

THE UNIVERSITY OF MANITOBA

FACTORS ASSOCIATED WITH CHANGE IN ADOPTION OF RICE FARMING
PRACTICES IN RURAL KOREA: A LONGITUDINAL STUDY (1966-1971)

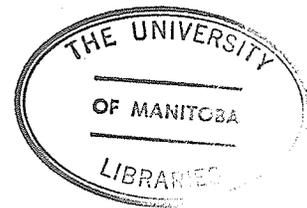
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ABSTRACT

The major purposes of this study are; (1) to determine the relative importance of selected variables and extracted factors in the adoption of improved rice farming practices, (2) to compare Community Development villages and Non-Community Development villages with respect to the adoption of improved rice farming practices, and (3) to examine the relationships between change in adoption of improved rice farming practices and changes in selected variables and extracted factors over a period of time.

The study covered a five-year period, from 1966 to 1971. The data were obtained from a sample of 359 farm operators in 12 selected villages in North Cholla Province, Korea. Half of the sample villages were Community Development villages, and the other half were Non-Community Development villages.

The underlying theoretical frame of reference in this study is that the adoption of improved rice farming practices takes place as a result of joint efforts between individual farmers and government's change agencies. Thus two theories, Action Theory and Theory of Systemic Linkage, are combined for the analytical framework of this study.

On the basis of existing theory, 13 independent variables were selected and then categorized into the following three dimensions; socio-economic, socio-psychological, and situational. Later the principal component analysis coupled with varimax rotation confirmed the factor-variable structure.

The analysis shows that the situational factor was the most significant factor for the adoption of improved rice farming practices in both types of villages in 1966. In 1971, however, the socio-economic factor appeared to be the most significant factor in non-Community Development villages, while the situational factor was still significant in Community Development villages. In the study area, the importance of socio-psychological factor over the adoption of improved rice farming practices was found to be minimal.

During the five-year period, change in socio-economic aspect was most significantly related to change in adoption of improved rice farming practices in Community Development villages, while change in situational aspect was significantly related to change in adoption of improved rice farming practices in non-Community Development villages.

The findings also indicated that contact with change agent, farm land size, possession of farm tools, and rationality were the most significant specific variables for the adoption of improved rice farming practices in both

types of villages in both years, 1966 and 1971.

The findings of this study suggest that the government's promotion of the improved rice farming practices as one of the major development programs for rural communities seems to be effective. However, it appears that such a development program becomes effective only if the individual farmers can afford the costs involved. Accordingly, a major practical implication derived from this study is that the government should pay much more attention to the socially and economically handicapped farmers by establishing adequate policies through which all farmers may benefit equally from such development program.

More extensive study dealing with the multi-phase rural community development is suggested. Such a study could be expected to provide some valuable insights into the relationship between the technological aspect of rural development and non-technological aspect of rural development.

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CHAPTER I

INTRODUCTION

A Theoretical Overview of the Problem

At the micro level, does economic or social development result mainly from the people's desire for change, or mainly from the outsider's design for change? Putting the same question differently, which is more desirable for the development of a village: spontaneous change or planned change?

Ideally speaking, community development in general, and rural community development in particular, may be regarded as an attempt to synthesize the two lines of thinking.

According to a U. N. definition, community development is:

"..... the process by which the efforts of the people themselves are united with those of governmental authorities to improve the economic, social and cultural conditions of communities, to integrate these communities into the life of the nation, and to enable them to contribute fully to national progress. This complex of processes is, therefore, made of two essential elements: the participation by the people themselves in efforts to improve their level of living, with as much reliance as possible on their own initiative; and the provision of technical and other services in ways which encourage initiative, self-help and mutual help and make these more effective. It is expressed in program designed to achieve a wide variety of specific improvements" (United Nations, 1963:4).

In connection with such a developmental change at the community level, which aspect of human factors is most important? Is it the change-incentive psychological orientation (or felt-need) of the people or the existing economic conditions of the people or the structural setting of a given society?

In social science, this question has long been a controversial issue among many different schools of thought.

First, since Max Weber's thesis on the contribution of 'the Protestant Ethic' to the rise of Western capitalism, there has appeared a number of similar concepts concerning the causal relationship between psychological orientation and social change, such as modernization. These are, for instances, Everett Hagen's 'creative minority' (Hagen, 1962), David McClelland's 'achievement motivation' (McClelland, 1961), Alex Inkeles' 'syndrome of modernity' (Inkeles, 1969) and so forth. The proponents of this line emphasize the relative importance of value orientation of the people for the sake of development of a society. Thus as far as peasant society is concerned, Daniel Learner's Passing of Traditional Societies and Everett Rogers' Modernization among Peasants may be considered as works representative of this line of thinking.

Secondly, another group of scholars view existing economic conditions as a decisive factor in the success of developmental change. Obviously it is true that the financial inability of individual farmers in most developing areas becomes a brake on rural development. Usually, economically well-off farmers benefit more from development programs than poor farmers. In the case of agricultural innovation, this is particularly so, because most technical

innovations aimed at higher yield require a larger amount of financial investment, a more intensive labour force and an improved infra-structure, compared with conventional methods of farming (Galjart, 1971; Myint, 1972:42-57).

Finally, there is a group that considers the structural rearrangement of a society as an essential step toward rural development. Those who hold this view are convinced that the pervasive underdevelopment problem of rural sectors, especially in developing areas, can be alleviated only through the replacement of traditional institutions and the rearrangement of relationship structure. Contrary to those views that rural development mainly depends on individual farmers' modernity-oriented value system or each farmer's economic conditions, they believe that, except for very few well-off ones, average farmers are not in the economic positions to improve their own life situations. For this reason, land reform has been considered a key program for the improvement of peasant society through which rearrangement of social structure is achieved. Collectivization of farms may be regarded as the extreme case of this line of thinking.

After reviewing successful rural community development programs in some Asian countries, e.g., Taiwan, East Pakistan and Malaya, G. D. Ness clearly pointed out that these countries succeeded because they were able to provide the

necessary institutional rearrangement and resource re-allocation. A peculiar thing in these countries was that none of them regarded the isolated village as the unit of development. They all viewed a village as an integrated part of the whole nation (Ness, 1970:577-593).

In connection with social change in general, and developmental change for rural communities in particular, the three different approaches were briefly reviewed here so that one may see the problems to be proposed in this study from a broader theoretical perspective. Since the three different theoretical approaches are mainly concerned with human factors in relation to social change, such as modernization (or development), they are relative to time and space. Therefore if one tries to understand the different theoretical approaches in terms of a rationalized vision of each school's world-view, one may be able to understand better the different emphasis of each theory. In other words, any social change theory suggesting a different change strategy rarely is free from its ideological or, often, its ethnocentric context (Horowitz, 1967; Gouldner, 1970).

This study, which is holistic in its approach, is at least an attempt to test the three different theoretical approaches related to social change in a specific time and space, i.e., in a rural Korean setting during a five-year

period (1966-1971). They will be examined in a concrete event such as introduction of improved rice farming practices to rural farmers, particularly from the viewpoint of the different emphasis of each approach to social change.

Significance of the Study

One of the most critical problems facing developing countries today is how to modernize their agriculture. A large proportion of the population in these countries still consists of poverty-stricken peasants who exist on subsistence agriculture. And to make the situation worse is the extremely rapid population growth. By Western standards, the traditional mode of production has remained unchanged for centuries.

Consequently, the Malthusian thesis is becoming of increasingly serious concern in most of the developing countries where the means of food production is being outstripped by the growth of the population. For instance, in South-east Asia as a whole, the percentage increase in major crop yields is below the percentage increase of population growth for the prewar time period (1935-1939) and the postwar time period (1960-1962) (Kirby, 1967:44).

Since the end of World War II, various rural community development programs have been enthusiastically introduced in the hope that the overall life situation of the rural populace would be improved. Accordingly, the

introduction of modern farming techniques to rural farmers has become a main focus, among many other development programs that are intended to increase the agricultural output. Naturally, such a program focuses on the major crop of a region.

Rice, needless to say, is the major crop of most countries in South-east Asia. There, the determined effort to improve this major crop was so intensive that modern agricultural technology was able to produce so-called 'miracle seeds', and this technological innovation is ushering in 'the green revolution' throughout the region (Harris, 1972; Myint, 1972).

Such is the case in Korea. Rice paddies occupy approximately 55 percent of the total arable land in the country (Ahmed, 1972). In spite of long history of rice cultivation, Korea still remains a rice-deficient country. The country is struggling to achieve the goal of being a rice-sufficient country by every means at its disposal.

In connection with the present study, the importance of rice farming is not only its socio-cultural impact on rural farmers who engage in it, but also its value to the Korean economy, especially in rural areas. For instance in his recent study on a Korean farming-fishing village, Brandt describes how rice farming is important from the sociological as well as the economic point of view.

"Although farming is becoming more diversified all over

South Korea, wet rice agriculture is still overwhelmingly important in terms of land use, proportion of total production, and the provision of food for local consumption. Attitudes and values among farmers in Sokpo focus primarily on rice, so that possession of paddy land, work connected with rice agriculture, and the gain itself are all far more prestigious than the equivalents for other crops. ...the possession of fields (particular paddy fields) is still so crucial as an indication of success and status, as a necessary qualification for playing an influential role, and for economic security, that sooner or later most economic resources are invested in land. ... There is also great personal satisfaction, since increasing the family's holdings constitutes the greatest single criterion of successful fulfillment of the responsibilities of a family head" (Brandt, 1971:49,50).

This is a typical phenomenon in almost all Korean villages. Thus the promotion of improved rice farming practices by the government and the adoption of these practices by the farmers has become so important in any community development project in rural Korea. This is a main reason why the subject of adoption of improved rice farming practices is viewed from a broad theoretical perspectives.

Accordingly, the importance of such a study of the adoption of improved rice farming practices by rural farmers is heightened by the fact that it can be a good reflector of the improvement in the life situation of a given rural sector. Also by focusing on the relationship between technological change and selected sociological characteristics of the population, one may obtain important knowledge of modernization trends.

Purpose and Scope of the Study

Irving Louis Horowitz makes the point when he summarizes the recent history of social science which tends to fall into distinct decades as follows: "In the 1950s we had functionalism; and developmentalism in the 1960s. For the 1970s the dominant organizing principle seems to be policy making" (Horowitz, 1971:1). Further he comments on the trend of social science in this way.

"In a sense, then, we are at a turning point. The question in an age of social science affluence is not the scientific status of the social science, but the social and political use of these soft sciences" (Horowitz, 1971:2).

Correspondingly, as members of development team, social scientists have been very active doing such things as identifying sociocultural barriers to development, and, at the same time, proposing action-strategies for development. For instance, in the area of adoption research alone, such efforts are evidenced by the fact that more than 1,200 empirical studies have been undertaken as of 1971 (Rogers and Shoemaker, 1971:387-443).

However, most previous studies, if not all, in the field have shown some weakness in dealing with social change, mainly planned change. One such weakness, for example, is that very few had used longitudinal data. As a matter of fact, unless one applies longitudinal analysis, it is almost impossible to get knowledge concerning the dynamics of change taking place in the course of time (Eberts, 1969;

Hobbs in Beal et al, 1971:13). Another weakness in most previous studies is that they did not suggest the relative importance of a particular variable or factor vis-a-vis others in terms of its explanatory power for the dependent variable over a certain period of time.

Thus, an attempt is made in the present study to overcome such weakness by using longitudinal data in a rather unexplored setting, rural Korea, where very few sociological studies on this subject, adoption of new farming techniques, have been done (Han et al, 1968:14).

The major purpose of this study is, therefore, to determine the relative importances of selected socio-economic, socio-psychological and situational variables and factors on the adoption of improved rice farming practices over a period of time. Another objective of this study is to compare an experimental group and a control group with respect to adoption of improved rice farming practices in order to see the effectiveness of planned change.

More specifically, the following questions will be examined in the present study. (1) To what extent was each of the selected variables and factors (extracted) related to the adoption of improved rice farming practices at two different points of time, 1966 and 1971? (2) How was the adoption of improved rice farming practices affected due to the change in selected variables and factors (extracted) over the five-year (1966-1971) period? (3) Was there any

difference between the experimental group (Community Development villages) and the control group (non-Community Development villages) with respect to questions (1) and (2)? If so, to what extent?

Definition of Terms

Community: Community means here the face-to-face village that shares similar activities, values, virtues and common problems within a clearly defined geographical boundary. Throughout this study, community and village are used interchangeably.

Development: It seems that there is no standard conceptual definition of the term, development. "The terministic usage is in a chaotic state" (Geiger in Beal et al., 1971:51). Yet in a developing country like Korea, Roger's definition of development seems to fit for rural community development closely.

"Development is a type of social change in which new ideas are introduced into a social system in order to produce higher per capita income and level of living through more modern production methods and improved social organization" (Rogers, 1969:8,9).

Change Agent: "Change agent is a professional person or group who attempts to influence the adoption decision of an other individual (or group) in a direction that he believes is desirable" (Klonglan et al., 1964:5).

In this study, the change agent includes both 'the residential community development workers' and 'the county extension agent' who were assigned by the government for

rural development.

Community Development Village (or C. D. Village): This is an experimental village where intensive rural development programs were initiated by the government¹ and given continuous effort through the residential community development workers. At the same time, it was given financial assistance needed for rural improvement activities from the central government.

Non-Community Development Village (or non-C. D. Village): This is a control village in this study where no intensive rural development programs were implemented by the government as were implemented for C. D. villages. However, non-C. D. villages had the services of the county-level extension agent.

¹ At the initial stage (1958), the community development was undertaken by the then Ministry of Reconstruction. From 1962, after the Military Revolution (1961), the community development program has been carried out by the Office of Rural Development under the Ministry of Agriculture and Forestry (see for detail Agricultural Year Book 1967, pp. 154-158).

CHAPTER II

GENERAL DESCRIPTION OF THE STUDY AREA

Population

North Cholla Province is one of nine provinces in South Korea. It is located in the south-western part of the country covering around 8,000 sq. km. According to statistics of the province (North Cholla Province, 1967), the population of the province was 2,521,207 in 1966 giving a population density of 313 people per square kilometer. The density of the rural population in the province is quite high compared to other rural regions in the country.

The province is composed of a total of 13 counties and 1,674 villages. Twelve villages in three of the 13 counties were selected for this study. Of the 13 counties in the province, the three selected counties are the most highly populated ones. Particular, the population density of Iksan county and Chungup county is 432 people and 400 people per square kilometers respectively.

Natural Environment and Rice Farming

In the country, the North Cholla Province is known as 'the rice bowl of Korea'. Of all the regions of the country, the province is the best suited for the cultivation of wet rice because of land forms and climate. A number of

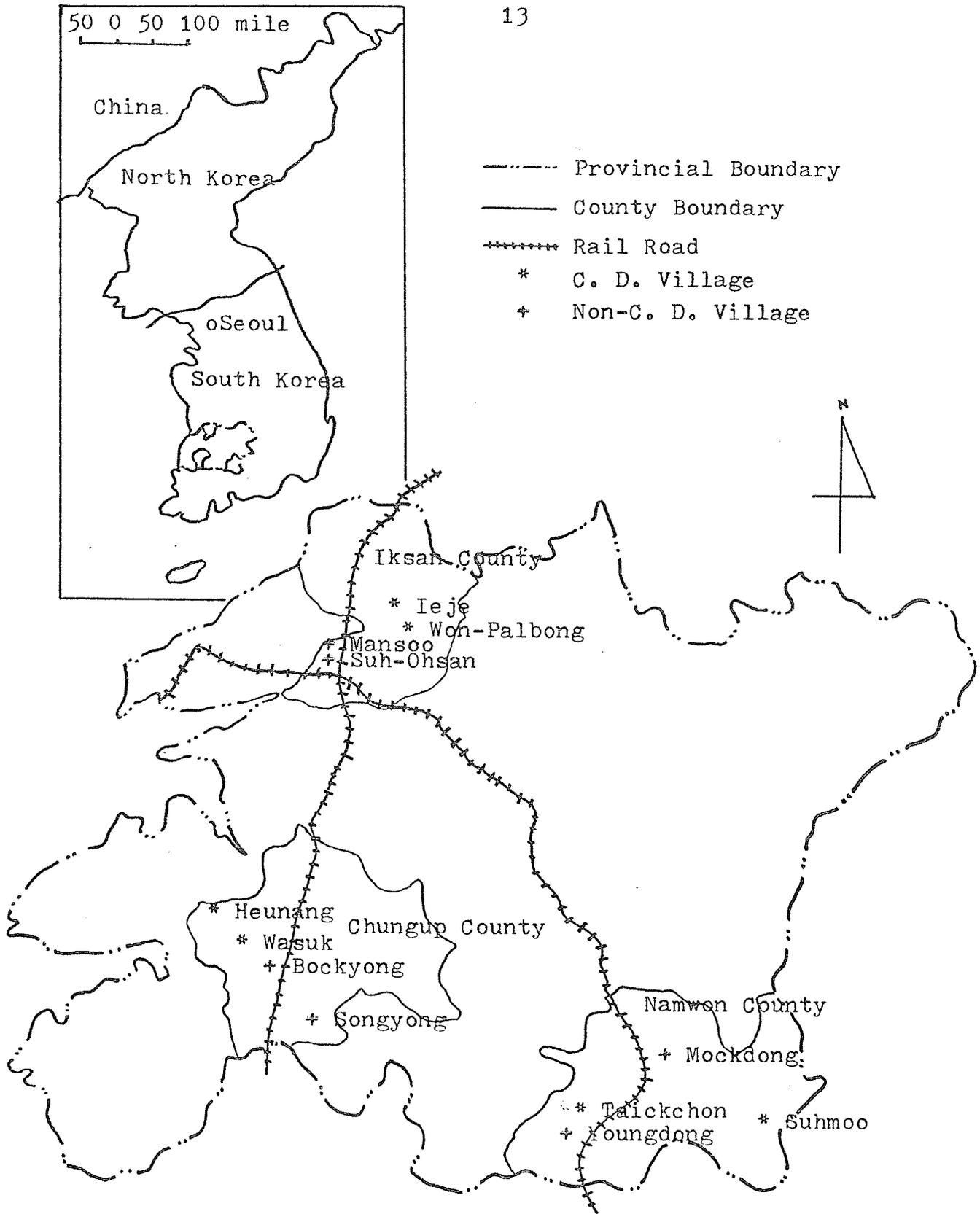


Figure 1. Twelve Villages in North Cholla Province

rivers such as the Mangyung River in the center, Tongjin River in the south, and numerous short streams joining the Kum River in the east make it easy to irrigate rice paddies in the fertile plains. The climate of the region is also favourable for rice farming.

Because of these favourable conditions the central government has introduced an extensive program of agricultural modernization, and the farmers of the region have been taught improved farming methods earlier than in other regions of the country.

Some General Characteristics of Korean Villages

Generally speaking, Korea is a culturally homogenous country. All Korean villages share many common characteristics among themselves, such as value system, economic activities and ecological setting.

"Nevertheless strong regional feeling persists and Koreans themselves insist on the importance of provincial and local differences in customs, attitudes and personality" (Vincent, 1971:7).

Further within this context of regional and local variations, neighboring villages are distinct from each other in terms of kinship compositions and what Vincent calls 'collective mood' (Vincent, 1971:7). Within the boundary of the village, most kinship groups show some common characteristics; (1) the central core of the group's members are unilineally related agnates; (2) the group has residential unity; (3) the group exhibits actual social integration.

The kinship solidarity is maintained by the leader's authority with regard to ritual practices, etiquette, and other aspects of social control. And the authority of the leader is established by the principle of deference to genealogical seniority and age. In the past, such social conditions had been repeatedly reinforced by the lineage-oriented Confucian ethic; an absolute loyalty to one's family and his clan which, in many cases, amounts to community solidarity.

However, these traditions have been changing. Since World War II, most Korean villages have been changed by many new forces that disturbed the traditional social structure. The new forces came from such causes as land reform, mass education, compulsory military service, and, recently, mass communication. Also new political ideology characterized by Western democratization continuously challenged the traditional authority in the village. Accordingly, the villages in on-going process of transition seem to face many difficulties both within themselves as well as without.

For instance, the quality of village leadership is one of many problems facing these villages. In general there appeared two types of villages; villages still having authoritarian leadership based on traditional ideology like Confucianism; and egalitarian villages without effective leadership. In the former case, there is a problem of incongruity between the old and young generations in terms of the value system and behavioral code, and in the latter

case, there is a problem of lack of solidarity through which village members may be cooperatively carry out common tasks for the benefit of the community. Thus from the developmental change point of view, a village with a competent and progressive leader based on egalitarian ideology is considered an ideal type (Vincent, 1971).

Since this study covers the twelve villages scattered throughout three counties within North Cholla Province, variations are shown among them in the aspects of kinship structure, village leadership, and community activity.

Half of the 12 villages are predominantly kinship-oriented villages in which the majority of the residents belong to the same kinship group, and the other half are non-kinship-oriented villages in which there are no dominant kinship groups within the village.

There seems to be no predetermined relationship between the kinship composition and the success of community organizations as well as the quality of community leadership. Regardless of the nature of kinship composition, some villages maintain good community leadership and cooperation among the village members, while the others do not.

However, there seems to be some relationship between the quality of leadership and the success of community activities. In a small peasant village, the leader plays not only the role of unifying the members within the village, but also the role of go-between for his villagers and external

officials. Opinions and informations from both sides flow through the leaders.

Finally, in connection with village leadership and the success of community action programs, the Community Development villages are doing better in the above areas than Non-Community Development villages. And this fact is understandable, because citizenship training is one of major objectives of any community development projects (Han et al, 1968).

Socio-Economic Aspects of the Study Area

In the light of general characteristics of peasant society (Shanin, 1971; Wolf, 1966), some socio-economic aspects of the 12 villages will be described on the basis of data gathered in January, 1966.

As may be seen in Table 1, the median family size of the study area was more than 7 persons, and, in most cases, three generations were living together under the same roof. The family members are the major source of labour for farming.

Regarding education, the formal schooling of heads and homemakers averaged four years, and the illiteracy rate was particularly high among homemakers. The low level of education was reflected in the area of utilization of mass communication media, such as newspapers, magazines, and farm magazines. Roughly two-thirds of the households in the 12 villages did not use any of the mass media including radio.

Table 1. Selected Socio-Economic Characteristics
of the Study Area as of 1965

1. Median size of households	7.2
2. Median age: Head	42.5
Homemaker	38.9
3. Median years of education:	
Head	4.8
Homemaker	3.3
4. Illiteracy rate:	
Head	15.8%
Homemaker	28.3%
5. Median size of rice paddy	6.2 tanboa (1.52 acres)
6. Median size of upland	2.3 tanbo (0.56 acres)
7. Reading no newspapers	68.7%
8. Reading no magazines	68.5%
9. Reading no farm magazines	89.8%
10. Possess radio	32.3%
11. Have lived in the same village more than 30 years	63.6%
12. Have never lived in town or city	64.8%
13. Gross median family income	118,750 won ^b (439.81\$)
14. Median income from crops	91,118 won (337.47\$)

a. 1 tanbo is equivalent to .245 acres.

b. 270 won is equivalent to \$1.00.

Taking these facts into consideration, it is not surprising that the income level of the study area is so low. For example, the median size of a rice paddy was only 1.5 acres in 1965. In the same year, the median gross family income was 440 U. S. dollars, and accordingly the per capita income in 1965 was approximately 62 U. S. dollars. Such a low level of per capita income in the study area is in striking contrast even to that of the nation as a whole, and that of some other developed countries like the United States, Canada and Japan (Harbison et al, 1970).

Finally, as may be seen from Table 2, the average number of households per village is 72. With the exception of two villages, Suh-Ohsan and Mansoo which are located very close to the county seat (Iri City) and railroad, the percentage of farm families ranged from 77.3% to 98.2% in 1966. Around two thirds of the total households had lived in the same villages for more than 30 years.

Nevertheless, with rapid industrial and commercial development taking place in the urban sectors since early 1960's, rural people have grown more and more restless feeling that they are living depressed lives in the alienated villages. As a matter of fact, in the last ten years, the Korean government has laid much emphasis on the growth of industrial urban sectors. Accordingly, the worsening rural economic conditions pushed out the peasantry to the urban centers only to become lowly-paid unskilled labourer.

Table 2. Some Basic Facts re Selected Villages as of 1966

Name of village	Distance County Seat	Iri City	Kinship Orientation	Total Household	Farm Family	C. D. Work
<u>Iksan County</u>						
1. Ieje	5 km		No	55	54 (98%)	Yes
2. Won-Palbong	7 km		yes	73	68 (93%)	Yes
3. Suh-Ohsan	3 km		NO	74	43 (58%)	No
4. Mansoo	6 km		No	95	67 (71%)	No
<u>Namwon County</u>						
5. Suhmoo	28 km	Namwon Eub	No	99	87 (88%)	Yes
6. Mockdong	10 km		Yes	115	99 (86%)	No
7. Youngdong	12 km		Yes	46	44 (96%)	No
8. Taickchon	15 km		Yes	61	59 (97%)	Yes
<u>Chungup County</u>						
9. Bockyong	2½ km	Chungup Eub	No	62	49 (79%)	No
10. Songyoung	4 km		Yes	66	51 (77%)	No
11. Heunang	15 km		No	61	53 (87%)	Yes
12. Wasuck	8 km		Yes	57	48 (84%)	Yes

The percentage in the parenthesis indicates the percentage of farm family out of total households in the village.

In a recent study on the rural-urban migration in two rural communities in the same province, more than half of the male migrants were reported to have left their villages for such reasons as "to get a job", "to earn money" or "because of poverty in the village" (Monn, 1972). Even in the selected 12 villages for this study, about 15% of the sample families left their villages during the study period (1966-1971). Such a trend of heavy outmigration indicates that the time-honored static equilibrium of peasant village is increasingly threatened by the unbalanced economic growth between urban and rural sectors.

CHAPTER III

PREVIOUS STUDIES IN THE AREA OF ADOPTION

As mentioned before, there is an extensive amount of literature on the subject of adoption of technical change. The literature review in this chapter will be divided into three parts.

In the first place, a number of synchronic studies that were conducted in the developing areas, mainly in Asia and Latin America, will be reviewed.

Next, three longitudinal studies that dealt with rural development in the United States will be discussed in detail.

Finally, a set of overall generalizations about some selected variables are quoted here. The generalization on each variable, in terms of its relationship to adoption of new ideas, is more or less universal by virtue of its basis on cross-cultural studies.

Review of Selected Synchronic Studies

Prior to reviewing some adoption studies undertaken in developing areas, it is considered useful to discuss one of the underlying key concepts that is widely utilized by social scientists who are engaged in empirical researches related to adoption of new farming techniques. That is the ideal polar type, classifying social systems on the basis

of general characteristics, i.e., the traditional and the modern. According to what has become the conventional view, members of modern social systems respond to new ideas more favourably than do members of traditional systems. Therefore, they tend to understand social change, such as modernization, as a movement on the continuum from the traditional to the modern. The modernization process which is characterized mainly by industrialization and urbanization is often identified as a Westernization process (Hoernig, 1970).

For this reason, a considerable number of adoption studies carried out in developing areas attempted to see whether there was any relationship between adoption of new ideas and such characteristics as rationality, cosmopolitanness, scientific attitude, empathy and so forth, that may be regarded more as the characteristics of industrialized urban sectors than that of backward rural sectors (Larson and Rogers in Copp, 1964:39-42).

Based on Redfield's theoretical model of the folk-urban continuum, Santi Priya Bose (1962) studied the relationship between adoption of improved farming practices and a set of value systems with eighty farm operators in West Bengal, India. A business-like attitude toward farming, rationality, and scientific outlook, which were believed to be closer to the urban characteristics were positively associated with adoption of improved farming practices. On the other hand, traditionalisms, religious belief in life after death and familism

(which were believed to be closer to the characteristics of folk society) were negatively associated with adoption.

In a North Indian village that had been the center of extension activities for over ten years, fatalism and conservatism were not only negatively related to multi-practice adoption behaviour, but the two variables explained nearly 50 percent of variance in the adoption behaviour. Although change-proneness and level of aspiration showed a positive relationship with the adoption behaviour, these variables did not contribute anything in addition of importance to the explanation of the variance in the dependent variable (Chattopadhyay and Pareek, 1967).

Among Mayan cultivators who lived in San Antonio, British Honduras, the following independent variables, age (young), education, level of living, extension service contact, and aspiration level were significantly correlated with Cultivator's innovativeness (Feaster, 1968).

In an adoption study of two villages in West Pakistan, higher adopters were found among the middle- and old-aged group, while younger persons represented the lower adopters (Chaudhair et al, 1967).

In their adoption study among Indian farmers in two villages in Delhi Territory, J. P. Hrabovszky and T. K. Moulik (1967) investigated the factors associated with adoption of the Olpad thresher. When each individual farmer was studied as the unit of analysis, adopters and non-adopters

were found to be significantly different from each other with respect to such socio-psychological variables as innovation proneness and economic motivation, while there was no significant difference between the two groups in terms of farm size, total family income and literacy.

At the village level, adoption of the Olpad thresher was found to be much higher in the village where group cohesion was well maintained and, at the same time, a variety of community development activities had been successfully implemented by a number of change agents, than other village where factions among different interest groups existed and low intensive community development programs were implemented by change agents.

In Korea, a questionnaire survey, regarding the adoption practices of 300 farmers in 30 villages in Yong Chun County, was carried out in order to examine the effectiveness of ORD's (Office of Rural Development) guidance and educational activities (Ahmed, 1972). The sample was composed of two types of farmers; farmers who participated in farmer training courses and nonparticipants. According to the results of the survey, the adoption rate of the participating farmers was relatively higher than that of nonparticipants. When a comparison of farm earnings for the two groups was made, farmers who participated in farmer training courses made significantly more money than nonparticipants from the same size of farm (per 0.1 hectare). This survey also

indicated that contact with guidance workers ranked first as a source of help in adopting new practices, as well as a source of information in both groups.

Review of Longitudinal Studies

Like the present study, the three longitudinal studies to be reviewed here all covered five-year periods. As far as adoption is concerned, the five-year period seems to have some practical implications.

The adoption period is "the length of time required for an individual to pass through the adoption process from awareness to adoption" (Rogers, 1962:105). According to Rogers' investigation of 18 farming innovations in the United States and Pakistan, the average adoption period is five years or less. He cited only one exception to this rule (Rogers, 1962:106,107).

In a series of experiments on five townships in Michigan, Nielson and Crosswhite (1959) found that the experimental group had made significantly greater change than the control group in most farm practices such as soil, crop, and live-stock practices over the period of five years, 1954-1958. Besides this, the percent of farmers keeping farm records and repairing farm machinery increased more in the experimental than in the control group. In summary, the differential change in total farm output was that experimental farmers increased their total value of farm production by over \$5,600

per farm (at 1953 prices), while the average for the control farmers increased about \$3,400 (Nielson and Crosswhite, 1959).

Almost at the same period of time, from 1954 to 1959, a similar study was undertaken in eight selected counties, in North Carolina. The main object of the study was to examine the effectiveness of a planned change program, entitled "Farm and Home Development" (Marsh, 1962).

During the five-year period, the experimental farm families exposed to the Farm and Home Development Program made greater progress than the control group in the size of farm, the livestock inventories, the size of poultry enterprise, and, consequently, the value of farm products sold. In 1959, the experimental farm sales averaged \$8,853, while that of the control group sales averaged \$6,903. The experimental sales increased by \$4,606 per farm and the control sales increased by \$3,137 over the five-year study period. However, in other areas of farming such as tobacco and corn practices, there was little difference between the two groups in adopting recommended practices. Such a discrepant outcome was a reflection of the different extent of change agents' efforts given in different areas. Of the 13 agricultural agents dispatched to the study area, seven had primary responsibility for livestock or poultry programs, and only two had responsibility for certain crop programs.

Hardee (1965) observed a five-year extension program (1955-1960) with part-time farm families in Transylvania county, North Carolina. Two extension agents had worked in three major functional areas; home projects (both agents), family projects (family agent), and farm project (farm agent). After five years, there appeared remarkable differences in terms of completion of projects introduced between a group of families in the high category of contact with change agents and a group of families in the low category of contact with change agents. For instance, during the five-year period, families in the high category of contact with change agent completed an average of 63 such projects, while those in the low category completed an average of only 33 projects. Particularity in the area of farm projects, the completion scores of high, medium and low category group are 21, 15, and 10 (projects) respectively.

Generalization of Selected Variables

From the many variables included in the generalizations made by Rogers and Shoemaker (1971), the selection of the following variables are made more or less in accordance with conceptual framework of the present study, which will be discussed in the next chapter. The generalizations were made through the comparison between 'early adopters' and 'later adopters'. Here, attention should be given to the meaning of 'later adopters'. The later adopters do not

necessarily mean the 'non-adopters'. The 'later adopters' adopt new ideas "just after the average member of a social system" (Rogers and Shoemaker, 1971:180-186).

Roughly, the selected variables may be grouped into three; socio-economic, socio-psychological and situational. Accordingly, the variables are clustered in terms of these factors.

Socio-economic Factor:

Age: Earlier adopters are not different from later adopters in age (231 studies, 19% show that earlier adopters are younger; 48% show no relationship; and 33% show that earlier adopters are older).

Education: Earlier knowers of an innovation have more education than later knowers (24 studies, 71% support; 29% do not support).

Earlier adopters have more years of education than do later adopters (275 studies, 74% support; 26% do not support).

Earlier adopters are more likely to be literate than are later adopters (38 studies, 63% support; 33% do not support).

Farm Land Size: Earlier adopters have larger sized units than do later adopters (227 studies, 67% support; 33% do not support).

Social Status: Earlier adopters have higher social status than later adopters (402 studies, 68% support; 32% do not support).

Socio-psychological Factor:

Achievement Motivation: Earlier adopters have higher levels of achievement motivation than later adopters (23 studies, 61% support; 39% do not support).

Aspiration: Earlier adopters have higher aspiraton (for education and so on) than later adopters (39 studies, 74% support; 26% do not support).

Social Mobility: Earlier adopters have a greater degree of upward social mobility than do later adopters (5 studies, 100% support).

Attitude toward Change: Earlier adopters have a more favourable attitude toward change than later adopters (57 studies, 75% support; 25% do not support).

Situational Factor:

Contact with Change Agent: Earlier adopters have more change agent contact than later adopters (156 studies, 87% support; 13% do not support).

Social Participation: Earlier adopters have more social participation than later adopters (149 studies, 73% support; 27% do not support).

Observability: The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption (9 studies, 78% support; 22% do not support).

Summary of Literature Review

The literature review undertaken in this chapter may be summarized as follows.

- (1) In some areas, higher socio-economic standing is highly and significantly related to the adoption of new farm practices, while, in other areas, the same is not significantly related to adoption of new farming practices.
- (2) Individual farmers or communities that maintain close relationships with change agents do relatively better in adopting recommended farming practices than those that do not maintain close relationships with change agents. Thus, experimental groups usually make more progress in adopting new farming practices than control groups.
- (3) Under planned change situation, usually a five-year

period, the acceptance of recommended farming practices seems to be proportional to the passage of time. At least this is so in the United States. Therefore, if the rate of adoption is compared between two points in time, the rate of adoption is higher at a later point in time than at an earlier point in time.

CHAPTER IV

CONCEPTUAL FRAMEWORK

Certainly, adoption is an individual action which is observable at the final stage of one's mental processes of 'awareness', 'interest', 'evaluation', 'trial' and 'adoption' (Rogers, 1962:103). In this sense, the actual adoption is distinguished from the symbolic adoption (Klonglan and Coward, 1970).

However, when these actions take place collectively and purposely within the context of planned change, such as community development, these actions may be viewed, to some extent, as the result of initiation and sustenance of certain change programs by an outside system. This is particularly so if a society is still a low-scale society which is characterized by low degree of interactions not only among the subsystems but also between subsystems and master system.

Under these circumstances, any purposive, collective and goal-directed actions may be understood as the result of a combination of internal system forces and outside system forces. Accordingly, these actions should be analyzed in terms of the individual actors involved, the social system involved, and the flow or stages of social action through time (Beal in Copp, 1964:234).

In order to explain the actors and the system involved simultaneously, two theories are combined and utilized as a frame of reference. At the same time, the combined frame of reference should be able to explain the flow or stages of social action through time. The two theories are Action Theory and the Theory of Systemic Linkage.

Action Theory

P. S. Cohen set out some basic assumptions about the action theory (Cohen, 1968:69).

- (1) The actor has goals (or aims, or ends); his actions are carried out in pursuit of these.
- (2) The pursuit of goals and selection of means always occurs within situations which influence the course of action.
- (3) The actor always makes certain assumptions concerning the nature of his goals and the possibility of their attainment.
- (4) Action is influenced not only by the situation but by the actor's knowledge of it.
- (5) The actor has certain ideas or condition which affect his selective perception of the situation.
- (6) The actor has certain sentiments or affective dispositions which affect both his perception of situations and his choice of goals.
- (7) The actor has certain norms and values which govern his selection of goals and his ordering of them in some scheme of priorities.

The fundamental argument of action theory is that "social action is governed by two sets of factors; those conditions in social situations which are external to the individual actor(s); and those conditions within the actor which affect his reactions to and perceptions of situations" (Cohen, 1968:92).

Yet the action theory does not satisfactorily explain such a phenomenon as the creation of totally new social situations which result from the involvement of an outside system as in the case of planned change, because, according to action theory, the social situation is the product of action and action is governed by the situation. Action is understood predominantly as an individual matter.

Thus, the following theory of systemic linkage supplements the weakness of action theory at the system level.

Theory of Systemic Linkage

Two systems are involved in any planned change; the system effecting change and the system to be changed. These two systems ought to be linked. The former is called the "change system" and the latter is called the "target system"; and the change agent plays a role in linking the two systems.

Charles P. Loomis defined the systemic linkage as

"the process whereby the elements (power, rank, sanction, facility, goal, norm, etc) of at least two social systems come to be articulated so that in some ways they function as a unitary system" (Loomis, 1959:55).

This systemic linkage proceeds in a series of stages. Kurt Lewin suggested three general phases of change process; "unfreezing phase", "moving phase" and "freezing phase" (Lewin, 1947). Later Lippitt and his colleagues extended Lewin's three phases into five. The five phases are;

- (1) Development of a need for change (unfreezing)
- (2) Establishment of a change relationship

- (3) Working toward change (moving)
- (4) Generalization and stabilization of change (freezing)
- (5) Achieving a terminal relationship (Lippitt et al, 1958:30).

In this case, the formation of a favourable social environment between target system and change system is very important for the success of planned change. Thus, a systemic linkage does not only initiate change, but also it creates a favourable social environment throughout the change process.

By combining these two theories, adoption behaviour may be explained at both the individual and the system levels. While action theory explains the adoption as individual behaviour, the theory of systemic linkage explains the same as collective action.

Derivation of Three Factors

On the basis of the literature review and the combined conceptual framework, a more concrete model for this study will be developed. This model is also based on the theoretical overview of the problem which was discussed in the very beginning of this study.

An individual's decision to adopt certain new ideas is mainly influenced by what Rogers calls 'receiver variables' and 'social system variables' (Rogers and Shoemaker, 1971:26). The 'receiver variables' are composed of personality characteristics, social characteristics and so on. The 'social system variables' include social system norms, communication,

integration and the like.

A similar framework to Rogers' receiver variables and social system variables was conceptualized by Niehoff. He maintains that technical innovation is put into effect through the integration of 'receptient characteristics' and 'innovator characteristics'. According to him, there are at least 17 different factors, and "all of the influence factors can act either as barriers or stimuli to the change process" (Niehoff, 1966:10-12).

Lippitt and his colleagues made the above conceptual distinctions in clearer terms. They asserted that there are two forces in any planned change situation. These are 'change force' and 'resistant force'. And these forces "are assumed to be representations of motives, capacities, and situational factors which influence the behaviour of the client system" (Lippitt et al, 1958:89).

In the present study, three dimensions are to be taken into consideration; socio-economic, socio-psychological and the situational dimension. Thus, two factors, adopter's socio-economic and socio-psychological status may be categorized under the heading of either Rogers' receiver variables or Niehoff's receptient characteristics. Lippitt and his colleagues call these factors capacities (socio-economic aspect) and motives (socio-psychological aspect) respectively.

The socio-economic factor may be defined here as one's ability (or capacity) to carry on what one wants to do. Galjart calls this factor the 'inability factor' from the negative viewpoint (Galjart, 1971:34).

The socio-psychological factor is defined as the individual's attitudes "which make him predisposed to react or behave in a certain way in a given behavioral situation" (Nielson, 1962; Galjart, 1971). Viewed from the standpoint of developmental change, there are two types of attitudes; 'change incentive attitudes' and 'change inhibitive attitudes' (Leagans, 1971:126).

The situational factor is the social environment in which people interact with each other. It is phenomenologically external to the actor, and it has potential behavioral consequences directly or indirectly. In this sense, it is distinguished from the physical environment (Tagiuri, 1968:11-30).

In the present study, the situational factor means the newly created social environment which result mainly from the systemic linkage. Due to the narrow definition, it is measured by observable phenomena such as contact with change agent and participation in development programs.

All these factors, the three different aspects of human factor, are assumed to be related to the adoption of improved rice farming practices which is one of major rural development programs in the study area. However, the contribution of each factor to the adoption is expected to be different.

Hypotheses

On the basis of empirical findings of previous studies, both synchronic and longitudinal, as well as on theoretical reasoning, six hypotheses are formulated. However, as stated earlier, this study is concerned with the comparison between Community Development villages and non-Community Development villages with respect to the adoption of improved rice farming practices over the study period (1966-1971). Therefore, both the intensity of the program implementation and the time element should be taken into account in developing hypotheses.

Regarding the time element, the central government started to choose 'demonstration village' from 1958 and it applied intensive efforts to those villages chosen for community development. The time of the bench-mark survey, 1966, could roughly be considered as the point between Lippitt's stage 4 (generalization and stabilization of change) and stage 5 (achieving a terminal relationship). After five years of intensive efforts, the government was withdrawing its efforts from the area, particularly from the Community Development villages. For this reason, the whole situation in 1971 is expected to be different from that of 1966.

Although there was a difference between the two types of villages in terms of the intensity of overall efforts given by the government, the difference is not an absolute one as far as the improvement of rice farming is concerned.

Because of the importance of rice farming in rural economy, both types of villages had been extensively introduced the improved rice farming practices by the government. The only difference between the two types of villages was that residential change agents lived in C. D. villages for more intensive rural development program implementation, while the county extension agents were responsible for the guidance of non-C. D. villages. For this reason, no distinction is made between the two types of villages in testing the following hypotheses.

The first two hypotheses are derived from the theory of systemic linkage and the literature review regarding rural community development. In the present study, both the Office of Rural Development and the county-level extension organization are defined as 'change system' through which various development programs including the improvement of rice farming were initiated and continued over a period of time. At the same time, each village is regarded as a 'target system' (Loomis, 1959). Therefore, at the time of 1966, the adoption of improved rice farming practices is viewed as a result of 'contact change' between the two systems.

Hypothesis I. In the year of 1966, situational factor had the strongest explanatory power in accounting for the variance in the adoption of rice farming practices in Community Development villages.

Hypothesis II. In the year of 1966, situational factor had the strongest explanatory power in accounting for the variance in the adoption of rice farming practices in non-Community Development villages.

Five years after the withdrawal of the intensive program, the effect of the situational factor can be expected to have diminished. Also during the period, farm operators are believed to have passed through the stage of 'trial and error' in adopting new rice farming practices which has followed a psychological process. Thus the socio-economic factor is expected to have replaced the situational factor in explaining variance in adoption of improved rice farming practices in 1971.

Hypothesis III. In the year of 1971, the socio-economic factor had the strongest explanatory power in accounting for the variance in the adoption of improved rice farming practices in C. D. villages.

Hypothesis IV. In the year of 1971, the socio-economic factor had the strongest explanatory power in accounting for the variance in the adoption of improved rice farming practices in non-C. D. villages.

The last two hypotheses are derived from the findings of previous studies, especially the longitudinal studies reviewed (Nielson et al, 1959; Marsh, 1962; Hardee, 1965).

Hypothesis V. During the five-year period, change in the socio-economic aspect had the strongest explanatory power in accounting for the variance in the change in adoption

of rice farming practices in C. D. villages.

Hypothesis VI. During the five-year period, change in the socio-economic aspect had the strongest explanatory power in accounting for the variance in the change in adoption of rice farming practices in non-C. D. villages.

CHAPTER V

RESEARCH METHOD

Source of Data

This study is based on a part of the data collected for a project entitled, "An Evaluation of Rural Development Program in Korea". In its early stage, the project was jointly carried out by Chunpuk National University in Korea and North Carolina State University under the sponsorship of the Agricultural Development Council, Inc. In 1971, the follow-up survey was conducted under the joint sponsorship of Research Board at University of Manitoba and International Liason Committee for Research on Korea (ILCORK).

The project covers a wide range of rural community development programs. The implementation of improved rice farming practices is one of major development programs in the study area.

Sampling and Interview

a. Selection of Villages:

Of the 448 natural villages that had served as pilot or demonstration villages for rural community development work in North Cholla Province until 1965, six villages in three counties (i.e., two from each county; see Figure 1 p.13) were purposely selected as an experimental group on the judgment of the field investigator.

At the same time, six villages (i.e., two from each of the same three counties) where no intensive rural community development work had been carried out were chosen as a control group on the basis of various matching characteristics.

b. Selection of the Households:

Using random numbers, approximately 40 households were selected from each of the twelve sample villages for interview, except for one village where 48 households were chosen. In order to qualify for the interview, each household had to be a farm family and the household had to include both a male head and his wife. Thus, the original sample size totalled 489 households.

c. Interview:

(i) Benchmark Survey: Since the project was a longitudinal one, there were two surveys covering the same villages in 1966 and 1971. In the period of January-February, 1966, 489 farm family households were interviewed by trained field workers.

(ii) Follow-up Survey: Five years after the benchmark survey, a follow-up survey was carried out during the summer months in 1971. Due to the residential and occupational

change mainly caused by rural outmigration in the study area, 418 households were reinterviewed. Of the 418 households that were reinterviewed, only 359 met the criteria set for this study. These 359 households still retained the same household head (farm operator), while in the case of the eliminated 59 households from this study there was a change in head during the five-year period.

Selection of Variables and Their Measurement

One dependent and 13 independent variables are selected. The dependent variable is the adoption of improved rice farming practices. On theoretical grounds, the 13 selected independent variables are categorized into three dimensions (factors): socio-economic, socio-psychological and situational (Lippitt et al, 1958; Galjart, 1971).

The theoretically defined factor-variable structures are as follows;

Socio-economic factor: Age, Education, Farm Land Size, Total Income, Level of Living and Farm Tools;

Socio-psychological factor: Aspiration, Anomia, Goal and Rationality;

Situational factor: Social Participation, Change Agent Contact and Benefit.

In order to measure some variables, four Guttman-type scales and five arbitrary indexes were constructed based on the data collected at the benchmark survey (Moon et al, 1967).

The Guttman-type scale is used to measure the level of living, farm tools, aspiration and anomia. Rice farming practices, rationality, change agent contact, social participation and goal are measured by arbitrarily developed indexes. As may be seen in Appendix A, some items that were originally included in the battery for scale or index are eliminated during the screening procedure because of their low discriminatory power.

A brief explanation on the measurement of each scale or index follows.

Rice Farming Practice Index (0-12 points)

An arbitrary index of 12 items was constructed in order to measure the adoption of improved practices in rice farming. A score of 1 was assigned to each item, if the response was positive. A split-half reliability test yielded a coefficient of .68. The index items are:

1. Have raised green manure plants.
2. Have practiced early transplanting method.
3. Have tilled about 5 or 6 inches deep.
4. Have soil tested.
5. Did first weeding within 16 days after transplanting.
6. Adopted recommended rice seeds.
7. Sprayed preventive chemicals in advance according to warning.
8. Sprayed preventive chemicals after transplanting.
9. Selection of rice seeds by using salt water.
10. Renewal rice seeds every 3 years.
11. Application of preventive chemicals in the seedling bed.
12. Careful usage of nitrogenous fertilizer for fear of rice blast.

Level of Living Scale (0-7 points)

In order to measure the level of living for farm family, a Guttman-type scale composed of seven items was developed.

The C. R. (coefficient of reproducibility) of this scale is .92 and the items are as follows: photo frame, abacus, study table, clock or watch, sewing machine, radio, and bicycle.

Farm Tool Scale (0-7 points)

A Guttman-type scale with seven items, i.e., sprayer, ox plow, forage choppers, pitch-fork, transplanting string for rice, night-soil container, and digging fork, was developed in an effort to measure the possession of farm tools of sample households. The C. R. is .92.

Anomia Scale (0-5 points)

A Guttman-type scale was constructed in order to measure farmer's psychological state of disorientation (or demoralization) (see Appendix A). The C. R. of the five-item scale is .92.

Aspiration Scale (0-6 points)

In order to measure the farm operator's upward job-mobility, a Guttman-type scale was constructed on the basis of six items (see Appendix A). The C.R. of this scale is .91.

Rationality Index (0-27 points)

A battery of nine items was used to measure the rationality in decision making among the sample farmers. The following weighting system was used to assign the response to each of the nine items, i.e., 3 for rational; 2 for intermediate; and 1 for nonrational (see Appendix A).

Change Agent Contact Index (0-13 points)

To measure the degree of contact made between farmer

and change agent for consultation on farming and other matters, a seven-item index was developed. Each item was scored differently, i.e., 3, 2, and 1, according to its importance (see Appendix A).

Social Participation Index

A modified version of Chapin's social participation scale was used in the measurement of the intensity of social participation of the respondents. For each of the formal organizations, membership earns a score of 1, attendance rate of more than one-fourth of meetings a score of 2, and holding office a score of 3. Thus a respondent may earn a maximum score of 6 from each organization to which he belongs.

Development Program Benefit Index

In order to measure personal benefits of the respondents from any action programs or C. D. programs carried out during the past five years, an arbitrary index was constructed. A positive response to each action program was assigned a score of 1.

Goal Clarity Index (0-9 points)

A three-item arbitrary index was developed to measure the degree of clarity of goal set for the future of family, farming and community. The following weighting system was used to assign the response to each of the three items, i.e., 3 for very clear; 2 for clear; and 1 for not-clear.

The operational definitions of the rest of the independent variables are as follows.

Age is the farm operator's age at the time of field survey. Education is the actual years of formal schooling. However, the reading ability of Korean or Chinese is regarded as grade three and grade six, respectively if the respondent had not attended formal school. Here farm land size means the total acreage of farm land utilized for cultivation. Finally, total income is the annual total income of the farm family from all income sources.

Statistical Analysis

In view of the problem presented in the study, two statistical analyses are to be performed. They are intended to measure the relative importance of each independent variable or factor (to be extracted) over the adoption of improved rice farming practices; and to confirm the theoretically defined factor-variable structures. To do these, the following methods are chosen.

a. Multiple Regression Analysis:

The basic concept of multiple regression analysis is to predict a single dependent variable from a set of independent variables while taking into account the inter-relationships among the independent variables. Accordingly, the relative importance of each independent variable in terms of its explanatory power can be known from this method. The stepwise multiple regression analysis will be used.

b. Factor Analysis:

One of the most common applications of factor analysis is to confirm the theoretically defined factor-variable structure and the number of factors (Nie et al, 1970:209).

On the basis of theoretical reasoning, three factors have already been defined. The validity of such a factor-variable structure will be statistically tested by the factor analysis method. The principal component analysis coupled with varimax rotation (orthogonal) will be employed.

CHAPTER VI

ANALYSIS OF DATA

This chapter is divided into two sections. The first section of this chapter discusses the relative importance of each independent variable and extracted factor in explaining the adoption of improved rice farming practices in 1966 and 1971. The second section discusses the relative importance of change in each independent variable and extracted factor in explaining change in the adoption of improved rice farming practices over the five-year period.

FACTORS ASSOCIATED WITH ADOPTION OF IMPROVED RICE FARMING PRACTICES IN 1966 AND 1971

Stepwise Multiple Regression Analysis

Although the hypotheses to be tested are stated in terms of factor rather than individual variable, the stepwise multiple regression analysis of adoption of improved rice farming practices on the independent variables is applied here in order to see the relative importance of each independent variable. Thus, the multiple regression analysis will show not only how much of the total variance in the dependent variable can be explained by all of the independent variables acting together, but also it will indicate the explanatory power of each independent variable on the

dependent variable.

When the farmers in both C. D. villages and non-C. D. villages are put together as one group, the 13 independent variables explain 40.5% of total variance in the dependent variable in the year of 1966. As seen in Table 3, the stepwise multiple regression technique reveals the order of variables according to the size of explanatory power (R^2 change). The first three most important variables are change agent contact, farm land size, and rationality for the total sample in 1966. Change agent contact alone explains 20% out of 41% of total variance in the dependent variable, while the first three variables together explain 36% out of 41%. There are four more variables, i.e., goal, farm tools, age, and education, that are significantly related to the dependent variable.

In the case of C. D. villages in 1966, the 13 independent variables together explain 40% of the total variance in the dependent variable which is quite close to that of the total sample. However, contrary to the expectation, the strongest variable in the C. D. villages is farm land size instead of change agent contact. As may be seen in Table 4, farm land size alone explains 20% out of 40% of total variance in the dependent variable. And the combination of the first three variables, i.e., farm land size, agent contact and rationality, accounts for 32% out of 40% of total variance in the dependent variable.

Table 3. Stepwise Multiple Regression Analysis of Adoption of Rice Farming Practices on 13 Independent Variables for All Villages in 1966

Independent Variables	R	R ²	R ² Change	Regression Coefficient	Beta	F
<u>All Villages (N=346)</u>						
1. Agent Contact	.443	.196	.196	.194	.252	24.078*
2. Farm Land Size	.564	.318	.121	.439	.302	18.520*
3. Rationality	.599	.359	.041	.174	.213	16.656*
4. Social Participation	.600	.360	.001	.048	.035	0.472
5. Goal	.615	.378	.017	-.321	-.139	8.454*
6. Total Income	.615	.378	.000	.045	.036	0.223
7. Farm Tools	.619	.384	.000	.147	.108	4.284*
8. Age	.626	.392	.007	-.197	-.132	6.349*
9. Education	.632	.399	.007	-.234	-.102	3.085*
10. Anomia	.634	.402	.002	-.109	-.056	1.538
11. Benefit	.635	.404	.001	.127	.046	0.992
12. Aspiration	.636	.405	.001	.046	.032	0.560
13. Level of Living	.636	.405	.000	-.008	-.006	0.012
(Constant=1.129)						

*F=1.75 is significant at .05 level with 13 and 332 degrees of freedom.

Table 4. Stepwise Multiple Regression Analysis of Adoption of Rice Farming Practices on 13 Independent Variables in Community Development Villages in 1966

Independent Variables	R	R ²	R ² Change	Regression Coefficient	Beta	F
<u>C. D. Villages (N=188)</u>						
1. Farm Land Size	.463	.214	.214	.970	.453	17.698*
2. Agent Contact	.545	.297	.082	.169	.218	9.589*
3. Rationality	.562	.316	.019	.134	.163	5.397*
4. Social Participation	.565	.319	.002	-.070	-.047	0.458
5. Total Income	.566	.321	.002	.054	.043	0.144
6. Anomia	.585	.342	.021	-.267	-.139	4.553*
7. Education	.599	.359	.016	-.362	-.147	3.466*
8. Age	.611	.373	.014	-.197	-.128	3.216*
9. Goal	.620	.385	.011	-.280	-.127	3.598*
10. Level of Living	.627	.393	.007	-.178	-.135	2.368*
11. Benefit	.630	.397	.004	.181	.067	1.029
12. Farm Tools	.632	.400	.002	.099	.068	0.832
13. Aspiration	.633	.400	.000	.039	.028	0.201

(Constant=2.371)

*F=1.75 is significant at .05 level with 13 and 174 degrees of freedom.

The following variables, anomia, education, age, and goal, are significant. However, they contribute less than 2% each.

In the non-C. D. villages, the percentage of the total variance explained in the dependent variable is increased by 10% as compared to the total sample and the C. D. villages sample. Out of 51% of the total variance in the dependent variable, 29% is explained by change agent contact (county extension agent) alone. As may be seen in Table 5, the combination of the first three variables, i.e., change agent contact, rationality, and farm land size, explains around 45% out of 51%. Although social participation, level of living, and goal are significantly related to the dependent variable, the contribution of these variables is very small.

In sum, change agent contact appears to be the most powerful variable in explaining the adoption of improved rice farming practices for the total sample and the non-C. D. villages sample in 1966, while farm land size appears to be the strongest variable for C. D. villages sample. Also the three most important variables are change agent contact, farm land size and rationality. It may be noticeable that the three independent variables are representing the three factors, i. e., situational factor, socio-economic factor, and socio-psychological factor, respectively.

After five years, in 1971, the scene appears to have changed considerably. As revealed in Tables 6, 7, and 8,

rationality appears as the strongest variable explaining 29% out of 35%, 32% out of 43%, and 26% out of 34% of the total variance in the dependent variable for the total sample, the C. D. villages sample, and the non-C. D. villages sample, respectively. Rationality is followed by farm tools and total income for the total sample and the C. D. villages sample. In non-C. D. villages, rationality is followed by farm tools and farm land size.

A new situation developed in 1971, different from that in 1966, in that no variable representing the situational aspect appears among the first three variables. The most important variable in 1966, change agent contact, is replaced by farm tools which seems to be quite relevant to the adoption of recommended rice farming practices.

Overall, the number of significant independent variables is reduced by an average of four in the three sample groups. Accordingly, except in the C. D. villages sample, the percentage of total variance in the dependent variable was decreased from 40.5% down to 35.3% and from 50.9% down to 33.5% for the total sample and the non-C. D. villages sample respectively.

Factor Analysis

As mentioned earlier, one of the major applications of the factor analysis is to confirm the theoretically defined factors in terms of number of factors to be extracted

Table 5. Stepwise Multiple Regression Analysis of Adoption of Rice Farming Practices on 13 Independent Variables in Non-Community Development Villages in 1966.

Independent Variables	R	R ²	R ² Change	Regression Coefficient	Beta	F
<u>Non-C. D. Villages (N=158)</u>						
1. Agent Contact	.539	.290	.290	.243	.316	19.070*
2. Rationality	.632	.400	.109	.205	.252	10.939*
3. Farm Land Size	.669	.448	.047	.416	.186	4.302*
4. Social Participation	.684	.467	.019	.189	.147	3.845*
5. Level of Living	.692	.478	.011	.215	.173	4.285*
6. Total Income	.692	.479	.001	-.044	-.035	0.128
7. Goal	.700	.490	.010	-.312	-.126	3.617*
8. Aspiration	.705	.497	.006	.113	.079	1.749
9. Age	.708	.502	.004	-.185	-.128	2.717*
10. Farm Tools	.712	.507	.005	.103	.081	1.288
11. Education	.713	.509	.002	-.137	-.064	0.606
12. Anomia	.713	.509	.000	.017	.009	0.022
13. Benefit	.713	.509	.000	.006	.002	0.001

(Constant=-.111)

*F=1.75 is significant at .05 level with 13 and 145 degrees of freedom.

Table 6. Stepwise Multiple Regression Analysis of Adoption of Rice Farming Practices on 13 Independent Variables for All Villages in 1971

Independent Variables	R	R ²	R ² Change	Regression Coefficient	Beta	F
<u>All Villages (N=334)</u>						
1. Rationality	.534	.285	.285	.234	.462	67.216*
2. Farm Tools	.570	.325	.039	.358	.227	14.966*
3. Total Income	.578	.334	.009	-.117	-.144	3.895*
4. Agent Contact	.583	.340	.006	.046	.092	2.764*
5. Farm Land Size	.585	.342	.001	.122	.080	1.471
6. Benefit	.585	.342	.000	.002	.004	0.006
7. Aspiration	.589	.347	.004	.088	.093	3.736*
8. Goal	.591	.349	.002	-.050	-.048	0.941
9. Anomia	.592	.351	.001	-.057	-.038	0.655
10. Age	.594	.352	.001	.009	.054	0.907
11. Level of Living	.594	.353	.000	-.036	-.039	0.435
12. Education	.594	.353	.000	.023	.016	0.708
13. Social Participation	.594	.353	.000	.009	.010	0.035
(Constant=1.724)						

*F=1.75 is significant at .05 level with 13 and 320 degrees of freedom.

Table 7. Stepwise Multiple Regression Analysis of Adoption of Rice Farming Practices on 13 Independent Variables in Community Development Villages in 1971

Independent Variables	R	R ²	R ² Change	Regression Coefficient	Beta	F
<u>C. D. Villages (N=171)</u>						
1. Rationality	.567	.322	.322	.275	.489	44.258*
2. Farm Tools	.602	.363	.041	.221	.226	6.753*
3. Total Income	.623	.388	.024	-.134	-.162	2.128*
4. Benefit	.631	.399	.010	.054	.082	1.137
5. Agent Contact	.633	.401	.002	.036	.070	0.847
6. Aspiration	.647	.419	.017	.138	.144	4.869*
7. Anomia	.650	.423	.003	-.114	-.073	1.297
8. Farm Land Size	.650	.423	.000	.042	.026	0.070
9. Goal	.653	.427	.003	-.073	-.033	1.080
10. Education	.654	.428	.000	.013	.014	0.162
11. Social Participation	.654	.428	.000	.013	.014	0.031
12. Level of Living	.654	.428	.000	.016	.016	0.041
13. Age	.654	.428	.000	-.001	-.008	0.011

(Constant=1.607)

*F=1.75 is significant at .05 level with 13 and 157 degrees of freedom.

Table 8. Stepwise Multiple Regression Analysis of Adoption of Rice Farming Practices on 13 Independent Variables in Non-Community Development Villages in 1971

Independent Variables	R	R ²	R ² Change	Regression Coefficient	Beta	F
<u>Non-C. D. Villages (N=163)</u>						
1. Rationality	.512	.262	.262	.219	.474	27.284*
2. Farm Tools	.546	.299	.036	.176	.199	5.474*
3. Agent Contact	.552	.305	.005	.051	.106	1.681
4. Benefit	.556	.310	.005	-.051	-.080	1.075
5. Total Income	.559	.313	.003	-.064	-.080	0.628
6. Farm Land Size	.566	.321	.007	.184	.127	1.882*
7. Level of Living	.572	.327	.006	-.102	-.113	1.603
8. Age	.576	.332	.004	.013	.079	0.825
9. Goal	.577	.333	.001	-.031	-.032	0.168
10. Anomia	.578	.334	.000	.035	.024	0.128
11. Education	.578	.334	.000	.038	.029	0.114
12. Aspiration	.578	.335	.000	.011	.012	0.028
13. Social Participation	.578	.335	.000	-.008	-.010	0.014

(Constant=2.193)

*F=1.75 is significant at .05 level with 13 and 149 degrees of freedom.

and factor-variable structure.

In chapter IV, three factors were derived and defined on a theoretical basis. Whether such theoretically derived factors are valid is still in question until they are confirmed by the factor analysis. In other words, if theoretically derived and defined factors are identified with statistically extracted factors, then it is valid to pursue further statistical analysis on the basis of the extracted factors.

In the present section, two factor analyses were performed separately; one based on data for 1966 and the other one based on data for 1971. It was expected that the results of the two factor analyses would be close to each other.

In 1966, as is seen in Table 9, with high coefficients of appropriate direction on variables 3 (farm land size), 7 (total income), 8 (farm tools), and 9 (level of living), it would appear that Factor I reflects the socio-economic aspect of farm operators.

Factor II, the unexpected factor, has two high coefficients on variable 1 (age) and variable 2 (education). Apparently it would seem that this factor reflects the educational aspect of farm operators in the study area.

Factor III has high and appropriate factor coefficients on variables 5 (social participation), 6 (benefit) and 13 (change agent contact). Undoubtedly, this factor

Table 9. Rotated Factor Matrix of 13 Independent Variables
for All Villages in 1966

Variables	Factor I	Factor II	Factor III	Factor IV
1. Age	.17	(-.68)	-.06	-.08
2. Education	.36	(.74)	-.03	.10
3. Farm Land Size	(.81)	.09	.23	-.05
4. Goal	.22	.38	.27	.01
5. Social Participation	.20	.26	(.50)	.27
6. Benefit	.25	-.01	(.43)	.06
7. Total Income	(.84)	.17	.23	.03
8. Farm Tools	(.56)	-.14	.22	.10
9. Level of Living	(.76)	.10	.03	.14
10. Anomia	.04	.01	-.05	(-.54)
11. Aspiration	-.14	.18	.15	-.11
12. Rationality	.31	.26	.22	(.44)
13. Agent Contact	.15	.10	(.50)	(.47)
Eigen Value	3.93	1.75	1.36	1.06
% Variance Explained	30.3	13.5	10.5	8.2

reflects the situational aspect of the study area, particularly with respect to the participation in development works.

Finally, Factor IV has high and appropriate factor coefficients on variable 10 (anomia), 12 (rationality) and 13 (Change agent contact). Seemingly this factor reflects the psychological aspect of the farm operators. Yet one 'factorial complex' appears in variable 13 (change agent contact) by loading highly in both Factor III and Factor IV.

After all, except for the unexpected Factor II which is separated from Factor I, the statistically extracted three factors confirm the theoretically derived and defined factors. Particularly, Factor I and Factor III are well identified with the theoretically defined counterparts. Although Factor IV seems to be weak, it is still possible to identify it as a psychological factor.

In 1971, the factor analysis reveals similar results to that of 1966. As indicated in Table 10, Factor I shows a strong loading on variables 2 (education), 3 (farm land size), 7 (total income), 8 (farm tools) and 9 (level of living). Apparently Factor I reflects the socio-economic aspect of farm operators. On the other hand, two variables (education and rationality) show high loadings on Factor I along with Factor III and Factor II.

Factor II shows a strong loading on variable 5 (social participation), 6 (benefit), 12 (rationality) and

Table 10. Rotated Factor Matrix of 13 Independent Variables
for All Villages in 1971

Variables	Factor I	Factor II	Factor III	Factor IV
1. Age	.01	-.26	(-.76)	-.20
2. Education	(.42)	.02	(.55)	.27
3. Farm Land Size	(.80)	.09	.08	.07
4. Goal	.22	-.19	.28	(.68)
5. Social Participation	.09	(.72)	.24	.25
6. Benefit	-.09	(.79)	-.08	-.17
7. Total Income	(.86)	.05	.12	.11
8. Farm Tools	(.67)	.36	-.22	-.16
9. Level of Living	(.76)	-.01	.02	.11
10. Anomia	.06	-.36	.38	(-.65)
11. Aspiration	-.04	.03	(.65)	-.16
12. Rationality	(.48)	(.52)	.04	.09
13. Agent Contact	.29	(.63)	.21	.04
Eigen Value	3.65	1.73	1.58	1.02
% Variance Explained	28.0	13.3	12.2	7.9

13 (change agent contact). Factor II indicates the situational aspect of the study area, particularly with respect to the participation in development works. It is understandable that rationality yields a high coefficient with Factor II, in view of the nature of the items included in the rationality scale (see Appendix A).

Factor III shows a strong loading on variable 1 (age), 2 (education) and 11 (aspiration). As was the case in 1966, Factor III reflects the educational aspect of farm operators.

Finally, Factor IV shows a strong loading on variable 4 (goal) and 10 (anomia). This factor reflects the psychological aspect of farm operators.

Thus in both years, 1966 and 1971, the factor analyses produced four factors respectively, and these factors are well identified with the theoretically derived and defined factors. In the next step, stepwise multiple regression analysis will be applied on the basis of the four extracted factors that were statistically derived.

Stepwise Multiple Regression Analysis of Adoption of Rice Farming Practices on the Four Extracted Factors

This is the final stage of testing hypotheses I, II, III and IV. Prior to performing the stepwise multiple regression analysis, the standardizing of the extracted factors using the factor score coefficients is considered proper for the purpose of this study. At the same time,

the dependent variable will be standardized. Thus the stepwise multiple regression analysis at this final stage will be performed on the basis of standardized dependent variable and standardized extracted factors.

Each standardized factor is created by adding up the 13 standardized independent variables that are multiplied by each factor score coefficients. The formula is:

$$\begin{aligned} \text{Standardized Factor I} = & \text{Fsc} \times (\text{Age} - \bar{X}) / \text{Sd} + \\ & \text{Fsc} \times (\text{Education} - \bar{X}) / \text{Sd} + \\ & \text{Fsc} \times (\text{Agent Contact} - \bar{X}) / \text{Sd} \end{aligned}$$

where Fsc is the factor score coefficient of Age to Factor I;

Age is the actual score for each individual;

\bar{X} is the mean of Age in the total sample;

Sd is the standard deviation of Age in the total sample.

The first two hypotheses to be tested here are that in the year of 1966, situational factor had the strongest explanatory power in accounting for the variance in the adoption of rice farming practices in both Community Development villages and non-Community Development villages.

However, before testing the first two hypotheses against the C. D. villages sample and non-C. D. villages sample, the total sample will be examined in the light of the same hypothesis. As may be seen in Table 11, the situational factor (Factor III in 1966 and Factor II in 1971) appears to be the most powerful factor. The four

Table 11. Stepwise Multiple Regression Analysis of Adoption of Rice Farming Practices on Four Extracted Factors for All Villages in 1966 and 1971

Extracted Factors	R	R ²	R ² Change	Regression		F
				Coefficient	Beta	
<u>1966 (N=346)</u>						
Factor III (Situational)	.409	.167	.167	.385	.283	37.132*
Factor I (Socio-economic)	.522	.273	.105	.359	.338	57.445*
Factor IV (Psychological)	.580	.336	.063	.354	.259	31.685*
Factor II (Educational)	.581	.337	.001	.039	.034	0.595
(Constant=.024)						
<u>1971 (N=334)</u>						
Factor II (Situational)	.373	.139	.139	.400	.398	68.546*
Factor I (Socio-economic)	.491	.241	.101	.258	.317	43.558*
Factor IV (Psychological)	.492	.242	.001	-.039	-.037	0.610
Factor III (Educational)	.493	.243	.000	-.023	-.024	0.253
(Constant=.058)						

*F=2.37 is significant at .05 level with 4 and 341 (in 1966) and 4 and 329 (in 1971) degrees of freedom, respectively.

extracted factors together explain 34% and 24% of the total variance in the dependent variable in 1966 and 1971 respectively. The situational factor alone accounts for more than half of the explained variance in the dependent variable. In both years, 1966 and 1971, the situational factor is consistently followed by the socio-economic factor, socio-psychological factor and educational factor, in that order. Except for the educational factor, the other three factors are significantly related to the adoption of rice farming practices in 1966, while, in 1971, only the situational and socio-economic factors are significantly related to the dependent variable. In both years of 1966 and 1971, the educational factor is not significant in its contribution.

In both C. D. villages and non-C. D. villages, the situational factor appears to be the most powerful factor in explaining the adoption of improved rice farming practices in the year of 1966. As is indicated in Tables 12 and 13, the situational factor alone explains 21% out of 44% and 14% out of 28% of the total variance in the dependent variable for C. D. villages sample and non-C. D. villages sample respectively. As was the case in the total sample, it accounts for almost half of the explained variance in the dependent variable. Also the stepwise multiple regression technique put the four factors in the same order as it did for the total sample in both years. Except for the

Table 12. Stepwise Multiple Regression Analysis of Adoption of Rice Farming Practices on Four Extracted Factors in Community Development Villages in 1966 and 1971

Extracted Factors	R	R ²	R ² Change	Regression		
				Coefficient	Beta	F
<u>1966 (N=188)</u>						
Factor III (Situational)	.371	.138	.138	.366	.251	14.021*
Factor I (Socio-economic)	.482	.232	.094	.347	.326	25.967*
Factor IV (Psychological)	.524	.275	.042	.293	.218	10.920*
Factor II (Educational)	.525	.276	.001	-.041	-.034	0.294
(Constant=.078)						
<u>1971 (N=171)</u>						
Factor II (Situational)	.469	.220	.220	.498	.488	55.475*
Factor I (Socio-economic)	.541	.293	.073	.223	.268	16.748*
Factor IV (Psychological)	.543	.294	.001	.043	.039	0.350
Factor III (Educational)	.543	.295	.000	.012	.011	0.032
(Constant=.044)						

*F=2.37 is significant at .05 level, with 4 and 183 (in 1966) and 4 and 166 (in 1971) degrees of freedom, respectively.

Table 13. Stepwise Multiple Regression Analysis of Adoption of Rice Farming Practices on Four Extracted Factors in Non-Community Development Villages in 1966 and 1971

Extracted Factors	R	R ²	R ² Change	Regression		Beta	F
				Coefficient	Constant		
<u>1966 (N=158)</u>							
Factor III (Situational)	.457	.208	.208	.425		.333	27.911*
Factor IV (Psychological)	.552	.305	.096	.440		.315	25.352*
Factor I (Socio-economic)	.656	.431	.125	.370		.349	32.921*
Factor II (Educational)	.666	.444	.013	.123		.115	3.607
(Constant=.052)							
<u>1971 (N=163)</u>							
Factor I (Socio-economic)	.348	.121	.121	.300		.378	28.549*
Factor II (Situational)	.462	.213	.092	.307		.306	18.762*
Factor III (Educational)	.464	.215	.001	-.038		-.041	0.339
Factor IV (Psychological)	.465	.216	.001	-.033		-.033	0.231
(Constant=.076)							

*F=2.37 is significant at .05 level, with 4 and 153 (in 1966) and 4 and 158 (in 1971) degrees of freedom, respectively.

educational factor, the other three factors are significantly related. Thus the first two hypotheses that in the year of 1966, situational factor had the strongest explanatory power in accounting for the variance in the adoption of rice farming practices in both C. D. and non-C. D. villages are supported.

Next, the third and fourth hypotheses are that, in the year of 1971, the socio-economic factor had the strongest explanatory power in accounting for the variance in the adoption of rice farming practices in both C. D. and non-C. D. villages.

As is seen in Tables 12 and 13, the situational factor is the most powerful in explaining the adoption of improved rice farming practices in C. D. villages, while the socio-economic factor is the most powerful factor in non-C. D. villages. The situational factor alone explains 22% of 30% of the total variance in the dependent variable in C. D. villages, while the socio-economic factor explains 12% of 22 % of the total variance in the dependent variable.

In the C. D. villages, the situational factor is followed by the socio-economic factor, and the contribution of the other two factors is almost negligible. In non-C. D. villages, the socio-economic factor is followed by the situational factor, and the other two factors are not significantly related to the adoption of improved rice farming practices.

Thus, Hypothesis III is rejected, while Hypothesis IV is supported.

RELATIONSHIP BETWEEN CHANGE IN ADOPTION OF IMPROVED RICE
FARMING PRACTICES AND CHANGES IN SELECTED VARIABLES OVER
FIVE-YEAR PERIOD (1966-1971)

It is natural to assume that changes were taking place, either positively or negatively, in almost every aspect of the farmer's life during the five-year study period (1966-1971).

Since the farm operators included in the sample were mostly between their 40 and 60 years of age, no substantial change in formal education could be expected during the study period. Besides, each farm operator automatically increased five years in age. Therefore, the two variables, age and education, are eliminated from the present list of variables.

As stated earlier, this section is mainly concerned with the relationship between change in adoption of improved rice farming practices and changes in each independent variable over the five-year period. The change score assigned to each variable is obtained by subtracting the actual score of 1966 from the actual score of 1971. In other words, the actual change is the difference in score at the two points of time.

Stepwise Multiple Regression Analysis of Change in the
Dependent Variable on Changes in 11 Independent Variables

As shown in Table 14, the 11 independent variables

together explain only 16% of the total variance in the dependent variable for the total sample. The explained variance in the dependent variable is very small. Nevertheless, changes in rationality, agent contact, social participation, farm land size and benefit are significantly related to change in adoption of improved rice farming practices.

In the C. D. villages, as seen in Table 15, the percentage of explained variance is increased. The 11 independent variables together explain about 24% of total variance in the dependent variable. Changes in rationality, farm land size, change agent contact, anomia, and aspiration are significantly related to change in adoption of improved rice farming practices. As was the case for the total sample, the first three important variables are rationality, farm land size and change agent contact.

In the non-C. D. villages, the same stepwise multiple regression analysis shows that the combination of 11 independent variables explain only 18% of the total variance in the dependent variable. Table 16 also shows that changes in social participation, agent contact, benefit, and rationality are significantly related to change in adoption of improved rice farming practices over the five-year period. The first three variables, social participation, agent contact, and rationality, explain 14% of 18% of explained variance in the dependent variable.

Table 14. Stepwise Multiple Regression Analysis of Change in Adoption of Rice Farming Practices on Changes in 11 Independent Variables for All Villages over Five-Year Period (1966-1971)

Independent Variables	R	R ²	R ² Change	Regression		Beta	F
				Coefficient	Inter		
<u>All Villages (N=322)</u>							
1. Rationality	.252	.063	.063	.137		.199	12.553*
2. Agent Contact	.318	.101	.037	.120		.168	9.806*
3. Farm Land Size	.348	.121	.020	.339		.109	3.700*
4. Total Income	.352	.124	.002	.078		.052	0.794
5. Social Participation	.377	.142	.018	.202		.156	7.967*
6. Benefit	.398	.158	.015	-.121		-.127	5.753*
7. Farm Tool	.400	.160	.001	.064		.043	0.631
8. Goal	.402	.161	.001	-.050		-.036	0.462
9. Anomia	.402	.161	.000	-.028		-.017	0.106
10. Aspiration	.402	.161	.000	.008		.007	0.018
11. Level of Living	.402	.162	.000	.009		.006	0.013
(Constant=1.417)							

*T=1.94 is significant at .05 level, with 11 and 310 degrees of freedom.

Table 15* Stepwise Multiple Regression Analysis of Change in Adoption of Rice Farming Practices on Changes in 11 Independent Variables for Community Development Villages over Five-Year Period (1966-1971).

Independent Variables	R	R ²	R ² Change	Regression		F
				Coefficient	Beta	
<u>C. D. Villages (N=166)</u>						
1. Rationality	.297	.088	.088	.140	.208	7.555*
2. Farm Land Size	.391	.153	.065	.146	.215	7.106*
3. Agent Contact	.426	.181	.028	.102	.150	4.055*
4. Total Income	.436	.190	.009	.167	.108	1.697
5. Social Participation	.440	.194	.003	.052	.041	0.279
6. Anomia	.461	.213	.018	-.219	-.143	3.875*
7. Aspiration	.481	.232	.018	.142	.133	3.335*
8. Benefit	.487	.237	.005	-.068	-.073	0.944
9. Level of Living	.489	.239	.001	.063	.043	0.338
10. Goal	.489	.239	.000	.015	.012	0.028
11. Farm Tools	.489	.239	.000	.011	.007	0.011
				(Constant= .392)		

*F=1.94 is significant at .05 level with 11 and 154 degrees of freedom.

Table 16. Stepwise Multiple Regression Analysis of Change in Adoption of Rice Farming Practices on Changes in 11 Independent Variables for Non-Community Development Villages over Five-Year Period (1966-1971)

Independent Variables	R	R ²	R ² Change	Regression		F
				Coefficient	Beta	
<u>Non-C. D. Villages (N=156)</u>						
1. Social Participation	.260	.068	.068	.310	.233	8.935*
2. Agent Contact	.344	.118	.050	.152	.204	6.558*
3. Rationality	.374	.142	.023	.123	.176	4.525*
4. Total Income	.377	.142	.000	.044	.030	0.131
5. Benefit	.389	.151	.009	-.120	-.124	2.522*
6. Farm Land Size	.389	.152	.000	-.002	-.000	0.000
7. Anomia	.403	.163	.011	.185	.107	1.858
8. Aspiration	.414	.171	.008	-.119	-.092	1.467
9. Goal	.421	.177	.005	-.117	-.080	1.032
10. Farm Tools	.427	.183	.005	.126	.083	1.038
11. Level of Living	.428	.183	.000	-.046	-.030	0.137
(Constant=2.152)						

*F=1.94 is significant at .05 level with 11 and 144 degrees of freedom.

Factor Analysis of 11 Independent Variables

The factor analysis in the present section is performed on the basis of the actual change score for each independent variable. Since the two variables, age and education that were highly loaded on the educational factor in the previous analyses, are eliminated, the number of factors to be extracted is expected to be three in the present factor analysis. The method is same as previously outlined.

As may be seen in Table 17, Factor I shows high loadings on the following variables; 1 (farm land size), 5 (total Income), 6 (farm tools), 7 (level of living) and 10 (rationality). These variables, except rationality, apparently indicate the socio-economic dimension of farm operators.

Factor II shows high loadings on variables 2 (goal), 3 (social participation) and 11 (change agent contact). Although there appears an unexpected variable, goal, Factor II reflects what was previously called the situational dimension of the study area.

Finally, Factor III shows high loadings on variable 8 (anomia) and variable 10 (rationality). Factor III reflects the psychological dimension.

After standardizing each factor score employing the same formula applied in the previous section, the multiple regression analysis was performed.

Table 17. Rotated Factor Matrix of Changes in 11 Independent Variables over Five-Year Period (1966-1971)

Variables	Factor I	Factor II	Factor III
Change in:			
1. Farm Land Size	(.49)	.05	.01
2. Goal	.10	(.37)	-.09
3. Social Participation	.05	(.57)	.13
4. Benefit	.11	.12	.08
5. Total Income	(.64)	.07	.05
6. Farm Tools	(.39)	.12	.02
7. Level of Living	(.43)	.10	-.14
8. Anomia	.07	-.10	(.50)
9. Aspiration	-.04	.14	.20
10. Rationality	(.33)	.21	(-.31)
11. Agent Contact	.12	(.31)	-.10
Eigen Value	2.05	1.26	1.22
% Variance Explained	18.7	11.5	11.0

Multiple Regression Analysis of Change in Adoption of Rice Farming Practices on change in Three Extracted Factors

The final two hypotheses to be tested are that during the five-year period, change in the socio-economic aspect had the strongest explanatory power in accounting for the variance in the change in adoption of rice farming practices in both C. D. and non-C. D. villages.

First of all, as may be seen in Table 18, the three extracted factors in the total sample explain together only 11% of the total variance in the dependent variable. Although the three factors are significantly related to change in adoption of improved rice farming practices, the situational factor appears to be the most important one in explaining the change in the dependent variable over the five-year period.

As revealed in Table 19, change in adoption of improved rice farming practices is explained mostly by change in the socio-economic factor which explains about 12% of 18% of the total variance in the dependent variable for C. D. villages sample. And it is followed by the situational and psychological factor.

On the other hand, in non-C. D. villages, the three extracted factors explain together only 9% of the total variance in the dependent variable. The situational factor is the only significant factor explaining almost all of the explained variance in the dependent variable.

Table 18, Stepwise Multiple Regression Analysis of Change in Adoption of Rice Farming Practices on Changes in Three Extracted Factors for All Villages over Five-Year Period (1966-1971)

Extracted Factors	R	R ²	R ² Change	Regression Coefficient	Beta	F
<u>All Villages (N=322)</u>						
Factor II (Situational)	.260	.068	.068	.322	.218	16.293*
Factor I (Socio-economic)	.320	.102	.034	.251	.188	12.272*
Factor III (Psychological)	.332	.110	.007	-.146	-.089	2.847*
				(Constant= -.006)		

*F=2.60 is significant at .05 level with 3 and 318 degrees of freedom.

Table 19, Stepwise Multiple Regression Analysis of Change in Adoption of Rice Farming Practices on Changes in Three Extracted Factors over Five-Year Period (1966-1971) by Community Development Villages and Non-Community Development Villages

Extracted Factors	R	R ²	R ² Change	Regression		
				Coefficient	Beta	F
<u>C. D. Villages (N=166)</u>						
Factor I (Socio-economic)	.341	.116	.116	.396	.302	17.316*
Factor II (Situational)	.388	.150	.034	.243	.178	6.007*
Factor III (Psychological)	.422	.178	.028	-.265	-.167	5.528*
				(Constant= -.142)		
<u>Non-C. D. Villages (N=156)</u>						
Factor II (Situational)	.284	.080	.080	.427	.266	11.507*
Factor I (Socio-economic)	.298	.089	.008	.123	.092	1.373
Factor III (Psychological)	.298	.089	.000	.004	.002	0.001
				(Constant=.129)		

*F=2.60 is significant at .05 level, with 3 and 162 (for C. D. Villages) and 3 and 153 (for Non-C. D. Villages) degrees of freedom, respectively.

Thus Hypothesis V is not rejected, while Hypothesis VI is rejected.

After all, the analysis of data showed not much dissimilarity between the two types of villages in adoption patterns in the years of 1966 and 1971. This outcome was not unexpected considering the degree of emphasis given by the government on the improvement of rice farming practices in rural Korea.

However, the relatively small amount of the explained variance in the change in adoption of improved rice farming practices was somewhat unexpected. Perhaps, this is mainly due to the small amount of change occurred during the five-year study period in these sample villages.

CHAPTER VII

SUMMARY AND CONCLUSION

This longitudinal study was based on a part of the data collected for a project entitled, "An Evaluation of a Rural Development Program in Korea". This study covered a five-year period, from 1966 to 1971. The data were obtained from a sample of 359 farm operators in 12 selected villages in North Cholla Province, South Korea. Half of the sample villages were Community Development villages (experimental group) and the other half were Non-Community Development villages (control group).

The major purpose of this study was to get an answer to the general question of which aspect of the human factor was most significantly related to the improvement of life conditions, such as improvement of rice farming, in the given rural Korean setting, the 12 selected villages in the study area. The general question was broken down into three specific questions so that it could be operationalized. The three specific questions were; (1) To what extent was each of the selected variables and factors (extracted) related to the adoption of improved rice farming practices at two different points of time, 1966 and 1971? (2) How was the adoption of improved rice farming practices affected due to the change in selected variables and factors (extracted) over the five-year period (1966-1971).

(3) Was there any difference between Community Development villages and non-Community Development villages with respect to questions (1) and (2)? If so? to what extent?

The underlying theoretical frame of reference is that the adoption of improved rice farming practices takes place as a result of joint efforts between individual farmers and government's change agencies. Thus two theories, Action Theory and Theory of Systemic Linkage, were combined in order to explain the adoption behaviour at the system level as well as individual level. From this combined conceptual framework, three factors were derived. The three factors were the socio-economic factor, the socio-psychological factor, and the situational factor and they were statistically confirmed.

Summary of Findings

The Relative Importance of Each Selected Variable to the Adoption of Improved Rice Farming Practices:

In 1966, farm land size, change agent contact, and rationality were the most powerful variables explaining together 32% out of 40% of the total variance in the dependent variable for the C. D. villages sample. In the same year, change agent contact, rationality, and farm land size, in that order, were the most powerful variables explaining together 45% out of 51% of the total variance in the dependent variable for Non-C. D. villages sample.

In 1971, rationality, farm tools and total income were the most important variables in explaining the adoption of improved rice farming practices in C. D. villages. On the other hand, rationality, farm tools and farm land size were the most important variables in non-C. D. villages.

The Relative Importance of Each Extracted Factor to the Adoption of Improved Rice Farming Practices:

In 1966, the situational factor appeared to be the most powerful factor in explaining the adoption of improved rice farming practices in both C. D. villages and non-C. D. villages.

In 1971, the situational factor for C. D. villages sample and the socio-economic factor for non-C. D. villages sample were the most powerful factors explaining more than half of the total explained variance.

Relationship between Change in Adoption of Improved Rice Farming Practices and Changes in Each Selected Variable:

During the five-year period, changes in rationality, farm land size, agent contact, anomia, and aspiration were significantly related to change in adoption of improved rice farming practices in C. D. villages. However, the first three variables explained more than two thirds of the total explained variance in the dependent variable.

In non-C. D. villages, Changes in social participation, agent contact and rationality together explained almost

half of the total explained variance in the dependent variable.

Relationship between Change in Adoption of Improved Rice Farming Practices and Changes in Each Extracted Factor:

Change in the socio-economic factor was the most significant factor in explaining change in the adoption of improved rice farming practices in C. D. villages, while change in the situational factor was the only significant factor in non-C. D. villages. It should be mentioned, however, that the explained variance in the dependent variable was very small.

The findings of this study lead to the following conclusions. As far as the adoption of improved rice farming practices is concerned, those farmers who maintained close relationships with change agents adopted more than those who did not maintain the same close relationships. At the same time, according to the result of this study, not only were those farmers more rational in their farm management, but also they could afford the cost involved in following the new instructions. This latter fact was well evidenced by the highly related variables, farm land size, farm tools, and total income.

However, when the relationship was examined in terms of the extracted factors rather than individual variables, it appears that the government's involvement in the study area to promote rural development is the most influential factor in adopting new rice farming practices in both C. D.

and non-C. D. villages, with the exception of non-C. D. villages in 1971. This seems to indicate that the planned change is comparatively more effective than spontaneous change in improving the living conditions of the Korean peasant villages. This was supported by the fact that the contribution of the psychological factor was really minimal compared to that of the situational and the socio-economic factors.

Finally, there seems to be not much difference between the C. D. villages and non-C. D. villages in terms of the overall relationship pattern between the adoption of improved rice farming practices and selected sociological variables.

Implication of This Study

Theoretical Implication:

Unlike the conventional conceptual framework employed in most adoption studies, which are mainly based on action theory, an analytical framework combining Action Theory and Theory of Systemic Linkage was used in the present study. The combined analytical framework seems to be more comprehensive in explaining the adoption behaviour from the individual and the systemic perspective. In particular, the theory of systemic linkage gives a much clearer understanding of planned change over a period of time such as rural community development.

Also, basing the analysis on factors derived from the combined analytical framework rather than on the basis of individual variables seems to be more appropriate for

this kind of study.

As compared to other factors, the relatively small contribution of the psychological factor to the explained variance in the adoption of improved rice farming practices seems to indicate that farmers' attitudes and motivations, as measured in the present study, have negligible impact on the adoption of new farming method. Assuming the instrument utilized in the present study as adequate one, the result would imply that the psychological approach of development (or modernization) advocated by some social scientists (McClelland, 1961; Hagen, 1962; Inkeles, 1969) is inapplicable in early-stage agricultural setting as is the case in the study area. Apparently, such a finding suggests that the socio-economic and other institutional rearrangement at the system level should precede the attitudinal change at the individual level. Perhaps the psychological factor would play an important role in developmental change only after favorable socio-economic and institutional conditions are provided.

Regarding the longitudinal change, the percentage of the total explained variance in change in adoption of improved rice farming practices is relatively small. It may be speculated that either the statistical method employed for the study was not appropriate one to measure changes over a period of time, or the variables included were not crucial ones to explain change over the study period.

Perhaps the following variables might have been more important for adoption of improved rice farming methods in rural Korea; the reasonable market price of the rice, the ideal weather conditions, the quality of change agents, the easy accessibility of farm supplies such as fertilizer, chemicals, and technical aid at the right time at the reasonable costs, etc. As a matter of fact, individual farmers have not much control over these key variables. Benefits from these key variables can be given to the farmers only through adequate public-policies and efficient administration in dealing with these key variables at the macro-level (Mosher, 1966).

Practical Implications:

As the results of this study indicate, the more farmers maintained close relationships with change agents, the more they adopted the improved rice farming practices. Also the farmers that are well-off economically, more readily adopted the new rice farming practices. Logically, the above two facts lead to the conclusion that the more farmers were economically well-off, the more they maintained close relationships with change agents. As may be seen from the correlation matrix in Appendices B, C, and D, these two variables are relatively highly correlated with each other. Considering the question of who benefitted from the development programs, this study seems to reveal that the economically

well-off farmers benefitted more from the development works by adopting advanced rice farming practices than socially and economically handicapped farmers who could not afford the cost involved. This fact implies that unless the government provides equal opportunity for both poor and rich farmers by the means of financial subsidies and technical aid to the needy farmers, then future development works are likely to end up, not helping the majority of poverty-stricken peasants. This is exactly what Galjart (1971), Harris (1972), and Myint (1972) pointed out in the negative aspects of the green revolution in South-east Asia. Therefore, any planning for rural development, particularly in a peasant society, should seriously take into account the existing gap not only between the rural and urban sector, but also the existing gap between the socially and economically well-off farmers and handicapped farmers even within a same village.

Suggestion for Further Study:

This study dealt with only one aspect of a multi-phase rural development program in the study area at the micro-level. If a more extensive study is undertaken in such a manner that the parallel relationships of different aspects of rural development such as agricultural improvement, living improvement, citizenship training, home-making and so forth, it would be possible to make an overall evaluation

of rural development. Also that kind of study would give some valuable insights into the relationships between the technological aspect of modernization and non-technological aspects of improvements.

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A P P E N D I C E S

Appendix A. Selected Scales and Indices

Aspiration Scale (0-6 points)

	Would favour	Wouldn't favour	Don't know
1. You would have to work at night instead of in the daytime.	<u>(1)**</u>	<u>(0)</u>	<u>(0)</u>
*2. You would have to leave your family for some time.	_____	_____	_____
3. You would have to move around the country a lot.	_____	_____	_____
*4. You would have to leave your village.	_____	_____	_____
5. You would have to give up your spare time.	_____	_____	_____
*6. You would have to leave your relatives.	_____	_____	_____
7. Your children's education would be difficult.	_____	_____	_____
*8. You would have to leave your friends in this village.	_____	_____	_____
9. You would have to work harder than you do now.	_____	_____	_____
10. You would have to work in a factory instead of on a farm.	_____	_____	_____
*11. You would have to keep quiet about your political views.	_____	_____	_____
*12. You would have to keep quiet about your religious views.	_____	_____	_____

Anomia Scale (0-5 points)

	Agree	Disagree	Don't know
1. Nowadays a person has to live pretty much for today and let tomorrow take care of itself.	<u>(1)</u>	<u>(0)</u>	<u>(0)</u>

*This symbol indicates the final inclusion of the item in the scale or index.

**The number in the parenthesis indicates the score assigned to the response.

- | | | | |
|--|-------------|----------------|------------------|
| *2. In spit of what some people say, the lot of the average man is getting worse, not better. | Agree _____ | Disagree _____ | Don't know _____ |
| 3. It is hardly fair to bring children into the world with the way things look for the future. | _____ | _____ | _____ |
| 4. If a man loses his job, he can fall back on his relatives for help. | _____ | _____ | _____ |
| *5. These days a person doesn't really know whom he can count on. | _____ | _____ | _____ |
| 6. There's little use consulting with public officials because often they are not interested in the problems of the farmers. | _____ | _____ | _____ |
| *7. Things have gone usually against me. | _____ | _____ | _____ |
| *8. It takes time even to get a trifling certificate without presenting the money for a pack of cigarettes. | _____ | _____ | _____ |
| *9. Since college diploma does not guarantee a means of livelihood, you need not send your children to college. | _____ | _____ | _____ |

Social participation index

	Member	Office or comm. member	Attended more than $\frac{1}{4}$ of meetings
1. Village Self-Gov't Association	<u>(1)</u>	<u>(3)</u>	<u>(2)</u>
2. Development <u>Kei</u>	_____	_____	_____
3. Young Men's Assn.	_____	_____	_____
4. Agricultural Co-operative	_____	_____	_____
5. Others	_____	_____	_____

Change agent contact index (00-13 points)

(3) Have you visited with the change agent any demonstration farm-house or village?

- (3) Have you attended any demonstration meetings held by him?
- (2) Has he ever visited your farm?
- (2) Have you received from him any letters or bulletins about farming or homemaking?
- (1) Has he ever visited your home?
- (1) Have you consulted with him about your farming or homemaking?
- (1) Have you attended any group meetings called by him?

Rationality Index* (00-27 points)

1. Have your farm soil tested for the past five years?
(3) Yes
(1) No, or don't know
2. Have you ever tried to figure out in detail what your profit was from your farm?
(3) Yes
(1) No, or don't know
3. The percentage of your rice paddy in which recommended rice seedlings were transplanted?
(3) 80% or more
(2) 1% - 79%
(1) 0%
4. Where did you get the rice seeds which you have sown during the past three years?
(3) Own seed-growing plant, O. R. D. or County Extension Office, Agri. Coop., demonstration field or seed-growing field.
(1) At own home, from relatives, neighbours, etc.
5. The knowledge about the use of mercurone.
(3) Right and perfect understanding.
(2) Partial understanding
(1) Confused, wrong or no understanding
6. How or on what grounds did you decide the kind and the quantity of fertilizer to apply to your rice last year?
(3) According to the results of soil test; guidance of Agri. Extension Service; "trial and error" method of a fairly scientific nature; the records of the application of fertilizer etc.

*Relatively strong correlation with the adoption of rice farming practices is expected because of some overlapping items.

- (2) On the basis of general knowledge or experience; informations obtained through mass media, relatives, and friends, etc.
- (1) Apply the same amount every year; don't know; use the quantity stocked at home.
7. Do you intend to apply agricultural lime to your upland, if it needs it?
- (3) Yes
- (1) No, or don't know, or undecided
8. Have you ever kept the following books or documents in the past three years?
- (3) Household ledger, farm accounts or diary, wage book.
- (2) Tax receipts
- (1) No
9. With whom do you mainly consult about what you do not know well in your farming?
- (3) O. R. D. officials or extension agents, other change agents, and agri. school.
- (2) Village leader and innovators, study by himself.
- (1) Neighbors, relatives, family members and get along somehow.

Goal-clarity index (0-9 points)

"What would you want to do for your family, your farm, and your village within the next five years?"

	very clear	clear	not clear
1. For family _____	<u>(3)</u>	<u>(2)</u>	<u>(1)</u>
2. For farm _____	_____	_____	_____
3. For village _____	_____	_____	_____

Development works benefit index (00-19)

"There must have been various development projects carried out in this village up to now. Was there any direct or personal benefit from such projects?"

1. Production projects _____
2. Public works construction _____
3. Health and sanitation _____
4. Improvement of living conditions _____

Farm tool scale (0-7 points)

1. _____ *sprayer (power or manual)
2. _____ straw-bag machine
3. _____ harrow
4. _____ *ox plow
5. _____ *forage chopper
6. _____ *pitch-fork
7. _____ *transplanting string for rice
8. _____ flail
9. _____ pickax
10. _____ *night-soil container
11. _____ *digging fork (traditional)

Level of living scale (0-7 points)

1. _____ camera
2. _____ hanging picture
3. _____ folding screen
4. _____ *bicycle
5. _____ amp
6. _____ *radio
7. _____ hand bag
8. _____ *sewing machine
9. _____ picture frame
10. _____ flash light
11. _____ *clock or watch
12. _____ *study table
13. _____ fountain-pen
14. _____ *abacus
15. _____ *photo frame

Appendix B. Correlation (r) Matrix of Selected Variables for All Villages in 1966

	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Rice†	-.092*	.168*	.439*	.086	.316*	.270*	.407*	.345*	.297*	-.190*	.015	.428*	.443*
2. Age		-.452*	.044	-.239*	-.201*	.003	.011	.171*	.095*	.076	-.135*	-.177*	-.070
3. Education			.351*	.361*	.288*	.047	.402*	.100*	.401*	-.028	.084	.321*	.186*
4. Farm Land Size				.271*	.252*	.321*	.765*	.507*	.582*	.025	-.076	.284*	.225*
5. Goal					.298*	.165*	.304*	.119*	.207*	.023	.024	.237*	.226*
6. Social Participation						.271*	.310*	.270*	.249*	-.140*	.060	.352*	.442*
7. Benefit							.327*	.205*	.204*	-.080	.044	.180*	.268*
8. Total Income								.456*	.656*	.009	-.040	.427*	.253*
9. Farm Tools									.453*	-.031	-.102*	.209*	.224*
10. Level of Living									-.040	-.082	.325*	.197*	
11. Anomia										.090	-.238*	-.281*	
12. Aspiration											-.003	.052	.399*
13. Rationality													
14. Agent Contact													

* P < .05 or less.

† Adoption of rice farming practices.

Appendix C. Correlation (r) Matrix of Selected Variables for All Villages in 1971

	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Rice†	-.046	.089	.261*	.010	.244*	.196*	.223*	.358*	.182**	.137*	.063	.534*	.326*
2. Age		-.444**	-.092**	-.230**	-.324**	-.063	-.070	.072	.024	-.005	-.316**	.146**	-.235*
3. Education			.342*	.188*	.172**	-.079	.398*	.116*	.356**	-.013	.123*	.177*	.303*
4. Farm Land Size				.253*	.168**	-.050	.702*	.468*	.452**	-.015	.011	.386*	.248*
5. Goal					.272**	.051	.239**	.007	.178**	-.058	.133*	.129*	.155*
6. Social Participation						.417*	.155*	.229*	.125**	-.201*	.131*	.352*	.416*
7. Benefit							-.041	.202**	-.038	-.140*	.007	.227*	.311*
8. Total Income								.492*	.570**	-.017	.055	.426*	.277*
9. Farm Tools									.438**	-.115**	.047	.317*	.268*
10. Level of Living										-.023	.042	.319*	.159*
11. Anomia											.121*	.166**	.098*
12. Aspiration												.023	.039
13. Rationality													.434*
14. Agent Contact													

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* P < .05 or less.
 † Adoption of rice farming practices.

Appendix D. Correlation Matrix of Changes in Selected Variables for All Villages

	2	3	4	5	6	7	8	9	10	11	12
1. Rice ⁺	.175*	.068	.196*	-.066	.168*	.116*	.100*	-.058	.018	.252*	.237*
2. Farm Land Size		.058	.123*	.069	.368*	.185*	.153*	.056	-.067	.079	.088
3. Goal			.225*	-.028	.120*	.086	.093*	-.072	.011	.145*	.116*
4. Social Participation				.122*	.068	.105*	.101*	-.012	.125*	.064	.163*
5. Benefit					.053	.016	.014	.088	-.018	.095*	.071
6. Total Income						.200*	.233*	.087	.026	.249*	.098*
7. Farm Tools							.269*	.039	.013	.094*	.059
8. Level of Living								-.074	-.036	.153*	.064
9. Anomia									.079	-.164*	-.060
10. Aspiration										-.042	.033
11. Rationality											.186*
12. Agent Contact											

* P < .05 or less.

+ Change in adoption of rice farming practices.