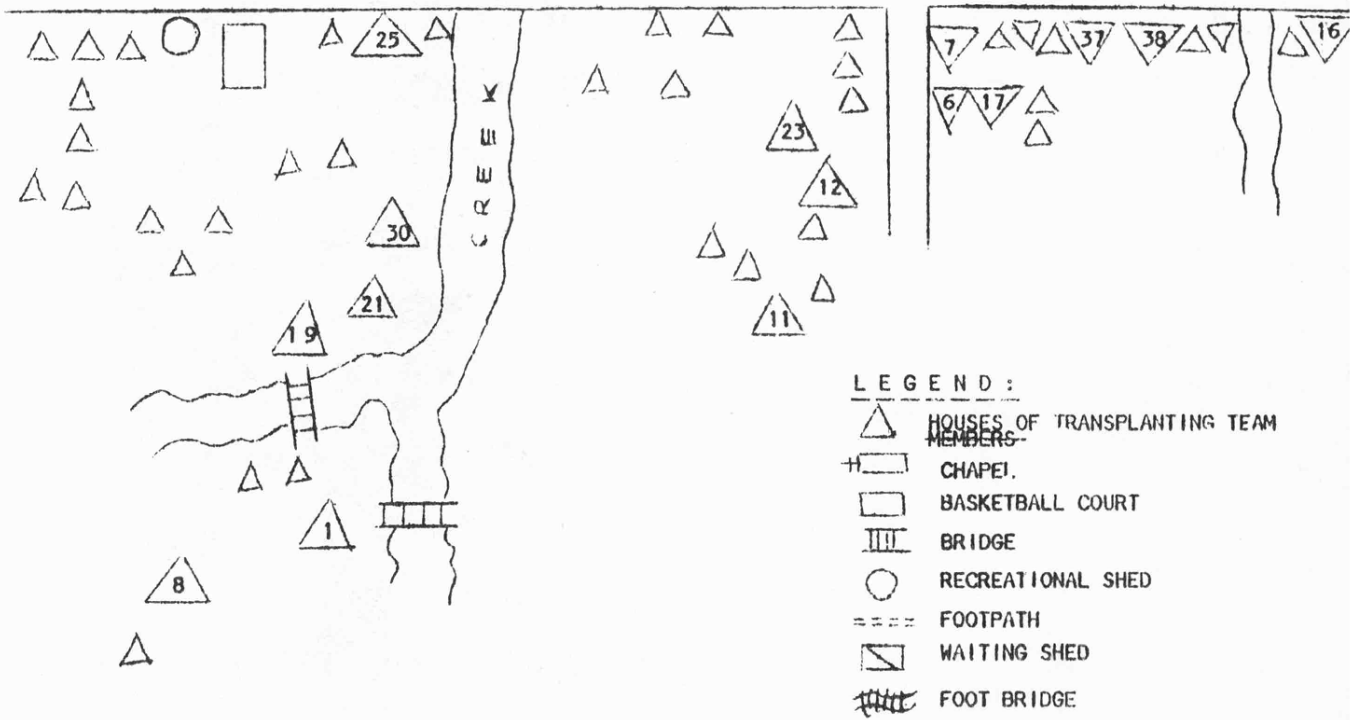
Two-thirds of the team's work was contracted under time rates. Member households accounted for a little less than half of contracts with area rates. However, as earlier mentioned, Felipe claimed that the quality of the team's work remains at a high level, whether area rates or time rates are applied.

SKETCH MAP OF PUROK 1 AND 2
NAGPANDAYAN



PUROK 2

PUROK 1



LEGEND :

- HOUSES OF TRANSPLANTING TEAM MEMBERS
- CHAPEL
- BASKETBALL COURT
- BRIDGE
- RECREATIONAL SHED
- FOOTPATH
- WAITING SHED
- FOOT BRIDGE

In contrast with the San Ramon reaping team, the kabesilya keeps a record of the accounts of each member because monetary advances are made and because a member household may have a balance of exchange labour which it owes to or is owed by the other members. If the household owes exchange labour or other members, this is cleared against any amount of wages still due him. Felipe is assisted in keeping accounts by his wife Carling and his sister-in-law Miling.

Likewise, each member household keeps its own records. At the tuwiran, it compares this with that of the kabesilya. There have been no complaints so far that kabesilya has been crooked in his bookkeeping. Since the transactions involved are relatively simple, each member household can easily discover whether it has been cheated or not.

Transaction costs are relevant to the decision of joining or not joining a team, whether the household is a labour demander or a labour supplier. Regarding search costs, joining a team would reduce these for both types of households precisely because the team would be composed of both types. The labour demander would be able to draw on the team's pool of labour and the labour supplier will receive cash income because of his positive net contribution to the labour pool. In addition, for the labour supplier, search costs are reduced by the existence of the kabesilya who is the one looks for employers or whom employers

contact.

Regarding bargaining and decision making costs, about scheduling of work, contract terms etc., both labour demander and suppliers would be more off if these were high, e.g long meetings, disagreement over scheduling, poor management.

Both types of households are equally concerned with monitoring costs. The labour demander is of course anxious that transplanting be done efficiently on his farm. The labour supplier would be concerned that poor performance would disaffect member households who are labour demanders and discourage non-members from hiring the groups, adversely affecting income.

5.4.5 Distribution of Income/Assets

As mentioned earlier, area cultivated during the dry season in Nagpandayan shrinks from 750.54 has. to 120 has. or 16% of cultivable area, shrinking employment opportunities in the process. Felipe's own small farm of 1/4 hectare is unirrigated and so he is unable to grow a dry season crop. His two sons went to Batangas, a province south of Nueva Ecija, to cut sugar cane for three months during the 1984 dry season. Felipe and his wife earned money from transplanting and reaping the palay crop that farmers with small pumps were able to plant.

Other farm households engage in carpentry and in construction work as hired workers, in the poblacion or in Cabanatuan City, the capital of Nueva Ecija, which is 45 minutes by public transport south of Guimba. Some are able to find employment in Metro Manila as construction workers.

Average annual gross household income for member households was roughly ₱ 18,800, with per capita income of ₱ 4,185. The bulk of income came from farming (88.1%), followed by wages earned from farm work (6.5%), with the balance generated by carpentry/construction work, poultry raising and other employment such as tricycle driving. Per capita income had a standard deviation of ₱ 1,786 and a coefficient of variation of 0.43, indicating a moderately skewed distribution.

On the other hand, average value of farm assets was approximately ₱ 24,600. Per capita assets were estimated at ₱ 5,600 having a standard deviation of ₱ 4,360 and a coefficient of variation of 0.78, indicating a highly uneven distribution. However, despite this and the less unequal distribution of income among the team, there appeared no attempt on the part of the wealthier member households to dominate the group.

Compared with the whole barangay, member households of the team were poorer on the average.

The mean farm size of a member farm household was 1.69

hectares ranging from .25 hectares to 6 hectares and divided into 1.5 parcels on the average. Only 30.3% of farm area cultivated by team members was irrigated during the dry season and produced a second crop. This contrasts with an average farm size of 2.13 hectares and 35.2% irrigated area for the barangay as a whole.

With respect to tenure status, 53% of member farm households were leaseholders, 16.7% were amortizing owners, and only 6.7% were owners. Another 6.7% were mortgagees and 16.7% cultivated equal areas of land under two or more tenure statuses.

There were four member households who were landless.

5.4.6 Atmosphere

Although relations among team members were largely characterized by quid pro quo considerations, these were not unrelieved. Mention has already been made of the practice of waiting until the tuwiran to ask for the payment of debts from member households who cannot afford to pay cash immediately.

The behaviour of the kabesilya in some respects also contributes to a non-calculating atmosphere. For one, Felipe collects the fee known as tacder only at the time of reckoning. Members also say that he is very

accommodating i.e. he readily lends money to members who ask, as long as he has funds to spare.

There are no festivities that mark the workday, except for an occasional afternoon snack enjoyed together in the field. Similarly, no festivities mark the end of the transplanting season. However, members remarked that others would try to lift up the spirits of a depressed member by sharing stories and jokes. Several members mentioned that they like being in the team because they were with their circle of friends (barkada).

5.5 Labour Teams for Other Farm Tasks

Among the members of Felipe's transplanting team, membership in a reaping team was most widespread, followed by membership in a land preparation team and lastly, in a weeding team. The same pattern holds for the random sample of 30 households. (See Table 5-5). The overwhelming majority of those who belonged to these other teams said they had no *kabesilya*. This means that team members exchanged labour among themselves but did not hire out their labour.

Land preparation teams, using carabaos, averaged 5 persons in number, all male. Land preparation consists of ploughing, followed by harrowing or breaking up of clods of earth into finer pieces, and finally levelling of the field in order to ensure that water is evenly distributed. A team

Table 5-4

Membership in Labour Teams for Other Farm Tasks

Farm Tasks	Member households of Transplanting Team		Sample of 30 households	
	No.	% of members	No.	% of sample
Land Preparation	11	28.2	12	40.0
Weeding	3	7.7	2	6.7
Reaping	22	56.4	17	56.7

could exist for one phase only, usually ploughing. Alternatively, it could undertake all three phases. Each phase can be separated in time by several days or can be done on successive days, the primary constraint being the fact that the field must be ready for transplanting when the seedling are mature. There is no indivisibility inherent in the process of land preparation.

Only one-third of the interviewees resorted to mechanical power (hand tractor and four-wheeled tractor) to perform the task of land preparation. The hire price for a hand tractor was ₦ 320 per hectare for ploughing including labour to handle the machine. The Irrigator's Service Association (ISA), set up with the help of FSDC, owned two four-wheeled tractors which were leased out. The charge was

₱ 460 per hectare. By comparison, the hire price of a man and carabao team was ₱ 35 per day, excluding meals. With six days needed to plough a hectare by a man and carabao team the total cost would be ₱ 210. Thus one reason for the relatively high incidence of membership in land preparation teams was the relatively high hire price of mechanical substitutes for the water buffalo.

Those who were members of land preparation teams cited associational gains as one benefit of membership. In particular, they cited the fact that, when working together, the tempo of work is faster than when each works alone. Thus less mandays are required to prepare a given area. They estimated that a team of three would require only 4.5 mandays to plough one hectare, whereas a single farmer-carabao team would need 6 days.

In spite of the absence of a kabesilya, transaction costs within land preparation teams are low because of their small size, ranging from three to five members.

With respect to weeding, close to 90% of farmers in both the transplanting team and in the random sample resorted to hand weeding, and only 10% applied herbicides. None of them used a mechanical weeder.

In fact, in Nagpandayan, farm records kept by one farmer show that only an average of three mandays was devoted to weeding (by hand) and that this was spread out

over a long period of time, anywhere between 10 and 34 DT. Also, yields of modern varieties were nowhere near the levels cited by De Datta, even though farmers in Nagpandayan exhibit optimising behaviour, due to factors such as inadequate application of fertilizer from lack of credit, inadequate irrigation water, etc., factors understandably absent from scientific experiments.

The high cost of herbicides (P 166 per liter) compared to low wages for weeding labour discourages the substitution of the former for the latter. Depending on the brand, from 1/2 to 2 liters of herbicides are prescribed per hectare. In Nagpandayan, farmers use 1 liter per hectare.

Notwithstanding the fact that most weeding is done by hand, the small amounts of labour devoted to the task, along with the practice of spreading out the task over a long time period, accounts for the low incidence of weeding teams in Nagpandayan.

The factors affecting the existence of reaping teams have been discussed at length in Chapter 4. There are only three differences to note in Napandayan vis-a-vis San Ramon. The first is that the reaping team in Napandayan is largely engaged only in exchange labour. This is denoted by the fact that it does not usually have a kabesilya. The absence of a decision center increases transaction costs but the reduction in work activities, since the group does

not hire out its services, would tend to counterbalance this. The second is that the reaping machines which are available are designed for modern, short-stalked varieties, which are grown in Napandayan in contrast to San Ramon which grows the tall, traditional varieties. However, no such machines were in evidence in Napandayan, due to its prohibitive price and maintenance costs and to a desire not to displace labour and add to unemployment. The third is the size of the reaping team. In Nagpandayan, it averaged 17 member households whereas in San Ramon it averaged 23.7. This means that transaction costs within Nagpandayan teams would tend to be lesser, ceteris paribus.

5.6 Conclusions

The findings of the case study can be summarised as follows. The transplanting team has two goals, shared by labour deficit and labour surplus farm households and landless labourer households: to secure an adequate and timely supply of transplanting labour and to augment household income. However, the team would not have come into existence or would not continue to operate, if the following conditions did not hold.

It was observed that the task of transplanting cannot be spread out over an indefinite number of days due to biological characteristics of an agricultural crop such as rice, thus requiring a pool of labour. Capital, in the

form of transplanting machinery, could easily be substituted for labour but the cost of the former is still prohibitive for the small farmers. In addition, farmers appear reluctant to make the substitution because of the effect on income and employment. There are also associational gains and other economies to be reaped from membership in a transplanting team.

Further, the team is characterized by some features which minimize transaction costs, and by other features which could increase such costs. Among those which minimize transaction costs are the existence of a decision centre, meetings at least once during the transplanting season and ethnic homogeneity. On the other hand, only a little more than one quarter of member households form the dominant kin group and member households are spread out among purok 1 and 2, tending to increase transaction costs.

Although relations within the team are based on quid pro quo considerations, this is softened by non-calculative characteristics. On the other hand, there is a high degree of inequality in the distribution of assets among members, which would be expected to foster conflict. Nevertheless, as in the case of the San Ramon reaping team, this element appears to be tempered by ties of kinship and personal friendship.

The hypothesis regarding the existence of indivisibilities as a determinant was not verified since it

was found out that rice transplanting does not involve any. However, this does not mean that it is irrelevant in other situations e.g. in the task of irrigation. As postulated at the outset, all the hypothetical variables taken together or singly, determine the choice between cooperation and individual action, depending on the situation under study.

The evidence also indicates that the same hypothetical variables, whether singly or together, were critical in the formation of labour teams in other farm tasks. The exception is weeding where the cultural practice is to do little weeding. Thus, even though it is labour-intensive since it is largely done by hand, there appeared to be very few weeding teams.

In general, the same factors affect a household's decision to join a team, whether it is a demander or a supplier of labour. By a supplier of labour is meant that a household in Nagpandayan cultivates less than one hectare of paddy and thus earned less than was necessary to keep it above the poverty line. Thus it would be in need of more income which it could secure by offering its labour for the performance of farm tasks.

It was shown in Section 5.4.2. that a household with a half hectare of paddy and two members for transplanting would still be concerned with securing an adequate and timely supply of planting labour. The fact that they cannot afford to buy transplanting machines and there are none for

hire is also a consideration. They would also be concerned with the existence of economies in team labour, both on their own field and on the field of non-members who employ them since these latter hire them because they are more efficient than ad hoc teams.

The four member households who are landless, would not be concerned with the adequacy and timeliness of transplanting labour since they would have no fields of their own. They would be concerned with transaction costs including all its three components. Search and information costs regarding employment opportunities would be reduced by membership in the team since it is the kabesilya who arranges for work. Bargaining and decision making and monitoring costs would also be of concern to them. So would the possibility of dominance of the team by any one group and the atmosphere that would exist.

Finally, the fact that the team hires out its labour to non-members breaks the dichotomy between hiring labour and joining a team. Non-members can thus secure the benefits of timeliness and efficiency by hiring the kabesilya-led team in advance. However, this fact does not negate the usefulness of investigating the determinants of membership in a team since it can still provide an understanding of the factors which make for cooperation among farmers in a developing country which is the main objective of this thesis.

CHAPTER 6 : A SAMPLE SURVEY OF PALAY TRANSPLANTING TEAMS

6.1 Preliminary Considerations

The aim in conducting a sample survey of palay transplanting teams was to universalise the findings from the two case studies. Such a survey would provide a wider picture of bayanihan as currently practised in the rural areas of the Philippines and at the same time enable the testing of hypotheses with respect to the factors that affect such cooperation. Due to resource constraints, however, such a "wider picture" is limited to North and Central Luzon, i.e., Regions 1 and 3, and to palay transplanting teams.

A further limitation has been necessary with respect to the number of hypothetical variables that could be tested. Out of the seven postulated, testing could only be done on transaction costs, distribution of assets and atmosphere via multiple regression.

The reason for the limitation of the explanatory variables to the three are the following. With respect to the existence of indivisibilities, these invariably are absent in transplanting paddy. Hence, there is no need to test for it. With respect to the elasticity of substitution among inputs, technically, this variable can be measured by estimating a production function for transplanting in which

output would be the total number of seedlings transplanted by a team, and inputs would be labour, land and machinery. In the case of transplanting, the only meaningful substitution among inputs in terms of its effect on the existence or viability of the team would be the substitution between labour and machinery. Since there is in fact no machinery employed in transplanting in the areas investigated, the elasticity of substitution between the two inputs is invariably zero.

Regarding the existence of economies, the case studies have indicated that the economies that are obtained by membership in a team are a combination of scale economies and associational gains and a reduction in the search costs of employment. Accurately measuring labour efficiency for twenty eight teams as an index of economies of scale and associational gains went beyond resource constraints. With respect to the reduction in the search costs of employment, this too would be difficult to measure.

Finally, the need for timeliness in transplanting is also invariably present and so was not tested for.

6.2 Description of the Sample

Twenty eight transplanting teams were surveyed. They averaged 19.5 member households, with Region 3 teams being larger on average than Region 1, having 25 member households as against 15.4 for the latter. The largest team had 42

member households while the smallest had 6. The average total number of transplanter in a team was 45.1 with 45.3% male and 54.7% female. Region 1 teams averaged 42.2 transplanter (42.2% male and 57.5% female) while Region 3 teams had 57.8 transplanter (47.3% male and 52.7% female). The average age of transplanter was 32.2 years overall, with 34.2 years for Region 1 and 30.1 years for Region 3. Male transplanter in both regions were younger, being 29.3 years old on the average as compared with 34.5 years for females.

With respect to length of membership, households claimed to have been in the same team for an average of 9.2 years. Region 1 households have been in such teams for an average of 10.2 years with 7.9 years for Region 3 households.

The teams engaged in both exchange labour among member households and in hiring out labour to non-members for payment in cash or in kind (mostly in cash). The system of accounting for teams in both regions followed that of the case study teams. Average income for a member household from the team's activities during the 1984 wet season transplanting was ₦ 516.60, with ₦ 443.80 for Region 1 teams and ₦ 613.60 for Region 3.

Of the 28 kabesilyas, seventeen were male and eleven female, with ten of the latter from Region 1. Only one

kabesilya in the sample from Region 3 was female. The majority belonged to farming households, although average farm size was less than one hectare. Eight of the kabesilyas were from landless labour households, with the majority of them from Manabo.

Half of the kabesilyas were chosen by the team members while the other half took the position by organizing the team or by being appointed. Of the kabesilyas chosen by team members, ten came from Region 1. Two were appointed by the kabesilyas who immediately preceded them and who were also their relatives by either affinity or consanguinity. One was asked by another kabesilya to assist him in managing a large group which they eventually split. Another was appointed kabesilya by his godfather in marriage, who happened to grow rice for certified seed purposes and needed the services of a large group of transplanter.

Kabesilyas in Region 1 did not charge any fee. Their "compensation" came from being able to borrow from prospective employers by pledging the team's labour. Those in Region 3 charged fees similar to those described in Chapter 5.

With respect to ethnic homogeneity, the vast majority of the teams were highly homogeneous, with 87.6% of team members belonging to only one ethnic group on the average,

with little variation between Regions 1 and 3 (See Appendix 2). In Region 1, six teams were largely Ilocano and ten teams largely Itnoeg (Tingguian). In Region 3, teams were similarly highly ethnically homogeneous, with 89.0% of membership being Ilocano, with a small proportion of Tagalogs and Pampangos.¹

With respect to consanguineal relations, on the average, a member household was related by blood to 4.4 other member households, on both spouses' sides. There was little difference between teams in Region 1 and 3 in this respect. With respect to neighbourhood, both residential and field but largely residential, a member household was neighbour to four other member households on the average, with practically no difference between the two regions.

Regarding primary occupation, eight out of nine member households on the average were farmers and one out of nine were landless labour households, with Region 1 teams having a slightly higher proportion of landless than Region 3. Average farm size was 1.07 hectares overall, with 0.82 hectares for Region 1 and 1.29 hectares for Region 3. Almost two-thirds of farmer members in Region 1 were share tenants while one-third were owner-cultivators. In Region 3, 10.8%

¹The Tagalog form the majority of the population in Nueva Ecija. Guimba is in north of the province, which is predominantly Ilocano. The province of Pampanga borders Nueva Ecija on the southwest (See Map of the Philippines in Chapter 1).

were owner-cultivators, 37.2% were amortising owners and 38.8% were leaseholders.

Average household income overall was ₦ 9,310 annually, with an average of ₦ 6,790 for Region 1 member households and ₦ 12,620 for Region 3. Average per capita income overall was ₦ 1,680, with ₦ 1,262 and ₦ 2,165 for Regions 1 and 3 respectively. The main crop was palay, with corn and vegetables as secondary crops.

Distribution of per capita income among member households of a team was highly unequal, with a coefficient of variation (c.v.) of 1.03 on the average. Region 1 teams showed a slightly more unequal distribution with a c.v. of 1.08 as against a c.v. of 0.97 for Region 3. Distribution of assets was also unequal, with an average c.v. of 1.16. Region 1 teams exhibited an average c.v. of 1.21 as against 1.10 for Region 3.

On the average, the teams held a meeting at least once during a transplanting season. Twenty one out of 28 teams kept a written record of member households' accounts. These were usually kept by the kabesilya. Several teams had a secretary who kept the records.

The vast majority of teams were fairly satisfied with the performance of the kabesilya. Only a small proportion were dissatisfied. Of those who were satisfied, the two major reasons given were efficiency and

honesty/fairness/helpfulness on the part of the kabesilya. With respect to efficiency, the kabesilya was seen as having a good command over his/her team, enabling it to finish its work according to schedule. S/he even trained the group in transplanting techniques on occasion and was on time for work. The kabesilya was also seen as being helpful, e.g. looking for work for members, patient, as being honest and as treating team members equally. Not paying members completely and on time, laziness and inefficiency were the major reasons for dissatisfaction with the kabesilya.

Again, the vast majority of team members were satisfied with the team, and only a small number were unhappy. The major reason for satisfaction was the cooperation that existed among members, i.e. each one did his/her share of work so that the task was made easy and readily completed. There was a minimum of shirking. There was an atmosphere of honesty and openness. A secondary reason were the socials, e.g. drinking and dancing that took place after work and after the season. Some teams, composed of a large number of unmarried young men and women, sponsored a dance after the transplanting season. This contrasts with the findings of the case studies where no festivities were held by the teams either during or after the seasons of transplanting and reaping.

No major reason was given for dissatisfaction with the team. Mentioned were absenteeism among members, delays in

payment, failure of a scheduled job to push through, and poor management by the kabesilya.

6.3 The Hypotheses

It was basically postulated that the degree of cooperation within a team depends on the extent of transaction costs, the degree of inequality in income/asset distribution and the degree of existence of a non-calculative atmosphere. This can be expressed in general functional form as:

$$C = f (X, Y, Z)$$

where C = degree of cooperation

 X = transaction costs

 Y = degree of inequality in the distribution of
 income/assets

 Z = degree of non-calculative atmosphere

In the above formulation of the problem, it is assumed that causation runs in only one direction, namely that C is the dependent variable and X, Y and Z are the independent or explanatory variables. It could very well be that causation also runs in the opposite direction, i.e. that X, Y and Z are the dependent variables and C is the explanatory variable. This is palusible if we consider the variables

which are used to measure C, which will be discussed in the next section.

For instance, the longer the average household has been a member of the team (one of the measures of the degree of cooperation which will be discussed below) it could be expected that transaction costs will be lower because of the greater degree of familiarity and trust that has grown up among member households. There would also tend to be a less calculative atmosphere.

Similarly, the more satisfied the members are with their team (another component measure of the dependent variable C which will be discussed below) the less transaction costs such as bargaining and decision making costs, will tend to be and the more probable the presence of a non-calculative atmosphere.

A more plausible assumption, therefore, would be that causation runs in both directions at the same time and thus estimate a simultaneous equation to test hypotheses. However, since the objective is to explain variations of cooperation within an agricultural labour team, it seemed logical to place C as the dependent variable and X, Y and Z as the explanatory variables. Thus we employed only a single equation linear regression which gave good results. Nevertheless, in their interpretation, the possibility of simultaneity of causation has to be kept in mind.

6.3.1 The Dependent Variable

More specifically, C, the dependent variable, was postulated to be measured by three component elements. First is average income per member household arising from the team's activities for the wet season. The reason for limiting observations on income to the wet season is due to the fact that most Region 3 teams are inoperative during the dry season due to lack of irrigation. Second is the average number of years a member household has been in the team weighted by team size. Third is the extent of members' satisfaction with the team, measured by the percent of favourable response to a question on the subject.

Average income per member household arising from the team's work is postulated as an index of cooperation within the team since, if team members are cooperative, the team will be efficient in its work. If the team is efficient, more employment will be given it by both farmer members and non-members. But if relations among team members are not smooth, e.g. they renege on their commitments, are dissatisfied with the kabesilya, etc., then the work is bound to be inefficiently done, leading to less employment and lower income.

It is postulated that the more cooperative the team is, the longer a household will remain in the team and the larger will be the team membership since it will attract

other households to join. However, while average number of years of membership may be high, a team may have remained small while the opposite may be true of another team. Thus, length of membership in the team is weighted by team size.

A team, while successful, may have remained small either because of personal preferences of individual members for a small team or because of limitations on the part of the kabesilya in managing a larger team. Although not formally tested, the latter hypothesis is suggested by the fact that the largest team in the sample (42 households, 72 transplinters), located in Region 3 had a kabesilya who had finished some high school and industriously kept systematic records with the help of his wife.

A counterindication, however, is given by the largest reaping team in Manabo in the 1983 wet season (33 households, 64 reapers) whose kabesilya is illiterate by the standards of formal schooling. Two other factors, though, may have offset this shortcoming: her integrity (she refused bribes by team members and non-members alike to have their fields reaped ahead of the others) and the fact that another member of the team also female, who was a high school graduate, kept records for the group.

While the two preceding elements of cooperation may be considered objective indicators, the third, namely, the

extent of member satisfaction with the team, is a subjective indicator based on members' perceptions.

6.3.2 Transaction Costs

Transaction costs were postulated to be indicated by team size, by the extent of homogeneity within the team as expressed by ethnicity and kinship, by whether or not members were residential and/or field neighbours, by the educational attainment of the kabesilya, by the manner in which the kabesilya was selected, by how well the kabesilya performed his/her functions, by the number of meetings held, by the existence of written records and by the number of officers.

Team size affects transaction costs. The larger the team, the greater information, bargaining, decisionmaking, and monitoring costs are.

It was postulated that the more ethnically homogeneous a team was, the lower transaction costs would be. This was measured by the largest percentage of member households that belonged to the ethnic group. It was also hypothesised that the larger the proportion of member households that were related consanguineally, the lower transaction costs would be. An index of this is the average number of households that a member household was related to, on both spouses' sides.

Being residential and/or field neighbours reduces transaction costs by reducing information and monitoring costs. This was illustrated in the case studies. Neighbours are also, to a certain extent, "known quantities" to each other. Thus, they are more willing to enter into a joint enterprise.

It was also postulated that the existence of a decision centre reduced transaction costs. Only one no-kabesilya team (as distinguished from an ad hoc team) could be found in the study areas. This means that a team without a kabesilya cannot survive for long due to high transaction costs.

For those teams with a kabesilya, how well s/he functioned would determine whether transaction costs were high or low. This was measured by the group's rating of the kabesilya and by number of years of formal schooling s/he attained.

Further, it was postulated that the manner in which the kabesilya was chosen would also affect transaction costs. If elected by team members, i.e. chosen democratically, the kabesilya would be more acceptable to them, they would readily accept his/her decisions and monitoring would not be resented. If the kabesilya were appointed, transaction costs would rise.

The number of meetings held by a group is ambivalent

as an indicator of transaction costs. Fewer meetings could affect the efficiency with which information was disseminated and could mean less participation in decisionmaking, leading members to renege on commitments. On the other hand, fewer meetings could mean that transaction costs were low. Team members readily agree and keep their part of the bargain. Hence there would be no need for more meetings. This seemed to be the case with the transplanting teams. Invariably, the team met only once during the transplanting season, only occasionally meeting more often. Because of this invariance, the number of meetings was dropped as an explanatory variable in the regressions.

The number of officers was also used as an indicator of transaction costs. The greater the number of officers, up to a certain point, the lower transaction costs would be since this would allow for division of labour in the tasks of information collection and dissemination, decisionmaking and monitoring of performance.

6.3.3 Distribution of Income and Assets

It was hypothesised that the more unequally income and assets were distributed among the member households of a team, the less cooperative the team would be because of tensions generated by conflicts among members. It was assumed that a high degree of inequality would give

incentives to the wealthier member households to use the group to their advantage. In the event of competing claims on the team's labour, the wealthier household could use its superior income/asset position to swing the group's decision in its favour. However, it was also recognized that a positive relation could exist between the unequal distribution of income/assets and the income of the team since the bigger farmer members provide income for the smaller ones.

Measurement of member households' income was limited to value of farm produce and wages from farm work, including imputed wages for exchange labour contributed to the group. Measurement of assets was limited to the market value of farm assets: land, farm implements and draft animals. In the case of land, the presence of irrigation, location and tenure status were taken into consideration. The index of inequality of distribution used was the coefficient of variation (c.v.) which is the ratio of the standard deviation of the variable in question to its mean. The higher the c.v. is, the more unequal the variable's distribution.

6.3.4 Atmosphere

It was postulated that the presence of a non-calculative atmosphere moderating the execution of the group's contracts, both among members and between the team

and non-members, contributed to the success of a team. It was further postulated that ethnicity, kinship, neighbourhood and the kabesilya's management of the team determined such as a non-calculative atmosphere. For example, being kin would tend to moderate strict compliance with the terms of a contract.

6.3.5 Region

The variable Region was added to take into account the existence of differences between Region 1 and Region 3, e.g. in the level of development. No hypothesis was formulated as to the sign of this variable.

6.4 Tests of Hypotheses

The hypotheses discussed in the previous section were tested by estimating four equations through multiple regression using the method of ordinary least squares (OLS). Since there were no a priori beliefs about the nonlinearity of the relationship between the dependent variables and the independent variables, a linear functional form was first employed since this form is the most convenient one to handle. A direct examination of the residuals by means of a scatter plot for each of the estimating equations did not show any curvilinearity. Thus the linear functional form was retained.

The same set of regressors or explanatory variables

C = index of degree of cooperation
 a = constant
 b_i = coefficients ($i = 1, 2, \dots, 11$)
 SIZE = team size
 ETHN = ethnicity
 KIN = kinship
 NBHR = residential and field neighbourhood
 KEDUC = education of the kabesilya
 KSELEC = process of selecting the kabesilya
 KPER = the team's evaluation of the kabesilya's
 performance
 GREC = existence of team records
 CVINC = coefficient of variation of per capita
 income
 CVASS = coefficient of variation of per capita
 assets
 REGION = Region 1 ; Region 3

Dummy variables were used for the manner of selecting the kabesilya, the existence of group records and region. If the kabesilya were chosen by the team members, a value of one would be entered in the regression; if self-appointed or appointed by others, a value of zero was entered. For the existence of records, a value of one was entered if there were group records, and a value of zero if there were none. For region, a value of one was entered if teams were located in Region 1, and a value of zero if located in Region 3.

In order to take account of the possibility of interaction among the explanatory variables, new variables were created out of combinations of some of the explanatory variables. The dependent variables were then regressed on the explanatory variables plus the interaction variables. For instance, the education of the kabesilya, the existence of group records, the number of officers and how well the kabesilya functioned can interact together in affecting the degree of cooperation or success achieved by the team.

The explanatory variables were entered stepwise into the regression equations using both the standard regression method and the hierarchical method (Statistical Package for the Social Sciences, 1975, pp.336-339). In the standard regression method, each variable was treated as if it had been added to the regression equation in a separate step after all other variables had been included. In the hierarchical method, variables were added to the regression equation in a predetermined order. For example, aside from directly accounting for variability in the dependent variable, the degree of kinship can affect the degree of cooperation in the team through its effect on the distribution of income/assets. It was postulated that a poorer member household would be financially assisted by other members who are its kin, thus lessening the disparity in income/assets and reducing possible tensions within the team. The more that member households are related to other

members by blood, the lower would be the coefficient of variation of income/assets. Thus kinship is entered into the equation ahead of the c.v. of income/assets.

Initial results indicated that only the variable on ethnicity was consistently not statistically discernible at the 10% error level and had the wrong sign in all four regressions.² Other variables which also exhibited these two characteristics in individual regression were dropped from those equations. Team size was excluded from equations (3) and (4) since it is part of the dependent variables HHYRS and C.

The c.v. of income (CVINC) was highly positively correlated with that of assets (CVASS). Of the two, the inclusion of CVINC in the regressions gave better results and was therefore used while CVASS was dropped.

All the coefficients of the interaction variables were statistically not discernible and so were also dropped.

6.5 Regression Results

The regression results are presented in Table 6-1.

²Statistical discernibility or significance at the 10% error level means that there is a 10% probability that a variable does not really explain the variation in cooperation. The 10% level was chosen as the cut-off point for statistical discernibility because of the small sample size which increases sampling error and because of strong a priori beliefs about the regressors. A bigger sample would verify the discernibility of the regressors at a lower error level.

Table 6-1

Regression Results: Cooperative Behaviour Model

DEPENDENT VARIABLE	CONSTANT	SIZE	KIN	NEHR	KEDUC	KSELEC	KPER	GREC	OFF	CVINC	REGION	R ²	\bar{R}^2	F
1. EVAL	18.686	-0.312 ⁺ (0.190)		0.438 (0.878)		3.835 (3.442)	0.920 ⁰ (0.466)	2.469 (3.993)		-14.193 [*] (4.258)	-0.244 (4.497)	.580	.460	3.949 [*]
2. INC	-1,207.97	-7.144 ⁰ (3.541)	26.542 ⁺ (19.182)		18.490 ⁺ (12.702)	89.933 (72.637)	15.5411 ⁰ (8.995)		121.710 ⁺ (74.504)	111.200 (90.913)	-310.801 [*] (76.70)	.538	.376	2.766 ⁰
3. C	-14.960		0.031 (0.190)	0.061 (0.163)	0.117 (0.110)	1.097 ⁺ (0.662)	0.164 ⁰ (0.083)			-1.857 ⁰ (0.755)	-1.414 ⁰ (0.606)	.552	.429	3.520 [*]

* Significant at the 1.0% level.

0 Significant at the 5.0% level.

+ Significant at the 10.0% level.

Data entries for each team are given in Appendix 2. The regression of the average number of years a household was with a team, weighted by the team size (HHYRS), gave poor results and was not included.

The multiple coefficients of determination (R^2) of the three regressions indicate that half or more of the variations in the indices of cooperation was accounted for by eight regressors, the particular regressor depending on the equation. The corrected R^2 , or \bar{R}^2 , are relatively high, given that only a small sample was used.³

Given the small sample size, these results compare favorably with those obtained by Osuntogun (1972) who attempted to identify the factors affecting the success of Western Nigerian cocoa marketing cooperatives. He reported an R^2 of 0.40 for a regression based on a cross section study of 45 cooperatives, using 14-year averages (p. 306). No figure was given for \bar{R}^2 .

The F-tests for all three regressions are statistically discernible at the 5% level or less, which means that, taken together, there is a probability of 95% or more that the regressors do affect the dependent variables as hypothesised.

³ R^2 is corrected for the possible inclusion of irrelevant explanatory variables or variables which do not really have any effect on the dependent variable but whose coefficient is nonzero because some small part of its fluctuation, by sheer coincidence, coincides with the fluctuation in the dependent variable.

Among the eleven postulated variables explanatory of the degree of cooperation achieved in a team, eight were shown to be statistically discernible at the 10% level or less in at least one equation. These are team size, kinship, education of the kabesilya, manner of selecting the kabesilya, the kabesilyas' performance, the number of officers, the distribution of income and region. Although these regressors are marked as being discernible at the 10% error level in Table 6-1, some are actually discernible at a lower error level but still above the traditional 5% cut-off point. An example of this is SIZE in equation (1) which was discernible at the 5.8% error level. The same can be said for those regressors at the 5% and 1% error level noted in Table 6-1.⁴

The statistical discernibility of the variable CVINC at the 1% and 5% levels in two equations goes counter to the findings of the case studies that the unequal distribution of assets did not adversely affect cooperation in the two labour teams because this appeared to be mitigated by kinship and friendship. The use of the hierarchical method explained previously, where variables are entered into the

⁴ Wonnacott and Wonnacott (1979) discuss the difficulties of arbitrarily selecting an error level or cut off point. They suggest using the observed level of discernibility of a regressor or its "prob-value" which is "an excellent way to summarize what the data says about the credibility of H_0 [the hypothesis that the regressor has no relation whatever with the dependent variable]" (p.91)

equations in a predetermined order also showed poor results. In this method, KIN and NBHR (which can be regarded as a proxy for friendship) were entered ahead of CVINC/CVASS because they were postulated to mediate the effects of the latter on the degree of cooperation.

Under the standard regression method, the variable KIN was discernible at the 10% level in only one equation and the variable NBHR was not discernible at the 10% level in any equation. Both also showed the wrong sign in one equation each. These results indicate that these variables in general did not affect cooperation within the team as strongly as the other variables. They would therefore not have as much of a mitigating effect on CVINC as would be indicated by the results of the case studies.

Although individual regressors in a particular equation may not be statistically discernible at the 10% level or less, they have the correct signs. Because they provide confirmation, though weak, to strong a priori beliefs, it was decided to retain them. For instance, with respect to NBHR which was statistically indiscernible at the 10% level, it was postulated that the greater the number of neighbours per member household, the greater the degree of cooperation. This translates into a positive coefficient since the hypothesis is that the two variables move in the same direction. Since the regressor NBHR had positive coefficients and since it is reasonable to suppose that the

extent of neighbourhood among team members does affect the degree of cooperation, it was retained in equations (1) and (3). However, it was dropped from equation (2) where initial results showed a negative and indiscernible coefficient.

The numbers displayed under each variable heading are the coefficients of those variables, measuring the amount of change in the dependent variable for a given unit change in the explanatory variable, keeping all other variables constant. Thus, in equation (2), for an increase (decrease) of one in the number of team members, average income per member household decreased (increased) by ₦ 7.144. The numbers displayed under each coefficient constitute its standard error.

The above results, however, while generally confirming the hypotheses put forward, have to be qualified. In the first place, the dependent variable that is being measured is the degree of cooperation, which is not easily quantifiable. Thus the question of whether the correct indices of cooperation have been chosen arises. This is always a difficulty that confronts those who are trying to measure the factors that account for the success or failure of cooperatives.

In particular, the variable HHYRS by itself does not appear to have been an appropriate measure of cooperation as seen from the fact that \bar{R}^2 was quite low and the F-statistic

was not discernible at the 10% level even if the same regressors were used on EVAL and INC, two other measures of cooperation, with resulting statistical significance of the overall relationship between dependent variable and regressors.

The variation in HHYRS among the teams surveyed is probably due to factors other than those postulated. An example is the reduction in the size of one team in San Ramon due to the creation of a new team in an adjacent neighborhood, which in turn was the result of the influx of refugees from a nearby municipality where there was increased rebel activity. The creation of the team drew members from the older team. Thus the reduced size of the team was not necessarily due to lack of cooperation among team members.

However, the three dependent variables of EVAL, INC, and HHYRS, when standardised and combined, gave good results. The challenge for future research would be to come up with variables which would more accurately measure cooperation.

A second caveat is the fact that the regression results were based on data generated for only one cropping season. The dangers of this limitation are brought out clearly in the example cited above of the reduction in the size of one team due to the creation of a new team in the

next cropping season. The reality is much more dynamic than the results of one survey in one point of time would lead us to believe. Thus, an inter-temporal study, i.e. a time series study, of the same 28 teams would give a clearer picture of the situation and lead to a more accurate assesment of the factors that affect the degree of cooperation.

A third caveat in the application of the empirical results presented here would be the fact that only a small sample of transplanting teams was surveyed. A bigger sample covering a wider geographical area would provide better grounds for generalization.

A fourth caveat is the problem of incomplete specification of regressors, also known as the problem of omitted variables. Some candidates for omitted variables are (1) farm fertility; (2) transplanting skills; (3) age of transplanter; (4) sex of transplanter, and (5) kinship between the team and non-member farmers who hired the team. These were not specified but could very well have affected the results.

For example, differences in farm fertility of the fields transplanted could have led to differences in INC, which would lessen its usefulness as a measure of cooperation. In this particular study, however, the teams were paid on the basis of hours worked or area transplanted,

and not on the basis of expected yield, which would be affected by soil fertility.

Differences in transplanting skills, in the age and sex of transplanter could indeed affect the way the team members assessed their team. However, field observations indicated that these differences were randomly distributed among the various teams and there did not appear to be any systematic distribution of such variables. That there might soon be a systematic distribution of skills and age of transplanter was indicated by the existence of a team of four young men in San Ramon who banded together and hired themselves out at area rates, based on their claim that they could transplant the same area as a larger team, but in a shorter time. For farmers who were concerned with timely delivery of transplanting services, this was an attractive proposition.

A factor which probably affects the income of a team but which was not included in the regressions is kinship between the team and non-member farmers who hired the team. In Region 1, close to one half of hired transplanter were related to the host farmer, either by blood or marriage. (See Table 4-7.) Among the hired groups would be kabesilya-led teams.

In one barangay in Region 3 which was included in the survey, the kabesilya of one of the transplanting teams was

a godson of a large landowner who invariably hired the team to transplant his fields. The existence of such relationships could explain the differences in incomes among teams. However, it stands to reason that the godfather would not hire his godson's team if they did a poor job. Inefficiency in turn, would be determined by the degree of cooperation among team members.

Finally, attention should be drawn to the existence of errors of measurement which would explain, in part, the existence of statistically insignificant individual regressors. Such errors can be minimised in future research by more extensive and more careful participant observation, a better designed interview schedule, and better trained interviewers.

6.6 Conclusions

As indicated at the start of this chapter, the four variables of indivisibility, elasticity of substitution, economies and timeliness could not be treated for. What were tested were the factors of transaction costs, distribution of income/assets, and atmosphere. Transaction costs were hypothesised to be a function of several characteristics of each team such as degree of kinship among members. The more these characteristics were present in a team (except for team size), the lower

transaction costs would be among members, and the greater the degree of cooperation. Atmosphere was also postulated to be a function of some of the same characteristics and to move in the same direction as these characteristics.

The distribution of income/assets was measured by the c.v. of income/assets. Since the two were highly correlated and since the use of the c.v. of income gave better statistical results, it alone was entered into the regressions. In general, the hypothesis was that the degree of cooperation in a team and CVINC would move in opposite directions. However, it was also recognized that average incomes of team members could move in the same direction as CVINC. This was verified in equation (2).

Among the seven variables indicated as discernible by the sample, the most likely to affect cooperation is the kabesilya's leadership/management abilities as indicated by his performance, since it was discernible at the 5% level of all three regressions. This does not mean that it would have a greater impact than other variables as indicated by the magnitude of their relative coefficients but that it was more likely to have an effect than the other variables.

The second factor that is most likely to affect cooperation is income distribution. It was statistically discernible at the 1% and 5% levels in two equations, including equation (3). The third most likely factor is

team size, followed by the manner of selecting the kabesilya, and lastly kinship, education of the kabesilya and the number of officers, each of the last three having an equal likelihood of determining cooperation in the transplanting teams.

Region, a highly discernible variable, was utilized to express differences between Regions 1 and 3. The negative coefficient of this variable should not be interpreted to mean that households in Region 1 were generally less cooperative than those in Region 3. However, it can be interpreted to mean that differences in such factors as incomes, farm sizes, etc. due to geographic location accounted for differences in the degree of cooperation achieved.

Finally, the results of the regression can be improved with (1) better indices which more accurately measure the degree of cooperation achieved in a group; (2) a time series analysis in combination with cross-section analysis; (3) a larger sample; (4) a more complete specification of independent variables, and (5) a minimisation of measurement errors.

CHAPTER 7 : SUMMARY AND CONCLUSIONS

7.1 Summary of Research Results

The objective of this study has been to investigate the factors that affect cooperation among small farmers in the rural areas of a developing country. Cooperation was defined as encompassing both market transactions and internal organization. In a market transaction, an individual cooperates with another to achieve a common goal, namely the satisfaction of needs and wants in general. But the particular need or want for each individual is different. We have called this cooperation in the broad sense in order to distinguish it from cooperation in the narrow sense where two individuals engage in joint efforts (collective action) to satisfy the same particular need or want.

In the light of the above distinction, an individual, who has a particular need or want in common with others, has basically two choices open to him: to act alone (individual action) or to cooperate with others in the narrow sense of cooperation (collective action). If he chooses individual action, there are two further possibilities: "pure" individual action, or cooperation in the broad sense, i.e. market transaction. Within a market transaction, cooperative and non-cooperative strategies are possible.

If an individual chooses collective action there are

also cooperative and non-cooperative strategies that are open to him. The Prisoner's Dilemma situation can occur in both a market transaction and in collective action.

This study of cooperation among small farmers in a developing country focuses on the performance of farm tasks, where the farmer has a choice between individual action and collective action, and among cooperative and non-cooperative strategies within collective action. A review of relevant but diverse literature has suggested a number of factors which affect both choices, namely (1) the existence of indivisibilities in inputs and/or processes; (2) the elasticity of substitution between inputs; (3) the existence of economies; (4) transaction costs; (5) the distribution of income/assets among potential or actual co-operators, (6) the degree to which a non-calculative atmosphere governs the relationships among co-operators and (7) timeliness in the execution of the farm task. The first six factors also determine cooperation in non-agricultural situations, whether singly or together.

The focus of field research was on indigenous forms of cooperation in rural villages or barangays in North Luzon (Region 1) and Central Luzon (Region 3) in the Philippines. After extensive probing, it was discovered that the most widespread and most frequently recurring form of cooperation among rural households was in the performance of certain tasks in palay (paddy) farming. These farm tasks were

transplanting and reaping.

In the two case study villages, farm households have a choice between family labour, hired labour and cooperative labour in the performance of farm tasks. A sample survey of sixty four farmers in the municipality of Manabo, which included both members and non-members of cooperative labour groups, showed that, on the individual household level, household labour supply and budgetary constraints were the main considerations in choosing between hired and cooperative labour for transplanting. These were followed by considerations of atmosphere, the existence of economies timeliness in the execution of farm tasks, and transaction costs.

Twenty three kabesilya of cooperative labour groups in Manabo were also interviewed as to the reasons for the existence of their teams. The major consideration was transaction costs, followed by budgetary constraints and the economies achieved by teamwork.

A study was made of transplanting teams in which approximately 19.5 households on the average, both farmers and landless labourers, would pool labour, providing as many as 45.1 workers.

These labour teams had been in existence for 9 years on the average, with the tradition of setting up such teams going back many more years. The teams were seen by members

as an expression of the cooperative spirit generically known as bayanihan, but variously called suyuan or ammo depending on the region. They existed solely for the performance of these farm tasks and did not extend to other farm tasks or non-farm tasks or welfare services. However, a number of team members joined teams for other farm tasks such as land preparation and weeding.

The teams engaged in exchange labour among members and in hiring out to non-members for wage compensation. Among members, there was a very clear ratio between inputs and rewards. In North Luzon, labour given was compensated for by equal amounts of labour either in units of time for transplanting, or in units of palay reaped for reaping. Any member could hire out the group's labour to a non-member and he would keep the wage payment for himself. In Central Luzon, where such teams existed largely for transplanting, equal amounts of labour were also exchanged among members. Wages received as compensation from non-members were equally divided among team members. In both North and Central Luzon, any imbalance in exchange between members in the course of the transplanting or harvesting season was rectified at the end of the season by payments in cash or in kind.

In organizational form, the teams were what Williamson terms "simple hierarchies", with only one officer (the kabesilyas) making most of the day-to-day decisions for the

group. Some teams had one other officer who could record the presence of members during a work period and their output. A team meeting would be held at least once during the transplanting or harvesting season where important matters such as wages would be discussed and decided upon.

The role and compensation of the kabesilya differed between the two regions. In North Luzon, the kabesilya did not look for employers of the group's labour while in Central Luzon, the kabesilya undertook this task, receiving the wages given and paying individual members in turn. In North Luzon, the kabesilya received no compensation for her office, while the kabesilya in Central Luzon charged each member a membership fee and each non-member who employed the team a commission. Kabesilya in North Luzon were predominantly female, while in Central Luzon they were predominantly male.

The farm tasks in which the teams engaged were also relatively simple. In transplanting, the teams only did the actual transplanting and not the pulling up of seedlings, which requires greater skill and was usually reserved for persons hired for the purpose. In harvesting, the teams (mostly in North Luzon) were limited to the cutting of the paddy stalks and their bundling. Thus, these task required a minimal degree of division of labour.

Another feature of these farm tasks was that no farm

machinery was involved, only labour. Field supervision by the kabesilya and record keeping were quite simple and straight forward.

In sum, the groups were relatively small, engaged in uncomplicated farm tasks and required simple organizational forms.

The review of the literature suggests variables which may help to interpret co-operative labour groups by taking account of data which cannot be explained by the analysis of household conditions alone. A pool of hired labour is engaged by just one individual or household and for a specific period of time. But a pool of co-operative labour is responsible to its own members and does not cease to exist after completing a given task; rather, it continues until all the members' claims upon it have been satisfied. Because of this, mechanisms must be established to settle conflicting claims and in general to manage the pool. Hence, the same variables which have been used to explain, for instance, collective property rights over assets such as land can also be used to explain collective property rights over labour.

Regarding the verification of the seven hypothetical variables which affect agricultural cooperation, the focus was on the agricultural work teams. No control group of non-member households in either case study villages was

studied because it was felt that the results of the sample survey of six four farm households in Manabo, which included non-members, gave a good picture of the reasons for the choice between hired labour (individual action) and cooperative labour (collective action) in transplanting. Given resource constraints, and the fact that very little was known about these agricultural work teams, the latter were studied in depth. In the course of investigating them, the hypothetical variables would also be verified or denied.

Moreover, participant observation indicated that a good number of households in both case study villages were members of at least one agricultural work team. Selecting a random sample of households who were not members of any team would have been difficult, given resource constraints. However, the results of the case studies can be improved with the inclusion of a control group of non-member households in each case study village.

Nevertheless, even with the inclusion of control groups of non-members, the dichotomy between hired and cooperative labour for farm tasks is broken by the fact that the agricultural work team hires out its labour to non-members, resulting in the fact that non-members can enjoy some of the benefits of team membership. Still, the case studies can contribute towards understanding the determinants of cooperation among farmers.

7.1.1 Results of the Case Studies

The results of the two case studies showed that, in the transplanting and reaping of paddy, indivisibilities did not exist and so were not relevant in determining the choice between individual action and group action. However, it was evident in the barangays where the case studies were conducted, that indivisibilities in physical assets such as dams, tunnels, canals and large electric pumps played a large role in the formation of irrigators' associations in order to carry out the task of irrigation.

While indivisibilities were not a relevant factor in the formation of the labour teams, timeliness in the execution of transplanting and reaping was, due to the biological nature of an agricultural crop such as rice.

Any delay in the transplanting of rice seedlings after they have reached a certain age, or any delay in the harvesting of rice after the grain has attained a certain level of maturity, would result in a loss in output. Hence, it is to the interest of the farmer to complete these operations in a relatively short time. Thus, the need for a pool of labour. Membership in a transplanting or a reaping team assured him of an adequate and timely supply of labour.

With respect to the elasticity of substitution, this was verified in the case studies as a factor affecting the

choice between cooperation and individual action. This was demonstrated by the fact that the labour teams existed largely in the tasks of transplanting and reaping where elasticity of substitution between machinery and labour are zero. On the other hand in the tasks of land preparation and weeding, where elasticity of substitution among inputs are positive, labour teams existed to a lesser extent.

With respect to economies, the case studies indicated that team labour was more efficient than family labour for reaping in Region 1, and more efficient than ad hoc team labour for transplanting for Region 3. The greater efficiency of team labour was the result of both physical and psychological factors.

On the physical side, the scale of reaping or transplanting was increased for each household because the formation of the team meant pooling their labour and their land. This resulted in a certain amount of specialization such as the creation of the position of kabesilya who was better at supervising the team than any other member. In addition, in Region 1, it was the choice of the more capable young men to be bundlers. In both, the large scale reaping and transplanting honed team members in these skills more than non-members would be, making the former more efficient in these tasks.

On the psychological side, associational gains were

made possible. This meant increased effort levels as a result of natural competition among team members and the desire to be regarded as a diligent and industrious worker.

Apart from greater work efficiency, team membership also reduced job search costs for each member household since it was the kabesilya (in the case of Region 3 teams) who looked for employment for the team.

As to the remaining variables, their validity as constraints were verified by the case studies and by the results of the sample survey. In particular, with respect to transaction costs, these were hypothesised in the context of the labour teams to be a function of team size, ethnicity, kinship, neighbourhood, the kabesilya's level of education, the manner in which s/he was selected, his/her performance, the number of officers, and the existence of written records. Atmosphere was also hypothesised to be functions of ethnicity, kinship, neighbourhood and the performance of the kabesilya.

The survey of sixty four farmers in Manabo indicated that both those who joined cooperative labour groups and those who hired labour for transplanting, relied chiefly on family, kin, and neighbours, both residential and farm. However, a larger proportion of hired labour than of cooperative labour did not fall into these categories, suggesting that transaction costs for hired labour are greater than those of cooperative labour and also suggesting

a difference in atmosphere in the two arrangements.

In fact it was observed that in San Ramon, members of hired work groups worked in separate parts of the field unlike the cooperative labour teams whose members worked together. This difference could be due to the fact that a number of hired transplanters were neither family, kin or neighbour to the host farmers and were not as well acquainted with the rest of the work group.

In the case studies, the kabesilya's level of education did not seem to matter since both kabesilya achieved only an elementary level of education and yet the team had been continuing in existence for a number of years, with few defections. Whether s/he was chosen by the group or was self-appointed or appointed by someone else also did not seem to matter.

In the case of the Nagpandayan transplanting team, residential neighbourhood was less significant since member households were spread out over a wide area. Since this same team was the larger of the two case study teams, and since the smaller team had a higher average number of neighbours per member, the indication is that the latter and team size are negatively correlated. This is borne out by the sample survey results which show a simple correlation coefficient (r) of $= -0.225$ between the two in the correlation matrix.

The fact that only one team (which engaged in both

transplanting and harvesting) was discovered in the research area which did not have a kabesilya indicates that transaction costs in no-kabesilya teams are high; otherwise, there would be more of them. In teams which have kabesilyas, his good performance means that his decisions will be readily accepted by the group and his monitoring will not be resented. This was also verified by the case studies.

The case studies also indicated that most members belonged to one ethnic group. However, with respect to kinship, it was evident that this was also negatively correlated with team size, i.e. degree of kinship among members diminished as team size increased. In the smaller group, nine households or half of the members comprised the dominant kin group. In the bigger group, twelve households or 30.8% of the members, made up the biggest kin group. This correlation was verified by the result of the sample survey which showed a negative correlation coefficient (r) of -0.127.

The case studies also revealed a high degree of inequality in the distribution of income and assets. Despite this, however, there was no attempt on the part of the wealthier members to dominate the team in terms of preference in the schedule of work and in other matters. Other factors such as kinship may have counter balanced any tendency towards dominance on the part of the wealthier

members. However, in a second, larger team in San Ramon, wealthier members tried to bribe the kabesilya to have their fields transplanted ahead of the others. A third reaping team also experienced a dispute between bigger and smaller farmers regarding output quotas with the former wanting larger quotas so as to complete the task on their farms and avoid having to hire labour which would be more difficult to secure since the reaping season would be progress. The smaller farmers wanted to maintain the smaller quota of ten bundles per worker since this would suffice to complete the task on their fields .

Finally, there were indications that agreements among team members were moderated by a not-too-rigorous enforcement as expressed, for example, in the kabesilya's handling of the team and of team members assisting another member complete a bundle as in the case of the reaping team in Region 1.

7.1.2 Results of the Survey of Cooperative Labour Teams

In the analysis of the results of the sample survey of twenty eight cooperative labour teams, only the significance of the three factors of transaction costs, distribution of assets and atmosphere were tested, for reasons given in Section 6.1. Four regression equations were employed.

Once more, transaction costs and atmosphere were measured by the indicators mentioned above, namely, ethnicity, kinship, etc. Taken together, all these indicators plus the distribution of income/assets and region, explained a significant proportion of the variation in the dependent variables, i.e. the degree of cooperation achieved by the team. Eight out of eleven individual regressors were statistically discernible at the 10% error level or less in at least one equation and had the correct signs (see Table 6- 1). These were team size, kinship, education of the kablesilya, manner of selecting the kablesilya, the kablesilya's performance, the number of officers, the distribution of income and region.

Excluding region, the most likely variable to affect cooperation within labour teams is the kablesilya's leadership and management abilities, since this variable was the most discernible. The second factor most likely to affect the viability of a team is distribution of income among the members. This finding is different from the results of the case studies, indicating that kinship and neighborhood were not significant in mediating the effects of inequality in income and asset distribution in the labour teams in general.

A third factor most likely to affect cooperation is team size, followed by the manner of selecting the kablesilya. Lastly, kinship, education of the kablesilya and

the number of officers also have an effect on cooperation, with each of them having an equal likelihood.

These results confirm that transaction costs, income distribution and atmosphere, as postulated, are relevant in determining the degree of cooperation within a cooperative labour team.

However, the result of the sample survey of twenty-eight agricultural work teams should be treated with caution due to the fact that only a small sample size was used and for one cropping season only. There is also the problem of more accurately measuring the dependent variable cooperation. It is also possible that some explanatory variables were omitted which should have been included, such as kinship between members of the team and non-members who hired the team. Finally, errors of measurement of variables have to be considered.

Since we are interested in the factors that affect cooperation, the latter was made the dependent variable and causality was assumed to be unidirectional. However, it is likely that causality runs in both directions at the same time. Use of a simultaneous system of equations could improve the results.

7.2 Conclusions

In chapter two, attention was called to the distinction

made between a Prisoner's Dilemma and an assurance game. In the former, the payoff to non-cooperation is greater than the payoff to cooperation. It is the reverse in an assurance game. It was also suggested that the way to achieve a cooperative outcome in a Prisoner's Dilemma situation was through altruism and trust. Since, in many situations, the achievement of cooperation would result in a positive sum game, it would be desirable to know what factors bring altruism and trust about. But this is a study for which disciplines other than economics are better equipped to undertake.

Nevertheless, the science of economics can still contribute toward understanding how cooperation can come about. It can do this by identifying the factors which affect the payoffs, i.e. the costs and benefits, of cooperation and of non-cooperation and by extension, between individual and collective action.

The research undertaken has tried to identify the factors which affect cooperation in an attempt to isolate those variables which promote cooperation among small farmers in a developing economy. These determinants have been discussed in various contexts, e.g. the nature of the firm, property rights, etc., but never explicitly to analyse cooperative behaviour, which is a topic of interest in itself. Where it has been analysed as such, as in Olson's work, the determinants of such behaviour have not

been discussed, except for group size, which affects transaction costs.

A decision tree was drawn up where the individual (1) chooses between individual action and cooperation, i.e. collective action and (2) within collective action, he chooses among various strategies of non-cooperation and cooperation, ranging from individualistic behaviour, which would include free riding, to consummate cooperation. It was postulated that the choices would be affected by the costs and benefits of alternatives and that these costs and benefits in turn are determined by certain factors.

The research results presented here confirm that the variables which were postulated at the start do indeed affect the choice between cooperation and individual action and thus explain the existence of agricultural work teams and the extent of cooperation that exists within these teams. The exception is the factor of indivisibilities which were shown not to be existent in the case studies. However, this result cannot be interpreted to mean that it is not a relevant factor in other situations, such as those mentioned in the literature reviewed in Chapter Two and in other farm tasks. It was stated earlier that one or all of the postulated variables affect cooperation, depending on the particular situation being studied.

The determinants of the costs and benefits of collective action/cooperation and the direction of their

effects are briefly discussed in the following paragraphs and summarised in Table 7-1.

The first four factors affect only the choice between individual and collective action and only as necessary but not sufficient conditions for collective action. Thus, if it is stated, as it is in Table 7-1, that the existence of indivisibilities tends toward the choice of collective action, this is to be interpreted to mean that this is so only insofar as it is a necessary but not sufficient condition for such action.

The last three factors affect the choice between cooperative and non-cooperative strategies within a group as well. To indicate this, the terms "collective action/cooperation" and "individual action/non-cooperation" are used in the Table. It is postulated that six of the seven variables, i.e. timeliness in the execution of farm tasks excluded, apply to both agricultural and non-agricultural situations. It could very well be that timeliness in task execution applies to non-agricultural situations as well but we do not have data in our processing to verify this.

If there is an indivisibility existing in an input or process the costs to the individual of undertaking alone a venture which involves such an input or process is likely to be high. If there is no indivisibility, then in all

likelihood, the costs of individual action are low and there is a tendency toward such action and not toward collective action. Thus, in ventures marked by the presence of indivisibilities, cooperation tends to take place.

If timeliness is necessary in the execution of a farm task, then costs of individual action are high, leading toward collective action. If it is not necessary, then the costs of individual action are low and will thus be favored.

Regarding the elasticity of substitution (σ) among inputs, if a particular production process is labour-intensive to begin with, a low sigma ($\sigma < 1$) would indicate a high payoff to cooperation and it will tend to be favoured. Symmetrically, if a production process is capital-intensive to begin with, a low sigma would mean that the payoff to collective action is low leading to the choice of individual action. Individual action here is synonymous with the substitution of machinery for labour, which means that the individual has less need of others to carry on some activity. In the case of a labour-intensive process, if it is difficult to substitute machinery for labour, i.e. sigma is low, then the cost of collective action is relatively low.

Where sigma is high ($\sigma > 1$) and an activity is labour-intensive to start with, the payoff to cooperation will tend to be low and there will be a tendency toward individual action if the cost of capital falls or the cost

of labour increases. On the other hand, where σ is high but the activity is capital-intensive to begin with, the payoff to collective action will be on the high side and there will be a tendency to favour it if the wages of labour fall or the cost of capital rises.

If economies are present in group work, then the benefit-cost ratio of collective action will tend to be high and thus it will be favoured over individual action. If they are absent from group activity, then the benefit-cost ratio of collective action will tend to be low and the opposite choice will be made.

If transaction costs of group work are low relative to individual action, then the benefit-cost ratio of collective action is high and it will be favoured. If transaction costs of such group activity are high, then the benefit-cost ratio of collective action will be low and there will be a tendency to choose individual action. Within a group, high transaction costs will encourage non-cooperation whereas low transactions will encourage cooperation.

A more or less equal distribution of assets or income among potential members of a group will keep the benefit-cost ratio of collective action on the high side, leading to its selection whereas an unequal distribution will reduce the ratio resulting in individual action. Within an

Table 7-1

Effects of Determinants on Benefits and Costs of
Cooperation with the Resultant Tendencies

DETERMINANTS	B/C	TENDENCY
1. Indivisibilities		
Existing	↑	Collective Action
Non-Existing	↓	Individual Action
2. Timeliness of Task Execution		
Existing	↑	Collective Action
Non-Existing	↓	Individual Action
3. Elasticity of Substitution		
< 1 : labour-intensive	↑	Collective Action
: capital-intensive	↓	Individual Action
> 1 : labour-intensive	↓	Individual Action
: capital-intensive	↑	Collective Action
4. Economies		
Present	↑	Collective Action
Absent	↓	Individual Action

existing groups, an equitable distribution of income/assets will encourage cooperation and an unequitable distribution will foster individualistic behaviour.

Table 7-1 Con't.

Effects of Determinants on Benefits and Costs of
Cooperation with the Resultant Tendencies

DETERMINANTS	B/C	TENDENCY
5. Transaction Costs		
High	↓	Individual Action/ Non-cooperation
Low	↑	Collective Action/ Cooperation
6. Distribution of Income/Assets		
Equal	↑	Collective Action/ Cooperation
Unequal	↓	Individual Action/ Non-cooperation
7. Atmosphere		
Rigid	↓	Individual Action/ Non-cooperation
Flexible	↑	Collective Action/ Cooperation

A rigid, calculative atmosphere in a group will reduce the benefit-cost ratio of collective action/cooperation with the attendant consequence of a tendency toward individual action/non-cooperation. On the other hand, a more flexible, non-calculative atmosphere will raise the benefit-cost ratio of collective action/cooperation.

It might be helpful to recapitulate the results of this research in the form of guidelines for projects or programmes which involve a group. Depending on the circumstances, it may turn out that either some or all of the following guidelines are relevant. Those projects/programmes which:

1. involve indivisibilities in inputs or processes will fare better than those where no indivisibilities are present;
2. involve timeliness in the execution of farm tasks will fare better than those where it is not involved;
3. are labour-intensive and have a low elasticity of substitution among inputs (σ) will fare better than those which have a high σ ;
4. realise economies, whether associational gains or economies of scale, will fare better than those which do not;
5. have low transaction costs of search information, bargaining, decisionmaking and monitoring will fare better than those with high transaction costs;
6. involve persons or households who are more or less equal in terms of income and assets will fare better than one wherein the distribution of income and assets is highly skewed;
7. temper a rigorous enforcement of contract terms with a non-calculative atmosphere will fare better than one which does not.

APPENDIX 1

LABOUR EXCHANGE MATRIX ¹

ABAYON COOPERATIVE LABOUR GROUP

WET SEASON HARVEST (NOVEMBER 1983 - JANUARY 1984)

¹The rows indicate the amount of labour received (in terms of bundles recorded in the upper left corner of each box) by each member household and the columns indicate the amount of labour given. For example, Household No.1 (Agmaoan) received 28 bundles from Household No.3 (Bados) and gave 16 bundles in return. It received a total of 408 bundles and gave 290 bundles worth of labour in exchange.

A positive number in the lower right corner of each box, indicates that a member (rowwise) received more labour (in terms of bundles harvested) than it supplied another. A negative number indicates the opposite. For example, Household No.1 (Agmaoan) received 12 bundles more than it gave Household No.3 (Bados) whereas the latter received 12 bundles less than it gave the former.

MEMBERS	(1) Agnayan	(2) Alfon	(3) Bados	(4) Dayapan	(5) Dosing	(6) Ellen	(7) Flora	(8) Ganayan	(9) Itlang	(10) Ligaya
1. Agnayan	---	0 -6	28 12	5 0	9 1	30 0	8 -3	37 33	41 0	57 43
2. Alfon	6 6	---	26 14	26 20	19 9	9 2	5 -4	13 5	48 11	37 14
3. Bados	16 -12	12 -14	---	12 -1	0 0	14 -6	11 -1	10 -2	23 0	22 10
4. Dayapan	5 0	6 -20	13 1	---	24 -4	23 5	13 -4	13 7	36 -4	40 11
5. Dosing	8 -1	20 2	0 0	28 4	---	7 -2	0 0	7 1	20 2	17 -13
6. Ellen	30 0	7 -2	20 6	18 -5	9 2	---	9 1	18 13	41 0	43 5
7. Flora	11 3	9 4	12 1	17 4	8 8	8 1	---	8 0	15 0	23 1
8. Ganayan	4 -33	8 -5	12 2	6 -7	6 -1	5 -13	8 0	---	27 0	12 1
9. Itlang	41 0	37 -11	23 0	40 4	18 -2	41 0	15 0	27 0	---	81.5 0
10. Ligaya	14 -43	23 -14	12 -10	29 -11	30 13	38 -5	22 -1	11 -1	81.5 0	---
11. Lourdes	37 -8	13 0	19 4	28 1	33 5	32 0	21 0	13 0	60 0	58 0
12. Padaman	16 0	17 1	20 4	24 -6	19 6	41 21	12 4	18 0	62 0	55 2
13. Palagtay	9 6	1 -19	6 1	11 -3	15 2	15 7	8 0	7 0	40 0	39 0
14. Roman	9 -10	7 -1	12 11	2 -4	10 1	6 0	3 0	13 -6	26 0	28 0
15. Romeo	15 0	7 -2	13 3	13 -8	21 3	17 0	12 0	13 0	47 0	39 0
16. Romy A.	3 -5	11 -13	2 -3	11 -7	11 0	5 1	10 -5	8 4	16 -26	20 -5
17. Romy J.	4 -8	18 0	11 0	9 -10	14 -3	8 0	10 0	9 0	22 0	23 0
18. Salia	17 0	19 -7	4 0	16 2	12 6	19 0	37 0	0 -3	78 17	62 40
19. Sianang	23 -13	22 -14	17 0	25 -4	12 6	31 11	18 0	21 0	67 0	59 18
20. Tinay	22 0	0 0	14 4	21 12	18 2	34 -13	5 -2	23 -6	45 -6	41 6
Total Number of Bundles Given	290	225	264	341	286	383	227	269	795.5	750.5

MEMBERS	(11) Lourdes	(12) Padanan	(13) Palagtay	(14) Roman	(15) Romeo	(16) Romy A.	(17) Rony	(18) Salia	(19) Sianang	(20) Tinay	Bundles Received
1. Agmaon	45 8	16 0	3 -6	19 10	15 0	8 5	12 8	17 0	36 13	22 0	408
2. Alfon	13 0	16 -1	20 19	6 1	9 2	24 13	18 -0	26 7	36 14	0 0	355
3. Bados	15 -4	16 -4	5 -1	1 -11	10 -3	5 3	11 0	4 0	17 0	10 -4	214
4. Dayapan	27 -1	30 6	14 3	6 4	21 8	18 7	19 10	14 -2	29 4	9 -12	360
5. Desing	28 -5	13 -5	17 -2	9 1	18 -3	11 0	17 3	6 -6	6 -6	16 2	236
6. Ellen	32 0	20 -21	8 -7	6 0	17 0	4 -1	8 0	19 0	42 11	47 13	398
7. Flora	21 0	8 -4	8 0	3 0	12 0	15 5	10 0	37 0	18 0	7 2	250
8. Ganayan	13 0	18 0	7 0	7 6	13 0	4 -4	9 0	3 3	21 0	29 6	212
9. Itlang	60 0	62 0	20 19	6 1	9 2	24 13	18 0	26 7	36 14	51 6	1801.5
10. Ligaya	58 0	53 -2	40 0	26 0	47 0	42 26	22 0	61 -17	67 0	35 -6	1623.5
11. Lourdes	---	41 0	32 -5	21 21	28 0	25 4	5 0	23 3	37 0	40 -6	566
12. Padanan	41 0	---	26 0	13 0	28 0	23 3	19 0	29 -5	55 0	43 19	561
13. Palagtay	27 -5	26 0	---	16 5	5 -3	10 10	8 5	11 0	10 -7	31 12	295
14. Roman	0 -21	13 0	11 -5	---	13 0	0 -5	10 0	6 -6	17 0	8 5	194
15. Romeo	28 0	28 0	8 3	13 0	---	11 3	3 -2	4 -12	21 0	22 0	335
16. Romy A.	21 -4	20 -3	0 0	5 5	8 0	---	0 0	9 -3	8 -9	11 -2	179
17. Rony J.	5 0	19 0	3 -5	10 0	5 2	0 0	---	10 0	13 0	16 3	209
18. Salia	20 -3	34 5	11 0	12 6	16 12	12 3	10 0	---	16 4	14 4	409
19. Sianang	37 0	55 0	17 7	17 0	21 0	17 9	13 0	12 -4	---	39 3	523
20. Tinay	46 6	24 -19	19 -12	3 -5	22 0	13 2	13 -3	10 -4	36 -3	---	409
Total Number of Bundles Given	537	512	288	221	347	267	230	323	526	450	17538

TEAM NO.	SAMPLE SIZE	EVAL (%)	HHYEARS	INCOME (Pesos)	SIZE	ETHN (%)	KIN	NBHR	KEDUC	KSELEC	KPER (%)	GREC	OFF	CVINC	REGION
A. Region 1															
1	11	100.00	158.76	388.18	18.00	90.91	4.09	2.62	2.50	1.	100.00	1.	1.	1.3282	1
2	7	85.71	92.52	531.57	9.00	100.00	4.2	4.50	6.00	0.	100.00	1.	1.	1.4579	1
3	5	100.00	40.80	457.00	6.00	40.00	5.14	4.43	0.00	0.	100.00	1.	1.	1.8719	1
4	10	100.00	96.20	627.90	13.00	100.00	4.0	3.66	6.00	0.	100.00	1.	1.	0.7437	1
5	11	100.00	141.75	430.73	15.00	100.00	4.72	2.20	6.00	1.	100.00	1.	1.	0.7832	1
6	7	100.00	260.70	543.57	22.00	71.43	3.43	2.76	12.00	0.	100.00	0.	2.	0.5455	1
7	8	87.50	252.00	414.38	24.00	62.50	5.625	4.73	2.50	1.	100.00	1.	1.	1.1510	1
8	8	100.00	116.00	534.88	16.00	100.00	8.0	10.47	2.50	1.	100.00	1.	1.	1.2172	1
9	6	66.67	73.58	401.67	13.00	100.00	3.16	2.79	2.50	0.	100.00	0.	1.	2.0403	1
10	9	100.00	211.54	152.22	14.00	100.00	4.77	4.08	8.00	0.	100.00	0.	1.	0.4964	1
11	8	100.00	100.32	371.75	11.00	87.50	3.55	5.84	6.00	1.	100.00	0.	1.	1.2728	1
12	11	100.00	291.00	399.45	15.00	81.81	3.70	3.70	2.50	1.	100.00	0.	1.	0.9989	1
13	12	91.67	194.40	221.67	20.00	83.33	4.83	2.44	0.00	1.	100.00	1.	2.	0.7488	1
14	16	93.75	230.00	572.75	23.00	100.00	2.81	4.85	2.50	1.	100.00	0.	2.	0.8304	1
15	12	100.00	268.20	591.54	20.00	83.33	3.983	2.86	2.50	1.	100.00	0.	1.	0.8295	1
16	7	100.00	61.68	462.14	8.00	85.71	4.71	4.13	2.50	1.	100.00	1.	2.	0.9951	1
B. Region 3															
1	8	100.00	175.00	657.38	14.00	100.00	4.875	5.45	8.00	0.	100.00	1.	1.	0.3221	0
2	16	100.00	310.32	457.75	24.00	97.75	2.5	5.42	2.50	0.	100.00	1.	1.	0.8141	0
3	9	100.00	239.94	948.22	18.00	100.00	9.33	4.70	6.00	1.	100.00	1.	1.	0.6317	0
4	16	69.75	211.99	797.25	29.00	81.25	6.0	3.59	6.00	0.	100.00	1.	1.	1.4100	0
5	5	100.00	101.40	528.00	13.00	100.00	5.2	6.84	2.50	0.	100.00	1.	1.	0.5986	0
6	16	93.75	275.52	478.00	42.00	87.50	3.8	2.99	8.00	0.	100.00	1.	1.	1.2854	0
7	9	100.00	76.65	857.14	15.00	88.89	3.22	2.62	2.50	0.	100.00	1.	2.	0.9696	0
8	10	100.00	63.00	708.00	14.00	80.00	2.90	1.88	2.50	1.	100.00	1.	1.	0.8799	0
9	13	69.23	254.56	430.84	28.00	76.92	4.0	4.52	6.00	1.	83.33	1.	1.	1.3000	0
10	9	88.89	161.00	522.22	23.00	88.89	3.44	3.47	2.50	1.	87.50	1.	1.	1.3140	0
11		92.86	288.60	576.47	39.00	100.00	4.90	2.70	2.50	0.	100.00	1.	2.	0.4268	0
12	15	85.71	221.41	401.80	41.00	66.67	2.8	3.11	6.00	0.	100.00	1.	1.	1.1932	0
Mean:															
Overall	11.0	93.73	177.46	516.59	19.54	87.66	4.42	4.05	4.25	0.5	98.96	0.75	1.21	1.0342	0.71
Region 1	9.2	95.33	161.84	443.84	15.44	86.65	4.42	4.13	4.00	0.62	100.00	0.56	1.25	1.0819	1
Region 3	13.4	91.68	198.28	613.59	25.00	88.99	4.41	3.94	4.58	0.33	97.57	1.00	1.67	0.9704	0

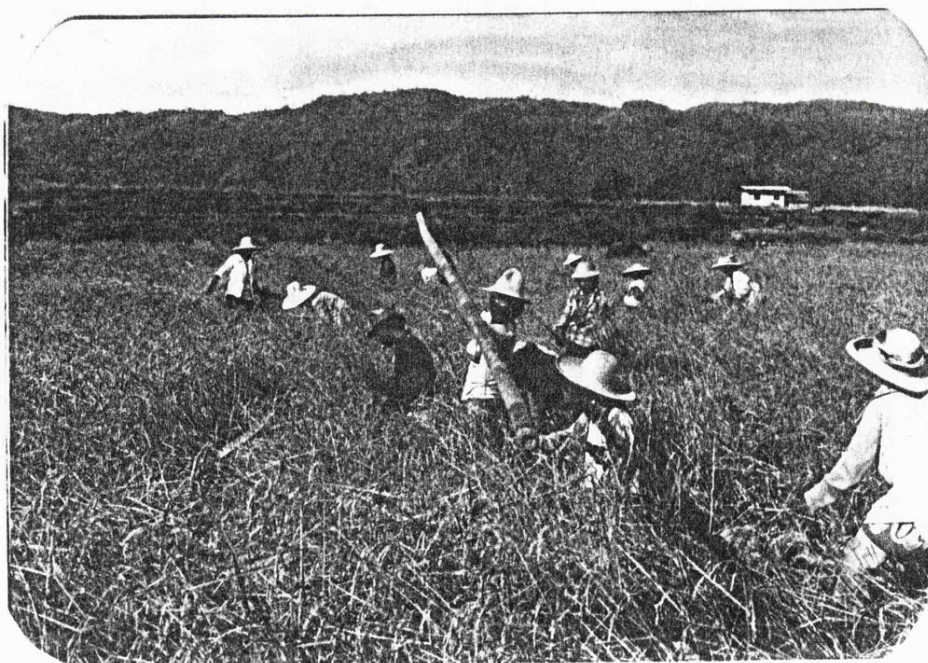
SOURCE: Random Sample Survey.

APPENDIX 3

The San Ramon Reaping Team

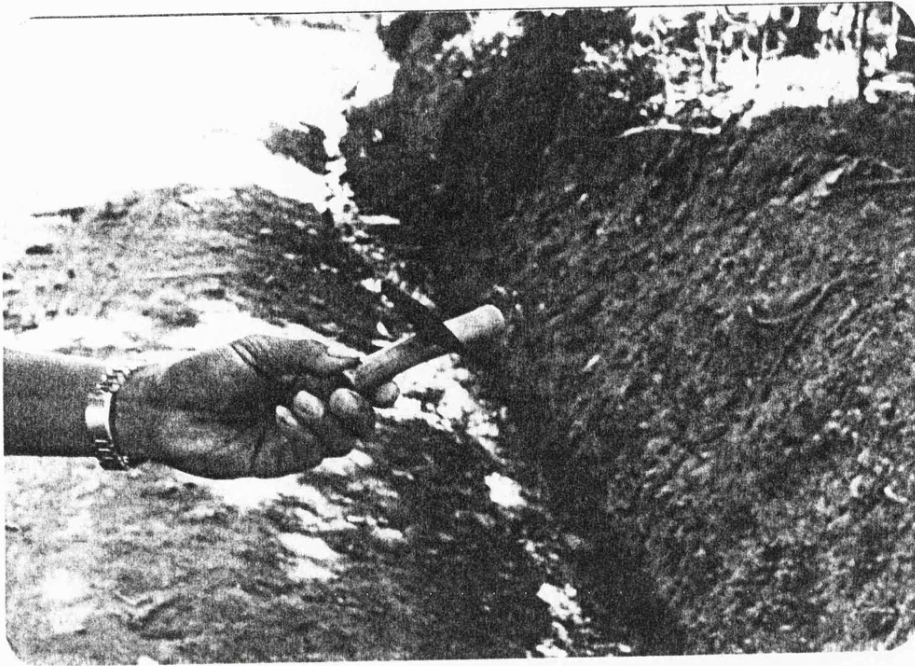


*The team gathers prior to the trek to the field.
The kabesilya stands second from the left.*



*The team at work, flattening the tall stalks and
reaping palay (paddy).*

APPENDIX 3 (Cont'd)

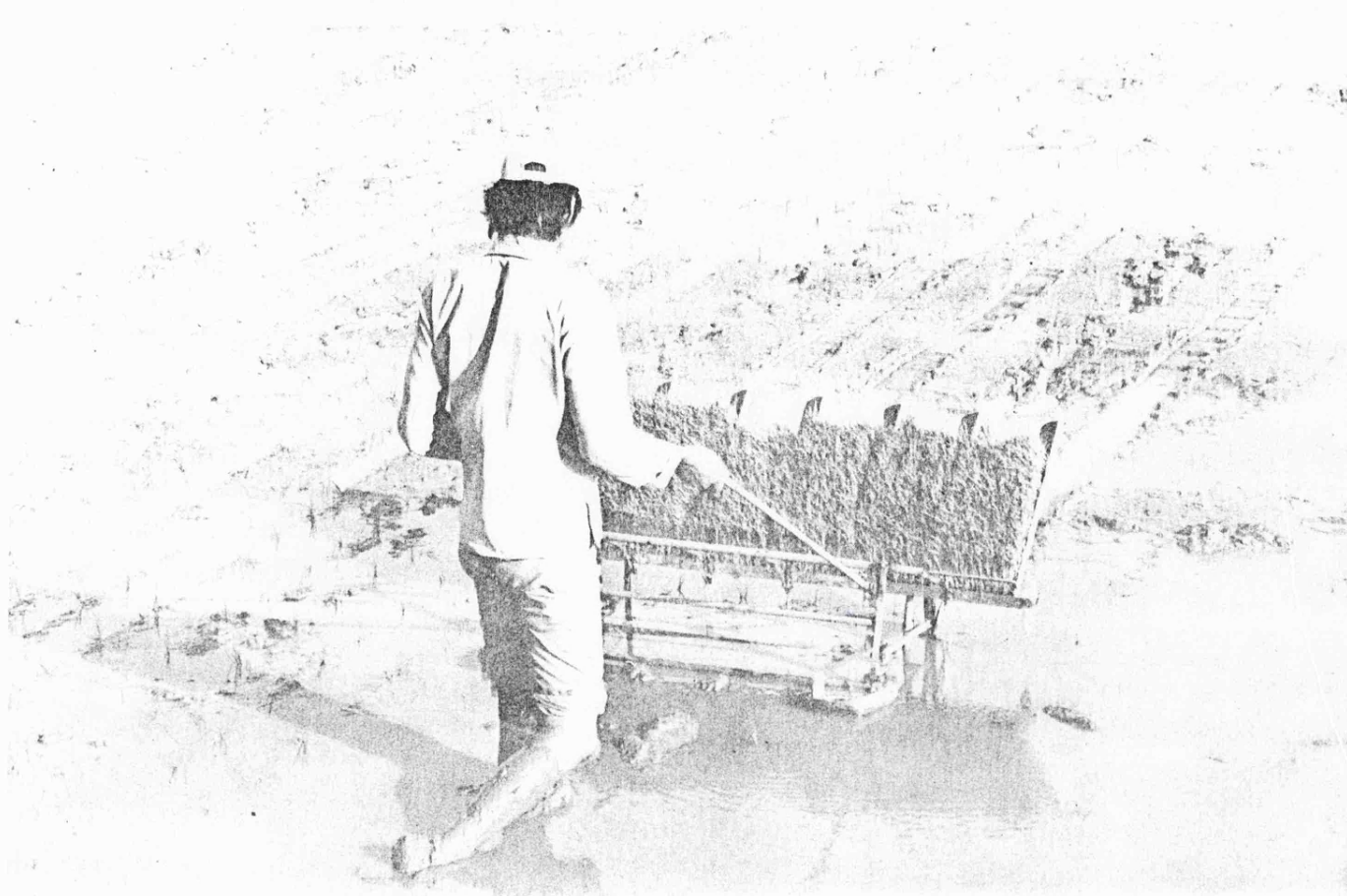


The Rakkem or reaping instrument.



Cutting individual palay stalks with the rakkem.

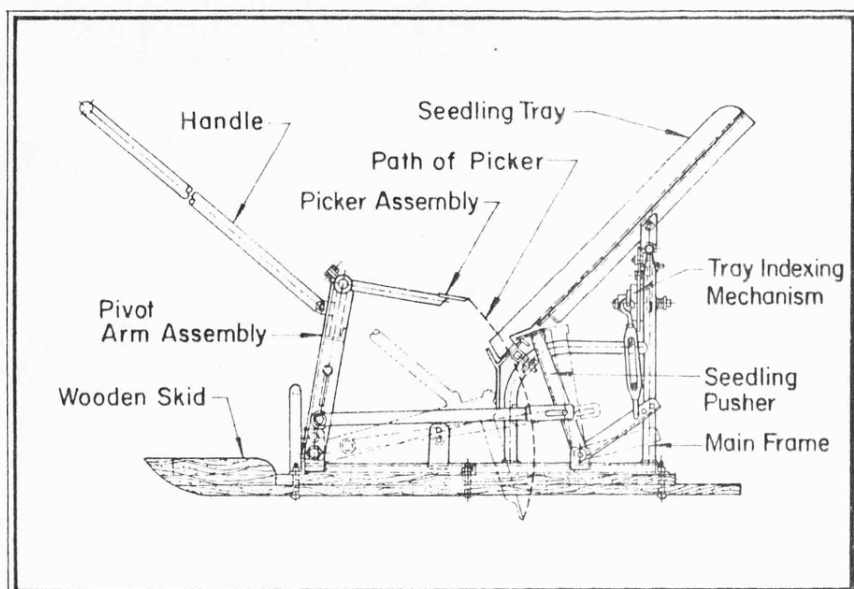
IRRI TR4 6-Row rice transplanter



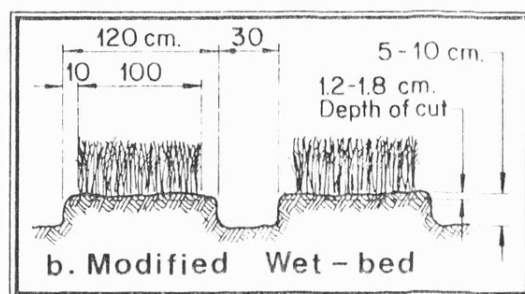
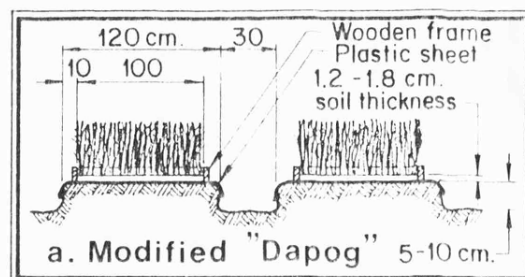
FEATURES

- HIGH CAPACITY — — — — — 0.3 - 0.4 hectare per day, depending upon the skill of the operator.
- EASY TO OPERATE & MAINTAIN — — — — — Machine is operated by single push-pull of the handle. Requires few adjustments.
- LOW POWER REQUIREMENT — — — — — Machine is operated by one person.
- SIMPLE CONSTRUCTION — — — — — Can be fabricated by small shops using readily available materials.
- HIGHLY PORTABLE — — — — — Can be carried by one or two persons.

SOURCE; Agricultural Engineering Department,
The International Rice Research Institute
Los Banos, Laguna, Philippines



Schematic of IRRI 6-Row Mechanical Rice Transplanter



SEEDLING PREPARATIONS suitable for IRRI Mechanical Transplanter.

MACHINE SPECIFICATION

POWER _____ 1 person
 FIELD CAPACITY _____ 0.3 - 0.4 ha. per day
 PLANTING DEPTH _____ 3 to 5 cm.
 TRAY DISPLACEMENT PER STROKE ADJUSTMENT _____ 1.0 / 1.3 cm.
 FIELD STANDING WATER DEPTH _____ 1 to 5 cm.
 WEIGHT _____ 20 kgs.
 LENGTH _____ 85 cm.
 WIDTH _____ 125 cm.
 CONSTRUCTION _____ steel and wood

SEEDLING PREPARATION :

SIZE OF SEEDLING MAT _____ 20 cm. x 50 cm.
 NO. OF SEEDLING MAT PER HECTARE _____ 400 - 450
 SIZE OF SEEDBED PER HECTARE _____ 1.2 m. x 45 m.
 SEED REQUIREMENT PER HECTARE _____ 30 - 40 kgs.

For further information write: Agricultural Engineering Department
 The International Rice Research Institute
 P.O. Box 933, Manila, Philippines
 Cable: RICEFOUND, MANILA

CAAMS^{*}-IRRI 1.0m reaper



Harvests paddy of different varieties

FEATURES:

HIGH CAPACITY 2.4 hectare per day

LOW HORSEPOWER REQUIREMENT 3-hp engine

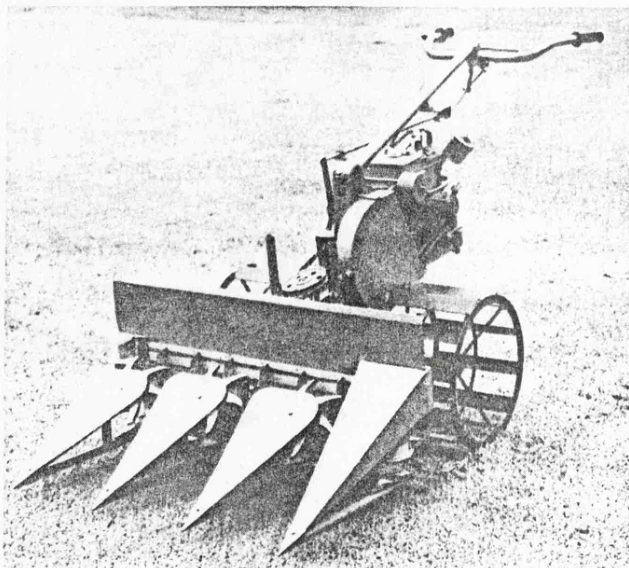
LOW LABOR REQUIREMENT One to three men to operate,
prepare plots and gather crop.

EASE OF OPERATION Simplicity of design-reduces operation
and maintenance problem.

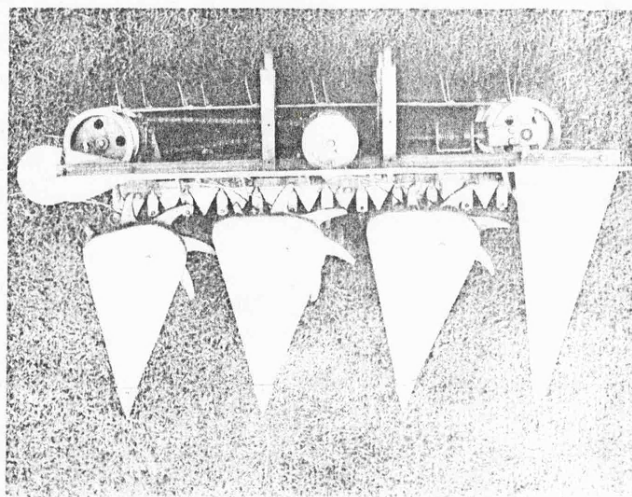
HIGHLY MOBILE Can be operated and carried with ease

^{*} CHINESE ACADEMY OF AGRICULTURAL MECHANIZATION AND SCIENCES

CAAMS*-IRRI 10m REAPER



Compact design



Reaper is adaptable to other hand tractor unit

Machine specifications:

POWER	3 hp gasoline engine
WEIGHT OF REAPER-TILLER UNIT	135 kg
WEIGHT OF REAPER ALONE	48 kg
TOTAL LENGTH OF REAPER PLUS 3 HP TILLER	218 cm
TOTAL WIDTH	117 cm
TOTAL HEIGHT OF 3 HP TILLER, MINIMUM	90 cm
FIELD CAPACITY	2.4 hectare per day
FIELD LOSSES	Less than 1%
MINIMUM CUT	7 cm
FORWARD SPEED	2.5 to 4.5 kph
KNIFE AVERAGE SPEED	1.3 x forward speed
CONSTRUCTION	All steel except the non-metallic starwheels
ADJUSTMENT	Throttle (synchronized with cutting speed), flat belt tension, windrow deflector.
FUEL CONSUMPTION	Approximately 1 liter per hr

Agricultural Machinery Development Program
International Rice Research Institute
P.O. Box 933, Manila, Philippines
Cable: RICEFOUND, MANILA

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