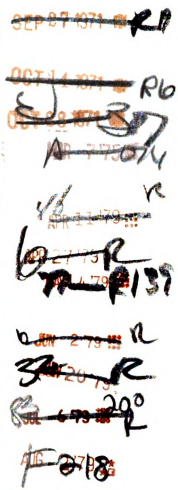
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ABSTRACT

HIGH SCHOOLS AND VOCATIONAL AGRICULTURE SCHOOLS:
A COMPARISON OF THE FARMER-PERFORMANCES
OF THEIR SENIOR GRADUATES IN TAIWAN

By

William Leslie Thuemmel

Problem.--Vocational education in agriculture at the secondary level has received much emphasis in Taiwan, especially since World War II. One of the major objectives of vocational agriculture in Taiwan has been to train prospective farmers for proficiency in farming. However, in contrast to the large volume of research conducted in the United States measuring the relationship of vocational agriculture to farmer-performance, no such investigation has been conducted in Taiwan even though a significant percentage of their secondary school graduates are presently farming.

Purpose.--The purpose of the study was to provide a comparative analysis of the farmer-performances of two kinds of middle (secondary) school senior graduates in Taiwan. Several comparisons were made of the senior graduates from the high schools with the senior graduates from the vocational agriculture (V-A) schools.

Background.--Several studies conducted in the United States, and some conducted in Taiwan, were reviewed to provide the foundation for this study. Also included was a comprehensive description of Taiwan--its general features and agricultural development, its farmers and agricultural organizations, and its educational system.

Method.--The population studied included all 1950, 1955, and 1959 male senior graduates, of high schools and V-A schools located within a five-hsien area of west-central Taiwan, who were classified as operators of family farms during 1967 and whose farms were located within the boundaries of the survey area. This population was identified through two steps: First, a multiple-stage, stratified sampling procedure was used to select graduates from all the graduates for the three designated years; second, those graduates who were operators of family farms were identified and became the 215 members for the study (203 graduates--46 from high schools and 157 from V-A schools--were interviewed). A comprehensive interview schedule was developed in Taiwan and was administered by eleven senior students who were majoring in agricultural education at Taiwan Provincial Chung Hsing University. Farming performance factors were calculated and interview schedule raw score data were processed.

Analysis.--Analysis of data involved the preparation of frequency tables and computation of chi square values. Contingency tables were computed and analyzed to

determine the relationship between eleven independent variables and various dependent variables regarding the graduates' personal and farm characteristics, farming performances, participation in formal organizations, and perceptions and opinions about schooling for prospective farmers. However, only data concerning two independent variables--kind of schooling, and in some instances, kind and type (provincial or hsien/city) of schooling--were reported in tabular form in this study.

Findings.--Of the thirty-five general information and farmer-performance variables for which contingency tables were computed, analyzed and presented, only three were found to be related to the kind of schooling completed by the graduate. Directional interpretations of the three significant relationships revealed that: (1) agriculture was the occupation of the parent, at the time the graduate entered senior middle school, for a greater percentage of V-A school graduates than of high school graduates; (2) a higher percentage of wives of high school graduates than of V-A school graduates completed nine or more years of schooling; and (3) high school graduates had higher livestock sales per farm during 1967 than did V-A school graduates.

Significant relationships occurred more frequently when kind and type of schooling, rather than just kind of schooling was used in the chi square computations. Furthermore, a pattern evolved among the four groups of graduates

(grouped by kind and type of schooling) with the provincial high school graduates tending to hold the most favorable position, in respect to the related variable, while the hsien/city V-A graduates usually held the least favorable position.

The relationships between both farming performance and kind of schooling, and participation in formal organizations and kind of schooling were found to be not significant at the $p \leq .05$ level. These findings led to the rejection of two hypotheses. Evidence which resulted in the support of two hypotheses was manifested in two findings. First, it was found that V-A schools were a greater continuing source of farm information and/or assistance to their graduates on farming problems than were the high schools to their graduates. However, V-A schools ranked considerably lower than several other sources. Second, it was observed that a greater percentage of V-A school graduates, than of high school graduates, perceived their kind and level of middle school education as being most appropriate for prospective farmers. The opinions of the high school and V-A school graduates were secured in regard to the school program which they had completed and its relevance to farming. Most of the graduates were of the opinion that their courses had been too theoretical and that not enough time had been spent in the laboratory or field. Over 80 per cent of the V-A school graduates

agreed that V-A schools should have offered classes to farmers.

Conclusions and Recommendations.--More similarities than differences were found to exist between high school and V-A school graduates in Taiwan. Even though their farmer-performances were the same, the larger number and proportion of V-A school graduates engaged in farming led to the conclusion that V-A schools had the greater potential for contributions to agriculture at the local and hsien levels. Recommendations included: (1) a re-evaluation of objectives for V-A school programs; (2) the establishment of post-middle school farm management training programs; (3) the establishment of a V-A school advisory committee at the provincial level; (4) that continued emphasis be directed toward phasing out the single program vocational school; and (5) that all senior middle school programs be brought under one type of administration as soon as possible.

HIGH SCHOOLS AND VOCATIONAL AGRICULTURE SCHOOLS: A COMPARISON OF THE FARMER-PERFORMANCES OF THEIR SENIOR GRADUATES IN TAIWAN

By

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CHAPTER I

THE PROBLEM

Introduction

Education at various levels is almost universally agreed upon by leaders in developing nations as being essential to long-term development. Most developing countries set an eventual goal of universal secondary education. However, for prospective farmers, differences of opinion exist among development planners and their agencies in developing nations as to what kind of secondary education is most useful.

Secondary schools in Taiwan provide an opportunity to study this question. In Taiwan, the educational system includes both high school programs and vocational agriculture school programs in rural areas.[1] The major points at issue are: In developing countries, should the prospective farmers' secondary schooling consist primarily of the same kind as provided to persons preparing for higher education

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[1]The high schools are academically-oriented, emphasing general education and preparation for higher education; while the vocational agriculture schools offer a specialized curriculum in agriculture, which includes some general education courses, and emphasize preparation for both farming and non-farm agricultural occupations.

or should it incorporate a major emphasis on agricultural technology and practices? In Taiwan, should a young man who is planning to farm after graduation from secondary school, enroll in a high school or in a vocational agriculture school? Which school provides the prospective farmer with more of the competencies needed in farming and rural leadership?

Very little research has been conducted in attempting to determine the effectiveness of various methods of educating prospective farmers in countries other than the United States. According to Wharton, "The general field of vocational agricultural education has been a particularly neglected field for low-income, early-stage agriculture and would profit considerably from research and experimentation."[2]

Vocational education is generally believed to be more expensive per student than general education. (For example, in Taiwan, the reported cost per vocational student is approximately twice the cost per high school student.)[3] Furthermore, vocational education in agriculture

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[2]Clifton R. Wharton, Jr., "The Role of Education in Early-Stage Agriculture," in Education and Economic Development, ed. by C. Arnold Anderson and Mary Jean Bowman (Chicago: Aldine Publishing Company, 1965), p. 219.

[3]The data were calculated from metric statistics for the year 1968 located in the Republic of China, Executive Yuan, Council for International Economic Cooperation and Development, Taiwan Statistical Data Book, 1969 (Taipei: Council for International Economic Cooperation

usually includes more than agricultural technology and farming practices. Allen's main criticism of agricultural schools in less developed countries is that they usually provide pupils with large amounts of information about agriculture, but rarely do they prepare rural youth for the kind of farming which they must practice or mode of life they must follow in order to be successful and happy in later life.[4] In referring to developing countries, Mellor claims that, "In practice, vocational agriculture is rarely effective"[5]

In spite of these criticisms, a sizeable number and percentage of the graduates of secondary schools of agriculture enter farming occupations in developing countries. Chang reported that the percentages of graduates of secondary agricultural schools entering farming in 1959, in three developing countries in Asia, were: Thailand, 13 per cent; Taiwan, 31 per cent; and South Korea, 45 per cent.[6] It is

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and Development, 1969), p. 174 (the Council is hereafter abbreviated CIECD).

[4]H. B. Allen, Rural Reconstruction in Action (Ithaca, N.Y.: Cornell University Press, 1953), pp. 124-25.

[5]John W. Mellor, The Economics of Agricultural Development (Ithaca, N.Y.: Cornell University Press, 1966), p. 353.

[6]C. W. Chang, The Present Status of Agricultural Education Development in Asia and the Far East (Rome: Food and Agricultural Organization of the United Nations, 1961), p. 18.

evident, therefore, that a significant percentage of secondary school graduates in developing countries enter farming either on a part-time or full-time basis. Thus, significant scarce resources are being invested in the secondary education of farmers in developing countries.

General theories for the transformation of agriculture specify investments in human resources. As pointed out by Schultz, in particular, the key to increased agricultural productivity is in the acquisition and effective use of modern factors of production; in almost all cases over the longer run, this requires investments in research and education.[7]

> . . . rapid sustained growth rests heavily on particular investments in farm people related to the new skills and new knowledge that farm people must acquire to succeed at the game of growth from agriculture.[8]

Farmer education, both formal and informal, is required for more productive farm management. Farm operators need to obtain greatly increased technical agricultural knowledge and applicative skills to effectively use large amounts of new technology. Wharton observed that:

> When dealing with agriculture, especially agriculture of the family farm type, the managerial skill of each farmer is the level of technology for that farm. His level of knowledge fundamentally determines the

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[7]Theodore W. Schultz, Transforming Traditional Agriculture (New Haven, Conn.: Yale University Press, 1964), p. 176.

[8]Ibid., p. 177.

> production possibilities. Two farmers given identical resources in all respects but with differing levels of technological knowledge will have different levels of production.[9]

Developing countries can import a great deal of agricultural technology from other nations. However, because the agricultural human resources (usually peasant farmers) of the recipient countries are at such a low level of development, they are likely to be unable to adequately utilize such technology. Those nations must decide how to effectively invest their limited financial resources so as to aid their farm people in effectively using the new technology. Part of this task requires the establishment of priorities, in terms of quantity, quality, and level, in education for prospective farmers.

Need

In Taiwan, vocational education in agriculture (also referred to as vocational agriculture) has received much emphasis, especially since World War II. During the decade 1950-1959, nearly fifteen thousand,[10] or 10.6 per cent of all middle school senior (grade 12) graduates in

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[9]Clifton R. Wharton, Jr., The Role of Farmer Education in Agricultural Growth (New York: Agricultural Development Council, Inc., 1963), p. 9.

[10]Data for the school year 1949-50 were unavailable and are not included in the percentage calculated by the investigator. See Appendix B, Table 55, for additional data, including sources used.

Taiwan were graduates of vocational agriculture programs;[11] or, using another comparison, there were less than five high school senior graduates for each vocational agriculture senior graduate.

It would seem appropriate and prudent, in light of the emphasis given to vocational agriculture, to conduct some form of evaluation as to how well the prescribed objectives of vocational agriculture have been achieved. One of the major objectives of vocational education in agriculture in Taiwan has been, and still is according to the Ministry of Education publications, to train prospective farmers for proficiency in farming. Other major objectives, such as developing rural leadership and establishing the vocational agriculture school as a center of education in the rural community, have also been identified in official documents.[12] However, as is revealed in the succeeding chapter, no investigation known to the researcher has been

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[11]High schools and vocational schools in Taiwan are referred to as middle schools (grades 7-12). Both kinds of middle schools have a junior program (grades 7-9) and a senior program (grades 10-12). This investigation is concerned primarily with the senior (grade 12) graduates of high schools and vocational agriculture schools.

[12]O. Donald Meaders, Educational and Occupational Attainments of Taiwan Vocational Agriculture Graduates (East Lansing: Institute for International Studies, College of Education, Michigan State University, 1966), p. 5; see also Republic of China, Ministry of Education, Secondary Education: Republic of China (Taipei: Ministry of Education, 1964), p. 130 (the Ministry is hereafter abbreviated MOE).

conducted to determine whether or not the farmer-performance of vocational agriculture senior graduates is any different than that of high school senior graduates.

Rationale for Selecting Taiwan for This Study

Taiwan has received much recognition during recent years for its extraordinary, and perhaps unique, agricultural, economic, and human resource development since World War II. Due to Taiwan's outstanding development record, particularly since implementing its land reform program of 1949-53, the United States terminated economic aid to Taiwan in 1965.

Taiwan's agricultural setting has much in common with other southeast Asian countries: a warm humid climate, very small farms (averaging 0.92 hectares, or about 2.3 acres, in size), a very high population density (969 people per square mile),[13] and a labor intensive, rice-oriented, cropping system. Nevertheless, Taiwan has compiled an enviable development record. In the twelve years from 1952 to 1964, Taiwan's population increased at an average compound rate of 3.5 per cent per year.[14] This was one of the highest population growth rates in the world; yet, during

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[13] Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., pp. 5, 30.

[14] Ibid., p. 4.

this same period, Taiwan's total agricultural production increased at an even greater rate of 5.9 per cent per year.[15] This is indeed remarkable when one considers that many less developed countries are burdened with population growth rates which are exceeding their rates of increase in food production.

Concerning the development of Taiwan's rural human resources, one finds that vocational education in agriculture has received much emphasis in the history of Taiwan's agricultural development. Junior high schools, offering instruction to boys in rural areas, were introduced in Taiwan by the Japanese in 1917.[16] Since World War II, vocational agriculture has made a big thrust forward in Taiwan. Meaders reported that, since 1945, the number of vocational agriculture schools has been increased, senior programs have been established, and numerous changes have been made to strengthen agricultural education in Taiwan.[17]

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[15]K. T. Wright, Taiwan's Postwar Agricultural Development, Agricultural Economics Report No. 19 (East Lansing: Department of Agricultural Economics, Michigan State University, October, 1965), pp. 14-15.

[16]John Hsueh-ming Chen, "A Study of Agricultural Education in Taiwan (Formosa)" (unpublished M.S. thesis, Virginia Polytechnic Institute, 1957), p. 71.

[17]O. Donald Meaders, "Descriptions of Agricultural Jobs Most Frequently Held by Taiwan Vocational Agriculture Graduates," Michigan State University, East Lansing, Michigan, March, 1966, p. 1. (Mimeographed.)

Presently, Taiwan is undergoing a rapid transformation from an agricultural to an industrial economy. One of the effects of modernization noted by Gallin was that educational and economic programs are altering the leadership patterns within the traditional Chinese culture of rural Taiwan. High school age students are becoming more independent, both socially and economically.[18]

Taiwan provides a particularly good location for this study because it is one of the few developing countries which has an abundant quantity of unusually accurate demographic, economic, educational, and related data available for research purposes.

Lastly, Taiwan is the site of two major agricultural education studies by Meaders. The first study, conducted in 1962, was a survey of the educational and occupational attainments of nearly five thousand Taiwan vocational agricultural graduates.[19] The researcher's study is not only partially based upon the findings of Meaders' first study, but is actually a part of his second study which was conducted in 1968.[20]

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[18]Bernard Gallin, Hsin Hsing, Taiwan: A Chinese Village in Change (Berkeley: University of California Press, 1966), pp. 277-281.

[19]Meaders, Educational and Occupational Attainments of Taiwan Vocational Agriculture Graduates, op. cit. See pp. 36-37 for a more detailed review of Meaders' 1962 study.

[20]Meaders was the director of the 1968 study entitled, "Education and Development: Contributions of

Purpose

The general purpose of this study is to conduct a comparative analysis of the farmer-performances of two kinds of middle school senior (grade 12) graduates in Taiwan; namely, those of the high schools with those of the vocational agriculture schools.

Specific Objectives

The specific objectives which provide the skeletal structure for this study are listed below:

1. To examine the relationship between kind of middle school education and farming performance.
2. To analyze the personal characteristics of the graduates, especially in regard to the graduates' participation in formal organizations and to their source(s) of information and/or assistance on farming problems.
3. To determine the extent to which the graduates perceive their middle school education as being the most appropriate kind and level of education for prospective farmers.

Agricultural Education at the Secondary Level to Agricultural Development in Taiwan." The researcher's study is the "Farmer Interview Phase" of the aforementioned project. Chapter IV contains a more detailed description of the relationship of this study to that of Meaders.

4. To obtain the opinions of the graduates in regard to selected features of their senior middle school education and its relevance to farming.
5. To draw conclusions and propose recommendations about schooling for prospective farmers.

General Hypotheses

The emphasis given and objectives assigned to vocational agriculture in Taiwan have led to the formation of several general hypotheses regarding farmers who are middle school senior graduates.

1. Farmers who have had a vocational agriculture school education utilize a greater number of improved production and management practices than do high school graduates.
2. Farmers who have had a vocational agriculture school education participate in more formal organizations, and hold more leadership positions in these organizations, than do high school graduates.
3. Vocational agriculture schools are a greater continuing source of information and/or assistance to their graduates on farming problems than are the high schools to their graduates.

4. Vocational agriculture graduates are more likely than high school graduates to perceive their kind and level of middle school education as being most appropriate for prospective farmers.

Scope and Limitations

The sample for this study includes only those farmers who are 1950, 1955, or 1959 senior graduates of either high schools or vocational agriculture schools and who were included in the randomly selected sample for Meaders' 1968 mail questionnaire. Furthermore, the graduate must have indicated that he was engaged in farming, either full- or part-time, at the time he completed the mail questionnaire. Professional farm managers of farms owned by non-relatives or corporate organizations, and farm laborers or technicians were excluded because they were not considered to be bonafide family farm operators. Only farmers who were designated as owner-cultivators, part-owners, or tenants and who farmed within the boundaries of the five-hsien (county) survey area during 1967 were included in the study.

Schools, as social institutions, have certain commonalities regardless of kind of school. One function of all schools is to reinforce the life patterns and values of society. Graduates of different kinds of schools within a common society (rural Taiwan) are likely to

exhibit more similarities than differences in their learned behaviors (farmer-performances). Therefore, one of the limitations to the study is inherent in the very nature of the schooling system--the programs of study within the different schools constitute a minor difference when all other factors are considered.

No evaluation was made of the possible contributions of informal farm experience, extension (adult) education, or elementary and junior middle school education to the senior graduate's farming performance.

Most of the data used in this study were collected "after the fact" through interviews rather than from farm records maintained by the graduates. It is quite likely that some memory bias was introduced in the reporting of information by the graduate for the previous year (1967), especially in regard to crop yields, market weights, rates of fertilizer applications, and related technical data.

The graduate's gross farm income was estimated indirectly by calculating the market value of all farm crops harvested, and all livestock marketed, on the graduate's farm during 1967. The market value data were provided by the Provincial Department of Agriculture and Forestry and the Public Offices of those townships in which the farmers interviewed in this study resided. Off-farm income was not determined in this study.

Assumptions

Three basic assumptions, reported herein, complement the aforementioned scope and limitations and provide additional framework for testing the hypotheses which have been established for this study.

First, it is assumed that the farm practices listed in the Interview Schedule (Appendix F) accurately reflect the best farm management practices for the graduate to have used on his farm during 1967.

Second, the calendar year 1967 is assumed to have been an average year for farmers in the five-hsien survey area since changes in farm production prices, weather conditions, political events, and related factors affecting farmer-performance were generally quite normal.

Third, even though many of the graduates who were interviewed in this study were farmers located in Taiwan's fertile western coastal plain, the investigator assumes that the farmer-performance characteristics which differentiate high school graduates from vocational agriculture school graduates are representative of senior graduates (of the two kinds of schools) who farmed in Taiwan during 1967. Two reasons are cited to substantiate the aforementioned assumption: (1) farmers throughout Taiwan are served by the Farmers' Association, the Public Offices, the public schools, and similar centralized agencies and institutions; and (2) Taiwan enjoys a very diversified agriculture, even

within the five-hsien survey area. Therefore, variables which tend to intervene in a consistant pattern with farmer-performance within the survey area are the same variables which would intervene in a consistant pattern with farmer-performance outside the survey area. Hence, the conclusions drawn from this study are assumed to be applicable to all senior graduates who have graduated during the same year (1950, 1955, or 1959), and who farmed in Taiwan during calendar year 1967.

Definition of Terms

Several terms are defined for use in this study. The researcher has borrowed heavily from the definitions of key terms used by farm management specialists who are familiar with the agriculture of Taiwan. A list of these terms may be found in Appendix A.

Overview

With the problem fully introduced, attention is now directed toward an overview of the remaining five chapters of the study. Chapter II contains a review of related literature, with the focus primarily upon research conducted in the United States, comparing the contributions of different kinds of secondary education to the farmer-performances of their senior graduates. Pertinent research regarding Taiwan is also reviewed.

In Chapter III, additional background for the study is presented in the form of a perspective of the Taiwan setting; its agricultural development, its farmers and agricultural organizations, as well as its educational system and other relevant features which have influenced the design, execution, and results of the investigation.

The research design and data collection aspects of the study are dealt with in Chapter IV. The methodological description concentrates upon the Project Team, the sampling procedures, the instrumentation, and the collection and analysis of data.

Chapter V contains the findings regarding the graduates and their personal characteristics, farms, farmer-performances, and perceptions about kind of education and farming. A summary is presented in the final chapter; in addition, conclusions are drawn, implications are discussed, and recommendations are made.

CHAPTER II

REVIEW OF RELATED LITERATURE

Most of the research comparing the contributions of different kinds of secondary education to the farmer-performances of their senior graduates has been conducted in the United States, primarily at Iowa State University, during the 1950s and early 1960s; although, the relevance of this research, in terms of both results and methods, is difficult to ascertain in the cultural context of a developing country such as Taiwan. The researcher could find no study which compared farmer-performances of high school vocational agriculture graduates with nonvocational agriculture graduates in any country other than the United States. Selected investigations related to the contributions of high school vocational agriculture to farming performance, to participation in formal organizations, and as a source of farm information are reviewed separately, and in the order of year reported. Studies related to vocational agriculture in Taiwan are also reviewed in the aforementioned manner.

Vocational Agriculture and Farming Performance

Unlike most studies conducted in the United States, cooperative investigations conducted by Agan, Donahoo, Gruenwald, and McKimpson at Iowa State College,[1] during 1949-1950, fail to support the hypothesis that instruction in high school vocational agriculture contributes to improved farming performance. The sample, common to all four studies and consisting of farmers enrolled in the veterans' on-farm training program, was divided on the basis of those farmers who had completed one or more years of vocational agriculture and those who lacked such instruction in high school. No significant difference existed when the two groups were compared on their use of selected livestock, crop, and soil management practices. Perhaps the findings of no significant difference are to be expected since the sample consisted of farmers who had served in the armed forces for a number of years between completion of high school and establishment in farming.

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[1]Raymond J. Agan, "Swine Management Practices Used by Participants of the Institutional On-Farm Training Program for Veterans" (unpublished M.S. thesis, Iowa State College, 1950); Alvin H. Donahoo, "Soil Management Practices Used by Participants in the Institutional On-Farm Training Program for Veterans" (unpublished M.S. thesis, Iowa State College, 1949); Ralph W. Gruenwald, "Cropping Practices Used by Veterans Enrolled in Institutional On-Farm Training Program" (unpublished M.S. thesis, Iowa State College, 1950); and, Grendel E. McKimpson, "Approved Practices of Dairy and Beef Cattle Management Used by Participants in the Institutional On-Farm Training for Veterans" (unpublished M.S. thesis, Iowa State College, 1950).

Such an interval between instruction and employment could tend to reduce the effectiveness of one's vocational education.

In a 1952 study, Wilkening investigated the problem of farmer acceptance of improved practices in three rural counties of North Carolina.[2] The sample was selected with the focus upon neighborhood groups of farmers rather than upon farmers selected individually over a wider area. Thus, some representativeness was sacrificed for the sake of gaining a better understanding of group influences upon the acceptance of innovations in farming. The selection of counties, and their subsequent division into neighborhoods, was governed by their possession of farm operator populations with relatively uniform socioeconomic characteristics. A stratified random sampling of the three counties resulted in the selection of eleven neighborhoods. Complete enumeration was made of all male white farm operators (owners and share-tenants), in the selected neighborhoods, who had obtained most of their gross cash income from farming in the year previous to interviewing. A total of 341 farm operators were administered an interview schedule consisting of an index of eleven farm practices applicable to farming in the survey area.[3]

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[2]Eugene A. Wilkening, Acceptance of Improved Farm Practices, North Carolina Agricultural Experiment Station Technical Bulletin No. 98 (Raleigh: North Carolina State College of Agriculture, May, 1952).

[3]Ibid., pp. 6-8.

Wilkening used three different methods to approach the problem of acceptance of innovations in agriculture:

> (1) The analysis of the contacts for information about certain improved practices; (2) the acceptance of improved farm practices as associated with socioeconomic status and other social characteristics of farmers; and (3) the correlation of certain attitudes with acceptance and the analysis of relationalizations for nonacceptance.[4]

It was found that participation in vocational agriculture instruction (either in high school or in the veterans' on-farm training program) was highly associated with the adoption of improved farm practices and with favorable attitudes toward these practices.[5] Unfortunately, this study, unlike the previously discussed Iowa studies, does not separate instruction in high school vocational agriculture from veterans' on-farm training in its design. Therefore, one cannot conclude to what extent each component of the vocational agriculture program (high school or veterans' training) was primarily responsible for influencing the farmer.

During 1954 and 1955, a second series of cooperative studies was conducted at Iowa State College; this time by Archer, Crawford, Miller, and Studt.[6] The purpose of

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[4] Ibid., p. 60. [5] Ibid., pp. 46-49; 55-62.

[6] Beverley B. Archer, "Influence of High School Vocational Agriculture on Participation of Graduates in Organized Groups" (unpublished M.S. thesis, Iowa State College, 1955); Harold R. Crawford, "Influence of High School Vocational Agriculture on Soil Management Practices Followed by Graduates" (unpublished M.S. thesis, Iowa State College, 1955); Jimmy W. Miller, "Influence of High

this series was to determine the influence of high school vocational agriculture on the farm practices followed by their graduates. Archer's study uses "participation in organized groups" as a variable in lieu of "farm practices followed." Therefore, the findings and interpretations of Archer's study are presented in the second section of this chapter.

The common sample for the four studies consisted of 240 high school graduates who were farming at the time of study; 120 were from ten high schools which had offered vocational agriculture since 1941, and 120 were from ten high schools which had not offered vocational agriculture. Each of the graduates from the first-mentioned group had completed three or more years of vocational agriculture. It is interesting to note that in this series of studies veterans enrolled in on-farm training programs were excluded from the sample. Interview schedules were prepared cooperatively and administered by the four researchers.

Crawford, Miller, and Studt, respectively, investigated the use by the two groups of twenty-one soil management practices, twenty-three swine production

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School Vocational Agriculture on Swine Production Practices Followed by Graduates" (unpublished M.S. thesis, Iowa State College, 1954); and Dale M. Studt, "Influence of High School Vocational Agriculture on Corn and Small Grain Production Practices Followed by Graduates" (unpublished M.S. thesis, Iowa State College, 1954).

practices, and twenty corn and small grain practices. Both mean scores and analysis of variance tests were used in the analyses of data. In each study, the investigator reported that the vocational agriculture graduates had higher mean scores on more of the selected practices than did the control group. Thus, the results from this series of studies indicate that the use of improved farming practices is related to high school vocational agriculture.

Ball,[7] in a 1956 Iowa study, measured the influence of high school vocational agriculture on the farm mechanics practices used by farmers enrolled in the veterans' on-farm training program. A farm mechanics schedule was prepared and administered to veterans enrolled in forty-six classes selected at random throughout Iowa. The sample, which consisted of 357 high school graduates who were farming at the time of the study, was selected from approximately 1,100 veterans enrolled in the forty-six classes. Of the sample group, 119 were classified as vocational agriculture graduates and 238 as nonvocational agriculture graduates.[8] Responses to fifty-six items

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[7]Wilbur P. Ball, "Influence of High School Vocational Agriculture on Farm Mechanics Practices Used by Participants in the Veterans Farm Training Program" (unpublished Ph.D. dissertation, Iowa State College, 1956).

[8]Nonvocational agriculture graduates refer to graduates of high schools not offering vocational agriculture.

involving farm mechanics activities yielded insufficient evidence to disprove the null hypothesis that there were no differences between vocational agriculture and non-vocational agriculture graduates when no classification was made of the two groups. However, when the graduates were grouped on the basis of present status in farming, former vocational agriculture students were found to be performing a proportionately greater number of recommended farm mechanics activities in certain areas than were former nonvocational agriculture students. The difference was sufficient to disprove the null hypothesis.

The most conclusive evidence in the establishment of a positive relationship between high school vocational agriculture and farming performance is manifested in the findings of the third, and largest, series of cooperative agriculture education studies conducted at Iowa State University. The series, consisting of at least seven studies, was conducted as a part of an Iowa State University Agricultural Experiment Station Project during the period 1956 through 1963. Six graduate students in agricultural education; Bear, Blake, Dakan, Henderson, Kasperbauer, and Nielson,[9] were among those who conducted

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[9]William F. Bear, "Relationship of High School Vocational Agriculture to Mechanical Farm Jobs Performed by Graduates" (unpublished M.S. thesis, Iowa State University of Science and Technology, 1959); Duane L. Blake, "Influence of High School Vocational Agriculture on the Rate of Establishment of Graduates in Farming" (unpublished M.S. thesis, Iowa State College, 1956); Duane L. Blake,

investigations in the cooperative project. The general purpose of the entire series of studies was to determine the relationship of high school vocational agriculture to the establishment of graduates in farming. Due to the closely related purposes and to the similarities in basic design of individual studies within the series, the methods employed and samples interviewed are summarized for the series as a whole.

The population for this series of studies consisted of the graduates of forty-five high schools in north-central and eastern Iowa which had offered vocational agriculture during eleven of the twelve years between 1943 and 1954. These graduates were paired with graduates from comparable schools, in the same farming area, not offering vocational or general agriculture. All data were collected by personal interview. The samples used were randomly drawn, both by school and by graduate, and varied from 120

"Relationship of High School Training in Vocational Agriculture to Subsequent Establishment in Farming and Participation in Organized Groups" (unpublished Ph.D. dissertation, Iowa State University, 1963); Edward E. Dakan, "Influence of High School Vocational Agriculture on Production and Management Practices Used by Graduates" (unpublished M.S. thesis, Iowa State College, 1956); Earl M. Henderson, "Influence of High School Vocational Agriculture on the Establishment of Graduates in Farming" (unpublished M.S. thesis, Iowa State College, 1956); Michael J. Kasperbauer, "Relationship of High School Vocational Agriculture and Military Service to Establishment of Graduates in Farming" (unpublished M.S. thesis, Iowa State College, 1956), and Duane M. Nielsen, "Relationship of High School Vocational Agriculture and Size of Home Farm to Establishment of Graduates in Farming" (unpublished Ph.D. dissertation, Iowa State College, 1958).

male graduates for the Bear and Nielsen studies to 320 for the studies by Blake, Dakan, and Henderson. All farmers included in the samples were graduated from high schools during the 1943 through 1954 years, with equal numbers coming from the first six-year and second six-year periods. In addition to stratifying the samples by period of graduation, the samples were also stratified by farm ownership status of the parents (owner or renter), type of high school training (vocational agriculture or no vocational agriculture), and size of home farm at time of graduation. All graduates in the vocational agriculture groups had completed three or more years of vocational agriculture in high school.

Blake's 1963 study uses "participation in organized groups" as a dependent variable;[10] hence, the findings from his second study in this series are presented in the second section of this chapter. Of the six remaining studies in this series, only Bear's findings fail to establish a strong positive relationship between high school vocational agriculture and farming performance.[11] The data from Bear's study do not indicate that farm mechanics instruction, as provided in high school vocational agriculture, greatly influenced the farm mechanics practices used by their graduates.

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[10]Blake, op. cit.

[11]Bear, op. cit.

Focusing on the positive relationships, Blake,[12] in his 1956 study, found a highly significant difference in the rate of establishment in farming, as measured by size of gross product, in favor of the vocational agriculture graduates. More of the vocational agriculture graduates had attained farmer operator status than had members of the control group. Vocational agriculture graduates were also farming more crop acres than were the latter. Dakan concluded that more vocational agriculture graduates were farming larger acreages than were the members of the control group.[13] Furthermore, vocational agriculture graduates had higher mean scores on twenty-three of the twenty-four production and management practices; five practices were significant at the 1 per cent level and four practices were significant at the 5 per cent level. Henderson found significant differences in favor of vocational agriculture graduates in ten of the twenty-eight size of business comparisons made.[14] A general mean gross product of $7,856 was found for the vocational agriculture groups, as compared to a general mean of $6,354 for the control group. He concluded that high school vocational agriculture had considerable influence upon the extent of establishment in farming.

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[12]Blake, op. cit.

[13]Dakan, op. cit.

[14]Henderson, op. cit.

Kasperbauer reported that vocational agriculture graduates had higher mean livestock, crop, and total gross products, and were better established in farming than were the graduates in the control group.[15] Nielsen's findings tend to reinforce those of the previously mentioned Iowa studies in this series. Nielsen concluded that instruction in high school vocational agriculture and the size of the graduate's home farm, when graduated, are each positively related to the degree to which a graduate becomes established in farming.[16]

Two Missouri studies in 1961, one by James and the other by Lester, tend to support the findings of the multitude of Iowa Studies.[17] James' sample included a stratified random sampling of fifty farmers with three or four years of vocational agriculture and fifty farmers without such instruction. All were high school graduates and full-time farmers in Chariton County. James found that the net farm income for the vocational agriculture group was greater than for the group which had not received such

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[15]Kasperbauer, op. cit.

[16]Nielsen, op. cit., p. 116.

[17]Kenneth E. James, "Influence of Vocational Agriculture on Farming in Chariton County with Implications for Adjustment" (unpublished Ed.D. dissertation, University of Missouri, 1961); and, Herschel T. Lester, Jr., "How Young Men in Missouri Communities Serviced by Vocational Agriculture Start and Progress in Farming" (unpublished Ed.D. dissertation, University of Missouri, 1960).

instruction, even though the total assets and gross sales were larger for the latter group. In addition, use of recommended practices was greater for seven of eight enterprise areas for the farmers who had studied vocational agriculture in high school. Lester,[18] in a study of young farmers in Missouri, concluded that young farmers who had completed four years of high school vocation agriculture had higher farm assets, higher farm net worth, and higher farm income than young farmers who had not studied vocational agriculture or had been enrolled in vocational agriculture for less than four years.

In 1965, O'Kelley and Lester studied the relationship between instruction in high school vocational agriculture and the number of improved practices adopted by farmers in eight counties in Georgia.[19] Information on the number of selected practices adopted for twelve different enterprises was obtained from interviews with 356 randomly-selected farmers. Calculation of chi square values revealed that farmers who had studied vocational agriculture in high school had adopted a significantly larger number of recommended practices in all crop and livestock enterprises

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[18]Lester, op. cit.

[19]G. L. O'Kelley, Jr. and Herschel T. Lester, Jr., A Comparison of Farmers Who Studied Vocational Agriculture in High School and Those Who Did Not in Terms of Their Tendencies to Adopt Improved Farming Practices (Athens: Department of Agricultural Education, University of Georgia, 1965).

than had the farmers who had not studied vocational agriculture in high school.

Thus, in the United States, there is considerable empirical evidence, especially in the more recent studies, that farming performance is related to instruction in high school vocational agriculture.

Vocational Agriculture and Participation in Formal Organizations

Not only do high school graduates who have completed vocational agriculture make greater use of improved farm management practices, but there is also evidence that they participate in more groups and assume more leadership responsibilities than do graduates from high schools not offering vocational agriculture.

Not all of the studies in this section relate to vocational agriculture; studies relating level of education to farmer participation in formal organizations also have been reviewed when their relevance was apparent. With the exception of a recent Taiwan study, no relevant studies have been discovered which involve farmers outside of the United States.

Kaufman in reviewing organizational participation studies completed in the United States prior to his 1949 study, noted that:

> In general, participation in organized activities has been found to increase with education, and with economic status (income and level-of-living indices), and to vary with occupation. Persons between 35 and 65 years of age are described as having higher

participation rates than those younger or older. Great variations are noted among communities.[20]

The findings of Kaufman's study, incidently, were in accord with his prior observations as cited above.

Kaufman conducted his 1949 study to determine the extent to which adults participate in organized activities and to identify selected factors associated with such participation. Particular attention was given to those factors which influence participation of rural, primarily farm, people in organized activities. Participation data and other social characteristics of 2,832 adults from eight Kentucky counties were collected by field interviews.[21] The farm operators in the sample provided information about their professional activities; for example, their use of soil-conserving practices. Two-hundred farmers, in three of the counties surveyed, reported the use of such soil-conserving practices as seeding grass and legumes, and using fertilizers.[22]

Kaufman found that the number of improved practices followed, and awareness of them, were related to participation in organized activities.[23] The farmers who had reported using less than two practices had 109 memberships

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[20]Harold F. Kaufman, "Participation in Organized Activities in Selected Kentucky Localities," Kentucky Agricultural Experiment Station Bulletin 528 (Lexington: University of Kentucky, February, 1949), pp. 4-5.

[21]Ibid., pp. 4, 36. [22]Ibid., pp. 15-17.

[23]Statistically significant at the $p \leq .02$ level.

per 100 persons and 67 per cent of them were members of one or more organizations. In contrast, those who had reported using four or more practices had 195 memberships per 100 persons and 91 per cent had memberships. Kaufman concluded that those farmers who have had the more extensive organizational participation were also the ones more likely to have been aware of and to have followed improved agricultural practices.[24]

Wilkening, in a 1952 study of farmer acceptance of improved practices in North Carolina, found that participation in farm organizations was significantly associated with the acceptance of improved practices. Members of farm organizations had an index of adoption of .40, whereas nonmembers had a median index of .25. Furthermore, farmers who participated in farm organizations were also likely to have had more favorable attitudes toward improved practices, with leaders in those organizations having had the most favorable attitudes. The index of attitudes were .73, .68, and .59, respectively, for officers in farm organizations, members of farm organizations, and nonmembers.[26]

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[24]Kaufman, op. cit., pp. 16-17.

[25]The basic design of Wilkening's study was reviewed on pp. 19-20.

[26]Wilkening, op. cit., p. 46.

Archer,[27] in one of the cooperative studies conducted in Iowa in 1955, measured farming participation in twenty-seven organized groups commonly found in rural communities. Data obtained from 240 farmer interviews led Archer to conclude that high school graduates, who were formerly enrolled in vocational agriculture, participated in more farm organizations and held a significantly greater number of leadership positions than had graduates of high schools not offering vocational agriculture.[28]

Nielsen,[29] in a 1958 Iowa study, used "participation of graduates in organizations" as a minor variable. Using a sample of 120 farmers and 20 organizations, Nielsen found that the vocational agriculture graduates had a higher mean index of participation than had the control group; however, unlike Archer's findings, the difference was not found to be significant.[30] Differences in sample size, and in numbers of organizations involved, may explain the difference in findings between the two studies.

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[27]The basic design of Archer's study was reviewed on pp. 20-21.

[28]Statistically significant at the $p \leq .01$ level.

[29]The basic design of Nielsen's study was reviewed on pp. 23-27.

[30]Nielsen, op. cit., pp. 88-90.

In his 1961 study of farmers in Chariton County, Missouri, James found that the vocational agriculture group had a higher percentage of farmers with membership in nine of ten farm organizations than did the control group.[31]

Blake,[32] in a more recent Iowa study, investigated the relationship of high school vocational agriculture to participation in organized groups and establishment in farming. The sample consisted of 320 high school graduates who had farmed in 1955. The original personal interview data, obtained for Blake's 1956 investigation, were reanalyzed and used again for his 1963 study.[33] In the latter study, Blake reported that the total mean participation scores, for all twenty selected organizations combined, revealed a more positive relationship for the vocational agriculture graduates than for the control group when related with farming status, farm management practices used, and type of records used.[34]

One study is available for Taiwan. Lionberger and Chang, in a recent study of Taiwan farmers, investigated the sources and channels of scientific farm information used by farmers in their decisions to adopt new

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[31]The basic design of James' study was reviewed on pp. 27-28.

[32]The basic design of Blake's study was reviewed on pp. 23-26.

[33]Blake, op. cit., pp. 43-45; 202-203.

[34]Ibid., pp. 214-216.

farm practices in two agricultural villages located in one of the best farming areas of Taiwan.[35] The primary focus was upon interpersonal patterns of communication and influence which necessitated the selection of relatively self-contained sociological units--in this case, villages. Therefore, as in Wilkening's 1952 study of North Carolina neighborhoods, some representativeness was sacrificed for a better understanding of group influences. A total of 396 farm operators were interviewed in Shangfung, an economically advantaged village; and in Luipao, an economically disadvantaged village. Information was obtained which measured farmer participation in extension activities and social groups.[36] The data revealed that the median scores for the farmers of Shangfung exceeded those for the farmers of Luipao in years of schooling completed, percentage of new farm practices adopted, and social participation in formal groups.[37] Unfortunately, no statistical analysis was conducted to determine the levels of significance of the differences between the two villages on the three variables.

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[35]Herbert F. Lionberger and H. C. Chang, Communication and Use of Scientific Farm Information by Farmers in Two Taiwan Agricultural Villages, Missouri Agricultural Experiment Station Research Bulletin 940 (Columbia: University of Missouri, May, 1968), p. 3.

[36]Ibid., pp. 6, 8. [37]Ibid., pp. 10, 24, 64.

It can be concluded from the empirical evidence presented that farmer participation in formal organizations in the United States is related to instruction in high school vocational agriculture. Furthermore, it appears that use of improved farming practices, level of income, level of living, farming status, and even kinds of records used are related to farmer participation in formal groups. Data from the Lionberger and Chang study suggest that similar relationships may occur with farmers in Taiwan. However, no information relating the aforementioned variables to vocational agriculture was reported in their study.

The Vocational Agriculture School as a Source of Farm Information

Unlike the two previous review section topics, few studies appear to have been made which compare the vocational agriculture department, or teacher, as a source of farm information and/or assistance to farmers with other agencies or individuals in the community. Nevertheless, four relevant major studies have been located and are reviewed henceforth.

One of the objectives of Wilkening's 1952 study of farmer acceptance of improved practices in three rural counties of North Carolina was to conduct an analysis of the contacts for information used by farmers.[38] Data were

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[38]Wilkening, op. cit., p. 11.

collected in respect to where the farmers had obtained most information and some information about each of eight selected practices. Information sources or contacts were grouped by type into fourteen different categories. It was found that "vocational agriculture"[39] accounted for 10.8 per cent of the total "most information" contacts reported by the farmers and was exceeded in importance only by "other farmers," which accounted for 47.4 per cent of the total contacts. An analysis of total "some information" contacts revealed that "vocational agriculture" accounted for only 8.0 per cent of the total and ranked below "other farmers," "radio programs," "farm journals," and "extension service," as an important contact.[40]

Wilkening noted that the types of contacts used for information are associated with the socioeconomic status of the farmer. Furthermore, access to sources of information may be limited by such factors as physical isolation of the farm or the absence of vocational agriculture instruction in the local high school.[41]

Meaders, in a 1962 study of the educational and occupational attainments of vocational agriculture

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[39]"Vocational agriculture" was one of the fourteen categories of information sources; such contacts as vocational agriculture or veterans' classes, or vocational agriculture teacher were included in this category.

[40]Wilkening, op. cit., p. 64.

[41]Ibid., pp. 25-26.

graduates in Taiwan, included questions in his survey instrument which related to the sources of information and help on farming problems of those graduates who were engaged in farming. Eleven possible sources of information were listed, including government agencies, mass media, educational institutions and quasi-government groups. Vocational agriculture schools ranked fifth, among the eleven sources of information, based on the percentage of the 2,662 graduates engaged in farming who reported they "frequently" secured information and/or help from that source. Meaders found that,

> About 17 per cent of the graduates engaged in farming reported they "frequently" received assistance on farming problems from the vocational agriculture schools while 31 per cent reported they "never" received such assistance.

The vocational agriculture school was identified more frequently by farm laborers (especially by those in the low-income bracket) than by farm owners, as a source of assistance on farming problems.[42]

Six years later, Meaders conducted a second study of middle school graduates in Taiwan. The more recent investigation surveyed the same vocational agriculture graduates who responded in the 1962 study as well as graduates of 1964; and, in addition, obtained comparable data from high school graduates from the same years of

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[42]Meaders, Educational and Occupational Attainments of Taiwan Vocational Agriculture Graduates, op. cit., pp. 38-40.

graduation as were represented by the vocational agriculture graduates. Only senior graduates of high schools or vocational agriculture schools were included in the 1968 study. Fourteen possible sources of information and/or help on farming problems were listed in the mail questionnaires. A rank ordering of the "frequently" used sources of information, based on the combined responses of 4,561 graduates revealed that vocational agriculture schools ranked ninth as a source.[43] The vocational agriculture graduates listed the vocational agriculture school as a source of information and/or help much more frequently than did the high school graduates, while the latter selected "agricultural colleges and agricultural institutes" as a source of assistance much more frequently than did the former. Other than the two aforementioned exceptions, practically no difference was noted in the extent to which the two kinds of graduates identified with the various sources.[44]

In their recent study of farm information dissemination systems in rural Taiwan, Lionberger and Chang analyzed the information sources and channels used

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[43] O. Donald Meaders, Contributions of Senior Middle School Graduates to Taiwan Agricultural Development (East Lansing: Institute for International Studies, Department of Secondary Education and Curriculum, Michigan State University, December, 1968), pp. 72-77.

[44] Ibid., p. 81

by farmers in two agricultural villages--Shangfung, economically advantaged; and Luipao, economically disadvantaged. Farm operators in each village were asked whether or not they had obtained farm information from a list of thirteen sources. The vocational agriculture school was reported to have been used as a source of farm information during the previous year by 10.1 per cent of the 237 Shangfung farmers and by 4.4 per cent of the 159 Luipao farmers. In both villages, the vocational agriculture school ranked eleventh as a source of farm information when compared to other listed sources on the basis of the percentage of farm operators who had reported to have used it as a source at least once during the previous year.[45]

Lionberger and Chang also asked the farm operators to indicate the source of farm information "used most frequently" and also the source considered "most influential" in helping them to decide to use specific practices. Shangfung farmers rated the farmers' association extension advisor as the source both "used most frequently" and "most influential," while Luipao farmers rated "other farmers" as the source "used most frequently" and the farmers' association extension advisor as the source "most influential." The findings emphasize

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[45]Lionberger and Chang, op. cit., pp. 30-32.

the high reliance farmers placed on extension sources and channels for obtaining farm information.[46]

The findings from the studies reviewed in this section indicate that the vocational agriculture school is a comparatively minor source of farm information for farmers in Taiwan and in the United States. Some evidence was presented which indicated that, in Taiwan, farmers with a low socioeconomic status depended more on the vocational agriculture school as a source of assistance on farming problems than did farmers with a high socio-economic status. In both Taiwan and the United States, "other farmers" are usually cited as a frequent source of information. As the socioeconomic status of the farmer increases, the less likely he is to depend upon other farmers for information and the more likely he is to depend upon agricultural agencies, especially the extension service.[47]

Studies Relevant to Vocational Agriculture in Taiwan

Many trends have been noted in the development of Taiwan. The kinds and levels of competencies needed by farmers is changing as agricultural technology increases.

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[46] Ibid.

[47] Wilkening, op. cit., p. 27; however, similar observations have been reported by Lionberger and Chang, and Meaders.

The impact of the rapid, modernization of Taiwan's traditional agricultural economy has brought about important and rather rapid socioeconomic changes. As a result, many changes have been made in Taiwan's educational programs in attempting to cope with the problems which accompany rapid development. The research reviewed in this section reflects some of the progress, and a few of the problems, affecting secondary education in general, and vocational agriculture in particular, in Taiwan.

In a 1957 investigation, Chen utilized government documents and publications, personal interviews, and his own professional observations to determine the existing status of agricultural education in Taiwan. Weaknesses in the island's vocational education programs in agriculture were identified as follows: (1) the vocational agriculture curricula were organized on a technical subject matter basis following the college pattern; (2) the vocational agriculture teachers were agricultural college graduates, but they had had no special teacher preparation; (3) the courses generally had an academic, rather than their intended vocational, orientation; (4) the available facilities were inadequate for vocational agriculture; and (5) the vocational agriculture training was not meeting local community requirements.[48] Chen recommended changes to correct the alleged deficiencies.

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[48]John Hsueh-ming Chen, op. cit., pp. 77-79.

Meaders, in his 1962 study referred to previously, measured the educational and occupational attainments of Taiwan vocational agriculture graduates. Data were collected on mail questionnaires from a stratified random sampling of 13,442 graduates of the years 1950, 1955, and 1959. The net sample consisted of 4,809 of the graduates for these three years; of which, approximately 30 per cent were employed in farming vocations as farmers, farm managers, farm foremen, or farm laborers.[49] Meaders did not include high school graduates in this study.

Three relevant conclusions from Meaders' study are: (1) secondary vocational agriculture programs have provided many persons in Taiwan with sufficient technical training to allow them to enter many occupations in addition to farming; (2) the program, curricula, and courses of study in the senior vocational agriculture schools should continue to strengthen school-community relationships; and (3) many of the vocational agriculture school graduates now look to the vocational agriculture schools for leadership in changing agriculture practices.[50]

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[49]Meaders, Educational and Occupational Attainments of Taiwan Vocational Agriculture Graduates, op. cit., pp. 6, 32, 84.

[50]Ibid., pp. 64-66.

A major conclusion by Foster, in 1963, was that education in the Republic of China (Taiwan) was not being utilized effectively as a primary instrument for achieving national economic goals.[51] This study focused on the role of vocational industrial education rather than vocational education in agriculture. Foster recommended the formation of a national organization charged with conducting pertinent manpower training research at the national, provincial, and local levels.[52]

Apparently by coincidence, three independent historical-analytical doctoral studies of Taiwan's educational development between 1945 and 1963 were conducted in the United States during 1964. Lee and Wu each examined the status of educational development in general;[53] whereas, Tzeng traced the development of

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[51]Donald M. Foster, Education as an Instrument of National Policy and Economic Development in the Republic of China, Phase I of Education as an Instrument of National Policy in Selected Newly Developing Nations, edited by Paul R. Hanna, Cooperative Research Project No. 1032 (Stanford, California: Comparative Education Center, School of Education, Stanford University, 1963), p. 89.

[52]Ibid., p. 94.

[53]Hwa-wei Lee, "Educational Development in Taiwan Under the Nationalist Government, 1945-1962" (unpublished Ph.D. dissertation, University of Pittsburgh, 1964); and Ping-lin Wu, "The Development of Taiwan Education From 1945 to 1962" (unpublished Ed.D. dissertation, New York University, 1964).

vocational education in agriculture in Taiwan from 1945 to 1963.[54]

Tzeng, like Chen in 1957, was critical of the evolutionary trend of vocational agriculture since World War II. He concluded that vocational agriculture in Taiwan has been largely dysfunctional in terms of the real needs of both students and the nation, and that the existing rigid regulations of the vocational agriculture system are a remnant of an old, undemocratic, traditional one which fits the student primarily for employment in government agencies. Tzeng's recommendations for improvement were similar to those of Chen and Meaders; however, Tzeng recommended short-term classes for young and adult farmers to help them adopt modern mechanized techniques.

Lee placed the 1964 status of education in Taiwan in historical perspective and revealed that considerable progress had been achieved in the province's educational development during the years 1945-1962. Both quantitative and qualitative evidence was cited to support his conclusion; including the fact that vocational education in agriculture, like other components in the educational program, has undergone improvements in curriculum,

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[54]Jenn Tzeng, "Taiwan Vocational Education in Agriculture, 1945-1963 (Research Project No. 1)" (unpublished Ed.D. dissertation, Colorado State College, 1964).

teaching methods, facilities and equipment, and in teacher preparation.[55] Lee acknowledged that, despite the improvements noted, many difficulties have been encountered: (1) high population growth rates and proportionately large school-age population, (2) defense budget outweighing educational budget, (3) increased demand for more and better education, (4) shortage of teachers, (5) the traditional preference for literary rather than vocational and technical training, and for public and government services rather than productive occupations, and (6) the political problems between the two "Chinas."[56] Several generalizations, regarding the future course of educational development in Taiwan, were presented in Lee's conclusions.

The purpose, methodology employed, and conclusions drawn in the 1964 study by Wu were similar to those contained in Lee's investigation.[57]

Meaders conducted his 1968 investigation to determine the contributions of vocational agriculture at

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[55]Lee, op. cit., pp. 174, 303-306.

[56]Ibid., pp. 306-308.

[57]Wu, op. cit.

the secondary level in Taiwan to agricultural development.[58] The occupational and educational attainments of 2,238 senior graduates from high schools and 2,323 senior graduates from vocational agriculture schools were compared. The sample included graduates from 1950, 1955, 1958, and 1964. Emphasis was placed on graduates employed in farming and other agricultural occupations. An analysis of data, regarding "present main job" at the time of survey, revealed that nearly 34 per cent of the vocational agriculture school senior graduates and slightly more than 6 per cent of the high school senior graduates were employed in agricultural occupations (including farming); while, about 10 per cent of the vocational agriculture graduates and 2 per cent of the high school graduates were engaged mainly in farming.[59] In both cases, disregarding year of graduation, the vocational agriculture school graduate maintained at least a 5:1 ratio over the high school graduate when compared on the basis of percentage of graduates employed primarily in agriculture.

Meaders concluded that: (1) both the high schools and vocational agriculture schools have made many positive

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[58]Meaders, Contributions of Senior Middle School Graduates to Taiwan Agricultural Development, op. cit., p. 1.

[59]Ibid., pp. 38, 44-45, 55. These percentages, unlike Meaders' data from which they are calculated, disregard year of graduation.

contributions to agricultural development in Taiwan since 1945; (2) the most significant contribution of the high schools in this respect has been through their graduates who have pursued college degrees in agriculture and who have worked as teachers and researchers in the agricultural field; and (3) the number of vocational agriculture schools and their wide dispersion in rural areas, combined with extensive public transportation facilities, have enabled many rural youth to acquire a senior middle school education.[60]

Recommendations by Meaders for improvement of Taiwan's vocational agricultural schools included: introduction of an area vocational school concept, increased emphasis on the application of knowledge and development of practical skills, expansion of post-middle school agricultural technician programs, and a redirection of the vocational agriculture school curricula focusing on the development of competencies needed to enter and advance in clusters of occupations.[61]

A recurrent theme noted in the findings and conclusions presented in this section is that vocational agriculture schools, and to a lesser extent, high schools, have indirectly contributed to farming performance, in Taiwan, by preparing large numbers of technically competent personnel for planning and implementing

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[60] Ibid., pp. 87-91. [61] Ibid.

agricultural improvement programs. Many senior graduates with training in the agricultural sciences are employed in agricultural, as well as non-agricultural, positions as professionals, semi-professionals, technicians, and specialists, in private as well as in governmental enterprises and organizations. This reservoir of agriculturally-trained personnel has provided the human resources needed to bring about a modernization of the various institutions serving farmers; thus, enhancing the farmers' opportunities to respond to socioeconomic incentives.

Little evidence, however, was presented which indicated that vocational agriculture schools in Taiwan have contributed directly to the farming performance of their senior graduates. Vocational agriculture schools in Taiwan appear to be "agriculturally" oriented, but this orientation has been criticized for being more "academic" than "vocational." The findings further indicate that the vocational agriculture schools need to develop their senior programs to better meet the needs of the local communities; particularly in respect to farmer education.

Summary

Research in the United States revealed that both farming performance and farmer participation in formal organizations are related to instruction in high school vocational agriculture. High school graduates who had

completed three or more years of vocational agriculture made greater use of improved management practices, participated in more groups, and assumed more leadership responsibilities than did graduates from high schools not offering vocational agriculture. Furthermore, the use of improved farming practices, level of income, level of living, farming status, and kinds of records used are associated with farmer participation in formal groups. Similar relationships were noted in a Taiwan study; although, vocational agriculture was excluded from the latter analysis. No previous study was located which compared farmer-performances of high school graduates who have had vocational agriculture with those who have not had vocational agriculture, in any country other than the United States.

Studies indicate that the vocational agriculture school (or department), in both Taiwan and the United States, is a relatively minor source of information to farmers; while, the category "other farmers" is usually cited as a frequent source of information. When seeking farm information, farmers with high socioeconomic status tend to rely more upon agricultural agencies, especially the extension service, and less upon "other farmers," than do farmers with lower socioeconomic status.

Investigations of vocational agriculture in Taiwan have indicated that vocational agricultural middle schools

have provided a large number of agriculturally-trained senior graduates to staff the extensive network of enterprises and organizations, both governmental and private, which have played a key role in the agricultural development of Taiwan. It was generally recommended that the vocational agriculture schools should increase their emphasis on application of knowledge and development of practical skills for their senior graduates; in addition, the curricula should be redirected to better meet the needs of the local farming communities. The fact that no apparent investigation has been conducted to measure the relationship between vocational agriculture middle school education and the farmer-performance of their senior graduates, points to a major shortcoming in the existing body of research on vocational agriculture in Taiwan.

CHAPTER III

THE SETTING IN PERSPECTIVE

Farmer performance is a complex phenomenon to measure especially when conducting research outside of one's native culture. Association of various factors with farmer performance can be measured, but cause-effect relationships cannot be positively determined regardless of one's statistical finesse. Many factors, other than kind of secondary education completed, contribute to farmer performance; however, these factors cannot be controlled unless they are first understood within their cultural context.

The research design of any investigation which involves people and their institutions must be adapted to fit the characteristics of the cultures involved. Most of the studies reviewed in the previous chapter were designed for, and conducted in, the United States. The purpose of this chapter is to present an overview of Taiwan; its agricultural development, its farmers and agricultural organizations, as well as its educational system and other relevant features which have influenced the design, execution, and results of this study. Breadth of coverage, rather than depth in any particular area, is of prime

essence; hence, the numerous sub-topics presented are summary in nature and serve to introduce Taiwan to the reviewer, as well as providing a holistic framework for interpreting the results of the study.

Orientation to Taiwan

Taiwan, also known as "Formosa" in the Western world, is a mountainous, semi-tropical island separated from the southwestern coast of mainland China by the 100-mile-wide Taiwan (Formosa) Strait (see Figure 1). It is one of the islands in the great chain of volcanic archipelagoes rimming the western Pacific Ocean. The Ryukyus are to the northeast and the Philippines are to the south. The island of Taiwan, appearing like a tobacco leaf floating astride the Tropic of Cancer, is about 240 miles long and 90 miles across at its widest point.

The term "Taiwan" is also used to refer to the province of Taiwan which comprises over 99 per cent of the land area of the Republic of China.[1] Taiwan Province includes

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[1]The Republic of China also includes two groups of islands, Kinmen (Quemoy) and Matsu, which are within visual distance of the Communist mainland; and Taipei City, which was designated a special municipality in 1967. Each of the two island groups is a hsien (county) of Fukien Province. Taipei is the largest city on Taiwan, but is under the direct administration of the Executive Yuan (Council) of the Republic of China. As a special municipality, Taipei has a status equal to that of a province. Taipei is geographically part of Taiwan; therefore, statistical data relating to Taiwan, in this investigation, include Taipei Special Municipality unless otherwise noted.

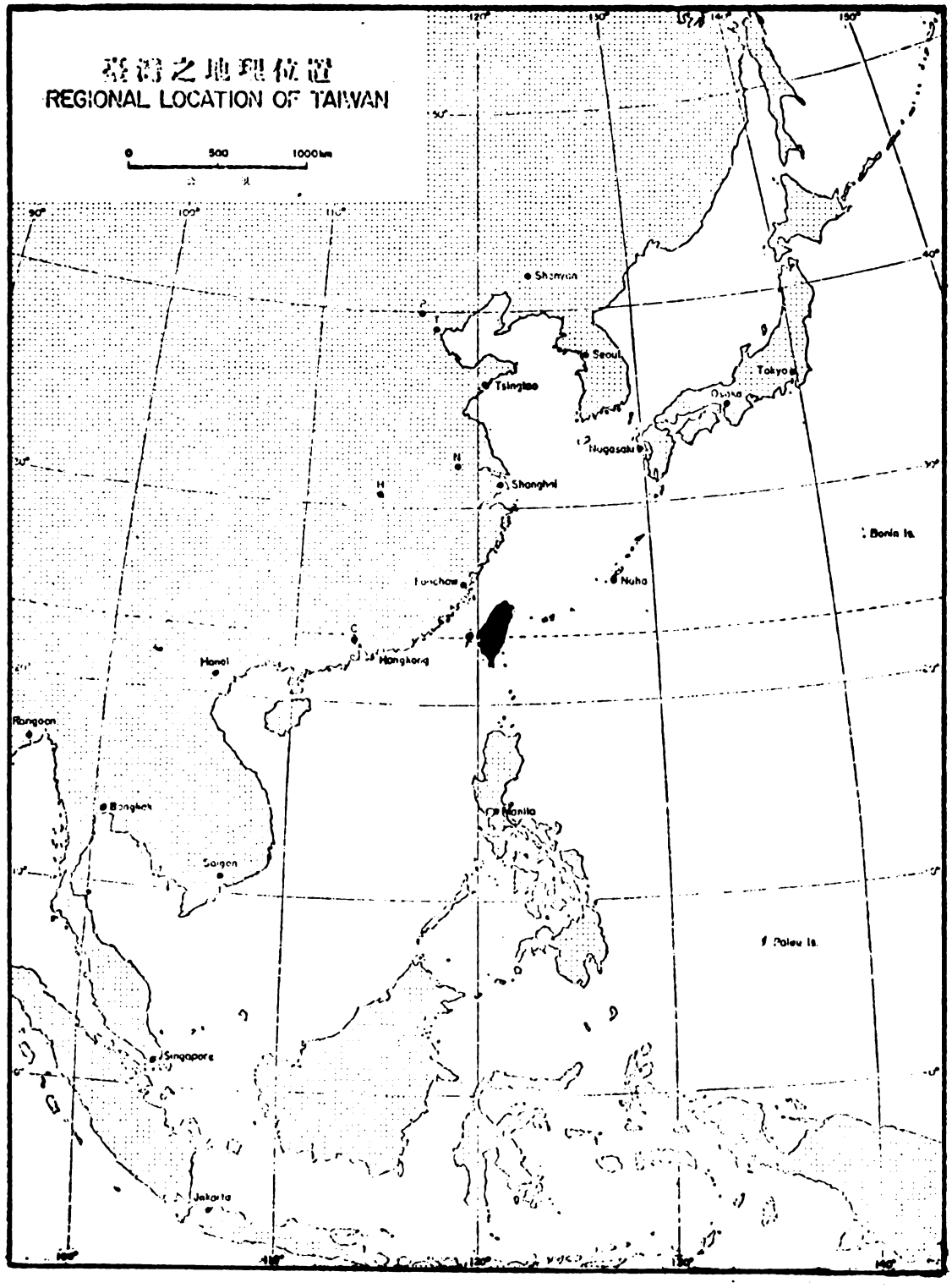

Figure 1.--Regional Location of Taiwan

Source: Cheng-siang Chen, Taiwan: An Economic and Social Geography, Vol. I, Research Report No. 96 (Taipei: Fu-Min Geographical Institute of Economic Development, 1963), p. 2.

the island of Taiwan, as well as fourteen small adjacent islets, and the sixty-four islands of the Penghu (Pescadores) group, for a total area of 13,885 square miles. Taiwan is slightly larger than the Netherlands or about the combined size of Connecticut, Massachusetts, and Rhode Island. Of the thirty-five Chinese provinces, Taiwan has the smallest land area. Taiwan is divided administratively into sixteen hsien (counties) and four municipalities (see Figure 2).[2]

Historical Perspective

Taiwan was known to the Chinese as early as the beginning of the 7th century A.D., but did not become an integral part of the Chinese Empire until during the Yuan Dynasty (1206-1368 A.D.) when an administrative office was established at Penghu (Pescadores) to rule over Penghu and Taiwan.[3] Migration of small numbers of Chinese to Taiwan began as early as the 12th century and, despite the Ming Dynasty's (1368-1644 A.D.) emigration prohibition, continued on a small scale until the early 17th century. During Ming rule, Chinese and Japanese pirates used the island as a base of operations.

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[2]China Yearbook, 1967-68 (Taipei: China Publishing Co., 1968), pp. 105, 180-181.

[3]China Handbook Editorial Board, China Handbook, 1952-53 (Taipei: China Publishing Co., 1952), p. 352.

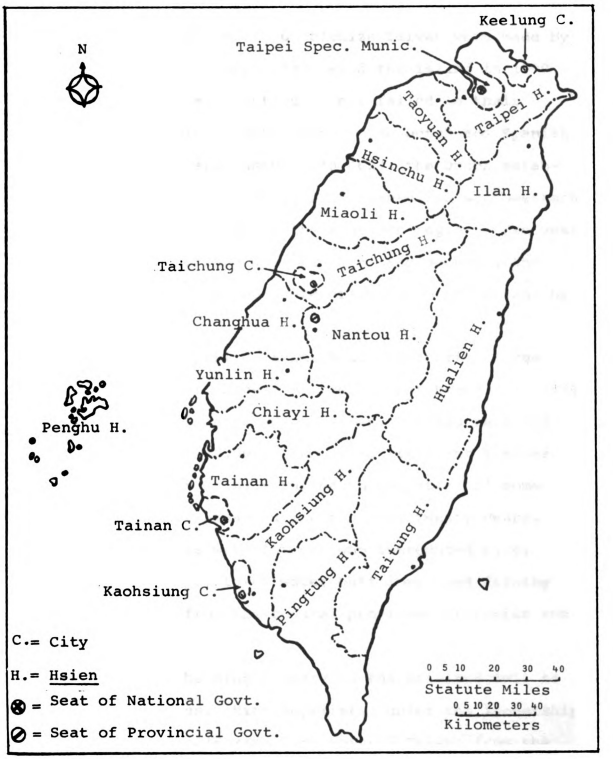

Figure 2.--The Administrative Areas of Taiwan

Source: Adapted from JCRR, Rural Economics Division Taiwan Agricultural Statistics, 1901-1965, Economic Digest Series: No. 18 (Taipei: JCRR, December, 1966), p. 3.

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The first attempts to colonize Taiwan were made by Europeans. The Portuguese discovered the island in 1590 and named it Formosa (beautiful), but failed in their attempts to establish a settlement. The Dutch and Spanish were somewhat more successful. In 1624, the Dutch established a settlement at Anping, near Tainan, in southwestern Taiwan and began to colonize the southern region. Two years later the Spaniards landed at Keelung, and occupied the northern coastal areas, but were driven from the island by the Dutch in 1642.

During the period of Dutch administration large scale immigration of Chinese settlers first began. In 1624, when the Dutch first arrived on Taiwan, Chinese settlers numbered only about 30,000.[4] However, recurrent famines and civil strife in China resulted in migration of some 100,000 Chinese to Taiwan during the next twenty years. Most of the settlers were farmers who introduced rice, sugar cane, sweet potatoes, water buffaloes, and farming tools and methods from the coastal provinces of Fukien and Kwangtung.

In 1644, the Ming Dynasty on the mainland fell to the invading Manchus. Ming loyalists, under the leadership of Cheng Cheng-kung (Koxinga) recaptured Taiwan from the Dutch, in 1661, and used the island as a center of resistance against the Ch'ing (Manchu) regime. Meanwhile, thousands of

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[4] China Yearbook, 1967-68, op. cit., p. 96.

refugees, Ming loyalists, continued to stream to Taiwan and by 1683, when the Manchus conquered the island, it had a Chinese majority population. Taiwan became part of Fukien Province in 1684 and for the next 200 years was a destination for emigrants, primarily for those from mainland Fukien. Taiwan had a population of over 2.5 million when it was granted separate provincial status in 1886.[5]

At the conclusion of the Sino-Japanese War (1894-1895), China ceded Taiwan to Japan in accordance with the Treaty of Shimonoseki. An independent Republic of Taiwan was promptly established by its inhabitants, but was soon overcome by Japanese military power. Frequent uprisings by the Chinese and aborigines on the island persisted against the Japanese for many years.

As Japan's first colonial possession, Taiwan underwent intensive development as a primary producer of agricultural products, especially rice and sugar, for the Japanese Empire. Industrial development of Taiwan was assigned a lower priority. Scientific management and long-range planning were characteristic of Japanese colonization methods. Much of the present day infrastructure for agricultural development in Taiwan can be traced to the Japanese colonial period. The Japanese promoted large scale development of water resources, transportation and communication networks, cadastral surveys, and technological improvements

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[5] Ibid., p. 97.

in rice and sugar production. They also established many rural institutional organizations, such as the agricultural research stations, vocational agriculture schools, irrigation associations, and farmers' associations, which served to introduce improved farming methods, distribute improved varieties and other production requisites, market farm products, and administer farm credit.[6] Until World War II, Taiwan's production of rice, sugar cane, sweet potatoes, pineapples, and bananas steadily increased.[7] The whole economy of Taiwan was affected by World War II, resulting in a sharp decline in agricultural production which did not recover to pre-war levels until 1951.[8]

Following the Japanese surrender in 1945, Taiwan was restored to Chinese sovereignity as one of thirty-five provinces of the Republic of China. In 1949, Communist victories on the mainland forced the withdrawal of nearly two million Nationalist troops, government officials, and other refugees to Taiwan. Taipei, then the provincial capital of Taiwan, became the provisional seat of the

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[6]T. H. Shen, Agricultural Development on Taiwan Since World War II (Ithaca, N.Y.: Comstock Publishing Associates, 1964), p. 29; see also U.S. Department of Agriculture, Economic Research Service, Taiwan's Agricultural Development: Its Relevance for Developing Countries Today, Foreign Agricultural Economic Report No. 39, by Raymond P. Christensen (Washington, D.C.: Government Printing Office, April, 1968), pp. 8-9 (the author is hereafter cited as USDA, ERS).

[7]Shen, loc. cit.

[8]USDA, ERS, Taiwan's Agricultural Development, op. cit., p. 10.

Government of the Republic of China (Nationalist China) in December of 1949. The seat of the Taiwan Provincial Government was moved to Chunghsing Village (Chungsinghsintsun) near Nantou during the fifties.

The general pattern of administration in Taiwan is from the provincial government to the hsien or city, to the township, to the neighborhood, to the head of the household.[9] The provincial government is headed by an appointed governor; however, government officials at the hsien or city, township and village levels are popularly elected, as are the representatives to the legislative bodies of the provincial, hsien, city, and township governments.

Geographical Conditions

The island of Taiwan is about 240 miles long and 90 miles across at its widest point. Rugged foothills and massive mountain ranges occupy two-thirds of the island. The Central Range, which alone covers one-half of the land area, has several peaks rising above 11,000 feet, and extends nearly the entire length of the island, forming its backbone. The eastern slopes of the Central Range are very steep, dropping precipitously either to the Pacific coast or to the lower, but very rugged, East Coast Range. The western slopes fall in successive gradients

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[9]Arthur F. Raper, Rural Taiwan: Problem and Promise (Taipei: Chinese-American Joint Commission on Rural Reconstruction, July, 1953), p. 175 (the commission is hereafter abbreviated JCRR).

to a coastal alluvial plain which is 200 miles in length and varies from five to twenty-five miles in width.[10]

Fertile alluvial soils cover one-fourth of the island and constitute its chief natural resource. Upland soils are generally leached, acid, and of low fertility. Forests cover most of the hilly and mountainous regions and account for nearly 62 per cent of the land area. Only 25 per cent of the land area (slightly over 2.2 million acres) is tillable, nearly all of which is under cultivation.[11] Of this, approximately 60 per cent is under irrigation.[12]

Taiwan can be classified into three land-use capability zones--crop land, marginal land, and forest land--on the basis of altitude (see Figure 3). Kind of climate, soil type, and topography are associated with altitude. Crop land, which is largely alluvial paddy land, refers to cultivated land below 100 meters in elevation on which rice, sugar cane, sweet potatoes, peanuts, vegetables and many other field crops are grown. Of course, many of Taiwan's urban and industrial areas, roads, rivers, and related

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[10]Chiao-min Hsieh, Taiwan--ilha Formosa: A Geography in Perspective (Washington, D.C.: Butterworths, 1964), p. 41.

[11]Calculated from metric statistics for the year 1968 in the Republic of China, Taiwan Statistical Data Book, 1969, op. cit., pp. 3, 27, 42.

[12]Calculated for the year 1967 from the data in the Taiwan, Provincial Department of Agriculture and Forestry, Agricultural Economics Division, Taiwan Agricultural Yearbook, 1968 (n.p.: Provincial Department of Agriculture and Forestry, July, 1968), pp. 44, 46 (the Department is hereafter abbreviated PDAF).

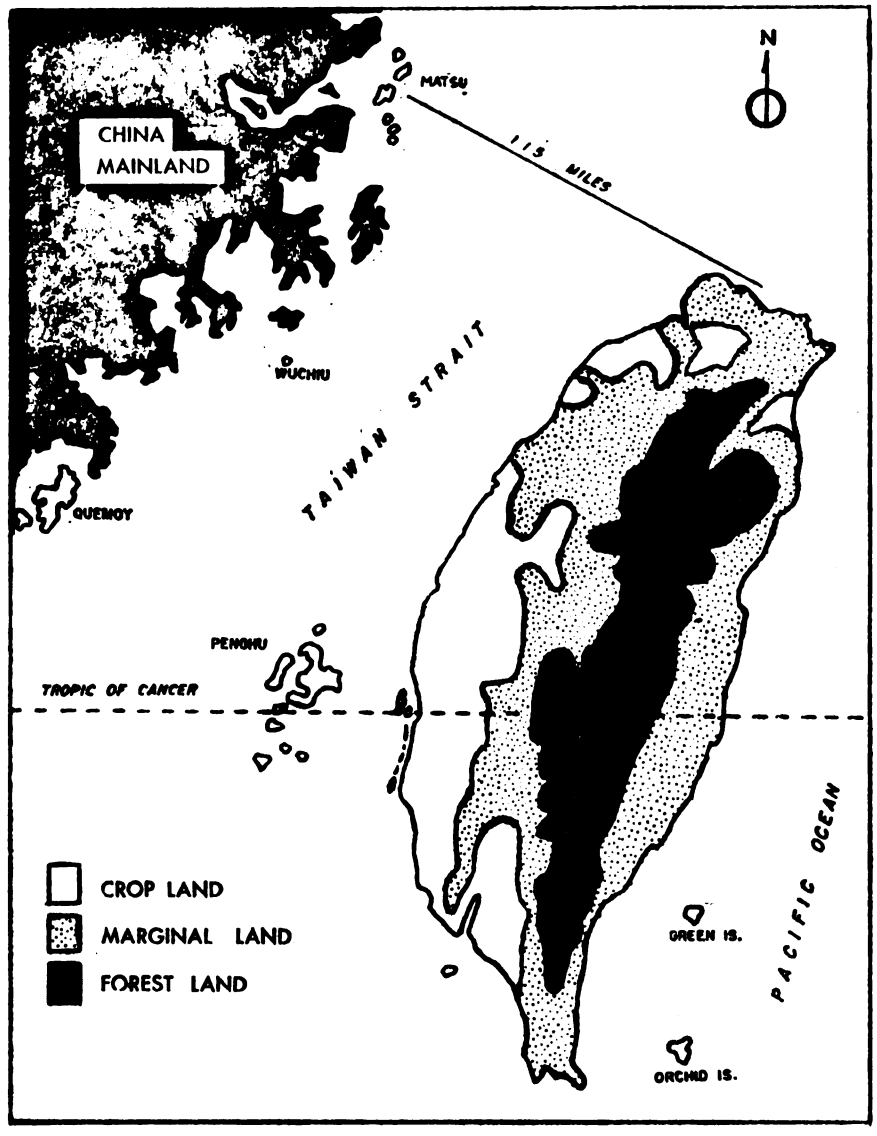

Figure 3.--Land Classification of Taiwan

Source: This map was adapted from T. H. Shen, Agricultural Development on Taiwan Since World War II (Ithaca, New York: Comstock Publishing Associates, 1964), p. 3.

areas are also in this category which comprises 31 per cent of the total. Land with an elevation of 100 to 1,000 meters is considered marginal. Most terraced foothills, both paddy land and dry land, are categorized as such. Thirty-seven per cent of the land is considered marginal and is devoted to tea, citrus fruits, bananas, pineapples, bamboo, and forests. Forest land, which comprises 32 per cent of the total, refers to land 1,000 meters or above in elevation where forests, bare rocks, and some grass land predominate.[13]

The climate of Taiwan is generally warm and humid, with long, hot summers and short, mild winters. Rainfall averages 100 inches annually, but is unevenly distributed both geographically and seasonally. Furthermore, at least three different climatic variations prevail on the island: tropical in the south, sub-tropical in the north and temperate at the higher elevations (above 1,500 meters).[14] Being situated within the great Asian monsoon system, Taiwan is subjected to frequent strong winds and torrential rains. Rainfall varies from less than 50 inches per year along the southwestern plains to over 200 inches at the northern tip of the island and at the higher elevations. Precipitation is fairly well distributed throughout the year in the northern part of the island, but in the central and southern regions over 85 per cent falls in the months between March

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[13]Shen, op. cit., pp. 3-4.

[14]Robert E. Dils, Watershed Conditions, Problems, and Research Needs in Taiwan, Forestry Series: No. 8 (Taipei: JCRR, August, 1964), pp. 2-3.

and October. An average of three to four typhoons sweep the island each year, often inflicting wind and water damage to land and crops.[15]

Taiwan's steep mountain slopes, intensive rainfalls, and rapid run-off, subject the many short, swift-flowing rivers to destructive flooding and erosion; however, such conditions also provide excellent conditions for providing hydro-electric power and irrigation water. Earthquakes occur frequently, but the tremors are generally weak and local.

In brief, notes Shen, "the natural conditions of Taiwan offer many opportunities but also demand a high level of technology and intensive farming operations for the successful development of agriculture."[16]

The Population

The population of Taiwan is predominately Chinese and is estimated at nearly fourteen million. About twelve million are native-born Taiwanese whose farmer-ancestors emigrated primarily from Fukien and Kwangtung provinces mainly during the seventeenth, eighteenth, and nineteenth centuries. With the exception of approximately 200,000 aborigines, the balance of the population consists of

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[15] Shen, op. cit., pp. 9-10.

[16] Ibid., p. 27.

mainland-born Chinese, many Mandarin-speaking, who immigrated to Taiwan since World War II.[17] The aborigines consist of seven linguistically different tribes; namely, the Ami, Yami, Taiyal, Saiset, Tsou, Bunun, and Paiwan, all of which are experiencing partial assimilation, and reside generally in the foothill and mountain regions of Taiwan. Anthropologists have traced the origin of the modern aborigine to the Indonesian-Malaysian region, as well as to the ancient Chinese mainland.[18]

Mandarin, which replaced Japanese in the schools in 1949, is the official language of Taiwan; however, Taiwanese, a Fukienese language similar to Amoy, is spoken as a first language by the majority of the population. Hakka, another Chinese language, is spoken by the Hakka, a minority people who originated in Kwangtung Province. As a result of the long Japanese occupation, many adults speak Japanese as a second language.[19] Despite the spoken language differences,

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[17]The population estimation for the end of 1969, which excludes armed forces and foreign nationals, was projected from data from previous years in the Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., p. 4; for an estimation of various groups within the total population, see also Hsieh, op. cit., p. 206.

[18]Hsieh, op. cit., pp. 125-127.

[19]U.S., Department of Health, Education, and Welfare, Office of Education, Education in Taiwan, by Abul H. K. Sassani, Bulletin No. 3 (Washington, D.C.: Government Printing Office, 1956), p. 2; see also Gallin, op. cit., pp. 18-21.

the population of Taiwan is bound together by a common Chinese script.

The principle religions or beliefs on Taiwan include Buddhism, Confucianism, and Taoism; however, the religious orientation of many Chinese is a polythesistic combination of ingredients of the aforementioned three, plus a smattering of animism. Christianity is also practiced on Taiwan.[20] The restriction or prescription of economic activities by religion is not present among the population, as it is in some developing countries.[21]

Earlier in the chapter, Taiwan's total area was compared with that of the Netherlands, the world's most densily populated country. The population density of Taiwan in mid-1968 was 969 persons per square mile, just 13 fewer than that of the Netherlands. Taiwan's average annual rate of natural population increase for the ten-year period 1959-1968 was 3.2 per cent as compared to 1.3 per cent for the Netherlands.[22] Thus, Taiwan will soon surpass the Netherlands in population density if the difference between their respective natural increase rates continues.

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[20]U.S., Department of Health, Education, and Welfare, Office of Education, Education in Taiwan, loc. cit.

[21]Shigeto Kawano, "The Reasons for Taiwan's High Growth Rate," in Economic Development Issues: Greece, Israel, Taiwan, Thailand, Supplementary Paper No. 25 (New York: Committee for Economic Development, September, 1968), pp. 133-34.

[22]The data were calculated from metric statistics in the Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., pp. 5, 191.

Average figures, however, do not present the entire picture as population densities throughout Taiwan are nearly as varied as, and closely parallel to, its physical conditions. The plains are crowded and the mountains are sparsely populated; for example, in 1962, 66 per cent of the population of Taiwan lived on the western coastal plain, which accounts for only 22 per cent of the province's land area. This results in an average density of over 3,000 persons per square mile on the cultivated land of the west coastal plain.[23]

Like most developing countries, Taiwan has a high rate of natural increase as a result of a high birth rate and a decreasing death rate. Despite the high average annual rate of 3.2 per cent in population increase for the past ten years, Taiwan's population has been increasing at a decreasing rate in every year since 1959, except in 1968 when it took a slight upturn to 2.38 per cent from 2.30 per cent in 1967.[24] The decreasing rate is due to a complex set of factors one of which is the increasing emphasis on family planning, resulting in a lowering of the birth rate. Nutritionally adequate diets and good health facilities have lowered the death rate. In 1964, the life expectancy at

[23]Hsieh, op. cit., p. 209.

[24]Rate of natural increase = (number births - number deaths) ÷ mid-year population x 100; see the Republic of China, CIECD, Taiwan Statistical Data Book, 1969, loc. cit.

birth was sixty-six years in Taiwan, compared with seventy years in the United States.[25]

The rapid increase in Taiwan's population has resulted in a very youthful population. In 1968, about 42 per cent of the people on Taiwan were fourteen years old or younger; this contrasts with 25 per cent in Japan and 30 per cent in the United States, for the same year.[26] A youthful population places a heavy burden upon the educational resources of a developing country. Taiwan has, nevertheless, made remarkable progress in educating its people; for example, illiteracy dropped from 42 per cent in 1952 to 16 per cent in 1968; during the same period, the percentage of the population with a primary school education, or higher, increased from 54 per cent to 79 per cent; and in 1968-69 over 97 per cent of the primary-school-age children attended school.[27]

Taiwan's rapid overall economic development, during the past two decades, is reflected in its population trends. In 1950, about 53 per cent of Taiwan's total population was agricultural (living on farms); however, migrations of rural youth from the agricultural sector to urban and industrial areas, helped to reduce the percentage to 44 per cent by

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[25] Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., p. 192.

[26] Ibid., p. 196.

[27] Ibid., pp. 6, 172.

the end of 1968.[28] Approximately one-half of the labor force is still employed in agriculture but industrial employment is increasing rapidly. In 1952, about 61 per cent were engaged in agriculture and only 9 per cent were employed in industry; by January, 1969, these percentages were 49 and 16, respectively.[29]

Economic modernization of traditional cultures does not occur without creating social change--either for better or for worse--and Taiwan is no exception. Changes in the socioeconomic patterns of the island, migrations from the rural to urban areas, and the effect of education and mass communication are contributing to a breakdown in the traditional Chinese family whose extended structure has prevailed for over one thousand years. The population of Taiwan is experiencing a decrease in the extended and linear family structures of three or four generations and an increase in nuclear families, with some of the grandparents still living with their children.[30] Family size and influence are

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[28] JCRR, Rural Economics Division, Taiwan Agricultural Statistics, 1901-1965, Economic Digest Series: No. 18 (Taipei: JCRR, December, 1965), p. 7; see also Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., p. 29.

[29] Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., pp. 7-8.

[30] Ruey Yih-fu, "Changing Structure of the Chinese Family," Bulletin of the Department of Archaeology and Anthropology, National Taiwan University, 17-18 (November, 1961), pp. 8-11, cited in The Family in Taiwan: Present Situation and Tendencies, [edited by Guilbert Guérin] (Hsinchu, Taiwan: Taiwan Sociographic Survey, Chinese Language Institute, Fujen [Catholic] University, November, 1967), pp. 3-4 (hereafter cited as Family in Taiwan).

also changing with trends toward smaller families and toward considering the traditional family as just one of several different institutions, rather than as the omnipotent one, in the Chinese society of Taiwan.[31] The disintegration of the extended family is having a disruptive effect upon Chinese society, causing "generation gaps," an upsurge in juvenile delinquency and related problems.[32]

Agriculture Development

Agricultural development has played a key role in Taiwan's post-war economic progress. Remarkable increases in both total agricultural output and in agricultural productivity--larger outputs per acre, per farmer, and per unit of all resources combined--have characterized Taiwan's agriculture during the past two decades. During the period 1952-1967, total agricultural output increased at an average annual rate of 6.5 per cent, over half of which was attributed to increased agricultural productivity.[33]

The increases in total agricultural output, during 1952-1967, have contributed to Taiwan's overall economic

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[31] Family in Taiwan, op. cit., p. 25.

[32] Ts'ai Wen-hui, "Changing System of the Chinese Family," Thought and Word, 2/1 (May, 1964), p. 214, cited in Family in Taiwan, op. cit., p. 4; see also Lin Teng-fei, "Survey and Analysis of the Origin and Development of Taiwan's Problem Teenagers," Hsu Hui, 6 (March, 1967), p. 97, cited in Family in Taiwan, p. 4.

[33] Agricultural production data are calculated from the Republic of China, CIECD, Taiwan Statistical Data Book, 1968 (Taipei: CIECD, 1968), pp. 26-27; see also Taiwan, PDAF, Taiwan Agricultural Yearbook, 1968, op. cit., p. 22.

development by providing adequate food and related commodities to a rapidly expanding population, and by earning over 71 per cent of Taiwan's annual foreign exchange income through export of farm products and processed agricultural products.[34] These earnings have provided a major share of the revenue to finance Taiwan's industrial development.

In regards to agricultural productivity, Christensen noted that:

> Gains in agricultural productivity in Taiwan have made possible the net transfer of large amounts of capital and large numbers of workers from agriculture to other sectors and thereby have contributed to the economic growth in the rest of the economy. Large increases in output per acre and per agricultural worker have been achieved with modest increases in capital inputs from other sectors of the economy.[35]

When Taiwan was taken over by the Japanese in 1895, it was the habitat of a traditional agricultural society. "It had static socioeconomic processes, and functioned in an environment that offered little stimulus to change."[36] The Japanese introduced "change" in the form of a vigorous developmental program designed primarily for producing food

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[34]Calculated from the Republic of China, CIECD, Taiwan Statistical Data Book, 1968, op. cit., p. 126.

[35]USDA, ERS, Taiwan's Agricultural Development, op. cit., p. 2.

[36]David H. Spaeth, Economic Development of Agriculture in Taiwan (Washington, D.C.: Foreign Development and Trade Division, Economic Research Service, U.S. Department of Agriculture, 1965), pp. VIII-1-4. (Mimeographed); cited in Neil H. Jacoby, U.S. Aid to Taiwan: A Study of Foreign Aid, Self-Help, and Development (New York: Frederick A. Praeger, Publishers, 1966), p. 72.

for Japan. Since the turn of the century, increased agricultural productivity, one of the major preconditions to general economic development, has provided the impetus for transforming Taiwan's economy into one of self-sustained economic growth. Rapid industrialization has accelerated its agricultural progress, modernizing both the agricultural and non-agricultural sectors of the economy. Such an exceptional achievement warrants a brief retrospection.

The strategy employed to attain Taiwan's present agricultural development status can be categorized into three basic areas: (1) institutional actions, (2) measures to improve the human element (knowledge and skills), and (3) actions to improve physical imputs.[37]

Taiwan has undergone two distinct stages of agricultural development. The three above-mentioned actions were evident in both stages. The first stage, between 1895 and 1945 while the island was under Japanese control, witnessed the introduction and extension of various rural institutions (see pages 57-58) and modern technology (both knowledge and physical inputs). A high degree of rural organization existed under the Japanese. An island-wide

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[37]John M. Brewster, "Traditional Social Structures as Barriers to Change," Agricultural Development and Economic Growth, eds. Herman M. Southworth and Bruce F. Johnston (Ithaca, N.Y.: Cornell University Press, 1967), pp. 88-89.

network of farmers' associations was developed under a central administration; and, by 1944, there were 4,891 local level farmer assocation units in Taiwan.[38] The farmers' associations required compulsory membership at the local level and were very instrumental in carrying out government policies in rural development and in disseminating agricultural technology.

During the second stage of Taiwan's agricultural development, since the end of World War II, incentives to increase agricultural productivity have been provided by many factors--education, research, extension, credit, price incentives, and several others--with land reform leading the list. A stable government and United States economic aid were instrumental in planning and implementing the post-war stage of development.[39]

By 1945, nearly all of Taiwan's potential farmland was under cultivation, but was unevenly distributed, resulting in serious tenancy problems.[40] Focusing on farm

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[38]Min-hsioh Kwoh, Farmers' Associations and Their Contributions Toward Agricultural and Rural Development in Taiwan (2nd ed., Bangkok: Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Far East, 1966), pp. 4-6.

[39]The United States discontinued its economic aid program to Taiwan in 1965 because of the latter's rapid economic development.

[40]Anthony Y. C. Koo, The Role of Land Reform in Economic Development: A Case Study of Taiwan (New York: Frederick A. Praeger, Publishers, 1968), p. 27.

income redistribution, a land reform program was implemented in three phases: (1) rent reduction in 1949; (2) sale of public lands to farm-operator families in 1951; and (3) initiation of a land-to-the-tiller program in 1953. In the latter phase, landlords sold rented lands to the government, which in turn resold them to hitherto tenant-operators.[41] A land consolidation program was initiated in 1961 to bring together scattered, fragmented, land parcels and thus increase the productivity of both farmers and their farms.[42]

During 1952-1968, the area of cultivated land increased by nearly 10 per cent, primarily from exploiting tidal land along the western coast as well as hillsides and river beds in eastern Taiwan. However, the percentage of increase in total agricultural population during the same period more than offset the gain in land area, resulting in a decrease in average farm size from 1.29 hectares in 1952 to 0.92 hectares in 1968.[43] Smaller farm size and greater off-farm employment opportunities, during the 1960s have resulted in a sharp decline in the percentage of farm households farming full-time. Data from two 5 per cent sample census of agriculture surveys indicate that full-time farm

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[41] Brewster, loc. cit.

[42] China Yearbook, 1968-69 (Taipei: China Publishing Co., 1969), p. 187.

[43] Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., p. 30.

households dropped from 48 per cent in 1961 to 32 per cent in 1966.[44]

The primary goal of land reform was reduction of socioeconomic inequalities. Since initiating land reform, owner-operators have increased from 36 per cent of all farmers in 1949 to more than 68 per cent in 1968, while tenant-farmers have decreased from 39 per cent to 12 per cent. The balance of the farm operators both own and rent land.[45]

Land reform and subsequent land consolidation, along with the introduction and extension of new farming techniques and farm enterprises, have helped to raise agricultural productivity to a very high level. Between 1952 and 1968, unit area yields of brown rice and sweet potatoes each increased 60 per cent; while soybeans, bananas, and pineapples more than doubled their yields per hectare. Similar increases were made with other crops. Livestock, fisheries and forestry production also registered substantial gains in total output.[46]

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[44]The percentages were calculated from data in the JCRR, Taiwan Agricultural Statistics, 1901-1965, op. cit., pp. 212-213; see also Taiwan, Provincial Government, 1966 Census of Agriculture, op. cit., p. 23.

[45]JCRR, Taiwan Agricultural Statistics, 1901-1965, op. cit., pp. 8-9; see also Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., p. 29.

[46]Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., pp. 32-37.

Farm family disposable incomes and savings have risen with increased yields per hectare, increasing the farmers' purchasing power and level of living.[47] Thus, it is apparent that land reform has not only contributed to rural socioeconomic justice, but has also helped to increase agricultural productivity.

Rural education and research activities have also played a major role in Taiwan's agricultural development. During the period of Japanese occupation, much emphasis was placed on expansion of primary and vocational education. Primary school enrollment increased from 17,579 in 1901 to 898,424 in 1944.[48] When education in colonial Taiwan was at its peak (1944), over 85 per cent of the primary-school-age (6-12) population and approximately 40 per cent of the secondary-school-age (12-18) population were in school.[49]

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[47]Taiwan, PDAF, An Economic Analysis of Agriculture in Taiwan (n.p.: PDAF, June, 1967), p. 14; see also China Yearbook, 1968-69, loc. cit.

[48]Taiwan, Department of Statistics, Statistical Summary of Taiwan for the Past 51 Years (Taiwan: Department of Statistics, 1946), p. 1227; cited in Yhi-min Ho, Agricultural Development of Taiwan, 1903-1960 (Kingsport, Tenn.: Vanderbilt University Press, 1966), p. 105. See also Republic of China, Ministry of Education, "Elementary and Secondary Education," General Development of Taiwanese Education, a report by the Ministry of Education (Taipei: Ministry of Education, 1961), pp. 1-26 (the Ministry is hereafter abbreviated MOE), cited in Ping-lin Wu, "Educational Modernization in Taiwan," Catholic Educational Review, LXVI (March, 1969), 761.

[49]Republic of China, MOE, "Elementary and Secondary Education," cited by Wu, loc. cit.

Vocational schools, students, and graduates outnumbered their academic high school counterparts, with junior vocational agriculture schools being the most common secondary school.[50] By 1945, about 71 per cent of all school-age children were in school.[51] Taiwan's illiteracy rate among persons over six years of age was about 55 per cent in 1946.[52] These percentages were much more favorable than those of most other Asian countries during the pre-war era.[53] The post-war period has witnessed a rapid expansion of all levels of education in Taiwan. In school year 1968-69, over 97 per cent of the primary school-age children were in school.[54]

Economists have acknowledged the role of rural education in the agricultural development of Taiwan. "It is inconceivable," noted Ho, "that the rapid expansion of primary education during the period [1901-1960] could have left agriculture unaffected."[55] According to Kawano,

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[50]Republic of China, MOE, Education in Free China (Taipei: MOE, October, 1952), p. 13.

[51]Han Lih-wu, Taiwan Today (rev. ed. 1967; Taipei: Hua Kuo Publishing Company, 1967), p. 150.

[52]Kawano, op. cit., p. 134.

[53]Wu, loc. cit.

[54]Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., p. 172.

[55]Ho, op. cit., p. 105.

"This is because the raising of levels of technology and the transmission of technical knowledge can be carried out all the more effectively and speedily if the people can read and write."[56]

Between 1901 and 1960, the aggregate input (land, labor, and capital) of Taiwan's agricultural sector increased at an average rate of 2.0 per cent (compound) per year. The observed farm output, however, grew at a rate of 3.14 per cent per year. Thus, technical change and other factors contributed about 1.14 per cent annually. Most of the change was attributed to the supply of modern, non-traditional farm inputs and the acquired skills of farmers in using them. Such inputs were made available through investment in agricultural research. The knowledge and applicative skills needed to effectively use the new physical inputs were acquired through investments in the education of Taiwan's farm population.[57]

Although industry is developing rapidly, Taiwan's agricultural sector, at the end of 1968, still accounted for 44 per cent of the total population, 49 per cent of the labor force, over 23 per cent of the net domestic production, and 34 per cent of total exports.[58]

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[56]Kawano, loc. cit.

[57]Ho, op. cit., pp. 119-120.

[58]Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., pp. 8, 18, 26, 136.

Taiwan must continue to industrialize for in the long run a country with limited land resources needs industrial exports to finance imports of agricultural raw materials.[59]

Present Agricultural Conditions and the Farmer

Taiwan agriculture is characterized by a favorable climate, a shortage of arable land, many small owner-operated family farms, highly developed farmer service organizations, and a diligent, hard-working rural population of nearly six million. In 1967, Taiwan had only 0.17 acre (0.07 hectare) of farm land per capita, compared with two acres in the United States; however, by employing a high degree of agricultural skill and technology, Taiwan's crop production per acre averaged about six times higher than it did in the United States.[60]

More than seventy kinds of crops are grown in Taiwan.[61] Rice is the most important crop; other principle crops include sweet potatoes, soybeans, corn, sugar cane, peanuts, tea, cassava, tobacco, bananas, pineapples, citrus fruits, mushrooms, asparagus, and other vegetables. Important livestock enterprises include swine, chickens, and ducks; minor, but expanding enterprises include beef and

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[59] USDA, ERS, Taiwan's Agricultural Development, op. cit., pp. 77-78.

[60] Ibid., p. 2.

[61] Hsieh, op. cit., p. 265.

dairy cattle. Pond fish culture, artificially propagated, is an enterprise on some farms, especially along the west coast. Farm products with high income elasticities, such as fruits and vegetables, and livestock and poultry products, have gained in relative importance in recent years.[62]

Taiwan has developed a special labor-intensive cropping system to compensate for its small cultivated area. This system, with the aid of irrigation water, uses multiple cropping, crop rotation, and intercropping techniques, as well as modern inputs such as improved crop varieties, chemical fertilizers, herbicides, pesticides and some farm mechanization. Because of the favorable climatic conditions, most cultivated areas in Taiwan yield at least two harvests per year.[63] As a result, one cultivated hectare can produce two or more hectares of crops per year by multiple cropping.[64] The index of multiple cropping for Taiwan in 1967 was 186.[65]

The typical crop rotation pattern in Taiwan includes a first (spring) and second (fall) rice crop,

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[62]Ho, op. cit., p. 117.

[63]Hsieh, op. cit., p. 259.

[64]One hectare of cultivated land producing two hectares of crops per year has an index of multiple cropping of 200.

[65]Republic of China, CIECD, Taiwan Statistical Data Book, 1968, op. cit., p. 22.

followed by an unirrigated winter crop; usually sweet potatoes, grains, vegetables, or green-manure plants. In areas where water is plentiful, farmers often grow a fourth crop during the summer season.[66]

Intercropping is an intensive cropping technique used by many farmers. Crops whose growing seasons overlap with that of rice are often interplanted in the rice field before rice harvest. This practice is referred to as relay planting. Another intercropping method involves planting a crop such as peanuts, sweet potatoes, cotton, or soybeans between the rows of a young sugar cane crop. The interplanted crop is harvested before the sugar cane, a long-season crop, becomes too tall.[67]

The average family farm in Taiwan consists of about .92 hectares (2.3 acres) and is often divided into two or more plots, one or two kilometers apart.[68] Farm families usually own all or most of the land they cultivate, and live in settlements or compounds; only a small percentage live in isolated dwellings. The houses are usually of bamboo frame or brick construction with tile roofs and are likely equipped with electric lights, an electric fan, a

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[66]Hsieh, loc. cit.

[67]Shen, op. cit., pp. 198-199.

[68]Republic of China, CIECD, Taiwan Statistical Data Book, 1969, op. cit., p. 30; see also E. Stuart Kirby, Rural Progress in Taiwan (Taipei: JCRR, 1960), p. 132.

radio and/or television set, and a sewing machine. Private wells are the most common source of the family water supply. Most farm households own at least one bicycle, a crop sprayer or duster and various tillage implements.[69]

Most family farms raise livestock and have an average of five hogs, fifteen chickens and/or twelve ducks, plus a one-half share, or full ownership, of a draft animal--usually a water buffalo or yellow cow. The average farm has access to irrigation water for most of the cropland and grows paddy (brown) rice, sweet potatoes, sugar cane, peanuts, green manures, and vegetables.[70] Large amounts of commercial fertilizer, compost and night soil are used on the crops.

The typical farm household consists of seven or eight persons; including the farm operator, who may or may not be the head of the household, his wife, and children, and frequently other relatives. Usually two, but often three, generations are represented in the household. Census date indicate that an average of three members of

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[69]Lionberger and Chang, op. cit., pp. 65-66; see also Taiwan, Provincial Government, Committee on Census of Agriculture, Report on the 1966 Census of Agriculture, Taiwan, Republic of China, 5 per cent Sample Census (n.p.: Taiwan Provincial Government Printing Press, October, 1967), p. 26 (hereafter cited as 1966 Census of Agriculture.

[70]The averages were calculated from data in Taiwan, Provincial Government, 1966 Census of Agriculture, op. cit., pp. 24-25; see also Taiwan, PDAF, Taiwan Agricultural Yearbook, 1968, op. cit., p. 260.

each household are considered farm workers.[71] Family farm labor requirements average 420 work-days per year; 87 per cent of the farm labor is provided by the family and the remainder is met by hired labor.[72] Several members of the farm household are most likely employed off-farm for part or all of the year.[73]

The typical farm worker (operator or helper) in Taiwan is literate and has completed primary school. Less than 7 per cent of the farm workers have attended middle schools or colleges (see Table 1). Data regarding level of middle school; i.e., whether junior or senior, were not available.

Data concerning the educational status of all members of farm household included in the 1966 sample census, indicate that about 48 per cent were uneducated (including many pre-schoolers), while members who were either graduates or were in attendance included: about 44 per cent, primary school; less than 8 per cent, middle school; and less than 0.5 per cent, college or university.[74] A 1964 survey of Taiwan's agricultural labor

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[71]Including the farm operator; hired labor (temporary, long-time, contract, or exchanged) is not considered part of the household; see Taiwan, Provincial Government, 1966 Census of Agriculture, op. cit., p. 24.

[72]Ibid. [73]Ibid., p. 23.

[74]Farm household members include the farm workers (operator and helpers), students, children, disabled, unemployed, and those in military service who would

TABLE 1.--Kind and highest level of schooling completed by farm workers in Taiwan, 1966[a] (percentages of farm workers by categories).

Level of Schooling Completed	Kind of Schooling		
	Non-Agricultural School	Vocational Agriculture School	Other
Uneducated	. .	. .	47.32
Primary	. .	. .	46.11
Middle	5.46	0.95	. .
College or University	0.14	0.02	. .
Total	5.60	0.97	93.43

[a]Calculated from: Taiwan, Provincial Government, Committee on Census of Agriculture, Report on the 1966 Census of Agriculture, Taiwan, Republic of China, 5 per cent Sample Census (n.p.: Taiwan Provincial Government Printing Press, October, 1967), pp. 23, 83-85.

force revealed that about 35 per cent were illiterate, 57 per cent had graduated from primary school, and slightly over 4 per cent had completed levels beyond primary school.[75]

It is evident that the average farmer in Taiwan is very responsive to socioeconomic incentives as evidenced by a high adoption rate of new farm practices, an increasing use of farm production credit and capital inputs, a rise in educational aspirations for his children, a desire for smaller families, and a rising standard of living.[76]

Organizations Relating to Farmers

A complex set of both governmental and private organizations have been instrumental in planning and administering agricultural development programs in

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otherwise be living at home; see Taiwan, Provincial Government, 1966 Census of Agriculture, op. cit., pp. 16, 23, 75-81.

[75]Data were calculated from Taiwan, Provincial Government, Labor Force Survey Research Group, Quarterly Report on the Labor Force Survey in Taiwan (n.p.: Taiwan Provincial Government, August, 1964), Table 8, p. 19.

[76]See Lionberger and Chang, op. cit., p. 66; USDA, ERS, Taiwan's Agricultural Development, op. cit., pp. 53-60, passim; and Shen, op. cit., pp. 369-373.

Taiwan.[77] The initiative, competence, and effectiveness of the personnel in these organizations is reflected in the performance record of Taiwan's farmers. Personnel from several of these organizations assisted in the development of the Interview Schedule used in this investigation.[78] Nearly all of the research institutes and extension education organizations were originally established during the Japanese administration, but in recent years, their work has expanded.[79]

Government Organizations

Government agencies of three levels of administration--national (central), provincial, and township--have been involved with agricultural development. Both the Executive Yuan and the Taiwan Provincial Government are responsible for agricultural development. Several of the government agencies are reviewed in brief.

Chinese-American Joint Commission on Rural Reconstruction (JCRR).--This organization, which was created on the mainland in 1948 and moved to Taiwan, has been the

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[77]See Appendix C, Figure 6, for a chart showing the organizations and their relationships to the farmer.

[78]See Appendix D, for a list of organizations and individuals.

[79]Shen, op. cit., p. 93.

catalytic agent in Taiwan's agricultural development. United States agricultural aid was administered through JCRR until such assistance was terminated in 1965. JCRR is not an executive agency,[80] but rather a semi-autonomous organization which serves to stimulate interest in rural development and to provide technical and financial assistance to other agencies in carrying out JCRR-approved projects. About one-half of its assistance is directed to lower government levels and local organizations on a cost-share, self-help basis.[81] JCRR sponsored the land reform program and the reorganization, in 1953, of farmers' associations and cooperatives, as well as numerous other projects such as those concerned with crop and livestock production, irrigation, and rural living.

Provincial Department of Agriculture and Forestry (PDAF).--This agency, which is a department of the Taiwan Provincial Government, has three basic responsibilities; administration, research, and extension. PDAF is organized into eight divisions mainly to facilitate the administration of agricultural programs.

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[80]Technically, JCRR is subordinate to the Executive Yuan (Central Government); see U.S.D.A., ERS, Taiwan's Agricultural Development, op. cit., p. 11.

[81]Shen, op. cit., pp. 38-39.

PDAF's research work is conducted by several of its subordinate organizations, namely: the Taiwan Agricultural Research Institute (TARI),[82] the Taiwan Livestock Research Institute (TLRI), seven district agriculture improvement stations (DAIS), and various other institutes and branch stations located throughout the province.[83] In general, the research institutes are organized to conduct basic research and are located where the physical conditions are best suited to the particular crop (TARI) and livestock (TLRI) in which the institute specializes; whereas, the improvement stations are operated on a regional basis so that research can be applied to local agricultural problems.[84] The latter work closely with hsien and township governments and farmers' associations by providing technical advice and assistance to extension workers.[85]

PDAF supervises the extension operations in Taiwan while the Provincial Farmers' Association carries out such activities with PDAF's financial and technical assistance. Taiwan's rather unique, dual, farm information dissemination system is described by Lionberger and Chang:

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[82]TARI conducts crop research in five departments and in five substations; see Shen, op. cit., p. 92.

[83]Ibid., pp. 92-93; see also USDA, ERS, Taiwan's Agricultural Development, op. cit., p. 31.

[84]Lionberger and Chang, op. cit., p. 79.

[85]Shen, op. cit., p. 93.

> Two parallel extension organizations or channels operate side by side from the provincial down to the township level. On the government side, the extension function is performed by agricultural divisions or offices at each governmental level: the Provincial Department of Agricultura and Forestry at the provincial level, the hsien or city government at the hsien or city level, and the Public Office at the township level. The second channel of agricultural extension education operates through the Farmers Association extension offices at the three levels.[86]

Extension advisory committees, chaired by high-ranking government officials, work with the farmers' associations on budgetary and policy matters at the provincial, hsien, and township levels.[87]

Most agricultural extension work in Taiwan is conducted by vocational agriculture school graduates. There is at the township level only one agricultural extension worker for approximately each 1,000 farmers.[88]

Government Corporations in Agriculture.--Agricultural research and extension is also conducted by the several institutes and/or experiment stations operated by the Taiwan Sugar Corporation (TSC), the Taiwan Tobacco and

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[86]Lionberger and Chang, op. cit., p. 80.

[87]The commissioner of PDAF, the hsien magistrate, and the head of the township Public Office, generally chair the extension advisory committee at their level of government; while the leader of the small agricultural unit, a grass-root organization of the Farmers' Association, usually assumes this duty at the village level. See Lionberger and Chang, loc. cit.

[88]USDA, ERS, Taiwan's Agricultural Development, op. cit., pp. 29-30.

Wine Monopoly Bureau (TTWMB) and the Taiwan Pineapple Corporation (TPC). The three corporations are public enterprises responsible for the planning, coordinating, processing and marketing of sugar cane, tobacco, and pineapples. The TSC also produces sugar cane on its own land, but most of Taiwan's sugar cane hectares are located on small family farms where the crop is grown under contract.[89]

Provincial Food Bureau (PFB). According to Christensen, the PFB:

> . . . is responsible for the collection of rice through fertilizer barter and rural land taxation and the supply of rice to military and civilian Government employees under the Government ration system. It releases rice for sale to markets for price stabilization purposes, handles exports and imports of rice, registers domestic rice merchants, and carries out other food administration activities.[90]

Agricultural Colleges.--Unlike agricultural research and extension, agricultural education in Taiwan is under the direction of the Ministry of Education (MOE) and the Provincial Department of Education (PDE). Taiwan has three institutions of higher education in agriculture: National Taiwan University (NTU) and Taiwan Provincial Chung Hsing University (TPCHU) each have a four-year agricultural college, and Taiwan Provincial Pingtung Junior College of Agriculture has a three-year program in

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[89] Ibid., p. 13. [90] Ibid., p. 12.

post-secondary agriculture. The Department of Agricultural Education in the TPCHU College of Agriculture is Taiwan's only teacher-preparation program in vocational agriculture.

Agricultural research work is conducted by both NTU and TPCHU. The agricultural colleges voluntarily cooperate closely with the research institutes and the district agricultural improvement stations, even though the former are administered through MOE and the latter are administered through PDAF.[91]

Private Organizations

The development of private farmer organizations in Taiwan began around 1900 when farmers' associations were organized voluntarily by farmers to protect themselves from landlords and to seek land rent reduction. The Japanese assumed control of the farmers' associations and promoted their development. Eventually, the colonial administration consolidated all rural organizations into a unified island-wide system of agricultural associations, under one administration, and organized at three levels: provincial, hsien, and township.[92]

Today, the farmers' associations are the largest and most important of all rural organizations in Taiwan. Other rural organizations, of relevance to this

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[91]Lionberger and Chang, op. cit., p. 79.

[92]Kwoh, op. cit., pp. 4-6.

investigation, include farm irrigation associations, agricultural cooperatives, and 4-H clubs.[93] Farmers are also likely to participate in the parent-teachers' associations or to serve as elected representatives to the township assembly, which is the legislative organ of the local government.[94]

Farmers' Associations (FA).--The farmers' association system in Taiwan, initiated by the Japanese and improved by the Chinese, has been the major organizational unit through which agricultural extension work has been carried out. In 1966, this federated network of multi-service cooperative organizations, consisted of 364 farmers' associations at three levels: provincial (1), hsien and city (22), and township (341).[95]

Members (each representing one household) in each village within a township area, organize themselves into a small agricultural unit (SAU); the actual "grass roots" component of the farmers' associations.[96] There were

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[93]Shen, op. cit., p. 48.

[94]Lionberger and Chang, op. cit., pp. 60, 63-64.

[95]USDA, ERS, Taiwan's Agricultural Development, op. cit., p. 32; see also Shen, loc. cit.

[96]The SAU is not an official part of the FA system, but is organized as a convenient bridge between the township FA and its members for disseminating farm information and for election purposes.

4,872 such units, in 1966, with a total membership of 830,000, or an average of 170 per unit. Farmer members of the SAUs elect a chairman to convene their meetings and representatives to elect directors and supervisors to boards of directors and boards of supervisors of the township FAs. The boards of directors are responsible for the policy decisions and operations of an association, including the election of a board chairman and appointment of a general manager; whereas, boards of supervisors are concerned with financial affairs. The general organization pattern of the hsien associations and the Provincial Farmers' Association (PFA) is the same as that of the township FAs.[97]

The multi-purpose character of the FAs is reflected in their three service sections: (1) an economic section for marketing, warehousing, and processing farm products and for purchasing farm supplies and consumption goods for sale to members, as well as conducting fertilizer-barter operations, collecting land taxes, and other activities on behalf of government agencies; (2) a credit section for handling savings deposits and providing loans to members; and (3) an agricultural extension section for conducting advisory and training services.[98]

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[97]USDA, ERS, Taiwan's Agricultural Development, loc. cit.; see also Shen, op. cit., p. 49; and Kwoh, op. cit., pp. 17-19.

[98]USDA, ERS, Taiwan's Agricultural Development, op. cit., pp. 32-33; and Kwoh, op. cit., pp. 29-36.

Many extension activities are carried out by the township FAs, including the establishment and promotion of village extension advisory committees, farm discussion groups, pest control teams, model farm programs, 4-H clubs, and various others.[99]

4-H Clubs.--JCRR sponsored the introduction of the 4-H club movement to Taiwan, in 1952, by setting up two kinds of 4-H clubs, school and village. In 1957, 4-H club work in the schools was turned over to the Provincial Department of Education, while those in the villages came under the sponsorship of PDAF and the direct supervision of PFA. Other than having a dual sponsorship, Taiwan's 4-H clubs are patterned closely after their United States counterparts. Taiwan's total village 4-H membership in 1966 was 65,978 organized into 5,335 clubs, with a like number of volunteer leaders, in 301 townships. School 4-H membership, in the same year, totaled 17,951 and were organized into 1,034 clubs in 65 secondary schools.[100]

Agricultural Cooperatives.--Both agricultural producers' cooperatives and marketing cooperatives are active

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[99]Taiwan Provincial Farmers' Association, Agricultural Extension Work in Taiwan, China ([Taichung], Taiwan: Provincial Farmers' Association, 1966), pp. 1-15, passim.

[100]Shen, op. cit., pp. 97-98; see also JCRR, 17th General Report of the Joint Commission on Rural Reconstruction (Taipei: JCRR, 1966), p. 84.

in Taiwan. In 1967, there were 117 agricultural producers' cooperatives, with a membership of 17,090, engaged in forestry, tea planting, bamboo growing, fisheries, animal husbandry, bird-raising, and vegetable production; and 28 marketing cooperatives, including those for fruit, milk, vegetables, lumber, and building materials, with a total membership of 70,490.[101]

Irrigation Associations.--The irrigation associations in Taiwan are organized by farmers to provide irrigation water for their farmers. The irrigation associations, twenty-six in number, are organized in a pattern similar to that of the farmers' associations. Members of each 100 to 150 hectares of farmland organize themselves into small irrigation units and elect representatives, who in turn, elect officers to administer their association. Each small irrigation unit is responsible for the distribution of irrigation water, maintenance of irrigation facilities, and collection of water fees, in their unit's area, in addition to participating in technical and service training sponsored by the association.[102] The supreme authority of the irrigation associations is vested in the Joint Council of Taiwan Irrigation Associations, which is composed of the

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[101] China Yearbook, 1967-68, op. cit., p. 303.

[102] JCRR, 17th General Report, op. cit., p. 79.

presidents of all twenty-six associations. The association presidents elect a board of supervisors, board of directors, and council president, and appoint a general manager to assist the president.[103]

Post-War Education in Taiwan

The Chinese people have traditionally revered education and knowledge. In the days of the mandarins, attainment of honor and fame was dependent upon first having passed the examination in Chinese literary classics. In fact, prior to the establishment of the Republic, in 1911, the teacher's position of honor in China was surpassed only by that of the Emperor and one's parents.

Educational Objectives

Taiwan's post-war educational objectives reflect a democratic educational philosophy and trace their origin to the teachings and writings of Dr. Sun Yat-sen, the founder of the Republic of China.

> In accordance with the Three Principles of the People, the purpose of Chinese education is to improve national living, to achieve mutual assistance, to develop national economic life, and to prolong the life of the democracy and higher standard of living, and in [the] end, to advance to an ideal world where harmony and equality prevail.[104]

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[103] Shen, op. cit., pp. 132-133.

[104] Republic of China, MOE, Long-Range Plan for Education in the Republic of China, 1964-1980 ([Taipei]: MOE, 1965), p. 64.

The Constitution of the Republic of China, as adopted on December 25, 1946, places special emphasis on education. Articles 158, 159, and 160 in Chapter 13, Section 5, Education and Culture, provide the legal basis for education; while Articles 162 and 164 assign supervisory and fiscal responsibilities for attaining the nation's educational objectives. The relevant Articles are quoted, to wit:

> Article 158.--The nation's educational and cultural services shall have as their aim the development among the citizens of national characteristics, democratic spirit, traditional morality, good physique, scientific knowledge, and the ability to earn a living.
>
> Article 159.--All citizens shall have an equal opportunity to receive education.
>
> Article 160.--All children of school age, to wit, those from six to twelve years, shall receive free primary education. Those from poor families shall be supplied with textbooks at the expense of the Government.
>
> All citizens above school age who have not received primary education shall receive supplementary education free of charge and shall likewise be supplied with textbooks at the expense of the Government.
>
> Article 162.--All public and private educational and cultural institutions throughout the country shall, in accordance with law, be subject to State supervision.
>
> Article 164.--Expenditures for educational programs, scientific studies and cultural services shall be in respect of the Central Government, not less than 15 per cent of the total national budget, in respect of the provinces, not less than 25 per cent of the total provincial budget, and in respect of the municipalities or hsien, not less than 35 per cent of the total municipal or hsien budget. Educational and cultural

> foundations established in accordance with the law shall, together with their property, be protected.[105]

Educational Development

The Nationalist Chinese commitment to education is reflected in the percentage of the Republic of China's gross national product (GNP) spent for education. With 2.7 per cent of its GNP spent for education in 1960, the Republic ranked among the leading countries of the world in level of human resource development when level of GNP per capita was considered.[106] By 1967, total expenditure for education had increased to 3.85 per cent of the GNP.

Taiwan's educational accomplishments, some of which have been cited in previous sections, indicate that substantial progress has been made toward attaining the Republic's educational objectives. Several of the more impressive accomplishments include:

1. Enforcement of free compulsory education for children from the ages of six through twelve

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[105] Republic of China, MOE, Education in the Republic of China: A Panoramic View in Pictures (Taipei: MOE, May, 1960), p. 6.

[106] The ranking is according to Harbison and Myers' composite index; see Frederick Harbison and Charles A. Myers, Education, Manpower, and Economic Growth (New York: McGraw-Hill Book Company, 1964), pp. 42-43, 47. Harbison and Myers used educational expenditure as a percentage of national income; however, the investigator calculated the percentage on the basis of GNP from data in the Republic of China, MOE, Educational Statistics of the Republic of China ([Taipei]: MOE, 1960), pp. 67-69; and from the Republic of China, CIECD, Taiwan Statistical Data Book, 1967 (Taipei: CIECD, 1967), pp. 11-12.

in elementary schools.[107] By school year 1954-55, over 90 per cent of all children in this age group were in school; presently this figure exceeds 97 per cent.[108]

2. A large expansion of educational opportunities at all levels; the percentage of students enrolled in schools has continued to increase, despite a high total population growth rate. Numbers of schools and teachers have also increased rapidly. By 1966-67, over one-fourth of Taiwan's entire population was attending school.[109] Illiteracy is declining rapidly.
3. Extension of free schooling, effective September, 1968, to nine years for all students. All elementary graduates may now continue their education at tuition-free, publicly operated

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[107]Some critics end their complimentary remarks about Taiwan's educational development, between 1951 and 1965, at this point. Jacoby, for example, in evaluating U.S. aid to Taiwan reported in 1966: "Beyond this [compulsory elementary school], Chinese education was a net inhibiting factor to modernization; with its rote teaching methods, inflexible curricula, and undue emphasis on literary subjects, it was a citadel of tradition." Jacoby, op. cit., p. 107.

[108]Republic of China, CIECD, Taiwan Statistical Data Book, 1967, op. cit., p. 152.

[109]Ibid., p. 149.

schools without taking the formerly-required entrance examination.[110]

Like most countries, especially the developing ones, Taiwan has many educational problems: a shortage of teachers, teaching facilities, schools, educational funds, and many others. Nevertheless, Taiwan's educational development over the past twenty-five years has been dynamic, with a determined effort on the part of the government to provide more and better programs and adequate educational facilities for all.

General Organization of the School System

The school system includes both public and private schools and is divided into three major levels: elementary, secondary, and higher education.[111] Allowing for some exceptions, most of Taiwan's schools would be included in Table 2.[112]

Pre-school education (nursery school or kindergarten) is optional. Social education includes special

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[110] China Yearbook, 1968-69, op. cit., p. 1.

[111] Public schools include national, special municipality, provincial, hsien, and city schools. This classification is based upon the primary source of the school's operational budget. For example, hsien schools are operated by the hsien government.

[112] A more detailed diagram of Taiwan's present school system is provided in Appendix C, Table 7.

TABLE 2.--A general classification of the school system in Taiwan

Level	Normal Age Range	Grades or Degree
Pre-school	4- 6 years old	Kindergarten
Elementary	6-12 years old	1-6
Secondary:		
Junior Middle	12-15 years old	7-9
Senior Middle	15-18 years old	10-12
Higher:		
Junior College	18-21 years old	13-14-15
College	18-22 years old	Bachelor Degree
University	18-25 years old	Bachelor and Advanced Degrees

education, supplementary education,[113] and adult education. Enrollments in both pre-school and social education have increased at a faster rate, during the past two decades, than has the population of Taiwan.

Vocational education is provided at two levels of schools: secondary and higher. Six kinds of vocational schools are in operation at the senior secondary level (grades 10-12): agriculture, industry, commerce, marine products, nursing and midwifery, and home economics.

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[113]Supplementary education programs are of two kinds: general and vocational. They provide school for dropouts and other youths who cannot attend regular schools; see Republic of China, MOE, Educational Statistics of the Republic of China, 1969 (Taipei: MOE, 1969), pp. 7-8.

Meaders observed that:

> The junior colleges offer vocational and technical programs in many areas such as industry, commerce, agriculture, medicine, and home economics. Some of these programs start at grade ten and continue through a total of five or six years. In general, the junior colleges are not established to serve as the first two years of a baccalaureate degree program.[114]

Administration of the School System

The schools in Taiwan, as prescribed in Article 162 of the Constitution (see page 96), are "subject to State supervision." The Ministry of Education (MOE) of the Central Government is responsible for the formulation of national educational policy and general supervision of the schools. However, in the case of elementary and secondary schools, it usually limits its operations to those of policy making and compilation of textbooks, leaving the administration of these institutions to the Provincial Department of Education (PDE) and the hsien/city bureaus of education.[115]

In principle, elementary schools should be established by local (hsien or city) governments and secondary

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[114] O. Donald Meaders, "Education and Development: A Case Study of Taiwan with Emphasis on Vocational Education," (paper prepared for education 882 "Vocational Education in Developing Countries," Michigan State University, East Lansing, spring term, 1969), p. 13. (Mimeographed.)

[115] UNESCO, World Survey of Education: III--Secondary Education (New York: International Documents Service, 1961), p. 359.

schools by the provincial government. However, if the need arises, schools may be established by any level of government (national, provincial, hsien or city) or by private individuals or organizations as long as they observe the basic regulations of MOE and PDE. In the case of secondary (middle) schools, their operation is not to conflict with the interest of the elementary schools in their district.[116]

In practice, since 1945, most of Taiwan's elementary schools have been funded and operated by hsien and city governments, accounting for approximately two-thirds of the local educational budget. However, most of the secondary (middle) schools have also been operated by hsien and city governments. Limited funds and heavy demands for secondary education have resulted in a gap between the administrative standards of the provincial and hsien or city middle schools, which has been narrowed only recently.

Secondary Education[117]

Secondary (or middle school) education in Taiwan is offered in three different kinds of institutions: high schools, vocational schools, and normal schools.[118]

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[116] Republic of China, MOE, Secondary Education, op. cit., pp. 20-23.

[117] Further discussion of elementary and higher education is not considered relevant to this investigation and is thus omitted.

[118] The main purpose of normal middle school is to train teachers for elementary schools. Their graduates were excluded from this study.

A complete high school or vocational school is divided into a junior program (grades 7, 8 and 9) and a senior program (grades 10, 11, and 12). However, most middle schools are established with only one program; either junior or senior. There are more than six separate junior middle schools for each senior middle school. During the years in which the graduates in this study attended school, both high schools and vocational schools offered junior programs. Operation of separate junior vocational schools was terminated at the end of school year 1965-66 as a result of changes in educational policies by MOE and PDE.[119]

Presently, students are admitted to junior middle school, which is free, but non-compulsory, upon graduation from elementary school. Prior to the 1968-69 school year, students were admitted to middle school only after passing a rigorous entrance examination. Admittance to senior middle school is still selectively determined by written examination. According to Meaders:

> The degree of selectivity practiced by the junior and senior middle schools has depend [sic] upon the number of applications for entrance, and the number of spaces available for students. The number of spaces available has depended upon the number of schools, the number of classes, and the number of students accepted per class. In general, many more students applied for admission than could be accepted. The academic schools usually had larger numbers of applicants than the vocational agriculture schools, and the provincial schools

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[119]Republic of China, MOE, Educational Statistics, 1969, op. cit., pp. 42-43.

> . . . usually had larger numbers of applicants than the county [hsien] and city financed schools.[120]

Taiwan's 803 middle schools in 1968-69, were administered in the following manner: 443 hsien or city, 192 provincial, 166 private, and 2 national. These included 487 junior schools, 216 complete (junior and senior) schools, and 100 senior schools. By comparison, during 1950-51, Taiwan had only 213 middle schools, which were administered accordingly: 117 hsien or city, 72 provincial, and 24 private. These included 94 complete schools, 110 junior schools, and 9 senior schools.[121] Provincial middle schools are expanding primarily in the direction of senior programs, while local schools are operating the bulk of the junior programs.

High Schools.--In 1950-51, high school junior programs comprised 63 per cent of Taiwan's middle school junior programs; however, by 1968-69, this percentage had climbed to 89 per cent.[122] The trend is likely to continue as the junior high school program, which is already free, becomes more comprehensive and attracts a broader range

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[120] Meaders, Contributions of Senior Middle School Graduates to Taiwan Agricultural Development, op. cit., p. 9.

[121] Republic of China, MOE, Educational Statistics . . ., 1969, op. cit., pp. 42-43.

[122] Ibid.; the percentages were calculated by the researcher.

of students. Compulsory education will likely be extended to nine years during the seventies.

The junior high school is established to provide general education; whereas the senior high school is to prepare the student for higher education. According to the Ministry of Education:

> The objectives of senior high are to educate the outstanding youth, refine their civic morality, and give them cultural, scientific and military trainig [sic] in order to lay the foundation of their higher academic study and of their professional readiness and to serve the community with academic as well as military knowledge.[123]

During the past two decades, the senior high school required courses of study have included Chinese, English, civics, Three People's Principles,[124] history, geography, mathematics, physics, chemistry, biology, physical education, music, art, industrial arts (home economics for girls), and military training (nursing for girls). In addition, some electives were offered during the second and third years of senior high school. The number of class-hours per week ranged from thirty-one to thirty-six.[125]

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[123]Republic of China, MOE, Secondary Education, op. cit., p. 7.

[124]A course emphasing Dr. Sun Yat-sen's San Min Chu I (Three People's Principles: nationalism, democracy, and livelihood).

[125]Republic of China, MOE, Secondary Education, op. cit., pp. 64-65.

Senior, as well as junior, high school programs have experienced tremendous growth during the fifties and sixties. Senior programs enrolled 18,866 students in 62 high schools in 1950-51 and by 1968-69 had expanded to 152,877 students enrolled in 177 high schools. During the same period, junior programs grew from 61,082 students and 128 high schools to 617,225 students and 626 high schools.[126]

Vocational Schools.--Vocational schools have expanded at a slower rate than have high schools. In 1950-51, 77 of 213 middle schools, or about 36 per cent, were vocational schools; whereas, in 1968-69, only 134 of 803 middle schools, or slightly less than 17 per cent, were classified as vocational schools.[127] The expansion has been in the direction of senior vocational programs. In 1950-51, about two out of every three vocational students were enrolled in junior programs; while in 1968-69, two out of every three were enrolled in senior programs.[128] During this period, total enrollments in junior vocational programs actually declined.

Total enrollments in vocational education have continued to rise in absolute terms; however, the

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[126]Republic of China, MOE, Educational Statistics . . ., 1969, op. cit., pp. 42, 54.

[127]Ibid., p. 2.

[128]Ibid., p. 58.

percentage of middle school students enrolled in vocational programs has decreased from 29 per cent in 1950-51, to 16 per cent in 1968-69.[129] Enrollment changes in the various kinds of vocational training (see Table 3) reflect the general trends of Taiwan's economy during the past two decades. Proportionately, vocational training in agriculture is decreasing, while commercial vocational training is increasing.

Vocational Agriculture Schools (V-A Schools).--Vocational agricultural schools, like the farmers' associations and agricultural research stations, were first established in Taiwan by the Japanese colonial administration. Between 1917 and 1945, ten district agricultural and forestry schools and twenty hsien farmers' training schools were formed to train elementary graduates to become, respectively, junior agricultural and forestry technicians and farmers. The district schools offered a three to five year program, while the hsien schools had a two year program. After the restoration of Taiwan to China, the V-A schools were reorganized; district schools were converted to provincial V-A schools and hsien schools became hsien/city junior V-A schools.[130]

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[129] Ibid., p. 10; the percentages were calculated by the researcher.

[130] John Hsueh-ming Chen, op. cit., pp. 66-67.

TABLE 3.--Enrollments in Taiwan vocational schools, 1953-54 and 1968-69[a]

Kind of Vocational Training	1953-54[b]		1968-69	
	No. Students	Percent	No. Students	Percent
Agricultural	17,582	38.5	24,431	16.3
Industrial	9,258	20.3	31,877	21.2
Commercial	14,265	31.3	75,922	50.6
Marine Products	1,450	3.2	4,745	3.1
Nursing & Midwifery	498	1.1	3,717	2.5
Home Economics	2,548	5.6	9,439	6.3
Total	45,601	100.0	150,131	100.0

[a]Calculated from: Republic of China, MOE, Educational Statistics of the Republic of China, 1960 (Taipei: MOE, 1960), p. 28; and Republic of China, MOE, Educational Statistics of the Republic of China, 1969 (Taipei: MOE, 1969), p. 58.

[b]Comparable data were unavailable for school years prior to 1953-1954.

Trends in vocational agriculture, since World War II, tend to reflect those of the entire field of vocational education; i.e., senior programs and their enrollments have expanded while their junior counterparts have contracted. However, vocational agriculture, unlike other kinds of vocational education, appears to have reached its zenith during the mid-sixties and is now experiencing a decline in total numbers of schools and, to a lesser extent, in enrollments.[131] In 1950-51, Taiwan's 39 V-A schools and their 3,309 graduates accounted for 51 per cent of the province's vocational middle schools and 35 per cent of its vocational graduates.[132] By 1968-69, there were only 31 middle schools offering vocational agriculture programs; or, only 23 per cent of Taiwan's vocational education programs were in agriculture. Less than 18 per cent of the preceding year's vocational graduates were from vocational agricultural programs.[133]

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[131] V-A schools numbered 42 in 1965-66; their enrollments had reached 22,222 in 1964-65; both figures are record highs. See Republic of China, Educational Statistics of the Republic of China, 1967 (Taipei: MOE, 1967), p. 29; and Republic of China, Educational Statistics . . ., 1969, op. cit., p. 58.

[132] Calculated from Meaders, "Education and Development," op. cit., pp. 9-10; and Republic of China, MOE, Secondary Education, op. cit., pp. 209-210. See Appendix B, Table 55, for additional data concerning V-A school senior graduates.

[133] Calculated from Republic of China, MOE, Educational Statistics . . ., 1969, op. cit., pp. 42, 64.

The general purpose of vocational education in agriculture has been to prepare persons for occupations in agriculture (farm and non-farm) and to improve the agricultural sectors of the communities. The following objectives for V-A schools were formally adopted by the Fourth National Education Conference in 1962:

1. To teach students knowledge and skills required by modern farmers and train basic farm technicians in order to facilitate agricultural improvement and accelerate farm production;

2. To cultivate the spirit of service and leadership of the youth in order to improve the living standard of rural people, and to strengthen rural reconstruction; and;

3. To make agricultural vocational school a Reconstruction and Education Center of the local rural community to improve farmers' modern knowledge and skills.[134]

The V-A school's senior program, like that of the high school, is much more specialized than is its junior program; also, few changes have occurred in its curriculum since 1950. The senior programs focus on subject-matter areas with practical training at school an integral part of the curriculum. The courses of study include those subjects offered in the high schools plus numerous technical agricultural courses in subject areas such as crops, animal

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[134] Republic of China, MOE, Secondary Education, op. cit., p. 130.

husbandry, farm management and the like.[135] The provincial schools have various divisions of specialization but the hsien/city schools offer only a comprehensive agricultural curriculum.[136] Instruction time in V-A schools varies from thirty-six to forty hours per week. Senior vocational programs allocate 20 to 30 per cent of their teaching time to general subjects, 30 per cent to vocational (technical agricultural) subjects, and the remainder to practical training. The general subjects are the same as those offered in the high school senior programs, but the V-A schools allocate only about one-fourth as much time to these courses as do the high schools.[137]

Summary

Historically, Taiwan's settlement and subsequent development is rather recent, especially in comparison to the lengthy civilization of mainland China. The people of Taiwan are predominately Chinese, most of whom are the descendants of settlers who immigrated from the mainland

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[135] A list of those courses which graduates in this study are likely to have taken appears in Appendix F, pp. 40-41.

[136] John Hsueh-ming Chen, p. 68; see also Meaders, Educational and Occupational Attainments of Taiwan Vocational Agriculture Graduates, p. 41 fn.

[137] Republic of China, MOE, Secondary Education, op. cit., p. 137.

between the early seventeenth and late nineteenth centuries. Taiwan was ceded to Japan in 1895, underwent intensive development as a primary producer of agricultural products for the Japanese Empire for the next fifty years, and was returned to China at the end of World War II. The small insular province has since become the seat of the Nationalist Chinese government and presently comprises over 99 per cent of the Republic of China.

Taiwan's rugged topography and varied climate hindered its pre-twentieth century development. The era of Japanese colonial rule witnessed the introduction and expansion of various rural institutions and modern technology. During the post-war period, emphasis has been given to the reorganization and expansion of rural institutions and to the improvement of agricultural technology. Farmer incentives have been provided by land reform and other programs which have contributed to improved rural socioeconomic conditions.

Since the turn of the century, investments in the island's agricultural research, extension, and education systems, as well as in its communication, irrigation, and transportation networks and other infrastructural features, have made possible the development, production, and skillful application of new physical inputs. As a result, Taiwan's agricultural productivity and total farm output have increased at a greater rate than has its rapidly-growing population.

Taiwan's agriculture is characterized by a favorable climate, a shortage of arable land, a labor-intensive cropping system, many small owner-operated family farms, highly developed farmer service organizations, and a skillful hard-working rural population which is responsive to socioeconomic incentives. Continued increases have been noted in the farmers' educational aspirations, living standards, and use of farm inputs.

A complex set of both governmental and private organizations have been instrumental in planning and administering agricultural development programs in Taiwan. JCRR has played a catalytic role among the organizations while PDAF has sponsored research and extension programs. The farmers' associations have been the primary units in carrying out extension activities.

Taiwan has a strong commitment to education. Presently, nearly 4 per cent of the GNP is spent on education, elementary education is nearly universal, free non-compulsory education is provided through the junior high school level, and one-fourth of the total population is attending school. There are both high schools and vocational schools at the secondary level with each kind having junior and senior programs. Junior secondary programs are moving in the direction of the comprehensive junior high school. Vocational education programs have expanded at a slower rate than have the high schools.

Vocational agriculture schools, which at one time accounted for most of the vocational enrollments, are beginning to decrease in number. One can expect the present educational trends to continue as Taiwan proceeds down the road to modernization and development.

CHAPTER IV

RESEARCH DESIGN AND DATA COLLECTION

The purpose of this chapter is to describe the methodology used in the study. Special attention is given to the Project Team, the populations and sampling procedures, the development and use of the survey instrument, and the collection and analysis of the data. This description provides the reviewer with some insight into the methodological quality of the investigation and serves as an outline for those who would conduct a similar study.

The investigation was conducted in three general stages: (1) on-campus (stateside) preparation, which included the study of Chinese culture and education on Taiwan and a review of research related to farmer education; (2) in-field operations, which involved the development and administration of the survey instrument and the coding of data; and (3) on-campus finalization, where the data were analyzed and the dissertation was written.

The research design and data collection method used in this investigation were built upon and incorporated

with the methodology employed in Meaders' Taiwan study of 1968.[1] The researcher was fortunate in having been able to design a study which was part of a larger study designed and executed by his project director (Dr. Meaders).[2] Such a professional arrangement between professor and graduate student is highly desirable from a pedagogical viewpoint; but, the opportunity for the two to operate together as a team both while on campus and in the field, as was the case in this study, is rare indeed.

At the outset, the researcher possessed at least three serious handicaps; namely, he had no prior experience in Taiwan, he was unfamiliar with its educational and agricultural systems, and he did not know either Mandarin or Taiwanese, the two major Chinese languages on the island. The first handicap was considerably reduced by deciding to work with Dr. Meaders, who had over two years of prior experience on Taiwan.[3] The researcher overcame his second handicap by intensive on-campus study of

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[1]Meaders, Contributions of Senior Middle School Graduates to Taiwan Agricultural Development, op. cit.

[2]See footnote 20, pp. 9-10, for a brief description of the relationship between this study and Meaders' study of 1968.

[3]Meaders was located at the Taiwan Provincial Chung Hsing University during 1961 and 1962 while serving as Agricultural Education Advisor on the Michigan State University Advisory Group. His personal contacts on Taiwan and his knowledge of Chinese customs and institutions were of invaluable assistance to the researcher.

relevant literature, before departing for Taiwan, and by conducting extensive investigations of the province's educational and agricultural features, primarily through personal interviews and observations, while on Taiwan. The third handicap was alleviated by the able assistance of several multilingual professional educators in Taiwan who served as counterparts and Project Team members to Dr. Meaders and the researcher.

The Project Team

The researcher would be remiss if reference was made only to "a counterpart," for the 1968 Taiwan Education and Development Project was a Chinese-American team effort involving many individuals.[4] The Project Team consisted of the head and four staff members of the Department of Agricultural Education at Taiwan Provincial Chung Hsing University (TPCHU), Dr. Meaders and the researcher; plus, eleven interviewers, one secretary-typist, four clerks, and three part-time assistants.[5] Dr. Meaders was the Project Director, and Professor Lin Lok-chien, Head, Department of Agricultural Education, TPCHU, was the

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[4]The 1968 Taiwan Education and Development Research Project is the project name of Meaders' 1968 study entitled "Education and Development: Contributions of Agricultural Education at the Secondary Level to Agricultural Development in Taiwan."

[5]See Appendix D, for a complete list of the Project Team personnel.

Project Co-Director. Mr. Hu Chi-ho, Associate Professor, was the Assistant Project Director. Messrs. Yao Jih-chang and Lin Chin-kun, Associate Professors, and Lee Teh-kwei, Instructor, were Project Field Supervisors. The researcher carried the title "Research Associate" and was the director of the Farmer Interview Phase of the Project.

The Agricultural Education Building on the campus of TPCHU at Taichung was the headquarters for the Project Team's field operations.[6] The campus site was selected because of its central location on the island, its accessibility to rail transportation, its close proximity to the Taiwan Provincial Government (including the offices of PDAF, PDE, and PFA), and because it is the location of the only university-level Department of Agriculture Education on the island. The agricultural education staff, as well as many other faculty members at TPCHU, were readily available to render assistance to the Project.

TPCHU granted Professor Lin and his staff sufficient release time from their regular duties to enable them to serve on the Project Team on a one-quarter to one-half time basis for the duration of the in-field operations stage (approximately seven months). The five agricultural educators, with their knowledge of farming and the educational system of Taiwan combined with their personal and organizational acquaintances, were able to

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[6]See Figure 2, p. 55 for the location of Taichung City.

provide valuable counsel and assistance to the Project. Their services, which are described individually and in more detail later in this chapter, were essential for the successful development and timely execution of the various in-field operations.

Sampling Procedures

The universe for the 1968 Taiwan Education and Development Research Project consisted of all senior graduates in Taiwan who had graduated from public high schools or vocational agriculture schools during June of 1950, 1955, and 1959.[7] Provincial, hsien, and city schools were included. The Project sub-sampling procedure, as it relates to this study, consisted of two parts (see Figure 4): Part One involved the delimitation and sampling of the Project population (conducted by Meaders), while Part Two included the identification of the population (Project sub-population) and the selection of respondents from Part One for the Farmer Interview Phase of the Project (directed by the researcher). The graduates who were interviewed in Part Two actually constituted a sub-population rather than a sample; however, the term "sample"

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[7]Meaders also included senior graduates from 1964 as well as graduates from the five-year vocational agriculture curriculum (grades 7 through 11). However, the two aforementioned categories of graduates are not germane to this investigation and are subsequently excluded from the data which are derived from Meaders' portion of the sampling procedure (Part One).

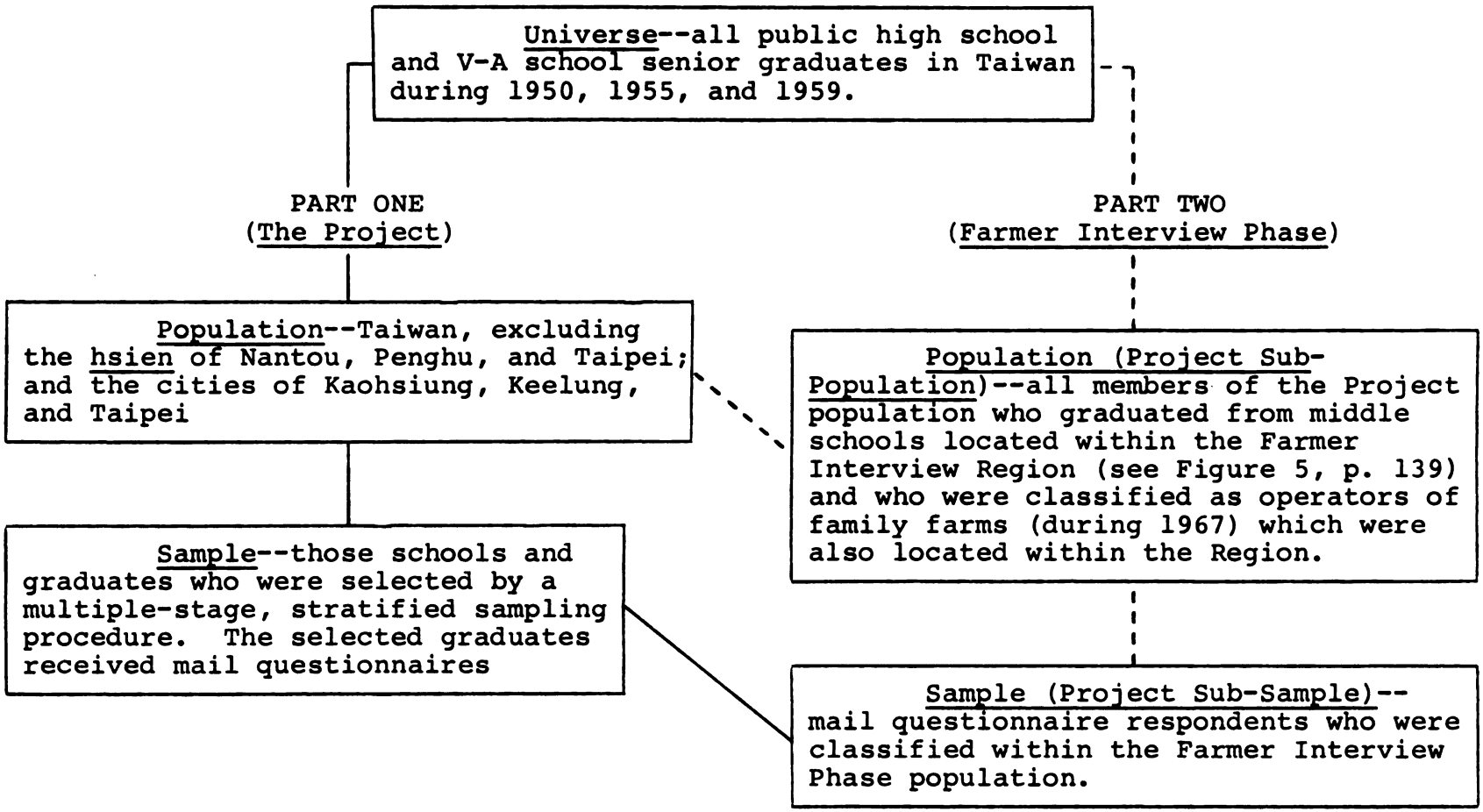

Figure 4.--The Two-Part Sampling Procedure Used in the 1968 Taiwan Education and Development Research Project

is sometimes used in a general sense in referring to the interviewees.

Part One (The Project)

Population, Sample, and Respondents.--Both schools and their graduates were selected by a multiple-stage, stratified sampling procedure. The Project population of middle schools was identified and delimited according to four major criteria:

1. The schools must have male, senior graduates.
2. The hsien and cities in which the schools are located must have more than 10 per cent of the population engaged in agriculture. (Three cities were excluded: Kaohsiung, Keelung, and Taipei.)
3. The schools must be public schools.
4. The hsien and cities selected must have had senior graduates from both high schools and vocational agriculture schools in at least one of the three selected years. (Three hsien were excluded: Nantou, Penghu, and Taipei.)[8]

The application of these four criteria resulted in the identification of seventy-seven schools located in thirteen hsien and two cities. The school Project population consisted of fifty-six high schools (thirty provincial

[8]Meaders, Contributions of Senior Middle School Graduates to Taiwan Agricultural Development, op. cit., p. 3.

and twenty-six hsien/city schools) and twenty-one vocational agriculture schools (ten provincial and eleven hsien/city schools).[9]

Application of the fourth criterion was made also in the selection of high schools for the study. The numbers of schools in communities with and without senior vocational agriculture programs, both for the population (Part One) and the sub-population (Part Two) were as indicated in Table 4.

The final step in the selection of high schools and V-A schools, as reported by Meaders, was guided by three major factors:

> (1) to maintain representativeness within the population; (2) to recognize the limits of financial, human, and time resources available for data gathering activities; and (3) to secure data from a sample of approximately 300-400 graduates (if possible) in each of the [twelve] sub-groups of senior graduates. . . .[10]

Since there were no senior graduates from hsien/city high schools and V-A schools in 1950, there were only ten sub-groups of senior graduates. A total of fifty-six schools were included in the sample for Part One (see Table 5).

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[9]Adapted from data presented by Meaders, Contributions of Senior Middle School Graduates to Taiwan Agricultural Development, op. cit., pp. 4, 96. See Appendix B, Table 56 for additional data regarding number of schools in the Project population and sample.

[10]Ibid., pp. 4-5. Since the 1964 graduates were excluded from this study, the researcher deleted "sixteen" from the quotation and replaced Meaders' number with "twelve."

TABLE 4.--Numbers of high schools in communities with and without vocational agriculture programs.

Type and Location of High School	Number of Schools[a]					
	1950		1955		1959	
	Population	Sub-Pop.	Population	Sub-Pop.	Population	Sub-Pop.
Provincial high schools:						
In communities with senior V-A programs	11(11)	5(5)	17(10)	9(4)	18(10)	10(4)
In communities without senior V-A programs	2(2)	1(1)	9(6)	5(3)	12(7)	7(4)
Sub-totals	13(13)	6(6)	26(16)	14(7)	30(17)	17(8)
Hsien/city high schools:						
In communities with senior V-A programs	0	0	4(4)	3(3)	7(5)	6(4)
In communities without senior V-A programs	0	0	9(9)	3(3)	19(9)	8(3)
Sub-totals	0	0	13(13)	6(6)	26(14)	14(7)
Totals	13(13)	6(6)	39(29)	22(13)	56(31)	31(15)

Source: The number of high schools in the population were calculated from O. Donald Meaders, Contributions of Senior Middle School Graduates to Taiwan Agricultural Development (East Lansing: Institute for International Studies, Department of Secondary Education and Curriculum, Michigan State University, December, 1968), pp. 4, 96.

Note: Sub-totals denote total number of schools included in at least one of the three years.

[a]The numbers selected for the study are shown in parentheses.

TABLE 5.--Number of schools, by sub-group, in the sample for Part One.

Schools		Year of Graduation			Total No. of Schools Included[a]
Kind	Type	1950	1955	1959	
High School	Provincial	13	16	17	19
	Hsien/city	0	13	14	16
V-A School	Provincial	9	10	10	10
	Hsien/city	0	4	11	11
Totals		22	43	52	56

[a]Total number of schools included with senior graduates in at least one of the three years.

Meaders selected the graduates through the use of systematic sampling techniques within the various sub-groups. The sampling fractions for the three years of graduates ranged from 1/1 (all of the male graduates) to 1/8. Replacements for "address unknown," "died," or "abroad" were provided from a reserve sample which had been drawn for this purpose.[11] (See Appendix B, Table 56 for numbers of schools, graduates, sample, and related details,)

Preliminary Data Collection.--Preliminary data about each sample graduate, some of which were essential in order to identify and locate the individuals in the sub-sample, were obtained from both school records and the

[11]Ibid., p. 5.

graduates themselves. Data secured from school records included the sample graduate's: (1) overall average in Chinese; (2) overall graduation average; (3) rank in graduation class; (4) occupation of parent at the time the student was accepted; (5) major division in which the student enrolled or the joint entrance examination taken after graduation; and (6) address of the graduate.[12]

Survey research techniques, including mail questionnaires and personal interviews, were used for gathering preliminary data from the sample graduates. The latter were asked to respond to various questions including the following:

1. Are you engaged in farming now?
   (1) Full-time, (2) Part-time, or (3) Not at all
2. About how many hours per week do you spend farming?
   (0) None (3) 21-30 hours
   (1) Less than 10 (4) 31-40 hours
   (2) 10-20 hours (5) More than 40
3. Are you engaged in farming as:
   (1) Owner of the farm?
   (2) Part-owner and part-renter?
   (3) Renter only?
   (4) Manager of father's or other relative's farm?

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[12] Ibid.

(5) Manager for another person or organization who is owner?

(6) Technician on father's or other relative's farm?

(7) Technician on other farm?

(8) Other?

4. If you are farming, what is the address where we may interview you?_____

An "intensive and personalized mailing procedure," which covered a period of five weeks, was used to obtain a completed response rate of 90 per cent (see Appendix B, Table 56, for response rate data). The questionnaires, with a cover letter signed by the principal of the school, were mailed from and collected by each of the schools in the sample. Approximately one-third of the sample graduates who failed to respond to the mail questionnaire were interviewed to determine their present occupation.[13] All completed questionnaires were returned by the schools to the Department of Agricultural Education, Taiwan Provincial Chung Hsing University, for coding purposes and to select the respondents for participation in the Farmer Interview Phase (Part Two) of the Project.

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[13]For a general outline of the mailing procedure used in Part One, see Meaders, Contributions of Senior Middle School Graduates to Taiwan Agricultural Development, op. cit., p. 6.

Part Two (The Farmer Interview Phase)

The Population (Project Sub-Population).--Before departing for Taiwan, the researcher had proposed that the population for the Farmer Interview Phase consist of high school and vocational agriculture school senior graduates, from 1950 and 1959, who indicate on the mail questionnaire that they had engaged in farming during 1967.

The reasons for including the 1950 and 1959 senior graduates were:

1. Preliminary data about the senior graduates from 1950 and 1959 (as well as from 1955 and 1964) would be available from Meaders' research.
2. The age level of the 1950 graduates would approximate thirty-six at the time of survey. At this age, the graduate should have had an opportunity to become well established in farming and to have had sufficient oppo-tunities to display his managerial and leadership ability.
3. Some minor changes occurred during the fifties in the curricula of both the high schools and the vocational agriculture schools. These changes could be reflected in the farmer performance of their graduates. If so, the findings from a younger group of graduates,

such as those from 1959, should differ from those of the 1950 graduates.

4. Farmers who had graduated in 1950 would have been exposed to eighteen years of post-secondary school influence from such elements as neighbors, extension activities, and land reform, resulting in a masking of the secondary school contributions to their farming performance. Using this rationale, the 1959 graduates will likely exhibit more of the influences of their secondary education than will the 1950 graduates.

Due to resource limitations, it was further proposed that the Farmer Interview Phase be confined to a region, rather than spread over the entire area covered by Part One, and that the number of farmers in the sample be limited to approximately 200. The Farmer Interview Region (population area) was to include a sufficient number of hsien and cities to yield a sample of the aforementioned size. The Region was to be selected on the basis of having within its boundaries:

1. A high percentage of the population engaged in farming.
2. Homogeneous farming enterprises relative to other regions.

3. A relatively large number of both high school and vocational agriculture school senior programs.

After inspecting the completed mail questionnaires, and with the proposed selection guidelines in mind, the population (Project sub-population) area was delimited as follows:

1. The five hsien of Chiayi, Changhua, Taichung, Tainan, and Taichung and the two cities of Taichung and Tainan were selected to form the Farmer Interview Region (see Figure 5, page 135).[14]
2. A third year of senior graduates (1955) was added to the proposed two (1950 and 1959) so that the number of farmers in the population would yield a sample of approximately 200.[15]
3. All bonafide family farm operators who had farmed either part-time or full-time within the Farmer Interview Region during all of 1967, and who were 1950, 1955, or 1959 senior

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[14]The reasons for selecting this particular region are discussed on pp. 132-135.

[15]Although graduates of both 1955 and 1964 were included in the population of Part One, the former were chosen because they have had a longer time in which to become established in farming than had the latter.

graduates from schools within the Region, were included in the population.[16]

Of the 1,669 usable replies from the Farmer Interview Region in Part One, 10 per cent (80) of the high school graduates and 30 per cent (262) of the V-A school graduates reported they were "engaged in farming" at the time of survey. Graduates who answered (3) to Question 1 and/or (0) to Question 2 (see page 125) were not considered as "engaged in farming." Furthermore, not all of the 342 graduates who indicated they were engaged in farming were included in the sample of this study.[17] A total of 127 were excluded for the following reasons:

1. Answering (5), (6), (7), or (8) to Question 3 (see pages 125-126) indicated the graduate was not a bonafide farmer.
2. Having a farm address which was located outside of the Farmer Interview Region as indicated in the response to Question 4 (see page 126).
3. Owning a farm, but not being the farm operator.

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[16]See Appendix A for definitions of "Farmer" and "Self-Owned Land." The graduate must have been classified as at least a "part-time farmer" for all of 1967 (January through December) to be included.

[17]See Appendix B, Tables 57 and 58.

4. Farming at the time of mail questionnaire survey, but not having farmed during all of 1967.[18]

The Farmer Interview Phase sample, which was reduced to 215 qualified interviewees, included nearly 6 per cent of the high school graduates and slightly more than 19 per cent of the V-A school graduates who had responded to the mail questionnaire. It was decided to attempt to interview 100 per cent of the sample; however, twelve of the graduates could not be interviewed because of attendance at summer military training, difficulty in locating the farm address, or failure to be at their address at the appointed time of interview. A total of 203 interviews were completed.[19] Because a relatively small percentage of high school graduates were engaged in farming, only 46 of the interviewees were high school graduates as compared to the 157 who were V-A school graduates.[20]

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[18] In some cases, reasons 3 and 4 could not be determined until the time of interview.

[19] See Appendix B, Table 58, for a detailed breakdown of the sample, including organization by kind (high school and V-A school) and type (provincial and hsien/city of schooling, as well as by year of graduation.

[20] Information concerning the distribution of graduates by degree of engagement in farming is presented on p. 168 Table 13. Data regarding the number of workdays used by the graduates on the farm during 1967 are shown on p. 174 Table 16.

The Farmer Interview Region.--At the outset, the selection of the Region was guided by the three criteria listed on pages 128-129. Approximately 57 per cent of the population of the Region--a relatively high percentage when compared with 45 per cent for all of Taiwan--were engaged in agriculture (primarily in farming).[21] However, the small number of bonafide farmers among the mail questionnaire respondents necessitated the inclusion of a larger geographical survey area than was anticipated. As a result, the Farmer Interview Region contained a much greater variety of farming enterprises than had been sought; but, what was sacrificed in farm enterprise homogeneity was gained in representativeness of farming throughout Taiwan. The latter is evidenced by the fact that the Region encompassed the same percentage (about 44 per cent) of Taiwan's total rice-growing area, in 1967, as it did of the island's total cultivated land area (see Table 6). It was reasoned that the aforementioned comparison would be a rough index of homogeneity of farm enterprises because rice is the island's most important crop; i.e., a disproportionate percentage of a region's cultivated land area devoted to the growing of rice would indicate a high (or low) homogeneity as compared to other regions.

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[21]Calculated from population distribution data (as of the end of October, 1967) in the China Yearbook, 1967-68, op. cit., p. 106; and from agricultural population data in the Taiwan Agricultural Yearbook, 1968, op. cit., p. 50.

TABLE 6.--Various factors of the Farmer Interview Region as a percentage of Taiwan Province and of the area covered by Part One.

Factor[a]	Part One as a Percentage of Taiwan Province[b]	Farmer Interview Region as a Percentage of Part One Area	Farmer Interview Region as a Percentage of Taiwan Province
Total Population	70.30	53.73	37.77
No. of Farm Families	86.90	55.55	48.27
Cultivated Land Area	86.63	50.77	43.98
Rice Growing Area	89.56	49.56	44.39
School with Sr. Grads.:[c]			
No. of High Schools[d]	62.22 (34.44)	58.06 (% of sample)	20.00
No. of V-A Schools[e]	95.45 (95.45)	47.62 (% of sample)	45.45

Sources: Calculated from the China Yearbook, 1967-68 (Taipei: China Publishing Co., 1968), p. 106; PDAF, Agricultural Economics Division, Taiwan Agricultural Yearbook, 1968 (n.p.: PDAF, July, 1968), pp. 46, 49, 59-60; and the Republic of China, MOE, Educational Statistics of the Republic of China, 1960 (Taipei: MOE, 1969), pp. 11, 19.

Note: Data for Taiwan Province include Taipei Special Municipality.

[a]The first four listed factors are for calendar year 1967.

[b]Percentages within parentheses refer to sample number.

[c]Total number of schools with senior graduates during at least one of the three years (1950, 1955, and 1959).

[d]There were ninety provincial and hsien/city high schools with senior programs in 1958-59, but it could not be determined if all had senior graduates during that year (see Republic of China, MOE, supra, p. 11).

[e]Of the thirty-two V-A schools with senior programs in 1958-59, twenty-two had senior graduates (see supra, p. 19).

The degree to which the Farmer Interview Region is representative of the agricultural and educational attributes of both Taiwan Province and the mail questionnaire survey area (Part One) can be adjudged by reviewing the percentages presented in Table 6 and in noting the location of the schools on the map of the Farmer Interview Region (Figure 5).

The Region was not only representative of Taiwan, but it was also administratively feasible for several reasons. First, the five hsien and the two cities forming the Region were served by just two of Taiwan's seven district agricultural improvement stations; namely, the Taichung DAIS and the Tainan DAIS. This facilitated the development and preparation of the Farmer Interview Schedule. Secondly, the Region was relatively close to the Project Team headquarters at Taichung. This helped both to minimize transportation costs and to enhance supervision while the interviewers were in the field. Finally, and perhaps coincidently, the home areas of each of the students selected for interviewing were located within the Farmer Interview Region. This factor facilitated the locating of farm addresses, since most of the interviewers were assigned to areas with which they were familiar.

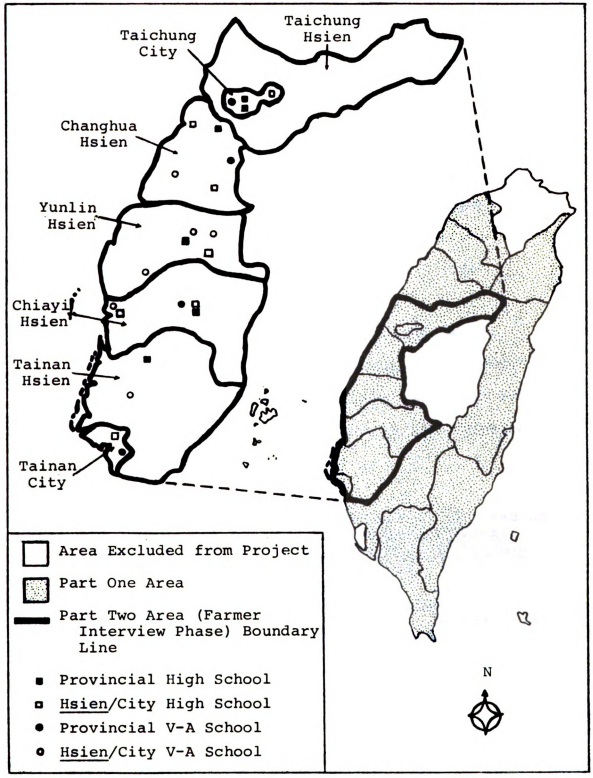

Figure 5.--The Farmer Interview Region and Locations of Schools Included in the Sample

Note: Five of the eighteen high schools included in the sample had no graduates interviewed and were consequently omitted from this map (see Appendix B, Table 59).

Development of the Survey Instrument

Design of the Instrument

An extensive review of survey instruments, which have been used to obtain data from farmers regarding their farming performance and/or participation in formal organizations, either in Taiwan or the United States, revealed the following pertinent questionnaires:

1. "Taiwan Diffusion Study Schedule I (for farmers)."[22]
2. "The Progress of High School Graduates in Becoming Established in Farming, 1943-1955."[23]
3. "An Economic Study of Land Use in Tainan Hsien and City: A Farm Management Survey Questionnaire" (in Chinese).[24]

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[22]The interview schedule was developed and used by Lionberger and Chang for their study entitled, Communication and Use of Scientific Farm Information by Farmers in Two Taiwan Agricultural Villages, op. cit.

[23]Designed cooperatively by D. L. Blake, E. E. Dakan, E. M. Henderson, D. M. Nielsen, and J. R. Wall, in 1956, as part of the Iowa State College [University] Agriculture Experiment Station Project 1253. The schedule is located in the Appendix of Nielsen's dissertation entitled, "Relationship of High School Vocational Agriculture and Size of Home Farm to Establishment of Graduates in Farming," op. cit., pp. 122-129.

[24]Shison C. Lee. An Economic Study of Land Use in Tainan Hsien and City, 1965 (Taichung, Taiwan: Research Institute of Agricultural Economics, Taiwan Provincial Chung Hsing University, 1967). The survey instrument was used to collect field data for the aforementioned study and was translated into English for the researcher by

The most relevant questionnaire relating to the farmer and his education in Taiwan was the "Survey of Graduates of V-A Schools, Taiwan," the mail questionnaire used in Meaders' 1962 study.[25]

With the four survey instruments in mind, an extensive investigation was conducted during January and February, 1968, (the researcher's first two months on the island) to acquaint the researcher with farming and education in Taiwan. An understanding of these areas was an essential prerequisite to the development of an appropriate interview instrument. Several farms were visited. Many specialists were consulted in the areas of agricultural education and extension, farm management, and related technical fields. Much assistance was received from such organizations as the Joint Commission on Rural Reconstruction, the Taiwan Sugar Corporation, the Provincial Department of Education, the Provincial Farmers' Association, the Taichung DAIS and the Tainan DAIS, and from several departments within the College of Agriculture at both National Taiwan University and Taiwan Provincial

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Mr. Lee Kuen-mu, Instructor, and Mr. Kwoh Yi-chung, Assistant Research Fellow, both of the Research Institute of Agricultural Economics, TPCHU.

[25]Meaders, Educational and Occupational Attainments of Taiwan Vocational Agriculture Graduates, op. cit., pp. 67-72.

Chung Hsing University.[26] The investigative operations were enhanced by the linquistic abilities and professional resourcefulness of Messrs. Hu Chi-ho, Lin Chin-kun, and Yao Jih-chang, one of whom usually accompanied the researcher on each of his exploratory quests.

The first draft of the Interview Schedule was prepared.[27] The instrument was designed to include the following items concerning the graduates: family background, personal characteristics, status in farming, level of living, farm equipment status, size of farm, nature of crop and livestock enterprises, use of improved farm practices and farm records, participation in formal organizations, and perception of the contribution of their education to farmer performance. Sufficient items were included concerning the livestock and crop production to facilitate the use of those data as a basis for figuring gross product values for the farm of each graduate. Parts of the farmer performance sections (II-X) of the Interview Schedule (see Appendix F) were adapted from the three previously listed questionnaires (Lionberger and Chang, Nielsen and others, and Lee); while the Education and

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[26]See Appendix D, for a list of the individuals who provided technical assistance to the researcher in the development of the Interview Schedule.

[27]See Appendix F, for the final draft (English version) of the Interview Schedule.

Farming Section (XI) was patterned after Meaders' 1962 mail survey instrument.

Translation

The first draft was translated into Chinese by Messrs. Hu and Yao. One translator would translate the English version into Chinese and the second would translate it back into English. Only one translator was present with the researcher while translating; differences were evaluated and the process repeated until agreement was reached.

Jury of Experts

An eight-member Jury of Experts was selected to provide professional guidance and to insure technical accuracy in the development of the Interview Schedule. The Jury members were chosen on the basis of their knowledge of farming and/or education in Taiwan and are listed on the following page.

The first draft of the Interview Schedule, after being translated into Chinese, was submitted to the Jury for an evaluation including possible suggestions for improvement. Their recommendations were evaluated by the researcher and a subsequent revised draft of the instrument was prepared and also submitted to the Jury for review. The English version of the latter was mailed to the researcher's Doctoral Guidance Committee at Michigan State University. Suggestions from the Jury and Guidance Committee were included in the final draft of the Interview Schedule.

Organization	Jury Member	Title
DAIS	Mr. Wang Tzu-tao	Director, Taichung DAIS
DAIS	Mr. Lee Wen-chou	Director, Tainan DAIS
JCRR	Mr. Chen Chin-wen	Senior Specialist, Agricultural Services Division
PDAF	Mr. Fu Teh-sung	Chief, Agricultural Economics Section
PDE	Mr. Y. L. Chen	Chief, Section III (Vocational Education)
PFA	Miss Chu Ming	Director, Agricultural Extension Division
TPCHUCA	Professor Lin Lok-chien	Head, Department of Agricultural Education
TSC	Mr. Yu Ying-piao	Director, Agriculture Department

Pilot Test

Due to the thorough review of the survey instrument by the Jury of Experts, the instrument's overall length, and in the best interest of the Project timetable, it was decided to conduct the pilot test with only one individual. The Interview Schedule was administered by Mr. Yao Jih-chang, and the researcher, to a full-time farmer who was a 1960 senior graduate of the Taichung Provincial V-A School. The graduate, who was interviewed on his farm in Tali Village just south of Taichung City, required three hours to complete the pilot test. Despite his lengthy ordeal, no impatience was expressed by the graduate; in fact, he appeared to be very interested in the content of the questions.

The primary benefit of conducting the pilot test was not so much to check the content of the Interview Schedule as it was to determine the availability of information and to develop efficient administration procedures for subsequent interviews. While Mr. Yao administered the questionnaire, the researcher compiled notes and suggestions for shortening the length of the interviews and for preparing the forthcoming interviewer training sessions.

It was decided to shorten future interviews ten to fifteen minutes by questioning the farmer about the improved practices used in the raising of only three

(the pilot test had required four) of his most valuable crops which he had harvested in 1967.[28] Furthermore, the poultry information section was to be completed only if the poultry raised by the farmer in 1967 was fifty fowl or more.[29] After completing the aforementioned modifications, and a few others, the Interview Schedule was finalized and printed.[30] The English version was printed after the interviews were completed.

Collection of Data

Most of the data for the study were collected by eleven interviewers who, using the Interview Schedule, completed interviews with 203 of the 215 farmers in the sample. The methods employed to collect township crop data, "the school as a source of information and/or assistance to their graduates" data, and information about middle school programs during the fifties, are discussed in a later section (see pages 147-149).

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[28]See Appendix F, p. 12, question 34.

[29]See Appendix F, p. 26, question 36.1.

[30]The crop and livestock enterprises, listed on pp. 12-32 of the Interview Schedule (Appendix F) were selected on the basis of having the highest total NT$ production value of all farm enterprises located in the Farmer Interview Region during 1966. Their selection was based upon data in the Taiwan, PDAF, Agricultural Economics Division, Taiwan Agricultural Yearbook, 1967 (n.p.: PDAF, July, 1967).

Mr. Jao Jih-chang, one of the Project Field Supervisors, was selected to assist the researcher in coordinating the data collection operation of the Farmer Interview Phase. This selection was based upon Mr. Yao's understanding and working knowledge of agricultural economics, (farm management), vocational agriculture, and English; in addition to personally knowing the interviewers.

The Interviewers

Selection.--Eleven interviewers were selected on the basis of the following criteria:[31]

1. A male senior agricultural education major at Taiwan Provincial Chung Hsing University.
2. Knowledge of Mandarin and Taiwanese.
3. Interested in obtaining experience in interviewing farmers.
4. Recommended by their department chairman, Professor Lin Lok-chien.

The interviewers, who were paid a per diem and were reimbursed for transportation costs, impressed the researcher as being alert, conscientious, and capable of academic excellence.

Training.--Because of the complexity of the Interview Schedule, and the classwork and pre-graduation

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[31]See Appendix D for a list of the interviewers by name.

activities of the seniors, it was decided to expose the interviewers to short intensive training sessions of approximately four hours duration. Seven of these sessions were conducted by Mr. Yao and the researcher during the two-week period preceding the beginning of the scheduled interview assignments. The twenty-eight hours of interviewer instruction included lectures on or exercises in:

1. The purpose of the 1968 Taiwan Education and Development Research Project, focusing upon the Farmer Interview Phase, and the importance of interviewer's performance in relation to the Project objectives.
2. What constitutes good interviewing procedure and some mistakes to be avoided.
3. A thorough review of each section of the Interview Schedule.
4. Drill in asking questions in a uniform manner and in a way which secures the information sought by the interviewer without volunteering the "best response" for the farmer.
5. Practice in overall interview procedures with fellow interviewers teamed up in pairs within the classroom.
6. Practice in making various post-interview calculations such as figuring out the farmer's average yield and weighted average land class, and the township's weighted average yield.

During the weekend following the last training session, the interviewers moved to the field, conducted at least two interviews, and returned to campus where two more four-hour sessions were held. However, the latter sessions were held to answer interviewer questions, resolve difficulties, check Interview Schedules and the calculations; and, in general, to ensure that the interviewing was proceeding as planned.

The Interviews

Each of the interviewers was assigned to his home hsien and, where possible, was assigned to interview those farmers who lived closest to his home area. Interview appointment letters signed by Dr. Meaders, Project Director, and Professor Lin, Head, Department of Agricultural Education were mailed to the farmers by their assigned interviewers several days in advance of their scheduled interviews. Similar letters were mailed by the researcher to the Public Offices, in townships where the graduates' farms were located, to request their cooperation in providing the interviewers with various crop statistical data.[32] The Provincial Farmers' Association also notified its township offices of the farmer-interviews and requested their cooperation with the interviewers. Letters were also sent to the middle schools of the graduates to

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[32]See Appendix F, pp. 11, 44.

be interviewed. The numerous letters, which were mailed to the various organizations involved, served to legitimatize the research in the eyes of the township officials, the school authorities, the graduates, and others who might have been called upon to assist the interviewers.

During the survey period, Mr. Yao and the researcher were in the field supervising and coordinating the collection of data. Each interviewer was provided with an identification card, complete with his personal photograph and the Taiwan Provincial Chung Hsing University official chop (identification mark), and a map of his area of responsibility. The survey procedure involved marking the farm location on the map, administering the Interview Schedule and, after completing all of the interviews which were to be completed in a particular township, visiting the township Public Office and farmers' association office to obtain the necessary crop statistical data and farmer rating information.

The farmers were interviewed during a relatively slack work season (the last two weeks of May and first week of June), which in this case was between rice weeding and rice harvest. This was especially important because the interviews averaged two and one-half hours in length. The researcher was sensitive to feedback from the farmers (via the interviewers) regarding the size of the survey instrument. Surprisingly, only one farmer balked at being

interviewed because he "did not have time"; however, in this case, the interviewer was skillful enough to persuade the farmer to complete the interview anyhow. The general reaction from the interviewers was that the farmers felt that the Interview Schedule was long, but also interesting.

The eleven interviewers used a total of 187 interviewer-days to complete the 203 interviews, or an average of seventeen days per interviewer. This included the time required to visit the Public Offices and the farmers' association offices in the ninety townships where farmer-interviews were completed. Transportation difficulties, inclement weather, and farmers not at home at the appointed time of interview were some of the problems encountered by the interviewers. While in the field, the interviewers demonstrated a great deal of competence and diligence, working long hours, seven days per week. All eleven of the interviewers completed their assignments and measured up well to the quality standards imposed.

Supplementary Data

As the completed Interview Schedules were returned to the Project headquarters, a list was compiled of the different kinds of crops harvested, and livestock and livestock products sold, in each township, as reported by the farmers who had been interviewed. Using this information, survey forms were prepared and mailed to the

appropriate township Public Offices, and other government agencies, where additional data were obtained regarding average crop yields and crop, livestock, and livestock product market values for calendar year 1967.[33]

Data which relate to Hypothesis 3, page 11; i.e., "schools as a continuing source of information and/or assistance to their graduates on farming problems" were obtained from the mail questionnaire used in Part One of the Project.

Following completion of the farmer-interviews, the researcher visited three high schools (two provincial and one hsien/city) and three V-A schools (also two provincial and one hsien/city) and interviewed their principals in order to learn more about the senior educational programs which were in effect during the period 1950-1959.[34] Each of the schools visited had graduates who had been included in the sub-sample and each of the principals interviewed was familiar with the middle school programs which had been in effect in Taiwan during the fifties. Information was obtained concerning the courses of study, school activities (especially the 4-H clubs), criteria for student

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[33]Average crop yields per hectare (in kilograms) were obtained from the township Public Offices; whereas, hsien NT$ market values per 1000 kilograms were secured from PDAF.

[34]See Objective 4, p. 11.

admissions, and related curricular factors which may have differed for the various categories of graduates in the sub-sample.

Processing of Data

Calculation of Farming Performance Factors

Data obtained from the completed Interview Schedule, the township Public Offices, and PDAF (see footnote 32 on the previous page) were used to calculate various measures of farming performance prior to actual coding of the survey instruments. This operation involved calculation of indexes of use of improved production and management practices for selected crop and livestock enterprises,[35] estimated total (and per crop chia) values of crop and livestock production, and total animal unit equivalents for each graduate interviewed.[36] Four clerks, under the supervision of Mr. Yao and the researcher, used mechanical desk calculators and worksheets to calculate the various factors. These data were encoded and transferred to the coding columns in the Interview Schedules.

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[35]The methods used to calculate indexes of use of improved production practices are detailed in Appendix E.

[36]Additional farming performance factors were calculated but were not reported in this investigation.

Coding of Interview Data

The four clerks (under the supervision of Mr. Lin Chin-kun), the researcher's wife, and the researcher processed and encoded the interview raw score data in preparation for transfer to data processing cards. The Electronic Data Processing Department of the Taiwan Sugar Corporation carried out the keypunching operation and prepared the initial listings of data.

Analysis of Data

After discussions with several statistical consultants, the researcher decided to use chi square values to test the hypotheses stated with reference to each of the objectives listed in Chapter I. Because of the complexity of the Interview Schedule and the rather small number in the sample, it was decided that a more refined statistical design or method was neither practical nor warranted.

When the 203 graduates were organized into six substrata (sub-groups) according to kind of schooling and year of graduation, as originally intended, it was discovered that because only a small percentage of graduates were engaged in farming the numbers in two of the cells were too small (high school graduates in 1950 and 1959 were twelve and eight respectively) for meaningful analysis purposes.[37]

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[37] See Appendix B, Table 60, for a detailed breakdown of the sample.

Therefore, an alternate plan of organization for analysis was chosen; one where the graduates were organized into four strata on the basis of kind and type of schooling, as shown in Table 7.

TABLE 7.--Interviewed graduates organized by kind and type of schooling.

Type of Schooling	Kind of Schooling		Combined Total
	High School	V-A School	
	No. of Interviews	No. of Interviews	No. of Interview
Provincial	22	118	140
Hsien/City	24	39	63
Total	46	157	203

Data involving eleven independent variables, and various dependent variables regarding the graduates' personal and farm characteristics, farming performances, participation in formal organizations, and perceptions and opinions about schooling for prospective farmers, were computed in the form of contingency tables.[38] The chi square statistic was used to determine whether or not significant relationships existed between variables. If the analysis revealed that the observed frequencies were not significantly different ($p \leq .05$ level) from the

[38]See Appendix B, Tables 61 and 62 for a list of the eleven independent variables and their relationships with selected dependent variables.

expected frequencies, it was concluded that no relationship existed between variables.

In general, only data which describe the relationship between kind of schooling (the key independent variable) and those dependent variables which are most closely related to the objectives of the study, are presented in tabular form.[39]

A computational limitation in the form of distorted chi square values may have occurred where the combination of a low number of total observations in one group (N = 46 for the high school graduates) and the coding of data into multiple categories (10 in some cases) has resulted in low expected frequencies per cell. However, this limitation is not likely to affect the overall testing of hypotheses since several relatively accurate chi squares were also computed for each hypothesis.

Summary

This study is the Farmer Interview Phase of the 1968 Taiwan Education and Development Research Project. Consequently, the research design and data collection method used in this investigation were built upon and incorporated with the methodology employed in Meaders' Taiwan study of 1968. The Project Team, which included

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[39]Data regarding the independent variable "kind and type of schooling" are reported when they help to describe the personal characteristics of the graduates or when significant relationships occur between types of schooling.

the head and four staff members of the Department of Agricultural Education at Taiwan Provincial Chung Hsing University, as well as several other individuals, assisted in the planning and execution of the various field operations of the Project, including those of the Farmer Interview Phase.

The Project sampling procedure consisted of two parts. Part One involved the delimitation and sampling of the Project population (schools and graduates). With the exception of the graduates from middle schools located in three cities and three hsien (which were excluded), the Project population included all 1950, 1955, and 1959 high school and V-A school male senior graduates in Taiwan. Mail questionnaires were administered to a net Project sample, consisting of 3,477 graduates (1,850 of whom were from schools located within the Farmer Interview Region), which had been selected according to a multiple-stage, stratified sampling procedure.

On the basis of the completed responses in Part One, it was decided in Part Two to delimit the Farmer Interview Phase population (Project sub-population) to include all members of the Project population who had graduated from middle schools located within a five-hsien area (Farmer Interview Region) of west-central Taiwan and who were classified as operators of family farms located within the boundaries of the Region. Graduates who were mail questionnaire respondents in Part One, and who met

the Farmer Interview Phase population criteria in Part One, constituted the sample (Project sub-sample) for this study. The sample was subsequently reduced to 215 qualified interviewees of which 203 (46 high school and 157 V-A school graduates) were interviewed.

An extensive Interview Schedule was developed with the cooperation and technical assistance of specialists from several agricultural and educational organizations in Taiwan. The survey instrument was translated into Chinese, scrutinized for technical inaccuracies by an eight-member Jury of Experts, revised several times, pilot tested, and printed.

Eleven male, senior students, who were majoring in agricultural education at TPCHU were selected to serve as interviewers. The latter, who were originally from the Farmer Interview Region and spoke both Mandarin and Taiwanese, received approximately twenty-eight hours of instruction prior to their interview assignments. The interviews averaged two and one-half hours in length and the interviewers required about two and one-half weeks to complete all of their assignments. Supplementary data were collected by the researcher from selected township Public Offices and other government agencies so that the graduates' 1967 gross farm income could be estimated. Personal visits were made to several middle schools to obtain data regarding their programs.

Farming performance factors were calculated and Interview Schedule raw score data were encoded and transferred to data processing cards. Chi square values were used to test the hypotheses developed for the study. Although, contingency tables were computed and analyzed to determine the relationships between eleven independent and several dependent variables, only data in regard to kind of schooling (and kind and type of schooling, when relevant) are presented in tabular form.

CHAPTER V

PRESENTATION AND ANALYSIS OF RESULTS

Data concerning the 203 graduates are presented in Tables 8 through 54. These tables are grouped under six subheadings and, with the exception of the first subheading, are presented in the same order as are the objectives and hypotheses to which they relate in Chapter I.

Tables 8 through 21 provide some general information about the graduates and their farms. The findings relative to the farming performances (establishment in farming, cropping programs, livestock programs, and estimated gross farm incomes) are presented in Tables 22 through 44. Tables 45 and 46 focus upon the participation of the graduates in formal organizations. Data regarding the sources of information and/or assistance on farming problems used by graduates are shown in Tables 47 through 49. An analysis of the graduates' perceptions regarding the most appropriate education for prospective farmers is featured in Tables 50 through 52. In the final section, the

opinions of the graduates in regard to their middle school program and its relation to farming are reported in Tables 53 and 54.

General Information About the Graduates and Their Farms

The purpose of this section is to provide some background information about the graduates and their farms and to partially satisfy the requirements for Objective 2; i.e., "to analyze the personal characteristics of the graduates." However, those personal characteristics which relate "to the graduates' participation in formal organizations and to their source(s) of information and/or assistance on farming problems" (the balance of Objective 2), are presented separately in later sections.

The data presented in this section determine whether or not various selected variables are related ($p \leq .05$ level) to the kind and type of schooling, as well as to the kind of schooling (disregarding type), received by the graduates. The data are analyzed in respect to the selected variables, which are sufficiently diverse in nature to be grouped and labeled under the subheading "general information." Comparisons are made between the percentage distributions of the graduates in respect to their personal characteristics (especially to those concerning their farming operations) and in regard to their farm location and quality of farm land.

A matrix, which identifies whether or not significant relationships occur between seven independent variables and fourteen general information (dependent) variables, which were computed and analyzed in the form of contingency tables, is located in Appendix B, Table 61.

The percentage distribution shown in Table 8, reveals that occupation of the parent (usually the father) at the time graduate entered senior middle school was associated ($p < .01$ level) with the kind and type of schooling received by the graduates. The percentage of graduates with agriculture as the occupation of their parent at the time the graduates entered senior middle school, in each of the four kind and type of schooling groups, was as follows: hsien/city V-A school, 84.6 per cent; provincial V-A school, 79.6 per cent; hsien/city high school, 70.8 per cent; and provincial high school, 45.5 per cent. The provincial high school graduates had the highest percentage in the free occupations (18.2 per cent) and hsien/city high school graduates had the highest percentage in the governmental and/or educational occupations (16.7 per cent).

Occupation of the parent at the time graduate entered senior middle school was also related ($p < .01$ level) to kind of schooling of the graduates. Agriculture was the occupation of the parent for 79.6 per cent of the V-A school graduates and for 58.7 per cent of the high school graduates.

TABLE 8.--Percentage distribution of graduates by occupation of parent at the time graduate entered senior middle school.

Occupation of Parent	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
	% (N=24)[a]	% (N=22)[a]	% (N=46)[b]	% (N=39)[a]	% (N=118)[a]	% (N=157)[b]	% (N=203)
Agriculture	70.8	45.5	58.7	84.6	78.0	79.6	74.9
Industry	4.2	9.1	6.5	2.6	0.0	0.6	2.0
Commerce	4.2	4.5	4.3	2.6	1.7	1.9	2.5
Free Occupations[c]	4.2	18.2	10.9	0.0	2.5	1.9	3.9
Government and Education	16.7	9.1	13.0	7.7	7.6	7.6	8.9
Miscellaneous	0.0	0.0	0.0	2.6	1.7	1.9	1.5
Not Determined	0.0	13.6	6.5	0.0	8.5	6.4	6.4
Total	100.1	100.0	99.9	100.1	100.0	99.9	100.1

[a]Kind and type of schooling $\chi^2 = 35.848$ d.f. = 18 Significant at $p < .01$ level.

[b]Kind of schooling $\chi^2 = 18.486$ d.f. = 6 Significant at $p < .01$ level.

[c]Include doctors, dentists, lawyers, and similar professionals.

The analysis of contingency tables showed that occupation of the parent at the time graduate entered senior middle school was also associated with a third independent variable; namely, farm location by hsien. The relationship was significant at the $p < .001$ level; although, the chi square value was thought to be spuriously high due to low cell frequencies.

A phi index (Cramér's ϕ' statistic) was computed to test and compare the apparent strengths of association between the occupation of the parent variable and each of the independent variables to which it was associated.[1] The resultant ϕ' indexes were as follow: kind of schooling, $\phi' = .301$; farm location by hsien, $\phi' = .296$; and kind and type of schooling, $\phi' = .242$. Thus, the association between kind of schooling and occupation of the parent at the time graduate entered senior middle school was about the same as the association between the latter and farm location by hsien. Kind and type of schooling had the lowest strength of association of the three.

The distribution of occupation of the father at the time the graduates completed senior middle school (see Table 9), unlike the percentage distribution of occupation

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[1] $\phi' = \frac{\chi^2}{N(L-1)}$ $\phi' = 0$ reflects complete independence and $\phi' = 1$ shows complete dependence between variables; see William L. Hays, Statistics for Psychologists (New York: Holt, Rinehart and Winston, 1963), p. 606.

TABLE 9.--Distribution of graduates by occupation of father at the time graduate completed senior middle school.

Occupation of Father	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
Deceased	9	19.6	19	12.1	28	13.8
Farming	27	58.7	115	73.2	142	70.0
Non-Farm Agriculture	0	0.0	2	1.3	2	1.0
Industry	0	0.0	1	0.6	1	0.5
Commerce	4	8.7	4	2.5	8	3.9
Free Occupations[a]	2	4.3	2	1.3	4	2.0
Government and Education	4	8.7	12	7.6	16	7.9
Retired	0	0.0	1	0.6	1	0.5
Other	0	0.0	1	0.6	1	0.5
Total	46	100.0	157	99.8	203	100.1

$\chi^2 = 9.147$ d.f. = 8 Not significant at $p \leq .05$ level.

[a]Include doctors, dentists, lawyers, and similar professionals.

of the parent at the time the graduates entered senior middle school (Table 8), did not differ significantly from the hypothetical no relationship data for graduates by kind of schooling. A significant relationship was observed between occupation of the father at the time graduate completed senior middle school and farm location by hsien.

By comparing the distribution of Table 9 with that of Table 8, it may be observed that the percentage of high school graduates, with agriculture (farm or non-farm) as the occupation of their parent (father) at the time the

graduates entered senior middle school, was the same as it was when the graduates completed senior middle school; however, in the case of the V-A school graduates, the percentage decreased from 79.6 per cent to 74.5 per cent. This decrease, plus some change in the categorization of occupations between Tables 8 and 9, most likely contributed to the change in levels of significance between the two tables.

The percentage distribution of graduates by senior middle school overall graduation average is shown in Table 10. It was found that the overall graduation average was associated ($p < .01$) with the kind and type of schooling completed by the graduates. The percentage of graduates with an overall graduation average of 75 and above, in each of the four kind and type of schooling groups, was as follows: hsien/city high school, 50.0 per cent; hsien/city V-A school, 48.7 per cent; provincial V-A school, 42.1 per cent; and provincial high school, 9.1 per cent. The hsien/city V-A school graduates had the highest percentage of overall graduation averages of 80 and above, with 23.1 per cent of their graduates in this category. The latter group was the only one of the four to have some graduates with overall graduation averages of 85 and above.

A review of contingency table data disclosed the existence of a significant relationship between overall graduation average and year of graduation, but the

TABLE 10.--Percentage distribution of graduates by senior middle school overall graduation average.

Overall Graduation Average[c]	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
	% (N=24)[a]	% (N=22)[a]	% (N=46)[b]	% (N=39)[a]	% (N=118)[a]	% (N=157)[b]	% (N=203)
85-89.9	0.0	0.0	0.0	7.7	0.0	1.9	1.5
80-84.9	4.2	0.0	2.2	15.4	7.6	9.6	7.9
75-79.9	45.8	9.1	28.3	25.6	34.7	32.5	31.5
70-74.9	37.5	59.1	47.8	43.6	39.0	40.1	41.9
65-69.9	8.3	27.3	17.4	7.7	13.6	12.1	13.3
Less Than 65	4.2	4.5	4.3	0.0	5.1	3.8	3.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[a]Kind and type of schooling $\chi^2 = 31.937$ d.f. = 15 Significant at $p < .01$ level.

[b]Kind of schooling $\chi^2 = 4.816$ d.f. = 5 Not significant at $p \leq .05$ level.

[c]None of those interviewed had an overall graduation average of ≥ 90 or < 60.

relationship between overall graduation average and kind of schooling was found to be not significant. Thus, the combination of kind and type of schooling was more closely associated with overall graduation average than was kind of schooling alone.

The distribution data, shown in Table 11, indicate that no significant relationship existed between the size of farm where the graduates lived at the time of graduation from senior middle school and the kind of school from which they graduated. In fact, the size of farm where graduate lived at the time of graduation from senior middle school appeared to be associated with none of the seven independent variables for which contingency tables were computed.

The data presented in Table 12 indicate that the number of years farmed by the graduates, since their graduation from senior middle school, was related to the kind and type of schooling received by the graduates. This relationship (significant at $p < .01$ level) was primarily the result of there having been no hsien/city school graduates during 1950. The percentages of graduates who had farmed nine or more years (as of December 31, 1967), in each of the four groups, were as listed: provincial high school, 85.7 per cent; provincial V-A school, 67.8 per cent; hsien/city high school, 41.7 per cent; and hsien/city V-A school, 28.2 per cent. No significant relationship was found between the number of years farmed by the

TABLE 11.--Distribution of graduates by size of farm where graduate was living at time of graduation from senior middle school.

Size of Farm (in chia)	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
10.0 or more	0	0.0	1	0.6	1	0.5
7.0 - 9.99	2	4.3	3	1.9	5	2.5
5.0 - 6.99	5	10.9	4	2.5	9	4.4
3.0 - 4.99	5	10.9	26	16.6	31	15.3
2.0 - 2.99	7	15.2	29	18.5	36	17.7
1.5 - 1.99	5	10.9	11	7.0	16	7.9
1.0 - 1.49	10	21.7	31	19.7	41	20.2
0.5 - 0.99	7	15.2	31	19.7	38	18.7
Less Than 0.5	4	8.7	20	12.7	24	11.8
Was Not Living on Farm	1	2.2	1	0.6	2	1.0
Total	46	100.0	157	99.8	203	100.0

$\chi^2 = 10.153$ d.f. = 9 Not significant at $p \leq .05$ level.

graduates since graduation and the kind of school attended by the graduates.

An analysis of contingency tables indicated that the number of years farmed since graduation was not only related to kind and type of schooling, but also to year of graduation, degree of engagement in farming, farm location by hsien, and farm location by agricultural region.

On page 46, findings reported by Meaders revealed that about 10 per cent of the V-A school graduates and 2 per cent of the high school graduates [of the nearly thirty-five hundred graduates in the net sample of

TABLE 12.--Percentage distribution of graduates by number of years farmed since graduation.

Number of Years Farmed	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
	% (N=24) [a]	% (N=21) [a]	% (N=46) [b]	% (N=39) [a]	% (N=118) [a]	% (N=157) [b]	(N=202) [c]
9 Yrs. or More	41.7	85.7	62.2	28.2	67.8	58.0	58.9
8 Yrs., < 9 Yrs.	4.2	4.8	4.4	12.8	2.5	5.1	5.0
7 Yrs., < 8 Yrs.	25.0	4.8	15.6	17.9	9.3	11.5	12.4
6 Yrs., < 7 Yrs.	4.2	0.0	2.2	28.2	7.6	12.7	10.4
5 Yrs., < 6 Yrs.	12.5	4.8	8.9	7.7	5.1	5.7	6.4
4 Yrs., < 5 Yrs.	8.3	0.0	4.4	2.6	4.2	3.8	4.0
3 Yrs., < 4 Yrs.	0.0	0.0	0.0	0.0	0.8	0.6	0.5
2 Yrs., < 3 Yrs.	4.2	0.0	2.2	2.6	1.7	1.9	2.0
Less Than 2 Yrs.	0.0	0.0	0.0	0.0	0.8	0.6	0.5
Total	101.1	100.1	99.9	100.0	99.8	99.9	100.1

[a] Kind and type of schooling $\chi^2 = 46.311$ d.f. = 24 Significant at $p < .01$ level.

[b] Kind of schooling $\chi^2 = 5.498$ d.f. = 8 Not significant at $p \leq .05$ level.

[c] N = 202 because one graduate did not respond to this item.

Part One of the study] had indicated that farming was their "present main job." However, the percentages of graduates engaged in farming on an other than "main job" basis was considerably larger. Of the 1,669 mail questionnaire replies from graduates of schools located within the Farmer Interview Region, 342 or about 20 per cent reported they were engaged in farming (see Appendix B, Table 58). After application of the selection criteria on pages 130-131, the number of graduates in the sample was reduced to 215. This number included approximately 19 per cent of the V-A school graduates and about 6 per cent of the high school graduates who had responded to the mail questionnaire.[2] In other words, it was found that the percentages of graduates who had responded to the mail questionnaire and who were operators of family farms located within the Farmer Interview Region at the time of survey, was over three times as great for the V-A school graduates as it was for the high school graduates.

In Table 13, the 203 senior graduates who were interviewed in this study were compared with all farm operators in Taiwan on the basis of their degree of engagement in farming. The percentage of senior graduates who had farmed part-time (83.7 per cent) during 1967 was much higher than was the percentage of all farm operators

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[2]Calculated from data in Appendix B, Table 58.

TABLE 13.--Distribution of graduates (and of all farm operators in Taiwan) by degree of engagement in farming.

Degree of Engagement in Farming	Kind of Schooling[a]				Combined Responses[b]		All Farm Operators in Taiwan[c]	
	High School		V-A School					
	No.	%	No.	%	No.	%	No.	%
Part-Time	38	82.6	132	84.1	170	83.7	336,920	38.6
Full-Time	8	17.4	25	15.9	33	16.3	536,080	61.4
Total	46	100.0	157	100.0	203	100.0	873,000	100.0

[a]Kind of schooling $\chi^2 = 0.056$ d.f. = 1 Not significant at $p \leq .05$ level.

[b]The data for the graduates are based upon their responses to the following question: were you engaged in farming during 1967? (1) No; (2) Yes, part-time; or (3) Yes, full-time.

[c]Calculated from sample census data for 1966. See Taiwan, Provincial Government, Committee on Census of Agriculture, Report on the 1966 Census of Agriculture, Taiwan, Republic of China, 5 per cent Sample Census (n.p.: Taiwan Provincial Government Printing Press, October, 1967), pp. 6-7.

in Taiwan who had farmed part-time (38.6 per cent) during 1966. The converse was true when compared on the basis of full-time farmers. A review of data indicated that no significant relationship occurred between the degree to which the graduates were engaged in farming in 1967 and any of the seven independent variables (including kind of schooling) for which contingency tables were computed.

Calculation of chi square from the percentage distribution data shown in Table 14, revealed that relation of graduate to the farm operator was associated ($p < .001$ level) with the kind and type of school attended by the graduates.[3] The percentage of graduates in each of the four groups, who claimed to have been farm operators during 1967, was as reported: hsien/city high school, 95.8 per cent; provincial V-A school, 78.8 per cent; provincial high school, 68.2 per cent; and hsien/city V-A school, 51.3 per cent. Graduates who were sons of farm operators during 1967 constituted the second largest "relation to the farm operator" category.

It was noted that 10.6 per cent more of the high school graduates than of the V-A school graduates claimed

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[3]Only graduates who had indicated on the mail questionnaire that they were farm managers (operators) were scheduled for interviewing. Some of the graduates, however, conceded at the time of interview that they considered their fathers to be the legal farm operators, even though the graduates made most of the farm management decisions. Oftentimes these decisions were made indirectly by influencing their fathers.

TABLE 14.--Percentage distribution of graduates by relation of graduate to the farm operator during 1967.

Relation of Graduate to the Farm Operator	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
	% (N=24)[a]	% (N=22)[a]	% (N=46)[b]	% (N=39)[a]	% (N=118)[a]	% (N=157)[b]	% (N=203)
Self	95.8	68.2	82.6	51.3	78.8	72.0	74.4
Son	4.2	22.7	13.0	35.9	20.3	24.2	21.7
Brother	0.0	4.5	2.2	10.3	0.8	3.2	3.0
Other Relation	0.0	0.0	0.0	2.6	0.0	0.6	0.5
More Than One Farm Operator	0.0	4.5	2.2	0.0	0.0	0.0	0.5
Total	100.0	99.9	100.0	100.1	99.9	100.0	100.1

[a]Kind and type of schooling $\chi^2 = 33.987$ d.f. = 12 Significant at $p < .001$ level.

[b]Kind of schooling $\chi^2 = 6.414$ d.f. = 4 Not significant at $p \leq .05$ level.

to have been farm operators during 1967. However, the relationship between kind of schooling and relation of graduate to the farm operator during 1967 was found to be not significant at the $p \leq .05$ level.

An analysis of contingency tables revealed that relation of graduate to the farm operator during 1967 was not only related to kind and type of schooling, but also to year of graduation, farm location by hsien, and farm location by agricultural region.

The percentage distribution data, shown in Table 15, indicate that relation of graduate to the head of household during 1967 was associated ($p < .05$ level) with kind and type of schooling. The percentage of graduates for each of the four groups, who claimed to have been heads of households during 1967, was as follows: provincial V-A school, 60.2 per cent; provincial high school, 59.1 per cent; hsien/city high school, 37.5 per cent; and hsien/city V-A school, 35.9 per cent. It was noted that the percentages of graduates who claimed to have been farm operators during 1967 were considerably higher than those of graduates who reported to have been heads of households during the same year. This contrast was especially great in the case of the hsien/city high school graduates, where 95.8 per cent were farm operators and only 37.5 per cent were heads of households.

TABLE 15.--Percentage distribution of graduates by relation of graduate to the head of household during 1967.

Relation of Graduate to the Head of Household	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/ City	Provin- cial	Sub- Total	Hsien/ City	Provin- cial	Sub- Total	
	% (N=24) [a]	% (N=22) [a]	% (N=46) [a]	% (N=39) [a]	% (N=118) [a]	% (N=157) [b]	% (N=203)
Self	37.5	59.1	47.8	35.9	60.2	54.1	52.7
Son	62.5	40.9	52.2	59.0	39.0	43.9	45.8
Brother	0.0	0.0	0.0	5.1	0.8	1.9	1.5
Total	100.0	100.0	100.0	100.0	100.0	99.9	100.0

[a] Kind and type of schooling $\chi^2 = 13.324$ d.f. = 6 Significant at $p < .05$ level.

[b] Kind of schooling $\chi^2 = 1.673$ d.f. = 2 Not significant at $p \leq .05$ level.

No significant relationship was found to exist between kind of schooling and relation of graduate to the head of household during 1967. Although, the latter was found to be associated with year of graduation and farm location by agricultural region.

The chi square value, computed from the percentage distribution data in Table 16, reveals that the number of workdays used by graduates on their farms during 1967 was related ($p < .05$ level) to the kind and type of school from which they graduated. When the data were collapsed into categories showing the percentage of graduates who used 180 or more workdays on their farms during 1967; the hsien/city high school graduates led the groups with 58.4 per cent, while the other groups ranged from 31.8 per cent to 35.6 per cent.

A higher percentage of high school graduates (45.7 per cent) than of V-A school graduates (35.1 per cent) used 180 or more workdays on their farms during 1967. However, the relationship between kind of schooling and number of workdays used by graduate on farm during 1967 was found to be not significant at the $p \leq .05$ level. As would be expected, the number of workdays used by the graduates during 1967 was associated with the degree to which they were engaged in farming.

Calculation of chi square from the percentage distribution data shown in Table 17, indicated that the number of workdays used by wife on farm during 1967 was

TABLE 16.--Percentage distribution of graduates by number of workdays used by graduate on farm during 1967.

Workdays Used by Graduate on Farm[c]	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/ City	Provin-cial	Sub-Total	Hsien/ City	Provin-cial	Sub-Total	
	% (N=24)[a]	% (N=22)[a]	% (N=46)[b]	% (N=39)[a]	% (N=118)[a]	% (N=157)[b]	% (N=203)
300 or More	29.2	18.2	23.9	25.6	21.2	22.3	22.7
240 - 299	0.0	4.5	2.2	7.7	3.4	4.5	3.9
180 - 239	29.2	9.1	19.6	0.0	11.0	8.3	10.8
120 - 179	8.3	9.1	8.7	10.3	16.9	15.3	13.8
60 - 119	20.8	22.7	21.7	46.2	33.1	36.3	33.0
59 or Less	12.5	36.4	23.9	10.3	14.4	13.4	15.8
Total	100.0	100.0	100.0	100.1	100.0	100.1	100.0

[a]Kind and type of schooling $\chi^2 = 27.965$ d.f. = 15 Significant at $p < .05$ level.

[b]Kind of schooling $\chi^2 = 10.607$ d.f. = 5 Not significant at $p \leq .05$ level.

[c]A measure of time spent on the farm. This does not include a measure of workdays spent off the farm.

TABLE 17.--Percentage distribution of graduates by number of workdays used by wife on farm during 1967.

Workdays Used by Wife of Graduate on Farm	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
	% (N=24) [a]	% (N=22) [a]	% (N=46) [b]	% (N=37) [a]	% (N=115) [a]	% (N=152) [b]	% (N=198) [c]
300 or More	18.2	33.3	26.1	47.0	54.1	48.7	43.4
240 - 299	4.5	0.0	2.2	3.5	8.1	4.6	4.0
180 - 239	0.0	16.7	8.7	8.7	2.7	7.2	7.6
120 - 179	0.0	16.7	8.7	5.2	5.4	5.3	6.1
60 - 119	27.3	8.3	17.4	13.0	8.1	11.8	13.1
59 or Less	18.2	8.3	13.0	7.0	13.5	8.6	9.6
None	31.8	16.7	23.9	15.7	8.1	13.8	16.2
Total	100.0	100.0	100.0	100.1	100.0	100.0	100.0

[a] Kind and type of schooling $\chi^2 = 31.739$ d.f. = 18 Significant at $p < .05$ level.

[b] Kind of schooling $\chi^2 = 9.252$ d.f. = 6 Not significant at $p \leq .05$ level.

[c] N = 198 because one married graduate did not respond to this item.

related ($p < .05$ level) to the kind and type of schooling completed by the graduate. When the data were collapsed into categories revealing the percentage of graduates in each group, whose wives used 180 or more workdays on the farm during 1967, the results were as follows: provincial V-A school, 64.9 per cent; hsien/city V-A, 59.2 per cent; provincial, high school, 50.0 per cent; and hsien/city, high school, 22.7 per cent. The latter group, which had the lowest percentage of wives who used 180 or more workdays on the farm, was the same group which had the highest percentage of graduates who used 180 or more workdays on the farm during 1967.

A higher percentage of V-A school graduates (60.5 per cent) than of high school graduates (37.0 per cent) had wives who used 180 or more workdays on the farm during 1967. However, the relationship between kind of schooling and number of workdays used by wife on the farm during 1967 was not significant at the $p \leq .05$ level. The number of workdays used by wife on farm was associated with farm location by hsien.

The observed distribution data in Table 18 differ significantly from the expected no relationship data. The number of years of schooling completed by the wives of the graduates was associated with both the kind and type of school attended by the graduates ($p < .05$ level) and by kind of schooling alone ($p < .05$ level). When the data were collapsed into categories in each of the four groups,

TABLE 18.--Percentage distribution of graduates by number of years of schooling completed by wife.

Years of Schooling Completed by Wife[c]	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
	% (N=24)[a]	% (N=22)[a]	% (N=46)[b]	% (N=37)[a]	% (N=116)[a]	% (N=153)[b]	% (N=199)[c]
13 - 14	0.0	4.5	2.2	2.7	0.0	0.7	1.0
11 - 12	20.8	36.4	28.3	8.1	8.6	8.5	13.1
9 - 10	29.2	22.7	26.1	13.5	31.9	27.5	27.1
7 - 8	0.0	0.0	0.0	2.7	0.0	0.7	0.5
5 - 6	50.0	36.4	43.5	62.2	53.4	55.6	52.8
3 - 4	0.0	0.0	0.0	0.0	0.9	0.7	0.5
1 - 2	0.0	0.0	0.0	0.0	0.9	0.7	0.5
None	0.0	0.0	0.0	10.8	4.3	5.9	4 5
Total	100.0	100.0	100.1	100.0	100.0	100.3	100.0

[a]Kind and type of schooling $\chi^2 = 34.526$ d.f. = 21 Significant at $p < .05$ level.

[b]Kind of schooling $\chi^2 = 15.997$ d.f. = 7 Significant at $p < .05$ level.

[c]Four of the graduates were single.

showing the percentages of graduates whose wives had completed nine or more years of schooling (formal education through junior middle school and higher), the results were as indicated: provincial high school, 63.6 per cent; hsien/city high school, 50.0 per cent; provincial V-A school, 40.5 per cent; and hsien/city V-A school 24.3 per cent.

When compared on the basis of kind of schooling of the graduates, 56.6 per cent of the wives of the high school graduates and 36.7 per cent of the wives of the V-A school graduates had completed nine or more years of schooling. Furthermore, nearly 6 per cent of the wives of the V-A school graduates had completed no formal education; while, none of the wives of the high school graduates had less than an elementary school education.

An analysis of contingency tables showed that the number of years of schooling completed by the wives of the graduates was also associated ($p < .001$ level) with the degree to which the graduates were engaged in farming during 1967. Since the latter variable had dichtomous distributions (part-time and full-time farming), it was possible to interpret the chi square specifically. Although the data are not presented in tabular form, it was observed that the numbers of years of schooling completed by the wives of the graduates who were farming part-time was higher than it was for the wives of the graduates who were farming full-time.

A phi index (Cramér's ϕ' statistic) was computed to test and compare the apparent strengths of association between the number of years of schooling completed by the wives of the graduates and each of the independent variables to which it was associated. The resultant ϕ' indexes were as follows: engagement in farming, $\phi' = .307$; kind of schooling, $\phi' = .283$; and kind and type of schooling, $\phi' = .240$. In other words, the number of years of schooling completed by the wives of the graduates was most closely associated with the degree to which the graduates were engaged in farming during 1967 and least associated with the kind and type of schooling completed by the graduates.

The data contained in Table 19 show that the farm locations of the graduates by hsien are associated ($p < .001$ level) with the kind and type of school attended by the graduates. Much of the difference between the expected and the observed frequency distributions was attributed to the fact that schools (by kind and type), and their graduates who were included in the population (and sample), were not distributed uniformly throughout the five hsien of the Farmer Interview Region.[4] Yunlin Hsien, for example, was the location of three of the six hsien/city V-A schools (which had graduated eighteen of the thirty-nine graduates)

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[4]A listing, by hsien, of the numbers of graduates, schools (by kind and type), and farms, included in this study, is located in Appendix B, Tables 59-60. The school locations are plotted on the map in Figure 5, p. 135.

TABLE 19.--Percentage distribution of graduates by farm location by Hsien.

Farm Location by Hsien	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/ City	Provin- cial	Sub- Total	Hsien/ City	Provin- cial	Sub- Total	
	% (N=24)[a]	% (N=22)[a]	% (N=46)[b]	% (N=39)[a]	% (N=118)[a]	% (N=157)[b]	% (N=203)
Taichung[c]	4.2	22.7	13.0	0.0	11.0	8.3	9.4
Changhua	37.5	22.7	30.4	5.1	39.8	31.2	31.0
Yunlin	16.7	31.8	23.9	43.6	19.5	25.5	25.1
Chiayi	33.3	4.5	19.6	15.4	11.0	12.1	13.8
Tainan[c]	8.3	18.2	13.0	35.9	18.6	22.9	20.7
Total	100.0	99.9	99.9	100.0	99.9	100.0	100.0

[a]Kind and type of schooling $\chi^2 = 44.10$ d.f. = 12 Significant at $p < .001$ level.

[b]Kind of schooling $\chi^2 = 4.021$ d.f. = 4 Not significant at $p \leq .05$ level.

[c]Farms located in Taichung City and Tainan City were included with the farm location data for Taichung Hsien and Tainan Hsien, respectively.

in this study. By contrast, there were no hsien/city V-A schools (with senior graduates) located in Taichung Hsien. It is not surprising then, to find 43.6 per cent of the farms of the hsien/city V-A school graduates located in Yunlin Hsien, while Taichung Hsien had none. Thus, the reason for the strong association between kind and type of schooling and farm location by hsien during 1967.

When type of school was disregarded, it was observed that each of the five hsien had at least one high school and one V-A school, as well as a number of their senior graduates, included in this study. It was also noted that some individuals had graduated from schools located in hsien other than where they were farming during 1967. For example, 19.5 per cent of the farms of all provincial V-A school graduates included in this study were located in Yunlin Hsien, even though no provincial V-A school was located in Yunlin Hsien. The net effect of disregarding type of schooling and the fact that some graduates had crossed hsien boundaries to attend a different type of school (usually the more prestigious provincial school), than what was located in their home hsien, resulted in a more uniform distribution of graduates throughout the five-hsien Region. Consequently, no significant relationship was found between kind of schooling and farm location by hsien during 1967.

In addition to being related to kind and type of schooling, farm location by hsien was also associated with year of graduation, farm location by agricultural region, and farm location by economic land class.

The data presented in Table 20 show that the farm locations of the graduates by agricultural region are related ($p < .01$ level) to the kind and type of schooling received by the graduates.[5] Of the four groups, the hsien/city V-A school graduates had the smallest percentage of farms located in the rice region (30.8 per cent) and the largest percentage of farms in the upland tree crop region (10.3 per cent). Few differences were observed among the three remaining groups of graduates in regard to the percentages of farms located in the various agricultural regions.

As was the situation with farm location by hsien, removal of type of schooling from the independent variable resulted in a finding of no significant relationship between kind of schooling and farm location by agricultural region. However, the latter was found to be associated with year of graduation, farm location by hsien, and farm location by economic land class.

Unlike farm location by agricultural region, neither kind and type of schooling nor kind of schooling

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[5]Agricultural region is defined in Appendix A.

TABLE 20.--Percentage distribution of graduates by farm location by agricultural region.

Farm Location by Agricultural Region	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
	% (N=24)[a]	% (N=22)[a]	% (N=46)[b]	% (N=39)[a]	% (N=118)[a]	% (N=157)[b]	% (N=203)
Rice	66.7	59.1	63.0	30.8	60.2	52.9	55.2
Rotational	12.5	27.3	19.6	56.4	25.4	33.1	30.0
Upland Field Crops	12.5	4.5	8.7	2.6	12.7	10.2	9.9
Upland Tree Crops	8.3	9.1	8.7	10.3	1.7	3.8	4.9
Total	100.0	100.0	100.0	100.1	100.0	100.0	100.0

[a]Kind of type of schooling $\chi^2 = 27.727$ d.f. = 9 Significant at $p < .01$ level.

[b]Kind of schooling $\chi^2 = 4.640$ d.f. = 3 Not significant at $p \leq .05$ level.

was found to be associated ($p \leq .05$ level) with farm location by economic land class.[6] Still, the percentage distributions shown in Table 21 reflect a pattern somewhat similar to the one evidenced for farm locations by agricultural region. When the four groups of graduates were ranked according to the percentage of farms located in class 1 land areas, the provincial high school graduates had the highest percentage, followed by the graduates of the provincial V-A schools, hsien/city high schools, and hsien/city V-A schools. When the percentages of farms in the class 1 and class 2 land areas were combined, it was observed that the farms of 81.8 per cent of the provincial high school graduates were located in the two best land areas; whereas, only 38.5 per cent of the hsien/city V-A school graduates had farms located in these areas. When combined on the basis of kind of schooling, the high school graduates had 73.9 per cent of their farms located in the two best land class areas as compared with 55.5 per cent for the V-A school graduates.

An analysis of contingency tables revealed that farm location by economic land class was associated with farm locations by hsien and by agricultural region.

The purpose of this section was to provide some background information about the graduates, and their

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[6]Economic land class is defined in Appendix A.

TABLE 21.--Percentage distribution of graduates by farm location by economic land class.

Farm Location by Economic Land Class	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/ City	Provin- cial	Sub- Total	Hsien/ City	Provin- cial	Sub- Total	
	% (N=24) [a]	% (N=22) [a]	% (N=46) [b]	% (N=39) [a]	% (N=118) [a]	% (N=157) [b]	% (N=203)
Class 1	20.8	40.9	30.4	15.4	23.7	21.7	23.6
Class 2	45.8	40.9	43.5	23.1	37.3	33.8	36.0
Class 3	25.0	13.6	19.6	43.6	31.4	34.4	31.0
Class 4	8.3	4.5	6.5	17.9	7.6	10.2	9.4
Total	99.9	99.9	100.0	100.0	100.0	100.1	100.0

[a]Kind and type of schooling $\chi^2 = 15.074$ d.f. = 9 Not significant at $p \leq .05$ level.

[b]Kind of schooling $\chi^2 = 5.127$ d.f. = 3 Not significant at $p \leq .05$ level.

farms, and "to analyze the personal characteristics of the graduates." In summary, only two of the fourteen general information variables--occupation of parent at the time graduate entered senior middle school and number of years of schooling completed by wife--were related ($p < .05$ level) to the kind of schooling completed by the graduates. It was observed that ten of the fourteen general information variables were associated ($p \leq .05$ level) with the combination variable of kind and type of schooling. When the graduates were grouped by kind and type of schooling, it was observed that a rather consistent "pecking order," or pattern, occurred among the four frequency distributions in the general information contingency tables. In five of the ten significant relationships, the provincial high school graduates occupied the most favorable position among the groups, while the hsien/city V-A school graduates were in the least favorable position. The hsien/city V-A school graduates, in addition, ranked last on two additional variables where the provincial high school graduates did not emerge as the leading group.

Farming Performance Factors

The purpose of this section is to satisfy the requirements of Objective 1; i.e., "to examine the relationship between kind of middle school education and

farming performance."[7] Hypothesis 1, which is to be tested in conjunction with Objective 1, is restated below:

> Hypothesis 1: Farmers who have had a vocational agriculture school education utilize a greater number of improved production and management practices than do high school graduates.

The data presented in this section determine whether or not selected farming performance variables are related ($p \leq .05$ level) to the kind of schooling (and in the first two tables to the kind and type of schooling) received by the graduates. The data are presented under four sub-subheadings; establishment in farming, cropping programs, livestock programs, and estimated gross farm incomes. Comparisons are made, between the percentage distributions and average indexes of use of improved production practices of the graduates, only when they are found to be relevant to satisfying the requirements of Objective 1.

A matrix, which identifies whether or not significant relationships occur between eleven independent and six to eighteen farming performance (dependent) variables, which were computed and analyzed in the form of contingency tables, is located in Appendix B, Table 62.

Establishment in Farming

Farming status, farm income-sharing arrangement, and total farm area owned were each considered to be

[7]Farming performance is defined in Appendix A.

measures of the graduates' establishment in farming, which in some respects is an indirect measure of farming performance.[8]

The distribution data, shown in Table 22, indicate that the relationship between the farming status of the graduates, during 1967 and type and kind of schooling was not significant ($p \leq .05$ level). Similar results were noted when the chi square value was computed for farming status and kind of schooling alone. The pattern, with the hsien/city V-A school graduates tending to have the weakest characteristics, continued to be evidenced; only two-thirds of the hsien/city V-A school graduates were owner-operators and one-third were managers of their fathers' or other relatives' farms. No significant relationship was found between farming status of the graduates and any of the other independent variables for which contingency tables were computed.

The percentage distributions and chi squares for the farm income-sharing arrangement of the graduate, during 1967, are featured in Table 23. No significant relationship was noted between kind and type of schooling, or kind of schooling, and the farm income-sharing arrangement of the graduate. Farm income-sharing arrangement was associated with farm location by hsien.

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[8]Farm area owned is a component of size of business, which is one of the measures of farming performance.

TABLE 22.--Percentage distribution of graduates by farming status during 1967.

Farming Status	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
	% (N=24)[a]	% (N=22)[a]	% (N=46)[b]	% (N=39)[a]	% (N=118)[a]	% (N=157)[b]	% (N=203)
Owner-Cultivator	87.5	77.3	82.6	66.7	82.2	78.3	79.3
Part-Owner, Part-Tenant	0.0	0.0	0.0	0.0	1.7	1.3	1.0
Tenant Cultivator Only	0.0	0.0	0.0	0.0	0.8	0.6	0.5
Manager of Father's or Other Relative's Farm	12.5	13.6	13.0	33.3	14.4	19.1	17.7
Other	0.0	9.1	4.3	0.0	0.8	0.6	1.5
Total	100.0	100.0	99.9	100.0	99.9	99.9	100.0

[a]Kind and type of schooling $\chi^2 = 19.830$ d.f. = 12 Not significant at $p \leq .05$ level.

[b]Kind of schooling $\chi^2 = 5.014$ d.f. = 4 Not significant at $p \leq .05$ level.

TABLE 23.--Percentage distribution of graduate by farm income-sharing arrangement during 1967.

Farm Income-Sharing Arrangement	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
	% (N=24)[a]	% (N=22)[a]	% (N=46)[b]	% (N=39)[a]	% (N=118)[a]	% (N=157)[b]	% (N=203)
None (Self)	83.3	63.6	73.9	69.2	88.1	83.4	81.3
Partnership	4.2	13.6	8.7	12.8	4.2	6.4	6.9
Wages Only	0.0	0.0	0.0	0.0	0.8	0.6	0.5
Wages and Share	0.0	4.5	2.2	2.6	1.7	1.9	2.0
No Definite Wage	12.5	13.6	13.0	15.4	5.1	7.6	8.9
No Definite Wage and Share	0.0	4.5	2.2	0.0	0.0	0.0	0.5
Total	100.0	99.8	100.0	100.0	99.9	99.9	100.1

[a]Kind and type of schooling $\chi^2 = 22.107$ d.f. = 15 Not significant at $p \leq .05$ level.

[b]Kind of schooling $\chi^2 = 5.565$ d.f. = 5 Not significant at $p \leq .05$ level.

By summing the percentages in Table 24, it was noted that 43.5 per cent of the high school graduates and 35.6 per cent of the V-A school graduates owned farms of 2.0 chia and larger during 1967. But, as in the previous table, the chi square value indicates that these data do not differ significantly from the hypothetical no relationship data. An analysis of contingency tables revealed no significant relationship between total farm area owned and any of the independent variables included in the study.

TABLE 24.--Distribution of graduates by total farm area owned during 1967.

Total Farm Area Owned (in chia)	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
10.0 or more	0	0.0	1	0.6	1	0.5
7.0 - 9.99	3	6.5	3	1.9	6	3.0
5.0 - 6.99	5	10.9	6	3.8	11	5.4
3.0 - 4.99	4	8.7	20	12.7	24	11.8
2.0 - 2.99	8	17.4	26	16.6	34	16.7
1.5 - 1.99	5	10.9	14	8.9	19	9.4
1.0 - 1.49	9	19.6	25	15.9	34	16.7
0.5 - 0.99	6	13.0	38	24.2	44	21.7
.001- 0.49	6	13.0	24	15.3	30	14.8
Total	46	100.0	157	99.9	203	100.0

$\chi^2 = 9.212$ d.f. = 8 Not significant at $p \leq .05$ level.

In short, there was found to be no significant relationship between establishment of the graduates in farming (farming status, income-sharing arrangement, and total farm area owned) during 1967, and the kind (or kind and type) of middle school attended by the graduates.

Cropping Programs

Included in this sub-section are tabular data concerning three measures of farming performance; namely, the index of multiple cropping, crop yields per unit area compared with township average yields for the same economic land class, and indexes of use of improved production practices for three crop enterprises. The remainder of the data provides some general information about the cropping programs of the graduates.

In Table 25, the distribution data for total cultivated area per farm for the graduates during 1967 exhibit a pattern nearly identical to the one for total farm area owned, shown in Table 24. Consolidation of categories revealed that 41.3 per cent of the high school graduates and 34.4 per cent of the V-A school graduates had total cultivated areas of 2.0 chia and larger during 1967. However, when tested statistically, neither kind of school, nor any of the other independent variables for which contingency tables were computed, were found to be associated with the total cultivated area per farm.

TABLE 25.--Distribution of graduates by total cultivated area per farm during 1967 and percentages of farms in Taiwan by size of cultivated area.

Total Cultivated Area (in *chia*)	Kind of Schooling				Combined Responses		Percentages of Farms in Taiwan by Size of Cultivated Area[a]
	High School		V-A School				
	No.	%	No.	%	No.	%	
10.0 or more	0	0.0	1	0.6	1	0.5	
7.0 - 9.99	1	2.2	2	1.3	3	1.5	5.0[b]
5.0 - 6.99	5	10.9	6	3.8	11	5.4	
3.0 - 4.99	6	13.0	18	11.5	24	11.8	11.5
2.0 - 2.99	7	15.2	27	17.2	34	16.7	16.6
1.5 - 1.99	5	10.9	13	8.3	18	8.9	14.7
1.0 - 1.49	9	19.6	28	17.8	37	18.2	19.3
0.5 - 0.99	7	15.2	39	24.8	46	22.7	22.0
.001- 0.49	6	13.0	23	14.6	29	14.3	10.9
Total	46	100.0	157	99.9	203	100.0	100.0

$\chi^2 = 5.753$ d.f. = 8 Not significant at $p \leq .05$ level.

[a]Calculated from sample census data for 1966. See Taiwan, Provincial Government, Committee on Census of Agriculture, Report on the 1966 Census of Agriculture, Taiwan, Republic of China, 5 per cent Sample Census (n.p.: Taiwan Provincial Government Printing Press, October, 1967), pp. 138-39.

[b]Approximately 5 per cent of the farms had five or more hectares (slightly more than five *chia*) of cultivated area.

Sample census data, also shown in Table 25, representing all farms in Taiwan by size of cultivated area during 1966, were converted to percentages and compared with the distribution of graduates by cultivated area per farm during 1967. The percentages of graduates' farms with total cultivated areas of 2.0 chia and larger (35.9 per cent) was slightly greater than the percentage of farm of this size in all Taiwan (33.1 per cent). Although no statistical test was applied to this comparison, most of the difference was attributed to the high school graduates.

Tables 26 and 27 both contain data regarding intensity of land use. Total crop chia (area cropped) is one of the factors used in calculation of the index of multiple cropping.[9] The chi square analyses revealed that neither total crop chia on farms of graduates nor the indexes of multiple cropping for farms of graduates, during 1967, were associated ($p \leq .05$ level) with kind of schooling. An analysis of contingency tables further revealed that total crop chia was associated with none of the independent variables used in this study; however, the distribution of indexes of multiple cropping was associated with farm location by hsien, by agricultural region, and by economic land class. The latter associations were not surprising, since irrigation facilities and climatic factors

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[9]Both total crop chia and index of multiple cropping are defined in Appendix A.

TABLE 26.--Distribution of graduates by total crop chia (area cropped) per farm during 1967.

Total Crop Chia (Area Cropped)	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
17.0 or more	1	2.2	1	0.6	2	1.0
13.0 - 16.99	0	0.0	2	1.3	2	1.0
10.0 - 12.99	1	2.2	0	0.0	1	0.5
7.0 - 9.99	5	10.9	5	3.2	10	4.9
4.0 - 6.99	11	23.9	34	21.7	45	22.2
2.0 - 3.99	13	28.3	43	27.4	56	27.6
1.0 - 1.99	7	15.2	42	26.8	49	24.1
.001- 0.99	8	17.4	30	19.1	38	18.7
Total	46	100.1	157	100.1	203	100.0

$\chi^2 = 11.226$ d.f. = 7 Not significant at $p \leq .05$ level.

vary somewhat from hsien to hsien, and since boundaries between agricultural regions and economic land class areas are partially determined by the climatic factors and intensity of land use, the latter of which is due to variation in land characteristics.

Even though the relationship between total crop chia and kind of schooling was not significant at the $p \leq .05$ level, the high school graduates tended to have a higher percentage of total crop chia per farm than did the V-A school graduates. For example, the percentages of graduates with 4.0 or more total crop chia per farm, by kind of schooling, were: high school, 39.2 per cent; and V-A school, 26.8 per cent. This pattern was also noted

TABLE 27.--Distribution of graduates by index of multiple cropping per farm during 1967.

Index of Multiple Cropping Per Farm	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
300 and over	0	0.0	3	1.9	3	1.5
250 - 299	1	2.2	4	2.6	5	2.5
200 - 249	22	47.8	68[a]	43.6	90	44.6
150 - 199	13	28.3	42	26.9	55	27.3
100 - 149	10	21.7	38	24.4	48	23.8
Below 100	0	0.0	1	0.6	1	0.5
Total	46	100.0	156	100.0	202	100.2

$\chi^2 = 1.470$ d.f. = 5 Not significant at $p \leq .05$ level.

[a]One farm with an IMC of 223 was omitted from this category because of a coding error.

in the agricultural region and economic land class data presented earlier. The observed differences between the distributions of index of multiple cropping for the two groups of graduates were practically nil.

After the yield of each crop harvested by each graduate during 1967 was compared with his township's average yield for the same crop grown on the same economic land class area as the graduate's, the data were consolidated according to kind of schooling and reported in Table 28. Although a visual inspection of the data revealed an apparent trend in favor of the V-A school graduate, the significance of this observation was not

TABLE 28.--Comparison of the graduates' crop yields in 1967 with those of their townships' average yields for the same economic land classes.

Crop Yields Compared With Township Averages[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.[b]	%	No.[b]	%	No.[b]	%
Above	47	47.0	195	57.5	242	55.1
Same	20	20.0	47	13.9	67	15.3
Below	33	33.0	97	28.6	130	29.6
Total	100	100.0	339	100.0	439	100.0

Hand calculated $\chi^2 = 3.919$ d.f. = 2 Not significant at $p \leq .05$ level.

[a]The range of the township average yield for the same economic land class as the graduate's was plus and minus 5 per cent of the township average yield. If the classified as "Same"; if outside, it was classified either "Above" or "Below," whichever was the case. See Appendix F, p. 11.

[b]Number of crop yields compared with township average yields.

supported by the chi square analysis. Thus, the relationship between the crop yields of the graduates (in comparison with their townships' average yields for the same economic land classes as the graduates) and kind of schooling was found to be not significant ($p \leq .05$ level).

The graduates were asked to rank the three most important crops (from the twelve crops listed in Appendix F, p. 12) which were harvested on their farms during 1967. The distribution data, which show the crop enterprises ranked "highest," "second highest," and "third highest" on the basis of gross income, are presented in Tables 29 through 31, according to kind of schooling of the graduates. No statistical measure was applied to the data.

Rice, by far the most important crop enterprise, was ranked "highest" by approximately two-thirds of both kinds of graduates. The latter agree also in the selection of sweet potatoes as both the "second highest" and the "third highest" crop enterprise on the basis of gross income.

Indexes of use of improved production practices were calculated for only the three crop enterprises which were ranked by each graduate on the basis of gross income.[10] Of course, not all graduates ranked the same

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[10] The methods used to calculate indexes of use of improved production practices (referred to before coding as improved practices scores) are detailed in Appendix E.

TABLE 29.--Distribution of graduates by listed crop enterprise ranked "highest" on the basis of gross income during 1967.

Listed Crop Enterprise[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
Rice	30	65.2	108	68.8	138	68.0
Peanuts	3	6.5	14	8.9	17	8.4
Sugar Cane	2	4.3	10	6.4	12	5.9
Sweet Potatoes	4	8.7	7	4.5	11	5.4
Ponkans	3	6.5	1	0.6	4	2.0
Asparagus	1	2.2	2	1.3	3	1.5
Bananas	0	0.0	2	1.3	2	1.0
Mushrooms	1	2.2	1	0.6	2	1.0
Pineapplies	0	0.0	2	1.3	2	1.0
Cassava	0	0.0	1	0.6	1	0.5
Others[b]	2	4.3	9	5.7	11	5.4
Total	46	99.9	157	100.0	203	100.1

[a]Only the listed crops which were harvested during 1967 were ranked by the graduates. See Appendix F, p. 12.

[b]Crops other than those listed in Appendix F, p. 12, which were harvested by the graduates during 1967.

TABLE 30.--Distribution of graduates by listed crop enterprise ranked "second highest" on the basis of gross income during 1967.

Listed Crop Enterprise[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
Sweet Potatoes	12	26.1	49	31.2	61	30.0
Rice	7	15.2	18	11.5	25	12.3
Others[b]	27	58.7	90	57.3	117	57.6
Total	46	100.0	157	100.0	203	99.9

[a]Only the listed crops which were harvested during 1967 were ranked by the graduates. See Appendix F, p. 12.

[b]Crops other than those listed in Appendix F, p. 12, which were harvested by the graduates during 1967.

TABLE 31.--Distribution of graduates by listed crop enterprise ranked "third highest" on the basis of gross income during 1967.

Listed Crop Enterprise[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
Sweet Potatoes	10	21.7	27	17.2	37	18.2
Rice	1	2.2	6	3.8	7	3.4
Others[b]	35	76.1	124	79.0	159	78.3
Total	46	100.0	157	100.0	203	99.9

[a]Only the listed crops which were harvested during 1967 were ranked by the graduates. See Appendix F, p. 12.

[b]Crops other than those listed in Appendix F, p. 12, which were harvested by the graduates during 1967.

crops; therefore, indexes are reported only for the three crops which were most commonly ranked by the graduates. These crops, and the number of graduates ranking each, were as follows: rice, 170; sweet potatoes, 107; and peanuts, 51. The distribution of indexes of use of improved production practices for rice, sweet potatoes, and peanuts are presented in Tables 32 through 34, respectively. At the bottom of each table are the improved production practice mean scores which were calculated from raw score data. Chi square was used to measure the association between the indexes of use and kind of schooling, but no statistical measure was applied to the mean scores.

The data presented in Tables 32 through 34 do not differ significantly from the hypothetical no relationship data. Hence, the relationship between each of the three indexes of use of improved crop production practices and the kind of schooling of the graduates, who harvested the particular crop during 1967, was found to be not significant at the $p \leq .05$ level.

An analysis of contingency tables showed that the indexes of use of improved rice production practices, for graduates who harvested rice during 1967, were associated with farm location by hsien and number of years farmed. In addition, the indexes of use of improved sweet potatoes production practices, for graduates who harvested sweet

TABLE 32.--Distribution of graduates, who harvested rice during 1967, by index of use of improved rice production practices.

Index of Use of Improved Rice Production Practices[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
90 - 100	12	31.6	47	35.6	59	34.7
80 - 89.9	8	21.1	31	23.5	39	22.9
70 - 79.9	9	23.7	26	19.7	35	20.6
60 - 69.9	6	15.8	18	13.6	24	14.1
50 - 59.9	3	7.9	9	6.8	12	7.1
40 - 49.9	0	0.0	0	0.0	0	0.0
30 - 39.9	0	0.0	1	0.8	1	0.6
0 - 29.9	0	0.0	0	0.0	0	0.0
Total	38	100.1	132	100.0	170	100.0
Improved Practices Mean Score[b]	80.2		81.6		81.3	

$\chi^2 = 0.875$ d.f. = 5 Not significant at $p \leq .05$ level.

[a]Categories 40 - 49.9, 20 - 29.9, and 0 - 19.9 had zero cell frequencies and were excluded from the chi square calculation.

[b]Calculated from raw score data.

TABLE 33.--Distribution of graduates, who harvested sweet potatoes during 1967, by index of use of improved sweet potato production practices.

Index of Use of Improved Sweet Potato Production Practices[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
90 - 100	2	7.7	4	5.0	6	5.7
80 - 89.9	5	19.2	10	12.5	15	14.2
70 - 79.9	8	30.8	17	21.3	25	23.6
60 - 69.9	0	0.0	0	0.0	0	0.0
50 - 59.9	3	11.5	20	25.0	23	21.7
40 - 49.9	3	11.5	17	21.3	20	18.9
30 - 39.9	0	0.0	0	0.0	0	0.0
20 - 29.9	4	15.4	8	10.0	12	11.3
0 - 19.9	1	3.8	4	5.0	5	4.7
Total	26	99.9	80	100.1	106	100.1
Improved Practices Mean Score[b]	62.6		57.8		59.0	

$\chi^2 = 4.811$ d.f. = 6 Not significant at $p \leq .05$ level.

[a]Categories 60 - 69.9 and 30 - 39.9 had zero cell frequencies and were excluded from the chi square calculation.

[b]Calculated from raw score data.

TABLE 34.--Distribution of graduates, who harvested peanuts during 1967, by index of use of improved peanut production practices.

Index of Use of Improved Peanut Production Practices[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
90 - 100	0	0.0	3	8.1	3	5.9
80 - 89.9	1	7.1	2	5.4	3	5.9
70 - 79.9	1	7.1	4	10.8	5	9.8
60 - 69.9	0	0.0	0	0.0	0	0.0
50 - 59.9	4	28.6	11	29.7	15	29.4
40 - 49.9	4	28.6	13	35.1	17	33.3
30 - 39.9	0	0.0	0	0.0	0	0.0
20 - 29.9	1	7.1	4	10.8	5	9.8
0 - 19.9	3	21.4	0	0.0	3	5.9
Total	14	99.9	37	99.9	51	100.0
Improved Practices Mean Score[b]	44.8		54.0		51.5	

$\chi^2 = 9.531$ d.f. = 6 Not significant at $p \leq .05$ level.

[a]Categories 60 - 69.9 and 30 - 39.9 had zero cell frequencies and were excluded from the chi square calculation.

[b]Calculated from raw score data.

potatoes during 1967, were associated with year of graduation and farm location by hsien. No association was found between the indexes of use of improved peanut production practices and any of the independent variables used in the study.

In brief, there was found to be no significant relationship between the kind of schooling received by the graduates and their indexes of multiple cropping, crop yields per unit area in comparison with their townships' averages, indexes of use of improved rice, sweet potato, and peanut production practices, or any other characteristics of their cropping programs during 1967.

Livestock Programs

Tabular data featuring two measures of farming performance--total animal units per farm (a component of size of business) and indexes of use of improved production practices for swine and poultry--are presented in this sub-section. In addition, distribution data which show the livestock enterprises ranked "highest" by the graduates on the basis of gross income during 1967, are shown in Table 35. No statistical test was applied to the latter.

Swine was the enterprise ranked "highest" on the basis of gross income by 63.1 per cent of the V-A school graduates and 56.5 per cent of the high school graduates. Poultry was the second most important enterprise for both

kinds of graduates, but was ranked "highest" by less than 7 per cent of the total graduates.

TABLE 35.--Distribution of graduates by listed livestock enterprise ranked "highest" on the basis of gross income during 1967.

Listed Livestock Enterprises	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
Swine	26	56.5	99	63.1	125	61.6
Poultry[a]	4	8.7	9	5.7	13	6.4
Dairy Cattle	2	4.3	0	0.0	2	1.0
No Livestock	14	30.4	49	31.2	63	31.0
Total	46	99.9	157	100.0	203	100.0

[a]Poultry enterprises with less than 50 fowl were classified as "No Livestock." See Appendix F, p. 26.

No significant relationship was found between the number of swine units on the farms of graduates, who raised swine during 1967, and the kind of school which those graduates had attended. Neither was the number of swine units on the farms of graduates associated with any of the independent variables in the study. According to the category mean in Table 36, an average of three animal unit equivalents of swine were raised by each of the 148 graduates.

The number of poultry units on the farms of graduates, who raised poultry during 1967, was found to

TABLE 36.--Distribution of graduates, who raised swine during 1967, by total swine units per farm.

Total Swine Units[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
9.0 or more	3	10.0	9	7.6	12	8.1
8.0 - 8.99	0	0.0	1	0.8	1	0.7
7.0 - 7.99	0	0.0	4	3.4	4	2.7
6.0 - 6.99	0	0.0	6	5.1	6	4.1
5.0 - 5.99	3	10.0	6	5.1	9	6.1
4.0 - 4.99	5	16.7	13	11.0	18	12.2
3.0 - 3.99	2	6.7	13	11.0	15	10.1
2.0 - 2.99	6	20.0	27	22.9	33	22.3
.01 - 1.99	11	36.7	39	33.1	50	33.8
Total	30	100.1	118	100.0	148	100.1
Mean of Categories[b]	3.0		3.1		3.1	

$\chi^2 = 5.169$ d.f. = 8 Not significant at $p \leq .05$ level.

[a]Swine animal unit equivalents were based upon market (sales) weights as shown in Appendix F, p. 27.

[b]Mean scores represent category means, not actual raw score means.

be not associated with kind of schooling, but was observed to be associated with degree of engagement in farming as indicated in Table 37.

The percentage distribution data presented in Table 38, reveal that the number of total animal unit equivalents per farm of the graduates during 1967 was related ($p < .05$ level) to the kind and type of schooling of the graduates, and also to their farm locations by hsien. The mean total animal units for each of the four groups of graduates was as listed: provincial high school, 13.5; hsien/city high school, 6.4; provincial V-A school, 4.3; and hsien/city V-A school, 3.9. This pattern is similar to the one manifested earlier in this chapter, with the provincial high school graduates in the most favorable position and the hsien/city V-A school graduates in the least favorable position. It should be noted that one-half of the provincial high school graduates' exceptionally large mean total animal units was attributed to one graduate who had a large dairy herd (125 animal units). However, omitting this individual would still leave the graduates from his group in the lead.

The relationship between total animal units per farm and kind of schooling (disregarding type) was found to be not significant at the $p \leq .05$ level. Nevertheless, the high school graduates tended to have a higher

TABLE 37.--Distribution of graduates, who raised fifty or more fowl during 1967, by total poultry units per farm.

Total Poultry Units[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
20.0 or more	1	2.6	1	0.7	2	1.1
15.0 - 19.99	0	0.0	0	0.0	0	0.0
10.0 - 14.99	1	2.6	1	0.7	2	1.1
8.0 - 9.99	1	2.6	0	0.0	1	0.5
6.0 - 7.99	0	0.0	1	0.7	1	0.5
4.0 - 5.99	0	0.0	2	1.4	2	1.1
2.0 - 3.99	0	0.0	5	3.4	5	2.7
0.5 - 1.99	9	23.7	32	21.8	41	22.2
.01 - 0.49	26	68.4	105	71.4	131	70.8
Total	38	99.9	147	100.1	185	100.0
Mean of Categories[b]	1.7		1.4		1.5	

$\chi^2 = 8.152$ d.f. = 7 Not significant at $p \leq .05$ level.

[a]Each mature bird equals .01 animal unit equivalent.

[b]Mean scores represent category means, not actual raw score means.

TABLE 38.--Percentage distribution of graduates by total animal unit equivalents per farm during 1967.

Total Animal Units[c]	Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture School			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
	% (N=24)[a]	% (N=22)[a]	% (N=46)[b]	% (N=39)[a]	% (N=118)[a]	% (N=157)[b]	% (N=203)
100 or more	0.0	4.5	2.2	0.0	0.8	0.6	1.0
50.0 - 99.99	4.2	4.5	4.3	0.0	0.0	0.0	1.0
25.0 - 49.99	0.0	4.5	2.2	0.0	0.0	0.0	0.5
10.0 - 24.99	8.3	0.0	4.3	7.7	4.2	5.1	4.9
7.0 - 9.99	4.2	0.0	2.2	12.8	7.6	8.9	7.4
5.0 - 6.99	4.2	18.2	10.9	7.7	16.9	14.6	13.8
3.0 - 4.99	12.5	27.3	19.6	23.1	12.7	15.3	16.3
1.0 - 2.99	33.3	4.5	19.6	28.2	28.8	28.7	26.6
.01- 0.99	25.0	27.3	26.1	20.5	22.9	22.3	23.2
None	8.3	9.1	8.7	0.0	5.9	4.5	5.4
Total	100.0	99.9	100.1	100.0	99.8	100.0	100.1
Mean Total Animal Units[d]	6.4	13.5	9.8	3.9	4.3	4.2	5.7

[a]Kind and type of schooling $\chi^2 = 40.244$ d.f. = 27 Significant at $p < .05$ level.

[b]Kind of schooling $\chi^2 = 16.598$ d.f. = 9 Not significant at $p \leq .05$ level.

[c]For details regarding calculations of total animal units, see Appendix F, pp. 27, 29, 31, 33.

[d]Calculated from raw score data.

percentage of total animal units per farm than did the V-A school graduates during 1967.

Indexes of use of improved production practices are reported only for swine and poultry, the two most important enterprises. At the bottom of Tables 39 and 40 are the improved production practice mean scores for the two enterprises. The mean scores were calculated from raw score data but, unlike the encoded distribution data, were not tested statistically.

The data presented in Tables 39 and 40 do not differ significantly from the hypothetical no relationship data. Therefore, the relationship between each of the two indexes of use of improved livestock production practices and the kind of schooling of the graduates, who raised the particular livestock during 1967, was found to be not significant at the $p \leq .05$ level.

An analysis of contingency tables indicated the indexes of use of improved swine production practices, for graduates who raised swine during 1967, were associated with degree of engagement in farming. But, no association was noted between the indexes of improved poultry production practices, for graduates who raised poultry during 1967, and any of the independent variables for which tables were computed.

In summary, there was found to be no significant relationship between the kind of schooling received by the

TABLE 39.--Distribution of graduates, who raised swine during 1967, by index of use of improved swine production practices.

Index of Use of Improved Swine Production Practices	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
90 - 100	3	10.0	13	11.1	16	10.9
80 - 89.9	3	10.0	7	6.0	10	6.8
70 - 79.9	8	26.7	35	29.9	43	29.3
60 - 69.9	5	16.7	16	13.7	21	14.3
50 - 59.9	7	23.3	18	15.4	25	17.0
40 - 49.9	2	6.7	15	12.8	17	11.6
30 - 39.9	1	3.3	5	4.3	6	4.1
20 - 29.9	0	0.0	7	6.0	7	4.8
0 - 19.9	1	3.3	1	0.9	2	1.4
Total	30	100.0	117	100.1	147	100.2
Improved Practices Mean Score[a]	65.6		63.4		63.9	

$\chi^2 = 5.423$ d.f. = 8 Not significant at $p \leq .05$ level.

[a]Calculated from raw score data.

TABLE 40.--Distribution of graduates, who raised fifty or more fowl during 1967, by index of use of improved poultry production practices.

Index of Use of Improved Poultry Production Practices	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
90 - 100	3	25.0	4	9.5	7	13.0
80 - 89.9	0	0.0	4	9.5	4	7.4
70 - 79.9	1	8.3	1	2.4	2	3.7
60 - 69.9	1	8.3	5	11.9	6	11.1
50 - 59.9	1	8.3	6	14.3	7	13.0
40 - 49.9	1	8.3	2	4.8	3	5.6
30 - 39.9	1	8.3	6	14.3	7	13.0
20 - 29.9	2	16.7	7	16.7	9	16.7
0 - 19.9	2	16.7	7	16.7	9	16.7
Total	12	99.9	42	100.1	54	100.2
Improved Practices Mean Score[a]	53.4		46.3		47.9	

$\chi^2 = 4.592$ d.f. = 8 Not significant at $p < .05$ level.

[a]Calculated from raw score data.

graduates and their total number of animal units per farm (size of business), indexes of use of swine and poultry production practices, or any other characteristics of their livestock programs during 1967. It was learned, however, that the total number of animal units per farm was associated with kind and type of schooling, with the two types of high school graduates having the greater numbers of units.

Estimated Gross Farm Incomes

The distribution data presented in Tables 41 through 44 feature estimated gross farm incomes as both quantitative (size of business) and qualitative (income per unit area) measures of the farming performances of the graduates during 1967. The quantitative aspects are manifested in the first three tables in the form of estimated total NT$ values of crops harvested, livestock sold, and crops harvested plus livestock sold per farm; while the qualitative factor is represented in Table 46, where the estimated total NT$ value of crops harvested plus livestock sold is shown on a per chia basis.

It was found that no significant relationship existed between the estimated total NT$ value of the crops harvested on farms of the graduates during 1967 and any of the independent variables for which tables were computed (including kind of schooling shown in Table 41). In the case of livestock sold, shown in Table 42, the situation

TABLE 41.--Distribution of graduates by estimated total NT$ value of crops harvested per farm during 1967.

Estimated NT$ Value of Crops Harvested	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
500,000 or more	0	0.0	1	0.6	1	0.5
100,000 - 499,999	14	30.4	34	21.7	48	23.6
50,000 - 99,999	12	26.1	42	26.8	54	26.6
25,000 - 49,999	11	23.9	36	22.9	47	23.2
10,000 - 24,999	5	10.9	32	20.4	37	18.2
5,000 - 9,999	2	4.3	2	1.3	4	2.0
1,000 - 4,999	1	2.2	4	2.5	5	2.5
1 - 999	0	0.0	1	0.6	1	0.5
None	1	2.2	5	3.2	6	3.0
Total	46	100.0	157	100.0	203	100.1

$\chi^2 = 5.382$ d.f. = 8 Not significant at $p \leq .05$ level.

was quite different; as the estimated total NT$ value of livestock and livestock products sold by the graduates during 1967 was found to be associated ($p < .05$ level) with kind of schooling, but with none of the other independent variables for which tables were computed. A comparison of the distributions by kind of schooling, in Table 42, indicated that much of the difference between the observed data and the hypothetical no relationship data occurred in the estimated total livestock sales value categories of NT$ 100,000 and higher, where 13.0 per cent of the high school graduates were located as compared with only 0.6 per cent of the V-A school graduates. In other words,

TABLE 42.--Distribution of graduates by estimated total NT$ value of livestock and livestock products sold per farm during 1967.

Estimated NT$ Value of Livestock and Livestock Products Sold	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
1,000,000 or more	1	2.2	0	0.0	1	0.5
500,000 - 999,999	2	4.3	0	0.0	2	1.0
100,000 - 499,999	3	6.5	1	0.6	4	2.0
50,000 - 99,999	1	2.2	5	3.2	6	3.0
25,000 - 49,999	6	13.0	23	14.6	29	14.3
10,000 - 24,999	7	15.2	39	24.8	46	22.7
5,000 - 9,999	9	19.6	30	19.1	39	19.2
1,000 - 4,999	3	6.5	9	5.7	12	5.9
1 - 999	1	2.2	3	1.9	4	2.0
None	13	28.3	47	29.9	60	29.6
Total	46	100.0	157	99.8	203	100.2

$\chi^2 = 18.221$ d.f. = 9 Significant at $p < .05$ level.

the high school graduates had significantly higher livestock sales than did the V-A school graduates.

As reported in Tables 43 and 44, findings of no significant relationship were observed, on both a per farm and a per chia basis, between the combined estimated total NT$ value of crops harvested and livestock sold by the graduates, and kind of schooling. It was noted that both of the aforementioned dependent variables were associated with the occupation of the father when the graduate completed middle school. The combined estimated total NT$ value per chia was also found to be associated with farm location by hsien.

TABLE 43.--Distribution of graduates by estimated total NT$ value of crops harvested and livestock and livestock products sold per farm during 1967.

Estimated NT$ Value of Crops and Livestock[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
60,000 or more	1	2.2	0	0.0	1	0.5
40,000 - 59,000	3	6.5	1	0.6	4	2.0
20,000 - 39,999	17	37.0	50	31.8	67	33.0
10,000 - 19,999	11	23.9	41	26.1	52	25.6
5,000 - 9,999	11	23.9	37	23.6	48	23.6
2,000 - 4,999	2	4.3	19	12.1	21	10.3
1,000 - 1,999	0	0.0	1	0.6	1	0.5
500 - 999	0	0.0	3	1.9	3	1.5
1 - 499	0	0.0	1	0.6	1	0.5
None	1	2.2	4	2.5	5	2.5
Total	46	100.0	157	99.8	203	100.0

$\chi^2 = 13.569$ d.f. = 9 Not significant at $p \leq .05$ level.

[a]Includes crops harvested and both livestock and livestock products sold during 1967.

TABLE 44.--Distribution of graduates by estimated total NT$ value of crops harvested and livestock and livestock products sold per crop chia during 1967.

Estimated NT$ Value of Crops and Livestock Per Crop Chia[a]	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
400,000 or more	2	4.3	0	0.0	2	1.0
200,000 - 399,999	1	2.2	1	0.6	2	1.0
100,000 - 199,999	1	2.2	4	2.5	5	2.5
50,000 - 99,999	5	10.9	18	11.5	23	11.3
25,000 - 49,999	22	47.8	79	50.3	101	49.8
10,000 - 24,999	12	26.1	46	29.3	58	28.6
5,000 - 9,999	2	4.3	2	1.3	4	2.0
1 - 4,999	0	0.0	3	1.9	3	1.5
None	1	2.2	4	2.5	5	2.5
Total	46	100.0	157	99.9	203	100.2

$\chi^2 = 10.489$ d.f. = 8 Not significant at $p \leq .05$ level.

[a]On the basis of crops harvested and livestock and livestock products sold during 1967.

In brief, there was found to be a significant relationship between the estimated gross livestock income of the graduates and the kind of school from which they graduated. This relationship was observed to be in favor of the high school graduates. However, the significance of this relationship was masked when estimated gross crop and livestock incomes were combined.

The purpose of this section was "to determine the relationship between kind of middle school education and farming performance." Consolidation of the findings of four sub-sections revealed that there was no significant relationship between kind of middle school education and farming status, size of business, index of multiple cropping, crop yields per unit area compared with township average yields for the same economic land class, indexes of use of improved production practices for five major farm enterprises, and estimated gross farm income. Since the relationships between indexes of use of improved production practices (for five selected farm enterprises) and kind of schooling were found to be not significant, Hypothesis 1 was rejected.[11]

Participation in Formal Organizations

The concept of "farmer-performance" is operationally defined in Appendix A as "including the

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[11]Hypothesis 1 was restated on p. 187.

graduate's farming performance as well as his participation in formal organizations."[12] Although main emphasis of the investigation was directed towards the "farming performance" component of "farmer-performance," this section focuses upon the lesser component of "farmer-performance"; i.e., the extent to which the 203 graduates participated in twelve formal organizations during 1967.[13]

The purpose of the section which follows is to satisfy the requirements of the underscored portion of Objective 2; namely, "to analyze the personal characteristics of the graduates, especially in regards to the graduates' participation in formal organizations." Hypothesis 2, which is to be tested as part of Objective 2, is restated below:

> Hypothesis 2: Farmers who have had a vocational agriculture school education participate in more formal organizations, and hold more leadership positions in these organizations, than do high school graduates.

Although the distribution data presented in Table 45 were not used to test Hypothesis 2, they do provide some information about the relative percentages of memberships held in the listed formal organizations by the two kinds of graduates. The memberships held as a percentage of the total graduates was higher for the V-A graduates than for

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[12]Formal organizations are defined in Appendix A.

[13]For a complete list of the organizations, see Appendix F, p. 35.

TABLE 45.--A list of formal organizations and the number and percentage of graduates who held memberships in each during 1967.

Formal Organizations in Which Memberships Were Held by Graduates	Kind of Schooling				Combined Responses	
	High School (N=46)		V-A School (N=157)		(N=203)	
	No.[a]	%[b]	No.[a]	%[b]	No.[a]	%[b]
Farm Discussion Group	9	19.6	21	13.4	30	14.8
Rice Growing Farm Discussion Group	3	6.5	16	10.2	19	9.4
Sugar Cane Growing Farm Discussion Group	3	6.5	13	8.3	16	7.9
Pest Control Team	2	4.3	15	9.6	17	8.4
Small Agricultural Unit	6	13.0	23	14.6	29	14.3
FA Representative	0	0.0	5	3.2	5	2.5
Township FA Board of Directors	0	0.0	1	0.6	1	0.5
Irrigation Unit	2	4.3	12	7.6	14	6.9
Marketing Cooperative	2	4.3	1	0.6	3	1.5
Parent-Teachers' Association	7	15.2	21	13.4	28	13.8
Representative to Township Assembly	1	2.2	4	2.5	5	2.5
Other Formal Organizations	2	4.3	4	2.5	6	3.0
Total	37	80.4	136	86.6	173	85.2

Note: No statistical tests were conducted on this table.

[a]Denote numbers of memberships held.

[b]Memberships held as a percentage of the graduates (N).

the high school graduates. This indicated that the V-A school graduates, who were members of organizations, held more memberships per individual than did the high school graduates. However, a review of the data in Table 46 indicated that a higher percentage of high school graduates (43.5 per cent) than of V-A school graduates (35.2 per cent) held memberships in at least one organization. The farmers' association organizations (farm discussion groups and small agricultural units) and parent-teachers' associations were the organizations which had the highest percentages of graduates as members. Still, no single organization, of those listed, had a membership of over 20 per cent of the graduates who were in the study.

An index of participation in all twelve organizations was computed for each graduate. A scale, which ranged from zero points for nonmembers and one point for members to five points for an elected officer,[14] was used to determine the graduate's participation score in each formal organization listed and any other that the graduate specified. The graduate's index was computed by summing the scores assigned for participation at the levels

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[14]The scale (see Appendix F, p. 35) was adapted from Herbert F. Lionberger and H. C. Chang, "Taiwan Diffusion Study Schedule I (for farmers)," (Columbia: University of Missouri, August, 1966), p. 20. "Schedule I" was one of the instruments used to collect data for Lionberger's and Chang's previously cited study entitled Communication and Use of Scientific Farm Information by Farmers in Two Taiwan Agricultural Villages.

TABLE 46.--Distribution of graduates by index of participation in formal organizations during 1967.

Index of Participation in Formal Organization	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
25 and over	0	0.0	1	0.6	1	0.5
21 - 24	0	0.0	1	0.6	1	0.5
17 - 20	1	2.2	4	2.5	5	2.5
13 - 16	1	2.2	6	3.8	7	3.4
9 - 12	3	6.5	9	5.7	12	5.9
5 - 8	6	13.0	8	5.1	14	6.9
1 - 4	9	19.6	25	15.9	34	16.7
None	26	56.5	103	65.6	129	63.5
Total	46	100.0	157	99.8	203	99.9

$\chi^2 = 4.926$ d.f. = 7 Not significant at $p \leq .05$ level.

indicated in each organization. A high index denoted a high level of participation by the graduate in one or more organization(s). For purposes of testing Hypothesis 2, the "holding of leadership positions" item was incorporated into, and equated with, the index of participation in formal organizations.

Calculation of chi square revealed that the distribution data in Table 46 do not differ significantly from the hypothetical no relationship data; consequently, no significant relationship occurred between indexes of participation in formal organizations by the graduates during 1967 and kind of school attended. It was further noted that the index of participation in organization

was associated with none of the independent variables for which contingency tables were computed. As a result of these findings, Hypothesis 2 was rejected.

Sources of Information and/or Assistance on Farming Problems

Mail questionnaire data from Part One of the Project were used to fulfill the requirements for the unsatisfied portion of Objective 2; i.e., "to analyze the personal characteristics of the graduates, especially in regard to . . . their source(s) of information and/or assistance on farming problems." The underscored portion of Objective 2 constitutes the purpose of this section. In conjunction with Objective 2, Hypothesis 3 is to be tested as restated below:

> Hypothesis 3: Vocational agriculture schools are a greater continuing source of information and/or assistance to their graduates on farming problems than are the high schools to their graduates.

The data upon which the findings reported in this section are based were a part of the data analyzed and reported by Meaders in 1968.[15] Subsequently, the two sets of findings are nearly identical. In the case of Meaders, the data included all graduates in the sample of the Project population who were farming at the time of survey; whereas, the data reported hereupon concern only the 203

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[15]Meaders, Contributions of Senior Middle School Graduates to Taiwan Agricultural Development, op. cit., pp. 72-77.

graduates in the Farmer Interview Region who farmed during 1967.

The graduates were instructed to indicate the frequency of receiving information and/or assistance on farming problems from each of fourteen specific possible sources on a list provided them. They were asked to indicate their response to each source on a four-space scale like the one shown below:

Never	Seldom	Occasionally	Frequently
( )	( )	( )	( )

As was the situation in Meaders' findings, the three sources cited by the greatest percentages of both kinds of graduates as being "frequently" used sources of information and/or assistance, were: (1) other farmers, (2) magazines, (3) and farmers' associations, as shown in Table 47. Two sources, high schools and television, received no "frequently" responses and were ranked at the bottom of the distribution.

As might be expected the V-A schools were much more frequently cited by their graduates, than by the high school graduates, as a source of information and/or assistance on farming problems. In contrast, no high school graduates listed V-A schools as being "frequently" used as a source of information. However, despite this anticipated contrast, only 17.8 per cent of the V-A school graduates indicated they "frequently" or even "occasionally"

TABLE 47.--Distribution and rank order of "frequent" sources of information and/or assistance on farming problems as reported by graduates.

Source of Information and/or Assistance	Kind of Schooling				Combined Responses	
	High School		V-A School			
	%[a] (N=46)	Rank Order	%[a] (N=157)	Rank Order	%[a] (N=203)	Rank Order
Other Farmers	37.0	1	39.5	2	38.9	1
Magazines	30.4	2	40.1	1	37.9	2
Farmers' Associations	17.4	3	26.8	3	24.2	3
Newspapers	13.0	5	12.7	4	12.8	4
Radio	15.2	4	7.0	6	8.9	5
Agricultural Improvement and Improvement Stations	2.2	7- 9	9.6	5	7.9	6
Taiwan Sugar Corporation Extension or Extension under Similar Industry	10.9	6	2.5	9-10	4.4	7
Provincial Department of Agriculture and Forestry	2.2	7- 9	3.8	7	3.4	8
Vocational Agriculture Schools	0.0	10-14	3.2	8	2.5	9-10
Joint Commission on Rural Reconstruction	2.2	7- 9	2.5	9-10	2.5	9-10
Agricultural and Forestry Divisions in Hsien and City Governments	0.0	10-14	1.9	11	1.5	11
Agricultural Colleges and Institutes	0.0	10-14	1.3	12	1.0	12
High Schools	0.0	10-14	0.0	13-14	0.0	13-14
Television	0.0	10-14	0.0	13-14	0.0	13-14

Note: A scale consisting of "Never," "Seldom," "Occasionally," or "Frequently" was provided on the mail questionnaire for each of fourteen possible sources of information and/or assistance on farming problems. However, data in this table are based only on the responses to "Frequently."

[a]Percentage who responded to "Frequently."

received information and/or assistance on farming problems from the V-A schools.

The data shown in Table 49 indicate that neither high school graduates nor V-A school graduates reported "frequently" receiving information and/or help on farming problems from high schools; and only one graduate (a high school graduate) reported "occasionally" receiving such assistance from high schools. Still, the high schools were more frequently cited by the high school graduates, than by the V-A graduates, as a source of information. This difference was primarily attributed to the very low percentage of V-A graduates who received information from the high schools.

When the data in Tables 48 and 49 were tested statistically, both sets of distributions differed significantly from the hypothetical no relationship data. The association between V-A schools as a source of information and kind of schooling (interpreted in favor of the V-A school graduates) appeared to be stronger (significant at $p < .01$ level) than the association between the high school as a source of information and kind of schooling (interpreted in favor of the high school graduates and significant at $p < .05$ level). These findings, coupled with the rank order data in Table 47, provided sufficient evidence to support Hypothesis 3.

TABLE 48.--Distribution of graduates by frequency of information and/or assistance on farming problems from vocational agriculture school.

Frequency of Information and/or Help	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
Frequently	0	0.0	5	3.2	5	2.5
Occasionally	1	2.2	23	14.6	24	11.8
Seldom	2	4.3	29	18.5	31	15.3
Never	34	73.9	80	51.0	114	56.2
No Response	9	19.6	20	12.7	29	14.3
Total	46	100.0	157	100.0	203	100.1

$\chi^2 = 15.295$ d.f. = 4 Significant at $p < .01$ level.

TABLE 49.--Distribution of graduates by frequency of information and/or assistance on farming problems from high schools.

Frequency of Information and/or Help	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
Frequently	0	0.0	0	0.0	0	0.0
Occasionally	1	2.2	0	0.0	1	0.5
Seldom	4	8.7	7	4.5	11	5.4
Never	30	65.2	129	82.2	159	78.3
No Response	11	23.9	21	13.4	32	15.8
Total	46	100.0	157	100.1	203	100.0

$\chi^2 = 8.402$ d.f. = 3 Significant at $p < .05$ level.

Graduates' Perceptions of the Most Appropriate Education for Prospective Farmers

The function of this section is to meet the requirements of Objective 3; i.e., "to determine the extent to which the graduates perceive their middle school education as being the most appropriate kind and level of education for prospective farmers." Hypothesis 4 is to be tested in conjunction with Objective 4 and is restated below:

> Hypothesis 4: Vocational agricultural graduates are more likely than high school graduates to perceive their kind and level of middle school education as being most appropriate for prospective farmers.

The data presented in Table 50 represent the graduates' responses to the following question:

If you knew that you were going to farm and had an opportunity to go to senior middle school again, which school program would you select as being most appropriate?[16]

Nearly two-thirds of the high school graduates and nearly all of the V-A school graduates selected the V-A school program as being most appropriate for prospective farmers. Still, it is interesting to note that about one-third of the high school graduates and several of the

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[16]See Appendix F, p. 38, question 49.

TABLE 50.--Distribution of graduates by senior middle school program perceived by graduate as being most appropriate for prospective farmers.

Most Appropriate Program for Prospective Farmers	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
High School	15	32.6	6	3.8	21	10.3
V-A School	29	63.0	148	94.3	177	87.2
Other	2	4.3	3	1.9	5	2.5
Total	46	99.9	157	100.0	203	100.0

$\chi^2 = 34.476$ d.f. = 2 Significant at $p < .001$ level.

V-A school graduates thought the high school program as being most appropriate. Not surprisingly, the relationship between the most appropriate kind of program for prospective farmers and kind of schooling was found to be statistically significant at the $p < .001$ level.

The graduates were also asked to indicate their most important reason (from a list provided them) for selecting the particular kind of school program as being most appropriate for prospective farmers.[17] As is shown in Table 51, the three most important reasons reported by the V-A school graduates, who had selected the V-A school program as most appropriate for prospective farmers, were

[17]Appendix F, p. 39.

TABLE 51.--Percentage distribution of the most important reasons given by graduates for selecting a particular senior middle school program as being most appropriate for prospective farmers.

Most Important Reason for Selection of Particular Senior Middle School Program	Kind of Schooling						Combined Responses		
	High School			V-A School					
	Most Appropriate Schooling For Prospective Farmers								
	High School % (N=15)	V-A School % (N=29)	Other School % (N=2)	High School % (N=6)	V-A School % (N=148)	Other School % (N=3)	High School % (N=21)	V-A School % (N=177)	Other School % (N=5)
Best Theoretical Training:									
In basic science	40.0	6.9	50.0	33.3	11.5	0.0	31.1	10.7	20.0
In applied sciences (agriculture)	0.0	24.1	0.0	0.0	24.3	0.0	0.0	24.3	0.0
In basic general knowledge	13.3	34.5	0.0	33.3	21.6	0.0	19.0	23.7	0.0
Most Practical Training:									
In "how to do" skills	26.7	17.2	0.0	0.0	30.4	100.0	19.0	28.2	60.0
In problem solving	0.0	3.4	0.0	0.0	4.7	0.0	0.0	4.5	0.0
In the development of good work habits	13.3	6.9	50.0	16.7	2.0	0.0	14.3	2.8	20.0
Best Personal Contacts:									
With agricultural organizations	0.0	3.4	0.0	0.0	3.4	0.0	0.0	3.4	0.0
With key persons of importance to farmers	6.7	3.4	0.0	0.0	1.4	0.0	4.8	1.7	0.0
Others:	0.0	0.0	0.0	16.7	0.7	0.0	4.8	0.6	0.0
Total	100.0	99.8	100.0	100.0	100.0	100.0	100.0	99.9	100.0

ranked as follows: (1) "most practical training in 'how to do' skills," (2) "best theoretical training in applied sciences (agriculture)," and (3) "best theoretical training in basic general knowledge."

On the other hand, the high school graduates, who had selected the V-A school program as most appropriate, reported the same three most important reasons as did the V-A graduates, but reversed their order of importance; i.e., "best theoretical training in basic general knowledge" headed their list. The high school graduates who had selected their own middle school program as being most appropriate most frequently reported "best theoretical training in basic science" as their most important reason.

The data shown in Table 52 were obtained from the responses to a third question; one concerning the kind and level of education the graduates would encourage their sons to complete if they wished to have them become farmers.[18] The rising educational aspirations in Taiwan are reflected in a rather striking manner in these data, for the majority of both kinds of graduates would encourage their sons to complete four years of college (most recommended an agricultural college) before farming. The senior V-A school program was the second most popular kind and level

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[18] Ibid.

TABLE 52.--Distribution of graduates by kind and level of education which the graduate would encourage his sons to complete if he wished them to become farmers.

Kind and Level of Education Encouraged for Sons	Kind of Schooling				Combined Responses	
	High School		V-A School			
	No.	%	No.	%	No.	%
Middle School:						
Junior high school or less	0	0.0	2	1.3	2	1.0
5-year V-A	0	0.0	8	5.1	8	3.9
Senior V-A	9	19.6	33[a]	21.0	42	20.7
Senior high school	0	0.0	0	0.0	0	0.0
Junior College:						
Agricultural	5	10.9	26[b]	16.6	31	15.3
Other	0	0.0	0	0.0	0	0.0
4-Year College:						
Agricultural	28[c]	60.9	73[c]	46.5	101	49.8
Other	4	8.7	10	6.4	14	6.9
Other:	0	0.0	5	3.2	5	2.5
Total	46	100.1	157	100.1	203	100.1

$\chi^2 = 6.942$ d.f. = 6 Not significant at $p \leq .05$ level.

Note: The most popular reason for each of the three most common kinds and levels of education reported is noted below.

[a]"Most suitable for farming" (69.7 per cent of the 33 responses).

[b]"To acquire more agricultural knowledge and technical skills" (84.6 per cent of the 26 responses).

[c]"To acquire more agricultural knowledge and technical skills" (89.3 per cent of the 28 high school graduate responses and 76.7 per cent of the 73 V-A school graduate responses).

of education selected. The data presented in this section were sufficient evidence to accept Hypothesis 4.

Graduates' Opinions About Their Middle School Education and Its Relevance to Farming

The purpose of the final section of the findings is to report on the opinions of the graduates in regard to selected features of their senior middle school education in respect to farming. The high school and V-A school graduates may perceive certain differences in the kinds of learning imparted by their respective schools which are not evidenced in their farmer-performances as measured by a technical instrument. If so, their opinions are worthy of analysis.

In an attempt to obtain additional information about the graduates and their kind of schooling, the graduates were asked how they felt in regard to five statements concerning the total senior middle school program, which they had experienced, and its relevance to farming. Each graduate was asked to indicate his opinion-response to each statement on a four-space scale (see Appendix F, pp. 42-43, questions 55-56). The structured responses were interpreted as listed:

(1) meant the graduate completely disagreed,

(2) meant the graduate partially agreed but was more in disagreement than agreement,

(3) meant the graduate partially disagreed but was more in agreement than disagreement (i.e., mainly agreed),

(4) meant the graduate completely agreed.

The five statements and data regarding responses (3) "mainly agreed," and (4) "completely agreed," are presented in Table 53. When the "mainly agreed" and "completely agreed" responses were combined, most high school and V-A school graduates indicated that their courses were too theoretical, not enough time was spent in the laboratory, and not enough time was spent in field work. In the case of the latter two qualities, the percentage of graduates and their intensity of agreement appeared to be greater for the high school graduates than for the V-A school graduates.

The graduates differed somewhat in their opinions about two of the statements. First, most high school graduates agreed that exams had placed too much emphasis on memorization, but slightly less than one-half of the V-A school graduates agreed with the statement. Secondly, the V-A school graduates indicated strong agreement with the statement, "Middle schools, like the kind which you attended, should have offered classes to farmers." As one might expect, most high school graduates were in disagreement with the latter statement.

Some adjustments, albeit minor ones, have been made in the middle school senior programs between the time

TABLE 53.--Percentage distribution of graduates who agreed with statements concerning the total senior middle school program, which they had experienced, and its relevance to farming.

Statements Which Concern the Senior Middle School Program Attended by Graduates[a]	Kind of Schooling					
	High School			V-A School		
	(N=46) % Mainly Agree	(N=46) % Completely Agree	(N=46) % in Agreement[b]	(N=156) % Mainly Agree	(N=156) % Completely Agree	(N=156) % in Agreement[b]
"Courses were too theoretical."	26.1	37.0	63.1	32.7	30.8	63.5
"Exams placed too much emphasis on memorization."	28.3	34.8	63.1	26.3	22.4	48.7
"Not enough time was spent in the laboratory."	23.9	60.9	84.8	32.5	44.6	77.1
"Not enough time was spent in field work."	19.6	60.9	80.5	27.6	44.9	72.5
"Middle schools, like the kind which you attended, should have offered classes to farmers."	13.0	30.4	43.4	15.9	66.9	82.8

[a]The graduates were asked how they felt concerning how the total senior middle school program, which they had experienced, has related to farming. Responses were placed on a 4-space scale "completely disagree," "partially agree, mainly disagree," "partially disagree, mainly agree," and "completely agree." See Appendix F, p. 42.

[b]"% in agreement" is the combined response of "% mainly agree" and "% completely agree."

the graduates attended middle school and the time of interview.[19] It was subsequently decided to obtain the opinions of the graduates in regard to the same five previously mentioned statements, but this time in light of today's (1968's) senior programs, of the kind of middle school which they had attended, and their relevance to farming.

Data regarding the graduates' responses to the statements concerning their contemporary senior programs are shown in Table 54. In comparing the data in Tables 53 and 54, little change was observed in the relative differences between kinds of graduates in regard to the five statements. The greatest change in percentage within the groups of graduates was a 13.2 per cent decrease, which occurred between the V-A school graduates who agreed that not enough time was spent in field work in the programs which they had experienced and those who felt the same was true for the contemporary V-A school programs. In other words, several of the V-A school graduates were of the opinion that more time was being devoted to field work today than was true for when they attended school. Three-quarters of the V-A school graduates were in complete agreement that today's V-A schools should offer classes to

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[19] A review of Ministry of Education and Provincial Department of Education official publications, as well as personal interviews with several principals of middle schools, led the researcher to conclude that no major changes were made in the senior educational programs which were in effect during the period 1950-1959. In addition, no major curricular changes were noted during the sixties either.

TABLE 54.--Percentage distribution of graduates who agreed with statements concerning today's senior programs, of the kind of middle school which they had attended, and their relevance to farming.

Statements Which Concern Today's Senior Middle School Programs and Their Relationship to Farming[a]	Kind of Schooling					
	High School			V-A School		
	(N=46) % Mainly Agree	(N=46) % Completely Agree	(N=46) % in Agreement[b]	(N=156) % Mainly Agree	(N=156) % Completely Agree	(N=156) % in Agreement[a]
"Today's senior courses are too theoretical."	28.3	30.4	58.4	36.5	23.1	59.6
"Exams place too much emphasis on memorization."	37.0	28.3	65.3	31.4	18.6	50.0
"Not enough time is spent in the laboratory."	26.1	50.0	76.1	31.2	43.3	74.5
"Not enough time is spent in field work."	17.4	58.7	76.1	23.6	35.7	59.3
"Middle schools, like the kind you attended, should offer classes to farmers."	2.2	39.1	41.3	8.9	75.8	84.7

[a]The graduates were asked how they felt concerning how today's senior programs, of the kind of middle school which they attended, are related to farming. Responses were placed on a 4-space scale "completely disagree," "partially agree, mainly disagree," "partially disagree, mainly agree," and "completely agree." See Appendix F, p. 43.

[b]"% in agreement" is the combined response of "% mainly agree" and "% completely agree."

farmers, indicating that these graduates perceived a need for the V-A schools to offer community service or adult education programs. If the perceptions of the graduates are accurate, it would appear that there is considerable room for improvement in today's middle school programs which are designed for the prospective farmer in Taiwan.

Summary

The sample, upon which the results of this study were based, constituted approximately 19 per cent of the V-A school graduates and 6 per cent of the high school graduates who had responded previously to the mail questionnaire in Meaders' study. The selected respondents had graduated from middle schools located in a five-*hsien* area of west-central Taiwan. Over 80 per cent of the graduates in this study were part-time farmers, while less than 40 per cent of all farm operators in Taiwan farmed part-time during 1966. In addition, the percentage of graduates' farms with total cultivated areas of 2.0 *chia* and larger was slightly greater than the percentage of farms of this size in all Taiwan.

Data concerning the 203 graduates were presented in forty-nine contingency tables which in turn were organized and analyzed under six subheadings: general information about the graduates and their farms; farming performance factors; participation in formal organizations; sources of information and/or assistance on farming

problems; graduates' perceptions of the most appropriate education for prospective farmers; and graduates' opinions about their middle school education and its relevance to farming. The chi square statistic was used as a measure of association between the various variables involved. Of the thirty-five general information and farmer-performance variables included in the study, only three--occupation of the parent at the time the graduates entered senior middle school, number of years of schooling completed by wives of graduates, and estimated total NT$ value of livestock and livestock products sold by graduates during 1967--were found to be related ($p \leq .05$ level) to the kind of schooling completed by the graduates. Interpretation of the dichotomous distributions of statistically significant data revealed that agriculture was the occupation of the parent for 80 per cent of the V-A school graduates and for 59 per cent of the high school graduates at the time the graduates entered senior middle school. It was also found that a significantly higher percentage of wives of high school graduates had completed nine or more years of schooling than had wives of V-A school graduates, and high school graduates had significantly higher livestock sales than had V-A school graduates.

Analyses of contingency tables revealed that significant relationships occurred more frequently when the combination variable of kind and type of schooling replaced the kind of schooling variable in the chi square

computations. When the graduates were grouped by kind and type of schooling, it was observed that a rather consistent pattern emerged among the four frequency distributions; i.e., the provincial high school graduates tended to occupy the most favorable position among the groups in respect to the related variable, while the hsien/city V-A school graduates usually occupied the least favorable position.

It was found that the relationship between farming performance (establishment in farming, cropping programs, livestock programs, and estimated gross farm incomes) and kind of schooling was not significant at the $p \leq .05$ level. A similar finding of no significant relationship was observed between participation in formal organizations and kind of schooling. These findings resulted in the rejection of two hypotheses.

Despite the fact that the V-A schools were a relatively minor source of information and/or assistance to their graduates on farming problems, it was found that V-A schools were a greater continuing source of farm information and/or help to their graduates than were the high schools to their graduates. In a second result which supported a hypothesis, it was observed that a greater percentage of V-A school graduates, than of high school graduates, perceived their kind and level of middle school education as being most appropriate for prospective farmers. However, a majority of both kinds of graduates

would encourage their sons, who they wished to become farmers, to first complete four years of college, preferably majoring in agriculture

The final results were based upon the opinions of the graduates concerning the senior middle school program, which they had completed, and its relevance to farming. Most high school and V-A school graduates agreed that their courses had been too theoretical and that not enough time was spent in the laboratory, or in field work. Over 80 per cent of the V-A school graduates agreed that V-A schools should have offered classes to farmers. The graduates' opinions regarding today's middle school programs were also obtained and found to be very similar to their previously mentioned opinions.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The study provided a comparative analysis of the farmer-performances of two kinds of middle school senior graduates in Taiwan. The comparisons made of the senior graduates from the high schools with the senior graduates from the vocational agriculture schools were based on the five specific objectives or goals for the study:

1. To examine the relationship between kind of middle school education and farming performance.
2. To analyze the personal characteristics of the graduates, especially in regard to the graduates' participation in formal organizations and to their source(s) of information and/or assistance on farming problems.
3. To determine the extent to which the graduates perceive their middle school education as being the most appropriate kind and level of education for prospective farmers.

4. To obtain the opinions of the graduates in regard to selected features of their senior middle school education and its relevance to farming.
5. To draw conclusions and propose recommendations about schooling for prospective farmers.

Four hypotheses, in regard to farmers who are middle school senior graduates, were postulated and tested in conjunction with fulfilling the requirements of the objectives of the study.

The Study in Perspective

Two chapters were devoted to establishing a sound foundation for the investigation. In Chapter II, a review of related literature was undertaken to gain an understanding of the methodology employed by and the results obtained from previous studies. The focus of the review was primarily upon research conducted in the United States, comparing the contributions of different kinds of secondary education to the farmer-performances of their senior graduates. It was generally reported in the United States that farmer-performance is related to training in high school vocational agriculture. Pertinent research concerning Taiwan revealed that V-A schools have provided a large corps of agriculturally-trained senior graduates to staff the island's extensive network of enterprises and organizations which have played key roles in the

agricultural development of Taiwan. Recommendations in the studies emphasized greater application of knowledge and development of practical skills, by the V-A schools, and a redirection of curricula to meet the needs of the local farming community.

In Chapter III, additional background for the study was presented in the form of a perspective of the Taiwan setting; its general features and agricultural development, its farmers and agricultural organizations, and its educational system. An understanding of Taiwan was, of course, an essential prerequisite to the development of an appropriate research design for the study and for the successful execution of the field operations for the study. Moreover, such an understanding is necessary in order to accurately interpret the results of the investigation.

Methodological Overview

The research design and data collection method employed in this study were based upon and integrated with the methodology used in the 1968 Taiwan Education and Development Research Project. This study, referred to as the Farmer Interview Phase of the Project, involved only a part of the population of schools and graduates which were included in the overall Project.

The population for this study included all 1950, 1955, and 1959 male senior graduates, of high schools and

V-A schools located within a five-hsien area (Farmer Interview Region) of west-central Taiwan, who were classified as operators of family farms during 1967 and whose farms were located within the boundaries of the Region. The Project sampling operation consisted of two parts. In Part One, mail questionnaires were administered to those graduates who had been selected (along with their schools) for the Project sample through the use of a multiple-stage, stratified sampling procedure. In Part Two, graduates who were operators of family farms were identified from the mail questionnaire data and became the 215 members for this study (203 graduates--46 from high schools and 157 from V-A schools--were subsequently interviewed).

A comprehensive interview schedule was developed in Taiwan. The survey instrument was translated into Chinese, scrutinized for technical inaccuracies by an eight-member Jury of Experts, revised several times, pilot tested, and printed. Eleven, male, senior students, who were majoring in agricultural education at Taiwan Provincial Chung Hsing University, were selected to serve as interviewers and received approximately twenty-eight hours of instruction prior to beginning their interview assignments. Since the interviews averaged two and one-half hours in duration, nearly three weeks were required to complete the 203 interviews.

Farming performance factors were calculated and Interview Schedule raw score data were processed. Analysis of data involved the preparation of frequency tables and computation of chi square values in order to test the hypotheses which had been developed for the study. Even though contingency tables were computed and analyzed to determine the relationships between eleven independent and various dependent variables, only data concerning kind of schooling, and in some cases kind and type of schooling, were reported in tabular form in this study.

Major Findings

The sample for this study included 19 per cent of the V-A school graduates and 6 per cent of the high school graduates who had responded previously to the mail questionnaire and had graduated from middle schools located in a five-*hsien* area of west-central Taiwan. It was learned that over 80 per cent of the 203 graduates in the sample were part-time farmers during 1967, while less than 40 per cent of all farm operators in Taiwan had farmed part-time during 1966. In the case of the percentage distribution of farms by total area cultivated, little difference was observed between the graduates and Taiwan farmers in general.

Contingency tables were computed, analyzed, and presented for thirty-five general information and farmer-performance variables; however, only three were found to be related ($p \leq .05$ level) to the kind of schooling

completed by the graduate. Since chi square computations which used the kind of schooling variable resulted in dichotomous distributions, it was possible to directionally interpret the three significant relationships as follow: (1) agriculture was the occupation of the parent, at the time the graduate entered senior middle school, for a greater percentage of V-A school graduates than of high school graduates; (2) a higher percentage of wives of high school graduates than of V-A school graduates completed nine or more years of schooling; and (3) high school graduates had higher livestock sales per farm during 1967 than did V-A school graduates.

Significant relationships occurred more frequently when kind and type of schooling, rather than just kind of schooling, was used in the chi square computations. Furthermore, a pattern evolved among the four groups of graduates (grouped by kind and type of schooling) with the provincial high school graduates tending to hold the most favorable position, in respect to the related variable, while the hsien/city V-A graduates usually held the least favorable position.

The relationships between both farming performance and kind of schooling, and participation in formal organizations and kind of schooling were found to be not significant at the $p \leq .05$ level. These findings led to the rejection of two hypotheses. Evidence which resulted

in the support of two hypotheses was manifested in two findings. First, it was found that V-A schools were a greater continuing source of farm information and/or assistance to their graduates on farming problems than were high schools to their graduates. Second, it was observed that a greater percentage of V-A school graduates, than of high school graduates, perceived their kind and level of middle school education as being most appropriate for prospective farmers. However, it must be noted that a majority of both kinds of graduates would encourage their sons, who they wished to become farmers, to first complete four years of college. Most high school and V-A graduates were of the opinion that their middle school courses had been too theoretical and that not enough time was spent in the laboratory or in field work. Over 80 per cent of the V-A school graduates felt that V-A schools should offer classes to farmers.

Conclusions

Subject to the conditions and limitations of this study, the following conclusions appear warranted:

1. Very few significant relationships were found to exist between the personal and farm characteristics of the graduates and the kind of senior middle school which the graduate had attended.

2. In general, the relationships between various general information factors (personal and farm characteristics) and the graduates, were more likely to be significant when the graduates were grouped by kind and type of schooling than by kind of schooling only.
3. When graduates were grouped by kind and type of schooling, provincial high school graduates tended to occupy the most favorable position, and hsien/city V-A school graduates the least favorable position, among the four groups in respect to the related general information variable.
4. There was no significant relationship between farming performance (establishment in farming, cropping programs, livestock programs, and estimated gross farm incomes) and kind of schooling.
5. There was no significant relationship between participation in formal organizations and kind of schooling.
6. V-A schools were a greater continuing source of farm information and/or assistance to their graduates on farming problems than were the high schools to their graduates. However, V-A schools ranked considerably lower than several other sources.

7. Vocational agriculture graduates were more likely than high school graduates to perceive their kind and level of middle school education as being most appropriate for prospective farmers.

Discussion

In this section, an attempt has been made to provide insight into some of the probable causes of the results obtained in the study and to set the stage for drawing implications and recommendations.

By United States standards, farms in Taiwan are very small and, unlike farms in the United States, are decreasing in size because of increasing population pressure and traditional patterns of inheritance. In Taiwan, trends toward decreasing farm size and decreasing percentages of farm households engaged full-time in farming (see pages 73-74), have been accompanied by a steady rise in farm productivity.

It was noted that farms operated by middle school senior graduates had slightly larger cultivated areas than had Taiwan farms in general, but the farmers who are senior graduates were much more likely to be engaged in farming part-time than was the average Taiwan farmer. It is likely that farmers who are middle school graduates aspire to higher socioeconomic goals than do their neighbors of

lesser schooling and, because of their middle school education, are more successful in securing economically and socially rewarding employment off-farm than are other farmers. In Taiwan, much status is awarded a person who holds a prestigious off-farm position, such as a Public Office or farmers' association official or extension advisor, and who also operates a farm. The combination of education and official position in the Chinese culture is traced to the days of the Mandarin and is also a remnant from Taiwan's recent colonial era.

Turning to graduates by kind of schooling, V-A school graduates were more likely to be engaged in farming than were high school graduates. Significant relationships between kind of schooling and two variables--occupation of parent at the time graduate entered senior middle school and number of years of schooling completed by wife--help to explain the fact that a greater percentage of V-A school graduates than of high school graduates were farming. At least two reasons are feasible: First, a greater percentage of parents of V-A school graduates, than of high school graduates, were engaged in agricultural occupations when the graduates entered senior middle school. As a result, the V-A school graduates may have been more farming-oriented, than were their high school counterparts, when they entered middle school. The V-A school graduate most likely preferred to attend a V-A school rather than a

high school; however, in some cases, the V-A school graduate may have attended the V-A school because he failed to pass the entrance examination required for admittance to high school. Second, V-A school graduates tended to marry women who had completed fewer years of schooling than had the wives of high school graduates. This may have been due to a difference in social values between the two kinds of graduates, or V-A school graduates may have thought that wives of lesser education would make better wives for farmers. It was noted that wives of V-A school graduates tended to use more workdays on the farm than did wives of high school graduates. Other than the above-mentioned observations, little difference was noted between the personal and farm characteristics of the graduates when analyzed on the basis of the kind of school from which they had graduated.

In general, the relationships between various general information factors and the graduates were more likely to be significant when the graduates were grouped by kind and type of schooling than by kind of schooling only. The socioeconomic factors which are related to the stratification effect of the entrance examination appeared to be a major factor in most of the significant relationships between the personal and farm characteristics of the graduates and the kind and type of school which they had attended.

In Chapter III, it was noted that generally more students apply for admission to senior middle schools than are accepted. Applicants for high schools have usually outnumbered applicants for V-A schools, and provincial schools usually have more applicants than do hsien and city financed schools. Admission to the kind and type of school desired by the applicant depends upon the applicant's performance on the senior middle school entrance examination. Many factors enter into an applicant's performance on the examination, including his level of preparation, self-concept, innate academic ability, and other elements, many of which reflect the applicant's socioeconomic background.

When the graduates were stratified into four groups by kind and type of schooling, provincial high school graduates tended to occupy the most favorable position, and hsien/city V-A school graduates the least favorable position, among the four groups in respect to the following: lower percentage of parents in non-agricultural occupations at the time the graduates entered senior middle school; higher number of years farmed, percentage of graduates who were heads of households, number of years of schooling completed by wives; and better farm location by economic land class. Hsien/city V-A graduates were also at the bottom of the list in respect to the percentages of graduates who were farm operators and their farm location by agricultural region.

In contrast, but not necessarily in contradiction to the above-mentioned pattern, the hsien/city V-A school group had the largest percentage of graduates (of the four groups) with overall graduation averages of 80 and above, while the provincial high school group was the only one to have no graduates in this category. Two alternative explanations appear feasible. In the first place, it is quite likely that the provincial high school graduates with the highest overall graduation averages were better qualified to pass the academically-oriented college entrance examination than were the hsien/city V-A school graduates with similar overall graduation averages. On the other hand, perhaps a higher percentage of hsien/city graduates, than of their provincial high school contemporaries with high overall graduation averages, preferred to farm for reasons mentioned earlier; i.e., more favorably disposed toward farming and/or for the socioeconomic advantages of being a well-educated farmer with a prestigious off-farm position in the local community.

The similar patterns evidenced between the graduates on the basis of kind and type of schooling and their relative position in regard to various personal and farm characteristics, leads one to the following question: Does the graduate have certain personal and farm (socio-economic) characteristics because he attended the most prestigious kind and type of middle school, or did the

graduate attend the most prestigious school because of the characteristics which he possessed before enrolling in senior middle school?

In the numerous studies conducted in the United States comparing the relationships of different kinds of secondary education to the farmer-performances of their senior graduates, it was generally revealed that farming performance was related to instruction in secondary school vocational agriculture. However, the results of this study indicated that no significant relationship existed between the farming performance of senior graduates in Taiwan and the kind of middle school which the graduates had attended. The evidence revealed that high school graduates and the V-A school graduates possessed similar levels of technological knowledge (as measured by their indexes of use of improved production practices) and these similarities were reflected in their levels of production.

The only studies conducted in the United States which failed to support the hypothesis that farming performance is related to instruction in vocational agriculture, were conducted in Iowa during 1949-1950 (see pages 18 and 19). In the four studies, their common sample consisted of farmers who had served in the armed forces for a number of years between completion of their high school vocational agriculture instruction and establishment in farming. A similar situation prevailed in the case of the

Taiwan graduates. Establishment in farming following graduation from senior middle school was delayed several years in Taiwan, while the graduates fulfilled their compulsory military service obligations. If differences existed in the levels of technical agricultural knowledge possessed by the two kinds of graduates at the time of graduation, it is quite reasonable to assume that those differences would have dissipated to a large extent while serving on a lengthy tour with the armed forces.

A second explanation for the differences in results between the United States studies and this study is rooted in the basic dissimilarities between the United States and Taiwan systems for developing and disseminating scientific farm information. Lionberger and Chang have noted the organizational differences between the two systems, each of which has been very successful. In the United States, the services provided by the system for developing and disseminating farm information--resident teaching (including preparation of teachers for public schools), research, and extension--are integrated in a single institution, the land grant colleges. Whereas, in Taiwan, the system consists of a variety of public and private agencies (discussed in Chapter III) coordinated by the Provincial Department of Agriculture and Forestry.[1] Structurally, and perhaps functionally as well, vocational agriculture programs in

[1]Lionberger and Chang, op. cit., pp. 1-5.

secondary schools in the United States appear to be more closely aligned with the total system (land grant colleges) for developing and disseminating farm information than are the V-A school senior programs (coordinated by PDE) in Taiwan. If this is indeed the case, then one would expect the differences in farming performance potential, between graduates of different kinds of secondary school programs, to be masked by post-secondary school influences (neighbors, extension activities, and others) in a lesser number of years for Taiwan graduates than would be required for United States graduates.

A third explantion for the differences in the relationships between farming performance and kind of schooling between United States graduates and Taiwan graduates is that a combination of the two previously described reasons has occurred resulting in different outcomes.

In the United States studies, participation in formal organizations was related to instruction in vocational agriculture; however, the results of this study revealed that, as was the case with farming performance, no significant relationship existed between participation in formal organizations and kind of middle school attended by senior graduates who farmed in Taiwan during 1967. The most feasible explanations for the difference in results between the United States studies and this study, in respect to participation in formal organizations and kind

of schooling, are the same as were presented in the discussion concerning farming performance. Thus, farmer-performance in the United States is related to instruction in vocational agriculture; but, no such relationship was evidenced in Taiwan, where vocational agriculture programs have been a part of the educational system, with varying degrees of emphasis, for more than fifty years.

Although V-A schools were a greater continuing source of farm information and/or assistance to their graduates on farming problems than were high schools to their graduates, the V-A school is a relatively minor source of farm information for their graduates when compared with other sources such as other farmers, magazines, and farmers' associations. These results are consistent with those of previous studies, conducted in the United States and Taiwan, which were reviewed in Chapter II.

In the opinions of a majority of both high school graduates and V-A school graduates, the middle school senior programs which they had attended were too theoretical and devoted an insufficient amount of time to laboratory and field work. However, the criticism of various features of their middle school programs, in respect to farming, was not as great in the case of the V-A school graduates; in fact, the latter felt that their school should also offer in-service classes to farmers.

Even though the evidence revealed that no significant relationship existed between farmer-performance and kind of schooling, nearly two-thirds of the high school graduates and almost all of the V-A school graduates indicated that the V-A program, despite its weaknesses, was the most appropriate kind of senior middle school program for prospective farmers. Such a strong endorsement of the V-A school program by both kinds of graduates points out that the V-A schools have some latent advantages in the eyes of graduates who are farming.

The high status attached to the well-educated person in rural Taiwan, who secures prestigious off-farm employment in addition to farming, was again reflected when a majority of both kinds of graduates indicated that they would encourage their sons, who they wished to become farmers, to complete four years of college before farming.

Implications

An interpretation of the outcome of this analysis has led to the following implications:

1. In the long run (eight or more years after graduation), farmers in Taiwan who are V-A school senior graduates exhibit about the same degree of farming performance and participation in formal organizations (rural leadership) as do farmers who are high school senior graduates. In light of this observation, one

questions whether or not the various kinds of senior middle school programs are being evaluated in terms of their official objectives. Especially since middle school graduates prefer the V-A school program for prospective farmers.

2. In 1962, Meaders found that most V-A school graduates felt that V-A schools should offer classes to farmers; similar opinions were revealed in this study. Apparently the graduates feel that a function exists for the V-A school to perform in the rural community. One of the objectives for V-A schools, which was formally adopted by the Fourth National Education Conference in 1962 (see page 110) was "to make agricultural vocational school a Reconstruction and Education Center of the local rural community to improve farmers' modern knowledge and skills." Limited numbers of farmers have been served through classes for farmers conducted by the vocational agriculture schools; and more farmers have been served through classes sponsored cooperatively by the farmers' associations and the V-A schools.
3. The V-A schools in Taiwan are under the general administration of the Provincial Department of Education. As such, the V-A school programs

are somewhat removed from the primary system of developing and disseminating farm information and technology, which is coordinated by the Provincial Department of Agriculture and Forestry. A lack of coordination was observed between the two departments in regard to the V-A school programs; for example, it was not customary for PDAF to supply the V-A schools with new technical bulletins. A combination of a review of previous studies, personal interviews, and the opinions of the graduates concerning the relevancy of the V-A school program for prospective farmers, suggested that the V-A school programs needed considerable improvement.

4. Increasing use of farm technology and rising educational aspirations and attainments of the rural population of Taiwan will probably be reflected in a continued up-grading in the level of education received by prospective farmers. The trend in Taiwan is toward part-time farming. Educational qualifications required for persons in off-farm occupations, including part-time farmers, are likely to rise. Positions presently requiring graduation from senior middle school may in a few years require post-middle school education.

Therefore, the prospective part-time farmer is confronted with the problem of preparing for a dual occupation; i.e., farming plus off-farm work. In order to perform this function, it is likely that in the long run the senior middle school programs (vocational and high school) will follow the pattern of the junior middle schools; i.e., consolidation into a comprehensive, but flexible, secondary school with a dual objective: general education, plus preparation for college or for post-secondary vocational-technical employment or training. Hopefully, a community service or continuing education element will also be a part of the secondary school program.

5. From a socioeconomic standpoint, the senior middle school entrance examination has tended to perpetuate the status quo. It would appear that elimination of the apparent inequalities between programs of provincial and hsien/city middle schools, would be a natural initial step. Eventual consolidation of vocational schools and high schools into comprehensive secondary schools would be a logical subsequent step in reducing inequalities between different kinds of schools.

Recommendations

The final objective set forth for this study was "to draw conclusions and propose recommendations about schooling for prospective farmers." The conclusions have been drawn in accordance with the data and provide the basis for proposing the following recommendations for Taiwan:

1. It is recommended that the Ministry of Education and Provincial Department of Education re-evaluate their objectives for V-A school programs. The V-A schools have made many contributions to Taiwan's agricultural development, primarily by preparing a large corps of agriculturally-trained semi-professionals, technicians, and specialists for staff positions in the various agencies which constitute the system for developing and disseminating farm information and technology to farmers. Of course, these are indirect means of improving farming performance, but no evidence was revealed which indicated that V-A schools had any direct influence on the farmer-performances of their senior graduates.
2. It is recommended that a post-middle school program be established to provide refresher farm management training to graduates who have returned to farming after completing their

military service. This recommendation seems especially relevant in view of the strong support voiced by V-A school graduates for their schools to offer classes to farmers.

3. As a move toward making the V-A school program more relevant to farming, it is recommended that a V-A school advisory committee, composed of agriculturists and educators, be established at the provincial level for two purposes: (1) to study and recommend ways of opening-up new channels of communication between PDAF and the V-A schools so that the technology and practices taught are kept up-to-date; and (2) to coordinate efforts among PFA, PDAF, and PDE in developing meaningful adult farmer education programs.

4. It is recommended that continued emphasis be directed toward phasing out the single program vocational school in the rural areas. With expanding off-farm employment opportunities for farmers, the senior middle school student should be provided with a much greater spectrum of vocational course offerings than are presently included in most V-A school curriculums.

5. Data listed in the 1969 Educational Statistics of the Republic of China indicate that considerable progress had been made during the late 1960s toward bringing all senior middle school programs under one type of administration. It is recommended that completion of this program be expedited so that inequalities in administrative and curricular standards between all provincial and hsien/city schools, regardless of kind or level, be eliminated as soon as possible.

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APPENDICES

APPENDIX A

ABBREVIATIONS AND CONVERSION FACTORS, AND DEFINITION OF TERMS

Abbreviations

Economic Terms:

GNP	Gross National Product
IMC	Index of Multiple Cropping
NT$	New Taiwan Dollars

Organizations:

CIECD	Council for International Economic Cooperation and Development
DAIS	District Agricultural Improvement Station
FA	Farmers' Association
JCRR	Chinese-American Joint Commission on Rural Reconstruction
MOE	Ministry of Education
NTU	National Taiwan University
PDAF	Provincial Department of Agriculture and Forestry
PDE	Provincial Department of Education
PFA	Provincial Farmers' Association
PFB	Provincial Food Bureau
SAU	Small Agricultural Unit
TARI	Taiwan Agricultural Research Institute
TLRI	Taiwan Livestock Research Institute

TPC	Taiwan Pineapple Corporation
TPCHUCA	Taiwan Provincial Chung Hsing University, College of Agriculture
TSC	Taiwan Sugar Corporation
TTWMB	Taiwan Tobacco and Wine Monopoly Bureau
USDA, ERS	United States Department of Agriculture, Economic Research Service
V-A	Vocational Agriculture

Conversion Factors

Weight:

To convert from	Multiply by	To obtain
Taiwan catty	1.31575	Pounds
Pound	0.76002	Taiwan catty
Taiwan catty	0.59682	Kilogram
Kilogram	1.67556	Taiwan catty

Area:

Chia	0.96992	Hectare
Hectare	1.03102	Chia
Chia	0.39680	Acre
Acre	0.40467	Hectare
Hectare	2.47114	Acres
Acre	0.41722	Chia
Square kilometer	100.00000	Hectares
Square mile	2.58998	Square kilometers
Chia	2934.00000	Ping

Hectare	3025.00000	Ping
Ping (tsubao)	3.95382	Square yards
Ping (tsubao)	3.30580	Square meters

Length:

Kilometer	0.62137	Mile
Mile	1.60935	Kilometer
Meter	3.28083	Feet

Value:

US dollars	40.00	NT dollars

Definition of Terms

Administrative Terms

Province.--An administrative division or sub-unit of a country. Taiwan is a province of the Republic of China and, as such, has a local government which consists of various departments, bureaus, boards, and a popularly elected legislative assembly.

Hsien.--A county, several of which make up a province. Each hsien has a local government and a local legislature.

Chen or Hsiang.--Both terms refer to townships; each hsien is divided into chen and hsiang administrative units. A chen, in addition to having a larger population than a hsiang, has at least one relatively important rural

town within its boundaries while a hsiang contains only ordinary villages.[1]

Farm Management Terms

Agricultural Regions.--Refer to:

> . . . large areas of land that differ from each other in respect to the amount of agricultural land per person of the farm population and in the usual combination of crops and livestock on the farms. The boundaries between agricultural regions usually are determined by differences in climatic or marketing factors. Less frequently broad differences in soil or topography best explains the difference between one agricultural region and another.[2]

Five different agricultural regions were identified for this study: (1) rice, (2) rotational, (3) upland field crops, (4) upland tree crops, (5) and forest regions.

Economic Land Classes.--Refer to:

> . . . smaller areas of land than agricultural regions that vary in their capacity to pay the expenses of operating a farm unit and provide a net family income. Within agricultural regions these areas differ in the intensity of use per hectare to which they are adapted because of variations in soil, topography or other land characteristic. Usually three or more land classes can be mapped within each agricultural region.[3]

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[1]Cheng-siang Chen, Taiwan: An Economic and Social Geography, Vol. I, Research Report No. 96 (Taipei: Fu-Min Geographical Institute of Economic Development, 1963), p. 21.

[2]Arthur W. Peterson, "An Economic Study of Land Use in Taichung Hsien and City, 1960," (Taichung, Taiwan: Research Institute of Agricultural Economics, Taiwan Provincial Chung Hsing University, 1960), p. 9. (Mimeographed.)

[3]Ibid.

In this study, five economic land classes (land classes 1 through 5) were available for classification of farm land. Land class 1 has "the highest income potential and most intensively used land within an agricultural region."[4] Land class 5:

> . . . is defined as a sub-marginal area for its present use. The usual farms in this land class do not pay operating farm expenses, provide an acceptable level of living for the cultivator [operator] and his family or maintain capital.[5]

Land Grade.--One of twenty-six productivity classes into which the cultivated land of Taiwan has been classified and is based upon estimated net income per hectare. Each field has an official grade and the grade number is commonly recognized by farm operators.[6]

Chia.--A unit of land used locally; a chia equals 0.9699 hectare, or 2.3968 acres.

Crop Area.--The total amount of land in crops. It includes lands for double paddy crops, single paddy crops, rotational crops, upland field crops, fruit crops, and grass.[7]

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[4] Ibid.

[5] Ibid.

[6] Shison C. Lee, An Economic Study of Land Use in Tainan Hsien and City, 1965 (Taichung, Taiwan: Research Institute of Agricultural Economics, Taiwan Provincial Chung Hsing University, 1967), p. 3.

[7] Ibid.

Total Crop Chia (Area Cropped).--Refers to:

> . . . the sum of the areas of individual crops raised on farm during the year. Some parts of the farm may produce three or four crops in one year, other parts may produce only one crop, and still other area[s] less than one crop. If an area was in a perennial crop like citrus it was considered as cropped one time, for the purpose of this calculation.[8]

Index of Multiple Cropping.--Equals total crop chia on farm divided by crop area and then multiplied by one-hundred.[9]

Farming Performance.--Operationally defined as the researcher's evaluation of the senior graduate's achievements as a farm operator during 1967. The evaluation includes several farm management factors such as the graduate's farming status, size of business (including size of farm area and total crop and livestock production), index of multiple cropping, crop yields per unit area (compared with township average yields for the same economic land class), indexes of use of improved production practices for various crop and livestock enterprises, and estimated gross farm income.

Farmer-Performance.--Operationally defined as including the graduate's farming performance as well as his participation in formal organizations. The term is

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[8] Ibid.

[9] Ibid.

hyphenated to focus attention upon its special usage in this study.

Farm.--"A piece of land, or a number of separate pieces of land, operated as a unit under one management. In Taiwan, a farm household usually is one management unit but may consist of more than one married couple and children."[10]

Farmer.--Synonomous with farm operator. Farmers refer to:

> . . . those actually directing all the farm operations on their own farms and making decisions upon their own will in regard to such improtant [sic] matters as crop planting, harvesting and marketing, with only one operator (not necessarily the head of the household) in each farm household.[11]

The land may be owned or rented by the farmer. Farm directors (managers) of public and private commercial farms are excluded from this definition. Graduates who earn 50 per cent or more of their annual family income from farming are considered full-time farmers; whereas, those who earn less than 50 per cent from farming are classified as part-time farmers.

Self-Owned Land.--The conceptual definition of farm (or land) ownership in Taiwan is much broader than it is as

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[10]Peterson, loc. cit.

[11]Taiwan, Provincial Government, 1966 Census of Agriculture, op. cit., p. 16.

used in the United States. In Taiwan, self-owned land indicates land with its ownership belonging to:

> . . . the household or its components such as parents, spouse, brothers, sons or other relatives, and land which farmers have the right to inherit or use without being subject to paying its farm-rent, and also the land acquired by the farmers under the "land-to-the-tiller" program.[12]

Other Terms

Formal Organizations.--Operationally defined as organizations or organized activities which have: (1) definite qualifications for membership, (2) a regular place and time for meetings, and (3) designated leaders called officers.[13]

Senior Graduate.--One who has successfully completed a three-year senior (grades 10-12) secondary education in Taiwan.

Vocational Agriculture.--Vocational education in agriculture of less than college grade.

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[12] Ibid.

[13] Kaufman, op. cit., p. 7.

APPENDIX B

SUPPLEMENTARY TABLES

TABLE 55.--Total numbers of secondary school senior graduates in Taiwan, 1950-1959 and 1968.

Year of Graduation	High School Grads. (1)	Normal School Grads. (2)	Voc. School Graduates			Total Sr. Grads. (6)	High School Grads. as % of Total[a] (7)	V-A School Grads. as % of Total[b] (8)	High School /V-A School Grad. Ratio[c] (9)
			V-A Grads. (3)	Non-V-A Grads. (4)	Sub-Total (5)				
1949-50[d]	. .	. .	648	1,447	2,095	. .	. .	. .	. .
1950-51	3,523	1,107[e]	825	1,942	2,767	7,397	47.63	11.15	4.27/1
1951-52	8,115[f]	. .	1,022	2,600	3,622	11,737	. .	8.71	. .
1952-53	7,850[f]	. .	1,207	2,542	3,749	11,599	. .	10.41	. .
1953-54	6,090	1,600	1,403	2,882	4,285	11,975	50.85	11.72	4.34/1
1954-55	6,494	2,169	1,429	3,480	4,909	13,572[g]	47.85	10.53	4.54/1
1955-56	7,502	2,311	1,613	3,552	5,165	14,978[g]	50.09	10.77	4.65/1
1956-57	8,446	2,155	2,079	4,339	6,418	17,019	49.63	12.22	4.06/1
1957-58	11,329	2,663	2,032	5,396	7,428	21,420	52.89	9.49	5.58/1
1958-59	13,291	2,542	2,595	6,407	9,002	24,835	53.52	10.45	5.12/1
Total	56,675[h]	. .	14,853	34,587	49,440	134,532	50.97[i]	10.56[j]	4.73/1[i]
1967-68	37,125	804	3,555	19,729	23,284	61,213	60.65	5.81	10.44/1

Sources: Republic of China, MOE, Educational Statistics of the Republic of China (Taipei: MOE, 1960), pp. 17, 31, 37; Republic of China, MOE, Secondary Education: Republic of China (Taipei: MOE, 1964), pp. 91, 210-11; and Republic of China, MOE, Educational Statistics of the Republic of China (Taipei: MOE, 1969), pp. 60, 62, 64-65.

[a]Col. 1 ÷ col. 6. [b]Col. 3 ÷ col. 6. [c]Col. 1 ÷ col. 3.

[d]Only data for vocational school senior graduates were available for 1949-50.

[e]Calculated by subtracting col. 1 from col. 6.

[f]Calculated by subtracting col. 1 from col. 6 and includes both high school and normal school senior graduates.

[g]Summation of cols. 1, 2, and 5. MOE data in Secondary Education (see supra, p. 91) report 11,403 senior graduates in 1954-55 and 15,048 in 1955-56; however, these figures are inconsistent with the summations of MOE data in this table.

[h]Total graduates for years of graduation 1950-51, plus 1953-54 through 1958-59.

[i]An average for years of graduation 1950-51, and 1953-54 through 1958-59.

[j]Average percentage excludes year of graduation 1949-50.

TABLE 56.--Taiwan senior high school and vocational agriculture school response to a mail questionnaire.

School		Year of Graduation	Number				Net Sample Grads.[b]	Sampling Fraction[c]	Usable Replies	
Kind	Type		Schools in Population	Male Graduates	Sample[a] Schools	Sample[a] Grads.			Number	Per Cent
Senior High	Provincial	1950	13	964	13	444	328	1/2	279	85.06
		1955	26	2,062	16	460	377	1/3	330	87.53
		1959	30	3,691	17	380	362	1/6	329	90.88
		Sub-total	30	6,717	19	1,284	1,067	. .	938	87.91
	Hsien /City	1950	. .	. .	. .	. .	. .	. .	. .	. .
		1955	13	436	13	436	369	1/1	322	87.26
		1959	26	1,735	14	301	290	1/3	264	91.03
		Sub-total	26	2,171	16	737	659	. .	586	88.92
	Total		56	8,888	35	2,021	1,726	. .	1,524	88.30
Senior V-A	Provincial	1950	9	641	9	568	515	1/1	475	92.23
		1955	10	1,201	10	382	349	1/3	320	91.69
		1959	10	1,687	10	401	375	1/4	326	86.93
		Sub-total	10	3,529	10	1,351	1,239	. .	1,121	90.48
	Hsien /City	1950	. .	. .	. .	. .	. .	. .	. .	. .
		1955	4	195	4	181	163	1/1	145	88.96
		1959	11	800	11	371	349	1/2	325	93.12
		Sub-total	11	995	11	552	512	. .	470	91.80
	Total		21	4,524	21	1,903	1,751	. .	1,591	90.86
Grand Total			77	13,412	56	3,924	3,477	. .	3,115	89.59

Source: Calculated from O. Donald Meaders, Contributions of Senior Middle School Graduates to Taiwan Agricultural Development (East Lansing: Institute for International Studies, Department of Secondary Education and Curriculum, Michigan State University, December, 1968), p. 96.

Note: Sub-totals denote total number of schools included in at least one of the three years.

[a]Sampling procedure is described on pp. 119-124.

[b]Sampling fraction was used to select graduates from sample schools.

[c]Net sample = (Sample graduates) - (Died, Address Unknown, and Abroad).

TABLE 57.--Taiwan senior high school and vocational agriculture school response to a mail questionnaire in the Farmer Interview Region.

School		Year of Graduation	Number				Net Sample Grads.[b]	Sampling Fraction[c]	Usable Replies	
Kind	Type		Schools in Population	Male Graduates	Sample[a] Schools	Sample[a] Grads.			Number	Per Cent
Senior High	Provincial	1950	6	582	6	291	221	1/2	184	83.26
		1955	14	739	7	248	205	1/3	171	83.41
		1959	17	1,115	8	185	171	1/6	151	88.30
		Sub-total	17	2,436	10	724	597	. .	506	84.76
	Hsien /City	1950	. .	. .	. .	. .	. .	. .	. .	. .
		1955	6	241	6	241	195	1/1	172	88.21
		1959	14	406	7	137	129	1/3	120	93.02
		Sub-total	14	647	8	378	324	. .	292	90.12
Total			31	3,083	18	1,102	921	. .	798	86.64
Senior V-A	Provincial	1950	4	342	4	308	282	1/1	266	94.33
		1955	4	651	4	210	196	1/3	190	96.94
		1959	4	910	4	219	213	1/4	197	92.49
		Sub-total	4	1,903	4	737	691	. .	653	94.50
	Hsien /City	1950	. .	...	. .	. .	. .	. .	. .	. .
		1955	2	84	2	79	73	1/1	65	89.04
		1959	6	358	6	175	165	1/2	153	92.73
		Sub-total	6	442	6	254	238	. .	218	91.60
Total			10	2,345	10	991	929	. .	871	93.76
Grand Total			41	5,428	28	2,093	1,850	. .	1,669	90.22

Source: Calculated from data collected by O. Donald Meaders, Director of the 1968 Taiwan Education and Development Research Project.

Note: Sub-totals denote total numbers of schools included in at least one of the three years.

[a]Sampling procedure is described on pp. 119-124.

[b]Sampling fraction was used to select graduates from sample schools.

[c]Net Sample = (Sample Graduate) - (Died, Address Unknown, and Abroad).

TABLE 58.--Senior graduates "engaged in farming" at time of the mail questionnaire survey and their classification for the Farmer Interview Phase.

School		Year of Graduation	Usable Mail Q. Replies			"Engaged in Farming"		Farm Operator Interviews Completed	
Kind	Type		Total No.[a]	Engaged in Farming		Excluded from Sample[b]	Included in Sample	Number	Per Cent
				No.	Per Cent of Total				
		1950	184	22	11.96	10	12	12	100.00
	Prov-	1955	171	17	9.94	7	10	9	90.00
Senior	incial	1959	151	4	2.65	3	1	1	100.00
		Sub-total	506	43	8.50	20	23	22	95.65
High	Hsien	1955	172	23	13.37	6	17	17	100.00
	/City	1959	120	14	12.50	7	7	7	100.00
		Sub-total	292	37	12.67	13	24	24	100.00
	Total		798	80	10.03	33	47	46	97.87
		1950	266	85	31.95	32	53	50	94.34
	Prov-	1955	190	65	34.21	24	41	40	97.56
Senior	incial	1959	197	48	24.37	18	30	28	93.33
		Sub-total	653	198	30.32	74	124	118	95.16
V-A	Hsien	1955	65	25	38.46	9	16	15	93.75
	/City	1959	153	39	25.49	11	28	24	85.71
		Sub-total	218	64	29.36	20	44	39	88.64
	Total		871	262	30.08	94	168	157	93.45
Grand Total			1,669	342	20.49	127	215	203	94.42

[a]Carried forward from the "Usable Replies" column of the preceding table.
[b]See pp. 130-131.

TABLE 59.--Numbers of graduates interviewed in Farmer Interview Phase by school name, by hsien location of school, and by kind and type of schooling.

Names of Schools With Graduates Interviewed[a]	Hsien Location of School	No. of Graduates Interviewed by Kind and Type of Schooling					
		High School			Vocational Agriculture School		
		Hsien/City	Provincial	Total	Hsien/City	Provincial	Total
Taichung Prov. V-A	Taichung	. .	. .	. .	. .	23	23
Taichung Prov. 1st	Taichung	. .	4	4	. .	. .	. .
Taichung Prov. 2nd	Taichung	. .	2	2	. .	. .	. .
Taichung City 1st	Taichung	2	. .	2	. .	. .	. .
Yuanlin Prov. V-A	Changhua	. .	. .	. .	. .	46	46
Erhlin V-A	Changhua	. .	. .	. .	2	. .	2
Changhua Provincial	Changhua	. .	5	5	. .	. .	. .
Peitou	Changhua	6	. .	6	. .	. .	. .
Lukang	Changhua	2	. .	2	. .	. .	. .
Huwei V-A	Yunlin	. .	. .	. .	10	. .	10
Touliu V-A	Yunlin	. .	. .	. .	5	. .	5
Peikang V-A	Yunlin	. .	. .	. .	3	. .	3
Huwei Provincial	Yunlin	. .	3	3	. .	. .	. .
Tounan	Yunlin	6	. .	6	. .	. .	. .
Chiayi V-A	Chiayi	. .	. .	. .	. .	28	28
Tungshih V-A	Chiayi	. .	. .	. .	5	. .	5
Chiayi Provincial	Chiayi	. .	4	4	. .	. .	. .
Chiayi	Chiayi	3	. .	3	. .	. .	. .
Tungshih	Chiayi	3	. .	3	. .	. .	. .
Tainan Prov. V-A	Tainan	. .	. .	. .	. .	21	21
Tsenwen V-A	Tainan	. .	. .	. .	14	. .	14
Hsinying Provincial	Tainan	. .	4	4			
Tainan City	Tainan	2	. .	2			
Total		24	22	46	39	118	157

[a]Five of the eighteen high schools in the Project sub-sample had no graduates, which were interviewed in the study, and were consequently excluded from this table.

TABLE 60.--Numbers of graduates interviewed by kind and type of schooling, by hsien location of school, and by hsien location of farm during 1967.

Hsien Location	No. of Graduates Interviewed by Kind and Type of Schooling						Combined Responses
	High School			Vocational Agriculture			
	Hsien/City	Provincial	Sub-Total	Hsien/City	Provincial	Sub-Total	
by Hsien Location of School							
Taichung	2	6	8	0	23	23	31
Changhua	8	5	13	2	46	48	61
Yunlin	6	3	9	18	0	18	27
Chiayi	6	4	10	5	28	33	43
Tainan	2	4	6	14	21	35	43
Total	24	22	46	39	118	157	203
by Hsien Location of Farm During 1967							
Taichung	1	5	6	0	13	13	19
Changhua	9	5	14	2	47	49	63
Yunlin	4	7	11	17	23	40	51
Chiayi	8	1	9	6	13	19	28
Tainan	2	4	6	14	22	36	42
Total	24	22	46	39	118	157	203

TABLE 61.--A matrix identifying the significant relationships between selected independent variables and various personal characteristics of the graduates.

General Information (Dependent) Variables	Independent Variables: Kind of Schooling	Kind and Type of Schooling	Year of Graduation	Degree of Engagement in Farming (Part- or Full-Time)	Farm Location by Hsien	Farm Location by Agricultural Region	Farm Location by Economic Land Class	Occupation of Father at Time Graduate Completed Senior Middle School	Number of Years Farmed	Number of Years of Schooling Completed by Wife	Former 4-H Club Member
Occupation of Parent at Time Graduate Entered Senior Middle School	.01[a]	.01	x[b]	x	.001	x	x	-[c]	-	-	-
Occupation of Father at Time Graduate Completed Senior Middle School	x	x	x	x	.001	x	x	-	-	-	-
Senior Middle School Overall Graduation Average	x	.01	.02	x	x	x	x	-	-	-	-
Size of Farm Where Living at Time of Graduation	x	x	x	x	x	x	x	-	-	-	-
Number of Years Farmed Since Graduation	x	.01	.001	.02	.001	.02	x	-	-	-	-
Degree of Engagement in Farming (Part- or Full-Time)	x	x	x	-	x	x	x	-	-	-	-
Relation of Graduate to the Farm Operator	x	.001	.01	x	.001	.01	x	-	-	-	-
Relation of Graduate to the Head of Household	x	.05	.001	x	x	.05	x	-	-	-	-
Number of Workdays Used by Graduate on Farm	x	.05	x	.001	x	x	x	-	-	-	-
Number of Workdays Used by Wife on Farm	x	.05	x	x	.001	x	x	-	-	-	-
Number of Years of Schooling Completed by Wife	.05	.05	x	.01	x	x	x	-	-	-	-
Farm Location by Hsien	x	.001	.001	x	-	.001	.001	-	-	-	-
Farm Location by Agricultural Region	x	.01	.001	x	.001	-	.001	-	-	-	-
Farm Location by Economic Land Class	x	x	x	x	.001	.001	-	-	-	-	-
Index of Participation in Formal Organizations[d]	x	x	x	x	x	x	x	x	x	x	x

[a]Indicates that a significant ($p < .01$ level) relationship occurred between occupation of parent at the time graduate entered senior middle school and kind of schooling.

[b]"X" denotes that the computed chi square statistic revealed that the relationship between variables was not significant at the $p < .05$ level.

[c]No contingency table was computed between variables.

[d]Not considered a general information variable, but was included in this table for convenience.

TABLE 62.--A matrix identifying the significant relationships between selected independent variables and various farming performance measures of the graduates.

Farming Performance (Dependent) Variables[a]	Independent Variables: Kind of Schooling	Kind and Type of Schooling	Year of Graduation	Degree of Engagement in Farming (Part- or Full-Time)	Farm Location by Hsien	Farm Location by Agricultural Region	Farm Location by Economic Land Class	Occupation of Father at Time Graduate Completed Senior Middle School	Number of Years Farmed	Number of Years of Schooling Completed by Wife	Former 4-H Club Member
Farming Status	x[b]	x	x	x	x	x	x	-[d]	-	-	-
Farm Income-Sharing Arrangement	x	x	x	x	.001[c]	x	x	-	-	-	-
Total Farm Area Owned	x	x	x	x	x	x	x	x	x	x	x
Total Cultivated Area Per Farm	x	x	x	x	x	x	x	x	x	x	x
Total Crop Chia (Area Cropped) per Farm	x	x	x	x	x	x	x	x	-	-	-
Index of Multiple Cropping per Farm	x	x	x	x	.001	.001	.001	-	-	-	-
Index of Use of Improved Rice Production Practices	x	x	x	x	.01	x	x	x	.05	x	x
Index of Use of Improved Sweet Potato Production Practices	x	x	.02	x	.001	x	x	-	-	-	-
Index of Use of Improved Peanut Production Practices	x	x	x	x	x	x	x	-	-	-	-
Total Swine Units per Farm	x	x	x	x	x	x	x	-	-	-	-
Total Poultry Units per Farm	x	x	x	.05	x	x	x	-	-	-	-
Total Animal Unit Equivalents per Farm	x	.05	x	x	.05	x	x	-	-	-	-
Index of Use of Improved Swine Production Practices	x	x	x	.05	x	x	x	-	-	-	-
Index of Use of Improved Poultry Production Practices	x	x	x	x	x	x	x	-	-	-	-
Estimated Total NT$ Value of Crops Harvested per Farm	x	x	x	x	x	x	x	-	-	-	-
Estimated Total NT$ Value of Livestock per Farm	.05	x	x	x	x	x	x	-	-	-	-
Estimated Total NT$ Value of Crops and Livestock per Farm	x	x	x	x	x	x	x	.001	x	x	x
Estimated Total NT$ Value of Crops and Livestock per Crop Chia	x	x	x	x	.02	x	x	.001	x	x	x

[a]The independent variables refer to the farming performances of the graduates during 1967.

[b]"X" denotes that the computed chi square statistic revealed no significant relationship ($p < .05$ level) between variables.

[c]Indicates that a significant ($p < .001$ level) relationship occurred between farm income-sharing arrangement and farm location by hsien.

[d]No contingency table was computed between variables.

APPENDIX C

SUPPLEMENTARY FIGURES

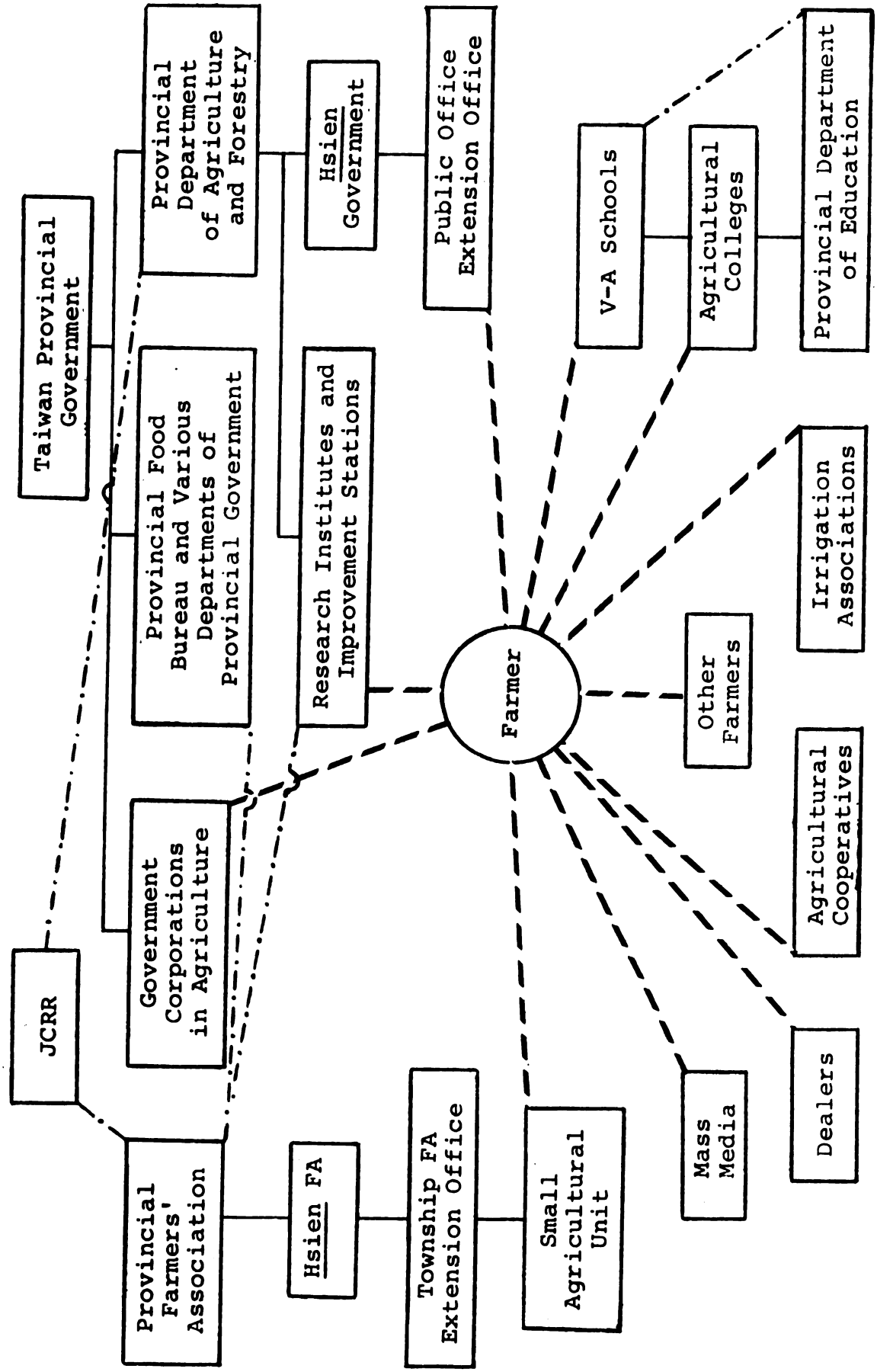

Figure 6.--Governmental and Private Organizations and Their Relationships to the Farmer in Taiwan

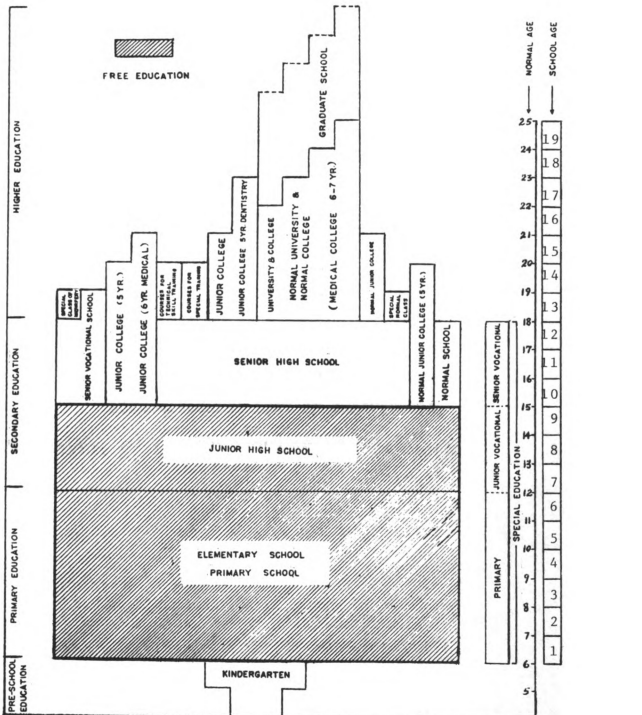

Figure 7.--An Organization Chart of the Present School System in Taiwan

Source: Adapted from Republic of China, MOE, Educational Statistics of the Republic of China (Taipei: MOE, 1969), p. iii.

APPENDIX D

ACKNOWLEDGMENT LIST OF INDIVIDUALS AND ORGANIZATIONS

Project Team Personnel

Position	Name/Title/Institution
Director:	Dr. O. Donald Meaders, Associate Professor and Associate Director, Research and Development Program in Vocational-Technical Education, Department of Secondary Education and Curriculum, Michigan State University, East Lansing, Michigan
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Research Associate and Director of the Farmer Interview Phase:	William L. Thuemmel, Graduate Student, College of Education, Michigan State University, East Lansing, Michigan
Assistant Director:	Hu Chi-ho, Associate Professor, Department of Agricultural Education, TPCHU
Supervisors of Field Work:	Yao Jih-chang, Associate Professor, Department of Agricultural Education Lin Chin-kun, Associate Professor, Department of Agricultural Education Lee Teh-kwei, Instructor, Department of Agricultural Education, TPCHU
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Typist:	Wang Su-ming

Clerks:	Chang Yung-shih	Sheng Tung-mei
	Hsu Su-li	Wang Tan

Individuals and Organizations Consulted in the Development of the Interview Schedule

Many individuals, in addition to the members of the researcher's Doctoral Guidance Committee and members of the Department of Agricultural Education at TPCHU, contributed to the development of the Interview Schedule (Appendix F). Much technical assistance was received from each of the below-listed individuals and organizations in the preparation of the instrument. (Note: the positions and titles indicated are as of June, 1968.)

District Agricultural Improvement Stations

Mr. Wang Tzu-tao, Director, Taichung DAIS
Mr. Ting Chun-chieh, Chief, Horticultural Section, Taichung DAIS
Mr. Lin Hsun-sun, Chief, Agronomy Section, Taichung DAIS

Mr. Lee Wen-chou, Director, Tainan DAIS

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Mr. C. H. Lin, Senior Specialist, Animal Industry Division
Mr. Chung Po, Senior Specialist, Animal Industry Division
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Mr. Lai Wen-cheh, Senior Specialist, Rural Economics Division
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Mr. Timothy L. T. Chen, Chief, Agricultural Extension Education Division, PDAF, and Associate Professor, Taiwan Provincial Chung Hsing University

Mr. Fu Teh-sung, Chief, Agricultural Economics Division

Provincial Department of Education, Wufeng, Taichung

Mr. Ma Kuang-hen, Chief, Section II (Secondary Education)

Mr. Y. L. Chen, Chief, Section III (Vocational Education)

Provincial Farmers' Association, Tali, Taichung

Miss Chu Ming, Director, Agricultural Extension Division
Mr. Yu Ying-cho, Chief, Rural Youth Section, Agricultural Extension Division

Mr. Fred Y. Tang, Chief, Supervision Section, Field Supervision Division
Mr. M. S. Ho, Chief, Technical and Processing Division
Mr. Shieh Neng, Technician, Technical and Processing Division

Taiwan Provincial Chung Hsing University, Taichung

Mr. Sung Mien-nan, Dean, College of Agriculture

Dr. Hu Chao-hwa, Professor, Department of Agronomy
Dr. Lu Ying-chuan, Professor, Department of Agronomy
Mr. Lin Pi-tsong, Professor, Department of Agronomy

Mr. John Y. K. Chen, Professor, Department of Animal Husbandry
Mr. Chen Chen-chia, Instructor, Department of Animal Husbandry

Mr. Huang Pi-chen, Professor and Head, Department of Horticulture
Mr. Peng Chong-kuo, Professor, Department of Horticulture
Mr. Fan Nien-tze, Associate Professor, Department of Horticulture

Dr. Puh Yen-sun, Professor, Department of Soil Science (formerly with JCRR and presently with FAO)

Dr. Shison C. Lee, Professor and Director, Research Institute of Agricultural Economics
Dr. Terry Y. H. Yu, Associate Professor, Research Institute of Agricultural Economics
Mr. Lee Ching-yu, Associate Professor, Research Institute of Agricultural Economics
Mr. Lee Kuen-mu, Instructor, Research Institute of Agricultural Economics
Mr. Paul S. T. Lee, Instructor, Research Institute of Agricultural Economics
Mr. Kuo Yi-chung, Assistant Research Fellow, Research Institute of Agricultural Economics

Mr. Wang Ying-por, Agricultural Extension Specialist, College of Agriculture

Taiwan Sugar Corporation, Taipei

Mr. Yu Ying-piao, Director, Agriculture Department
Mr. Lu Wei-tzu, Deputy Director, Agriculture Department (Chichow, Changhua)
Mr. Mai Sui-chi, Deputy Director, Agriculture Department (Chichow, Changhua)

Taiwan Tobacco Research Institute, Wufeng, Taichung

Miss Chang Yu-cheng, Entomologist
Mr. Chang Kuo-mou, Senior Agronomist

United States Sources

Dr. Herbert F. Lionberger, Professor, Department of Rural Sociology, College of Agriculture, University of Missouri, Columbia, Missouri

Dr. Arthur W. Peterson, Extension Economic Specialist, Washington State University, Pullman, Washington

Dr. Karl T. Wright, Professor, Department of Agricultural Economics, Michigan State University, East Lansing, Michigan

APPENDIX E

CALCULATION OF INDEXES OF USE OF IMPROVED PRODUCTION PRACTICES

Measure: Index of use of improved rice production practices (referred to before coding as improved practices scores).

Method and formula: One point was credited to the graduate for each of twelve listed improved practices which he reported to have used in producing rice on his farm during 1967. The identification numbers of twelve practices (see Appendix F, p. 13) were 2, 3.1-3.5, and 4-9.

$$\text{Index} = \left[\frac{\text{No. of practices used}}{12}\right] \left[100\right]$$

Example: Graduate No. 2524 used seven listed improved practices

$$\text{Index of use} = \left[\frac{7}{12}\right] \left[100\right] = 58$$

Note: Similar methods and formulas were used in calculating indexes of use of improved production practices for other selected crop enterprises. The maximum number of listed improved practices available for each of the three crop enterprises reported in this study, and their identification numbers, are listed below:

Crop Enterprise	Maximum No. of Improved Practices	Identification Nos. of Practices	Appendix F Page No.(s)
Rice (example)	12	2,3.1-3.5,4-9	13
Sweet Potatoes	7	2,3.1,3.2,4-7	14
Peanuts	7	2,3.1,3.2,4-7	17

Measure: Index of use of improved swine production practices.

Method and formula: This calculation involved two parts (see Appendix F, page 28): management practices (section B) and improvement practices (section C). One point was credited to the graduate for each of the following responses in section B:

Question	Response	Index Points
2.	(3) or (4)	1
4.	(2) or (3)	1
5.	(2) or (3)	1
6.	(1) only	1

One point was also credited the graduate for each of the seven listed improved practices in section C which was used by the graduate in producing swine on his farm during 1967.

Unlike the crop enterprises, the maximum number of listed improved swine production practices available (the divisor in the index of use formula) varied according to the nature of the graduate's swine enterprise. The latter determined the number of responses, since the interviewers omitted questioning the graduate about the use of practices

which were inappropriate; i.e., some of the practices applied to mature breeding stock and others only to weaned stock or suckling pigs. The index of use of improved swine production practices is the percentage of applicable improved practices which were actually used by the graduate during 1967. The index of use formula for swine was the same as the one used for crops except the size of the divisor varied between swine enterprises for the aforementioned reasons.

Measure: Index of use of improved poultry production practices.

Method and formula: This index was calculated only for graduates who raised fifty or more fowl during 1967. In the case of graduates who raised chickens, this calculation, like the previous one, involved two parts (see Appendix F, p. 30): management practices (section B) and improvement practices (section C). One point was credited to the graduate for each of the following responses in section B:

Item	Response	Index Points
1	3 or 4	1
2	3 or 4	1
3	3 or 4	1

One point was also credited the graduate for each of the listed improved practices in section C which was used by the graduate in producing poultry on his farm during 1967.

In the case of chicken enterprises, the divisor in the index of use formula was five plus the appropriate number from section B. However, for duck and turkey enterprises, the divisor number was always fixed at three and four, respectively. The index of use formula for poultry was the same as the one used for crops except the size of the divisor varied according to the kinds of poultry enterprises--layers or broilers (chickens), ducks, and/or turkeys--on the farm of the graduate during 1967.

APPENDIX F

INTERVIEW SCHEDULE

(ENGLISH VERSION)

TAIWAN'S ACADEMIC AND VOCATIONAL AGRICULTURE

MIDDLE SCHOOL GRADUATES ENGAGED IN FARMING

INTERVIEW SCHEDULE

EDUCATION AND DEVELOPMENT RESEARCH PROJECT

FARMER INTERVIEW PHASE

College of Education,
Michigan State University, East Lansing, Michigan
and
Department of Agricultural Education,
Taiwan Provincial Chung Hsing University, Taichung, Taiwan

June 1968

PRELIMINARY INFORMATION

(The following information is to be completed by the interviewer prior to the interview and then verified at the time of interview.)

Interview Date _____ Code Number _____

Place of Interview: Year of Graduation _____

☐ (1) School School _____

☐ (2) Residence Name of Graduate _____

☐ (3) Farm Address of Graduate _____

☐ (4) Other Interviewer _____

☐ (5) No Interview

If no interview, explain why: _____

_____

(The following information concerning the location of the graduate's farm in 1967 is to be obtained from the graduate and from the interviewer's land use map. Write in the names of the adminstrative areas in which the farm is located. Place an "X" in the squares preceding the appropriate responses.)

_____ Hsien	_____ City
City, Township or Hsiang	_____ Precinct
_____ Village	_____ Li

*Agricultural Region:

☐ (1) Rice

☐ (2) Rotational

☐ (3) Upland Field Crops

☐ (4) Upland Tree Crops

☐ (5) Forest Region

*Land Economic Class:

☐ (1) Class 1

☐ (2) Class 2

☐ (3) Class 3

☐ (4) Class 4

☐ (5) Class 5

*Check the response which indicates the location of 50% or more of the farm on the map.

1-4	
5	
6-7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18-20	
21	
22	

II. GENERAL INFORMATION

(Interviewers please note: Enter the respondent's answer to each question in the space provided. If a choice is to be made among two or more alternative answers, please write the number corresponding to your answer in the parenthesis brackets after that question.)

1. Were you engaged in farming during 1967? ( ) 23
   (1) No, (2) Yes; part-time, or (3) Yes; full-time

2. Since graduating from senior middle school, how many years had you spent farming, either part-time or full-time, up until December 31, 1967?_____ 24

3. What was your marital status as of July 1, 1967? ( )
   (1) Single
   (2) Married
   (3) Divorced
   (4) Widower 25

4. If you were married on or before the above date, when were you married?_____ (Year) 26

5. How many children did you have as of July 1, 1967?_____ 27

6. How many members were there living in your household during most of 1967?
   _____ 28

7. How many generations were there living in your household during most of 1967?
   _____ 29

8. What were your parents' occupations at the time of your graduation from secondary school?
   A. Father's occupation?_____ 30
   B. Mother's occupation?_____ 31

9. What were your parents' occupations during 1967?
   A. Father's occupation?_____ 32
   B. Mother's occupation?_____ 33

10. We would now like some detailed information about the size of your family and farm labor force in 1967. **(Instructions for completing the table below are as follow:**

1. **Enter information in the table for each person who lived in the same household or who were long-time (over 3 months) workers on the same farm as the graduate in 1967. Do not complete Column 1 for those family members who were 15 years old or less on July 1, 1967.**
2. **For Columns 4 through 8, record all information as of July 1, 1967.**
3. **Place a plus (+) in Column 7 for those individuals who are still attending school. Place a zero (0) in Column 7 for those indiv-iduals who have completed their formal education.**
4. **In Column 12, the rates of man equivalents are: males, ages 16 to 60, equal 1 M.E. (1/300); females, ages 16 to 60, equal .8 M.E. (0.8/300); and all others, ages 15 and under or ages 60 and over, equal .5 M.E. (0.5/300). All man equivalents are based on 300 workdays per year.**
5. **After completing Columns 1 and 2, ask the name of the "farm operator". Indicate who the "farm operator" is by placing a circle around the "relationship to the graduate" item in Column 2.**
6. **Place an "X" after the name of the person in Column 1 who was head of the household during most of 1967.)**

0	1	2	3	4	5	6	7	8	9	10	11	12	13	
Code No.	Name	Relationship to the Graduate	Sex M F	Marital Status S M	Age	Level of Formal Education: No. of Years	+	0 Kind of Highest Level of Schooling Completed	Months Lived on Home Farm in 1967	Workdays Used on Farm During 1967	Months of Off-Farm Work in 1967	Rate of Man Equivalent	Man Equivalents for Farm	
1		Graduate	1 2	1 2										34
2			1 2	1 2										35
3			1 2	1 2										36
4			1 2	1 2										37
5			1 2	1 2										
6			1 2	1 2										38
7			1 2	1 2										
8			1 2	1 2										39
9			1 2	1 2										
10			1 2	1 2										40
11			1 2	1 2										
12			1 2	1 2										41
13			1 2	1 2										
14			1 2	1 2										42
15			1 2	1 2										
16			1 2	1 2										
17			1 2	1 2										
18			1 2	1 2										
19			1 2	1 2										
20			1 2	1 2										43-44
21	Totals	XXXXX			XXX			XXXXX				XXXXX		

11. Did you hire any short-time (3 months or less) labor on your farm in ( ) calendar year 1967? (1) No, (2) Yes — 45

11.1 If "Yes", complete the table below:

0	1 Laborers: Kind	1 Laborers: Number	2 Workdays Used on Farm During 1967	3 Rate of Man Equivalent	4 Man Equivalents for Farm	
1	Men			1		
2	Women			.8		
3	Under 16 or 60 and over			.5		
4	Totals			XXXXX		46

Total Man Equivalents from Col. 13 — 5

11.2 Total Man Equivalents used on the Farm in 1967 — 6 — 47

12. What was your farming status during the first full year (12 month period) that you spent on the farm after graduation? ( ) 48

(1) Owner-cultivator (include farms owned and operated by partners)

(2) Part owner-cultivator (own some land and rent some land)

(3) Tenant-cultivator only

(4) Manager of father's or other relative's farm

(5) Manager for another person or organization who is owner

(6) Technician on father's or other relative's farm

(7) Technician on other farm

(8) Other (**Specify**) _____ 49-50

12.1 In which year did you begin in this farming status? _____ (**Year**)

13. What was your farming status during most of calendar year 1967? ( ) 51
(**Select one from the list in Question 12**)

13.1 In which year did you begin in this farming status? _____ (**Year**) 52-53

14. What type of farm income-sharing arrangement did you have during the first full year (12 month period) that you spent on the farm after graduation? ( ) 54

(1) None (self)

(2) Partnership (2 or more persons)

(3) Wages only

(4) Wages+share

(5) No definite wage

(6) No definite wage+share

(7) Other (**Specify exact arrangement**) _____

_____

15. What was your farm income-sharing arrangement during 1967? ( ) 55
(**Select one from the list in Question 14**)

15.1 In which year did you begin using the above farm income-sharing arrangement? _____ (**Year**) 56-57

12. What was your farming status during the first full year (12 month period) that you spent on the farm after graduation? ( ) 48

(1) Owner-cultivator (include farms owned and operated by partners)

(2) Part owner-cultivator (own some land and rent some land)

(3) Tenant-cultivator only

(4) Manager of father's or other relative's farm

(5) Manager for another person or organization who is owner

(6) Technician on father's or other relative's farm

(7) Technician on other farm

(8) Other (**Specify**) _____ 49-50

12.1 In which year did you begin in this farming status? _____ (**Year**)

13. What was your farming status during most of calendar year 1967? ( ) 51
(**Select one from the list in Question 12**)

13.1 In which year did you begin in this farming status? _____ (**Year**) 52-53

14. What type of farm income-sharing arrangement did you have during the first full year (12 month period) that you spent on the farm after graduation? ( ) 54

(1) None (self)

(2) Partnership (2 or more persons)

(3) Wages only

(4) Wages+share

(5) No definite wage

(6) No definite wage+share

(7) Other (**Specify exact arrangement**) _____

_____

15. What was your farm income-sharing arrangement during 1967? ( ) 55
(**Select one from the list in Question 14**)

15.1 In which year did you begin using the above farm income-sharing arrangement? _____ (**Year**) 56-57

(Questions 16 through 21 refer to the day the farmer graduated from senior middle school.)

16. Were you living on a farm at the time of your graduation from senior middle school? (1) No, (2) Yes ( ) 58

17. If "No" to Question 16: How did you become established in farming?_____ 59

18. If "Yes" to Question 16: Was this your parent's farm? (1) No, (2) Yes ( ) 60

19. If "No" to Question 18: Whose farm was it?_____ 61

20. We would like some information about the size of your parent's farm or, if your parents were not farming, the farm where you were living at the time of your graduation.

[Interviewers: Enter information in the table below to indicate the size of this farm at the time of the farmer's graduation. Always figure area to the nearest 1 li (.01 chia)] 62

	0	1	2	3
	Land Use	Owned	Rented	Total Farmed
		Chia	Chia	Chia
1	Paddy Land			63
2	Upland			
3	Other (e.g., orchard, tea, garden, forest, etc.)			
4	Totals			64

21. Did you have any brothers at the time of your graduation from senior middle school? (1) No, (2) Yes ( ) 65

(If "No" to Question 21: Go directly to Question 25.)

22. If "Yes" to Question 21: How many brothers have completed at least senior middle school?_____ 66

23. How many brothers (of those who have completed at least senior middle school) have farmed some since graduation?_____ 67

24. Of those brothers who have farmed some since their graduation, how many were still farming in 1967?_____ 68

25. Were you farming on your home farm in 1967? (1) No, (2) Yes ( ) 69

26. In the land-to-the-tiller program, you and your parents:

	(**Check one in each column**)	
	You	Your Parents
(1) Neither received nor sold land		
(2) Sold land		
(3) Bought land		
(4) Sold and bought land		

70	
71	
72	
73	
74	
75	
76	
77	
78-79	
80	J
1-8	Same as Deck J
9-10	

III. LEVEL OF LIVING

	Yes	No		
27. Total score_____			11	
a. Electricity	1	2	12	
b. Running water or well (drinking water)	1	2	13	
c. Methane gas heater	1	2	14	
d. Telephone	1	2	15	
e. Radio	1	2	16	
f. TV	1	2	17	
g. Clock	1	2	18	
h. Sewing machine	1	2	19	
i. Motorcycle or motor bike	1	2	20	
j. Three-wheeled truck (motorized)	1	2	21	Same as Deck J
k. Three-wheeled truck (pedaled)	1	2	22	Same as Deck J
l. No. of bicycles_____	1	2	23	
			24	
			25	
m. Concrete kitchen floor	1	2	26	
n. Construction of house wall (50% or more):				
(1) Earth (unfired)				
(2) Plastered				
(3) Brick (fired)				
(4) Other_____ (**Specify**)		( )	27	
o. Roofing:				
(1) Thatched				
(2) Tile				
(3) Other_____ (**Specify**)		( )	28	

p. Subscriptions to farm magazines and newspapers:

Farm magazines:	Subscribes to Regularly	Does Not Receive	Borrows, Buys, or is Given		
Harvest	(1)	(2)	(3)	29	
Farmers' Friend	(1)	(2)	(3)	30	
Other_____ (**Specify**)	(1)	(2)	(3)	31	
Newspaper:	(1)	(2)	(3)	32	

IV. FARM POWER, EQUIPMENT, AND FACILITIES

28. Total score_____

	Own*		Borrow or Rent Equipment	
	Yes	No		33
a. Power unit:	—	—	—	34
(1) Power tiller	1	2	3	35
(2) Water buffalo	1	2	3	36
(3) Draft cow	1	2	3	37
b. Spacing guage	1	2	3	38
c. Winnower	1	2	3	39
d. Electric motor (1/4 H.P. or more)	1	2	3	40
e. Water pump (power-driven)	1	2	3	41
f. Disease and insect control equipment:	—	—	—	42
(1) Mist blower (power-driven)	1	2	3	43
(2) Both duster and sprayer	1	2	3	44
g. Engine (other than power tiller; 1/2 H.P. or more):	—	—	—	45
(1) Diesel	1	2	3	46
(2) Gasoline	1	2	3	47
(3) Kerosene	1	2	3	48
h. Thresher:	—	—	—	49
(1) Foot-treadle	1	2	3	50
(2) Power-driven	1	2	3	51

*Including joint ownership

Crops Key

01 Paddy Rice
02 Sweet Potatoes
03 Sugar Cane
04 Peanuts
05 Bananas
06 Mushrooms
07 Asparagus
08 Ponkans (bearing)
09 Tobacco
10 Pineapples
11 Cassavas
12 Corn
13 Wheat
14 Fresh Edible Sugar Cane
15 Jute
16 Watermelon
17 Green Beans
18 Soybeans
19 Cabbage
20 Longan
21 Cotton
22 Flax
23
24
25
26
27
28
29
30

75	Blank
76	Blank
77	Blank
78	Blank
79	Blank
80	K
1-8	Same as Deck J
9-10	Same as Deck K
11	Blank
12	Blank
13	Blank
14	Blank
15	Blank

4	Level Upland					
5	Hilly Upland					
6	Orchard					
7	Total Cultivated Area					
8	Pasture					
9	Forest					
10	Fish pond					
11	Farmstead and Other Unculti-vated Areas					
12	Total Farm Area					

60	
61	
62	
63	
64	
65	
66	
67	
68	
69	
70	
71	
72	
73	Blank
74	Blank

		5 Chia	
13	Total Area Culti-vated by Graduate		**(Line 7, Column 3)**
14	Total Area Farmed by Graduate		**(Line 12, Column 3)**
15	Total Area Owned by Graduate		**(The sum of Line 12, Column 1 and Line 12, Column 4)**

IV. FARM POWER, EQUIPMENT, AND FACILITIES

28. Total score_____

	Own*		Borrow or Rent Equipment	
	Yes	No		
a. Power unit:	—	—	—	33
(1) Power tiller	1	2	3	34
(2) Water buffalo	1	2	3	35
(3) Draft cow	1	2	3	36
b. Spacing guage	1	2	3	37
c. Winnower	1	2	3	38
d. Electric motor (1/4 H.P. or more)	1	2	3	39
e. Water pump (power-driven)	1	2	3	40
f. Disease and insect control equipment:	—	—	—	41
(1) Mist blower (power-driven)	1	2	3	42
(2) Both duster and sprayer	1	2	3	43
g. Engine (other than power tiller; 1/2 H.P. or more):	—	—	—	44
(1) Diesel	1	2	3	45
(2) Gasoline	1	2	3	46
(3) Kerosene	1	2	3	47
h. Thresher:	—	—	—	48
(1) Foot-treadle	1	2	3	49
(2) Power-driven	1	2	3	50
				51

*Including joint ownership

V. SIZE OF FARM

29. We now would like some information about the type and amount of land in your 1967 farming operation.

[Interviewers, enter information in the table below to indicate the type of land owned, rented, or cultivated by the graduate between January 1 and December 31 of 1967. Always figure area to the nearest 1 li (.01 chia). All entries in Column 3 are the sums of the entries in Columns 1 and 2.]

0	0 Type of Land	1 Owned and Farmed Chia	2 Rented In and Farmed Chia	3 Totals Chia	4 Owned and Rented Out Chia
1	Double Paddy				
2	Single Paddy				
3	Rotational Land				
4	Level Upland				
5	Hilly Upland				
6	Orchard				
7	Total Cultivated Area				
8	Pasture				
9	Forest				
10	Fish pond				
11	Farmstead and Other Uncultivated Areas				
12	Total Farm Area				

		5 Chia	
13	Total Area Cultivated by Graduate		**(Line 7, Column 3)**
14	Total Area Farmed by Graduate		**(Line 12, Column 3)**
15	Total Area Owned by Graduate		**(The sum of Line 12, Column 1 and Line 12, Column 4)**

52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 Blank 74 Blank

VI. CROP INFORMATION

A. Cropping Pattern

30. In order to better understand your cropping operations, we need to know the cropping pattern for your entire farm during 1967. We are interested in knowing which crops were growing on your farm between January 1 and December 31, 1967. We also need to know which crops were harvested in 1967 and what were their total yields in kilograms.

(On the right half of the table below, plot the cropping pattern for all crops which were growing on the graduate's farm during 1967. Record the total crop chias harvested in 1967 for each crop. Record the total yield in kilograms only for the 12 crops listed above the double line in the crops key.)

← Crop No.·····Yield (kgs.) →

Chia

1	2	3	4	5	6	7	8	9	10	11	12	1966						1967												1968					
Land Parcel No.	Land Grade	Cultivated Land Area																																	
		Double Paddy Land	Single Paddy Land	Rotational Land	Level Upland	Hilly Upland	Orchard	Pasture	Forest	Fish Pond	Farmstead & Other Uncultivated Areas	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Totals																																			

Crops Key

01	Paddy Rice
02	Sweet Potatoes
03	Sugar Cane
04	Peanuts
05	Bananas
06	Mushrooms
07	Asparagus
08	Ponkans (bearing)
09	Tobacco
10	Pineapples
11	Cassavas
12	Corn
13	Wheat
14	Fresh Edible Sugar Cane
15	Jute
16	Watermelon
17	Green Beans
18	Soybeans
19	Cabbage
20	Longan
21	Cotton
22	Flax
23	
24	
25	
26	
27	
28	
29	
30	

75	Blank
76	Blank
77	Blank
78	Blank
79	Blank
80	K
1-8	Same as Deck J
9-10	Same as Deck K
11	Blank
12	Blank
13	Blank
14	Blank
15	Blank

B. Crop Production Summary

B. Crop Production Summary

(Interviewers: At this point, check Item 30 to make sure that you have all the necessary data for completing the table below. The information for Columns 8 and 9 must be obtained from the township Public Office **after you have completed all of the interviews with the sample graduates who were farming in the particular township in 1967. Furthermore, the summary calculations for this page are to be calculated after the interview.)**

1	2	3	4	5	6	7	8	9	10	11	12
Kind of Crop	*Labor Requirement Units Per Crop Chia	Grad.'s Total Crop in Chias in 1967	Total Labor Requirement Units Per Crop	**Economic Land Class	Grad.'s Total Yield in Kilograms	Graduate's Average Yield in Kgs. per Chia	**Township's Average Yields for Same Econ. Land Class as Graduate's		Graduate's Yield Compared to Township's Average Yield in 1967		
							Ave.	***Ave. Range	Below	Same	Above
01 Paddy Rice	3										
02 Sweet Potatoes	2										
03 Sugar Cane	6										
04 Peanuts	3										
05 Bananas	6										
06 Mushrooms(100 ping)	6	pings ( )				kgs/ping/season		kgs/ping/season			
07 Asparagus	17										
08 Oranges (bearing)	22										
09 Tobacco	13										
10 Pineapples	4										
11 Cassavas	2										
12 Corn	2										
13 Wheat	2							13 Totals			
14 Fresh Edible Sugar Cane	4										
15 Jute	5										
16 Watermelon	4										
17 Green Beans	2										
18 Soybeans	2										
19 Cabbage	4										
20 Longan	5										
21 Cotton	5										
22 Flax	2										
23											
24											
25											
26											
27											
28											
29											
30 Totals											

*See Page 45 for a detailed listing of crop labor requirement units.

**For summarizing purposes, land grades are converted to economic land classes as follow;

Class	Land Grade	
	Paddy Land	Upland
1	1 — 5	1 — 10
2	6 — 9	11 — 13
3	10 — 13	14 — 16
4	14 — 17	17 — 19
5	Over 17	Over 19

***The range of the township's average yield for the same economic land class as the graduate's in 1967 is plus and minus five percent of the average yield.

31. Multiple Cropping Index = _____

(**Total Col. 3**)

Total Crop Chias in 1967 / Total Cultivated Area in 1967 × 100 = MCI

(**Page 9, Line 13, Col. 5**)

16	
17	
18	
19	
20	
21	Same as Deck J
22	Same as Deck J
23	
24-25	
26-27	
28-29	
30	
31	
32	

32. Did you sell any crop(s) for seed in 1967? (1) No, (2) Yes ( ) | 33

33. If "Yes", please list: Kind_____ Amount_____ (Kilograms) | 34-35

Kind_____ Amount_____ (Kilograms) | 36 | 37-38 | 39

C. Crop Enterprises and Improved Practices

(Hand the respondent the red card and ask:)

34. If you have harvested three or more of the twelve listed crops on your farm in 1967, which three would you say brought you the most gross income? Please rank the selected crops.

(Interviewers: Have the graduate rank the three crops, which were harvested on his farm in 1967, on the basis of gross income. If the graduate harvested less than three of the listed crops, rank those listed crops which were harvested. Place the number preceding the selected crops in the blanks next to the appropriate rankings.)

01 Paddy Rice	07 Asparagus		
02 Sweet Potatoes	08 Oranges	(1) _____ Highest gross income	40-41
03 Sugar Cane	09 Tobacco		
04 Peanuts	10 Pineapples	(2) _____ Second highest	42-43
05 Bananas	11 Cassavas		
06 Mushrooms	12 Corn	(3) _____ Third highest	44-45

35. We would now like to know about some of the cultural practices which were used by you in the production of the three crops which you ranked in Question 34.

[Instructions for completing the crop enterprises and improved practices section:

1. **Question the graduate only in regard to the three ranked crops.**
2. **When asking questions about fertilizer application rates be sure to refer to the list of plant nutrient contents of common fertilizers in Taiwan. This information is located at the bottom of most crop improvement practice pages and also on Page 46.**
3. **Ask the farmer for the name of the main variety (or varieties) of the particular crop in question which he harvested in 1967. Indicate the names of the variety (varieties) in the appropriate sections.]**

01 RICE

01 RICE: Improved Practices - 1967 Crop	Adopted? Yes	Adopted? No	Year of First Use	
1. First year crop raised by farmer after graduation	—	—		46
2. Variety of most of the crop:	—	—	XXXXX	47
Chainan 8	1	2		48
Chianung 242	1	2		49
Taichung 65	1	2		50
Taichung 178	1	2		51
Taichung 184	1	2		52
Taichung 186	1	2		53
Taichung Tsai-Lai 1	1	2		54
Taichung Tsai-Lai 2	1	2		55
Tainan 1	1	2		56
Tainan 5	1	2		57
Other (**Specify**)	1	2		58
Don t know variety	1	2		59
3. Fertilization:	—	—	XXXXX	
3.1 Used an organic fertilizer on each crop	1	2	XXXXX	60
3.2 Top dressed each crop with N at least twice	1	2	XXXXX	61
Chiayi, Tainan and Yunlin Hsiens / Changhua and Taichung Hsiens	—	—	XXXXX	
3.3 100 kgs. or more / 80 kgs. or more — N per chia per crop	1	2	XXXXX	62
3.4 40 kgs. or more / 30 kgs. or more — P_2O_5 per chia per crop	1	2	XXXXX	63
3.5 60 kgs. or more / 40 kgs. or more — K_2O per chia per crop	1	2	XXXXX	64
4. Treated seeds with a fungicide:	—	—	XXXXX	65
Used granosan	1	2		66
Other (**Specify**)	1	2		67
5. Used certified seed, or seed which was no more than 2 years from being certified	1	2		68
6. Used an improved seed bed (3 to 4 ft. wide; hilled up)	1	2		69
7. Transplanted seedlings when they had 4 to 5 leaves	1	2		70
8. Dense spacing: 64 plants per ping (7 to 8 in. between rows and 5 to 6 in. between plants)	1	2		71
9. Controlled stem borer by approved method:	—	—	XXXXX	72
Used parathion	1	2		73
Used BHC gamma	1	2		74
Other (**Specify**)	1	2		75

Plant Nutrient	**Common Commercial Fertilizer**		
	475 (380) kgs. Ammonium Sulfate (21%)	76	
100 (80) kgs. N	500 (400) kgs. Calcium-Ammonium Nitrate (20%)	77	
	215 (170) kgs. Urea (46%)	78	
40 (30) kgs. P_2O_5	220 (165) kgs. Calcium Superphosphate (18%)	79	Blank
60 (40) kgs. K_2O	100 (65) kgs. Potassium Chloride (60%)	80	L

02 SWEET POTATOES

02 SWEET POTATOES: Improved Practices - 1967 Crop		Adopted? Yes	Adopted? No	Year of First Use		
1. First year crop raised by farmer after graduation		—	—		1-8	Same as Deck J
2. Variety: Areas for which Recommended	Varieties	—	—	××××××	9-10	Same as Deck K
All hsiens	Tainung 57	1	2		11	
Tainan Hsien	Tainan 14	1	2		12	
Changhua and Taichung Hsiens	Hsinchu 1	1	2		13	
	Okinawa 100	1	2		14	
*Other (**Specify**)		1	2		15	
Don't know variety		1	2		16	
3. Fertilization:		—	—	×××××	17	
3.1 Applied 35 to 60 kgs. of N per chia per crop		1	2	××××××	18	
3.2 Applied 90 kgs. or more K_2O per chia per crop		1	2	××××××	19	
4. Treated soil with insecticide before planting:		—	—	××××××	20	
Aldrine		1	2		21	Same as Deck J
Other (**Specify**)		1	2		22	Same as Deck J
5. Dipped vine cuttings in DDT solution before planting		1	2		23	
6. Dense planting (32,000—36,000 plants per chia)		1	2		24	
7. Cut and removed lateral suckers from plant		1	2		25	
					26	
					27	
					28	
					29	
					30	
					31	
					32	Blank
					33	Blank

*Other varieties recommended for Chiayi, Tainan, and Yunlin Hsiens include Tainung 10, Tainung 27, Tainung 31, and New 31.

Plant Nutrient	**Common Commercial Fertilizer**
35 (60) kgs. N	165 (285) kgs. Ammonium Sulfate (21%) 175 (300) kgs. Calcium-Ammonium Nitrate (20%) 75 (130) kgs. Urea (46%)
90 kgs. K_2O	150 kgs. Potassium Chloride (60%)

03 SUGAR CANE

03 SUGAR CANE: Improved Practices - 1967 Crop			Adopted? Yes	Adopted? No	Year of First Use	
1. First year crop raised by farmer after graduation			—	—		34
2. Did you harvest spring planted sugar cane in 1967? If "No", go directly to Item 6.			1	2	××××××	35
SPRING PLANTED SUGAR CANE						
3. Variety: Areas for which recommended		Varieties	—	—	××××××	36
Intercropped with rice	Changhua and Taichung Hsiens	H37-1933	1	2		37
Paddy or common land	All hsiens	F-152	1	2		38
		F-156	1	2		39
Hilly upland	All hsiens	N: CO 310	1	2		40
Other (**Specify**)			1	2		41
Don't know variety			1	2		42
4. Applied nitrogen 2 or 3 different times during the cropping season, stopping applications before July 1.			1	2	××××××	43
5. Density: 24,000 to 30,000 plants per chia			1	2		44
6. Did you harvest autumn planted sugar cane in 1967? If "No", go directly to Item 10 (next page).			1	2	××××××	45
AUTUMN PLANTED SUGAR CANE						
7. Variety: Areas for which recommended		Varieties	—	—	××××××	46
Paddy or common land	All hsiens	F-146	1	2		47
		F-152	1	2		48
		F-156	1	2		49
Hilly upland	All hsiens	N: CO 310	1	2		50
Others (**Specify**)			1	2		51
Don't know variety			1	2		52
8. Applied nitrogen 3 or 4 different times during the cropping season, stopping applications before June 1.			1	2	××××××	53
9. Density: Paddy or common land - 22,000 to 24,000 plants per chia Hilly upland - 24,000 to 26,000 plants per chia			1	2		54

(Turn to Page 16 and complete for all sugar cane growers)

(CONTINUED)

03 SUGAR CANE: Improved Practices—1967 Crop	Adopted? Yes	Adopted? No	Year of First Use	
ALL SUGAR CANE				
10. Fertilization:	—	—	××××××	
10.1 Applied organic matter at rate of 10 or more tons per chia per crop	1	2	××××××	55
10.2 Applied 200 kgs. or more N per chia per crop on paddy land (150 kgs. or more on hilly upland)	1	2	××××××	56
10.3 Applied 50 kgs. or more P_2O_5 per chia per crop	1	2	××××××	57
10.4 Applied 80 kgs. or more K_2O per chia per crop	1	2	××××××	58
11. Controlled woolly aphids by approved method:	—	—	××××××	59
Used BHC	1	2		60
Used malathion	1	2		61
Other (**Specify**)	1	2		62
12. Controlled rats in cane fields by approved method:	—	—	××××××	63
Used warfarin	1	2		64
Other (**Specify**)	1	2		65
				66
				67
				68
				69 Blank
				70 Blank

Plant Nutrient	**Common Commercial Fertilizer**
200 kgs. N—paddy land (150 kgs. N—hilly upland)	950 (710) kgs. Ammonium Sulfate (21%) 1000 (750) kgs. Calcium Cyanamide (20%) 435 (325) kgs. Urea (46%)
50 kgs. P_2O_5	275 kgs. Calcium Superphosphate (18%)
80 kgs. K_2O	135 kgs. Potassium Chloride (60%)

If the graduate used a mixed compound fertilizer, the analysis should have been 11-9-18 or 20-5-10.

04 PEANUTS

04 PEANUTS: Improved Practices - 1967 Crop	Adopted? Yes	Adopted? No	Year of First Use		
1. First year crop raised by farmer after graduation	—	—		71	
2. Variety:	—	—	× × × × ×	72	
Tainan 9 (Chiayi, Tainan, and Yunlin Hsiens)	1	2		73	
Tainung 3 (Changhua and Taichung Hsiens)	1	2		74	
Other (**Specify**)	1	2		75	
Don't know name of variety	1	2		76	
3. Fertilization:	—	—	× × × × ×		
3.1 Applied 60 kgs. or more P_2O_5 per chia per crop	1	2	× × × × ×	77	
3.2 Applied 40 kgs. or more K_2O per chia per crop	1	2	× × × × ×	78	
4. Treated soil before planting to prevent insect damage:	—	—	× × × × ×	79 80	M
Used aldrin	1	2		1-8 9-10	Same as Deck J Same as Deck K
Used other (**Specify**)	1	2		11	
5. Treated seed with approved solution:	—	—	× × × × ×	12 13	
Used spergon	1	2		14	
Used other (**Specify**)	1	2		15	
6. Dense sowing (30 to 35 cm. × 10 cm.); used only one grain per hole	1	2		16	
7. Sprayed during growing period to control insects:	—	—	× × × × ×	17	
Sevin	1	2		18	
Malathion	1	2		19	
Other (**Specify**)	1	2		20	
				21	Same as Deck J
				22	Same as Deck J
				23	
				24	
				25	
				26	Blank

Plant Nutrient	**Common Commercial Fertilizer**
60 kgs. P_2O_5	330 kgs. Calcium Superphosphate (18%)
40 kgs. K_2O	65 kgs. Potassium Chloride (60%)

05 BANANAS

05 BANANAS: Improved Practices - 1967 Crop	Adopted? Yes	Adopted? No	Year of First Use		
				27	Blank
				28	Blank
				29	Blank
1. First year crop raised by farmer after graduation	—	—		30	
2. Plant density: Level upland - 1,800 to 2,000 plants per chia Hilly upland - 1,200 to 1,400 plants per chia	1	2		31	
3. Applied 2 to 2.5 kgs. per plant of a mixed fertilizer containing equal parts of ammonium sulfate, calcium superphosphate and potassium chloride	1	2		32	
4. Applied 10 kgs. or more compost to each plant 1 to 2 years after planting	1	2		33	
5. Used an approved method to control stem borer:	—	—	XXXXX	34	
Dieldrin	1	2		35	
Endrin	1	2		36	
Other (**Specify**)	1	2		37	
6. Controlled leaf spot by spraying with:	—	—	XXXXX	38	
Maneb (M-22) and banana oil	1	2		39	
Dithane M-45	1	2		40	
Other (**Specify**)	1	2		41	
7. Protected from typhoons: (**Select only one answer**)	—	—	XXXXX	42	
7.1 Used untreated bamboo poles as props	1	2	XXXXX	43	
7.2 Used treated bamboo poles as props	1	2		44	
7.3 Other method (**Specify**)	1	2	XXXXX	45	
				46	
				47	
				48	
				49	Blank

06 MUSHROOMS

06 MUSHROOMS: Improved Practices - 1967 Crop	Adopted? Yes	Adopted? No	Year of First Use	
1. First year crop raised by farmer after graduation	—	—		50
2. Made compost on concrete floor	1	2		51
3. Compost ingredients:	—	—	××××××	52
3.1 Used light lime ($CaCO_3$) to neutralize compost pH to between 6.5 and 7.2	1	2		53
3.2 Included 2 or more kilograms of ammonium sulfate for each ping of bed area	1	2	××××××	54
3.3 Included 2 to 4 kilograms of superphosphate for each ping of bed area	1	2	××××××	55
4. Disinfected or treated mushroom house with:	—	—	××××××	56
DDT	1	2		57
Formalin	1	2		58
Other (**Specify**)	1	2		59
5. Applied 170 or more kilograms of fermented compost to each ping of bed area	1	2		60
6. Used 1½ bottles of spawn per ping	1	2		61
7. Controlled spring tails by applying DDVP to walls and floor of mushroom barn before casing	1	2		62
8. Controlled cecid fly by making several applications of pyrethrin directly to mushroom beds	1	2		63
				64
				65
				66
				67 Blank

07 ASPARAGUS

07 ASPARAGUS: Improved Practices - 1967 Crop	Adopted? Yes	Adopted? No	Year of First Use		
1. First year crop raised by farmer after graduation	—	—		68	
2. Applied a total of at least 30,000 kgs. of compost per chia before planting and during the first year of growth	1	2		69	
3. Applied commercial fertilizer at least 3 times per year (spring, summer, and autumn) during the second year after planting	1	2		70	
4. Hilled soil at least 11 inches (33 cm.) deep over fertilizer at time of spring application	1	2		71	
5. Fertilization during the second year after planting:	—	—	XXXXX		
5.1 At least 305 kgs. N per chia	1	2	XXXXX	72	
5.2 At least 90 kgs. P_2O_5 per chia	1	2	XXXXX	73	
5.3 At least 250 kgs. K_2O per chia	1	2	XXXXX	74	
6. Applied fertilizer in six uniform monthly applications during the harvest season	1	2		75	
7. Fertilization during harvest season:	—	—	XXXXX		
7.1 At least 156 kgs. N per chia	1	2	XXXXX	76	
7.2 At least 18 kgs. P_2O_5 per chia	1	2	XXXXX	77	
7.3 At least 51 kgs. K_5O per chia	1	2	XXXXX	78 79	
8. Used approved method to control rust:	—	—	XXXXX	80	N
Dithane M-45	1	2		1-8	Same as Deck J
Other (**Specify**)	1	2		9-10	Same as Deck K
				11	
9. Used approved method to prevent wilt:	—	—	XXXXX	12	
Lime-sulfur and Bordeaux mixture	1	2		13 14	
Other (**Specify**)	1	2		15	
10. Used knife to cut asparagus	1	2		16	
11. Plant density was at least 14,000 plants per chia	1	2		17	
				18	
				19	
				20	
				21	Same as Deck J
				22	Same as Deck J
				23	Blank
				24	Blank
				25	Blank

Plant Nutrient	**Common Commercial Fertilizer**
305 (156) kgs. N	1450 (740) kgs. Ammonium Sulfate (21%) 1520 (780) kgs. Calcium-Ammonium Nitrate (20%) 660 (340) kgs. Urea (46%)
90 (18) kgs. P_5O_2	500 (100) kgs. Calcium Superphosphate (18%)
250 (51) kgs. K_2O	415 (85) kgs. Potassium Chloride (60%)

08 PONKANS

08 PONKANS: Improved Practices - 1967 Crop	Adopted? Yes	Adopted? No	Year of First Use		
				26	Blank
				27	Blank
1. First year crop raised by farmer after graduation	—	—		28	
2. Applied 20 or more kilograms of compost to each tree each year	1	2		29	
3. Fertilized mature trees on the following basis: 300 to 400 grams of a mixed fertilizer per tree × age of the tree	1	2		30	
4. Tree density per chia:	—	—	××××××	31	
Quick decline is a problem—spaced trees 2.6 to 5 meters apart (400 to 750 trees per chia)	1	2		32	
Spaced trees 5 to 7 meters apart (200 to 400 trees per chia)	1	2		33	
Intercropped—spaced trees 7 to 9 meters apart (120 to 200 trees per chia)	1	2		34	
5. Controlled scale insects by spraying with malathion and summer oil	1	2		35	
6. Controlled scab with:	—	—	××××××	36	
Bordeaux mixture	1	2		37	
Lime-sulfur mixture	1	2		38	
Other (**Specify**)	1	2		39	
7. Controlled aphids with:	—	—	××××××	40	
Dimethoate	1	2		41	
Malathion	1	2		42	
				43	
				44	
				45	
				46	Blank

09 TOBACCO

09 TOBACCO: Improved Practices - 1967 Crop	Adopted? Yes	Adopted? No	Year of First Use	
1. First year crop raised by farmer after graduation	—	—		47
2. Variety:	—	—	××××××	48
Vam-Hicks	1	2		49
Vam-fen-Hicks	1	2		50
Other (**Specify**)	1	2		51
Don't know variety	1	2		52
3. Fertilizer:	—	—	××××××	
3.1 Applied 50 kgs. or more N per chia	1	2	××××××	53
3.2 Applied 60 kgs. or more P_2O_5 per chia	1	2	××××××	54
3.3 Applied 150 kgs. or more K_2O per chia	1	2	××××××	55
4. Thinned seedlings 3 or more times before transplanting	1	2		56
5. Covered seedbed with plastic to protect seedlings	1	2		57
6. Delayed topping until the top of the flower bud was at the same height as the top of the top leaf on the plant	1	2	××××××	58
7. Left 12 to 14 leaves below the topping point	1	2	××××××	59
8. Used insecticides to control insects:	1	2		60
Dithane Z-78	1	2		61
Sevin	1	2		62
Malathion	1	2		63
DDT	1	2		64
Other (**Specify**)	1	2		65
Don't know name of chemical	1	2		66
				67
				68
				69
				70 Blank

Plant Nutrient	**Common Commercial Fertilizer**
50 kgs. N	240 kgs. Ammonium Sulfate (21%) 250 kgs. Calcium Cyanamide (20%) 150 kgs. Ammonium Nitrate (33%) 105 kgs. Urea (46%)
60 kgs. P_2O_5	330 kgs. Calcium Superphosphate (18%)
80 kgs. K_2O	130 kgs. PotassiumChloride (60%) 160 kgs. Potassium Sulfate (50%)

10 PINEAPPLES

10 PINEAPPLES· Improved Practices - 1967 Crop	Adopted? Yes	Adopted? No	Year of First Use		
1. First year crop raised by farmer after graduation	—	—		71	
2. Variety:	—	—	XXXXX	72	
Normal Smooth Cayenne	1	2		73	
Other (**Specify**)	1	2		74	
Don't know variety	1	2		75	
3. Fertilization during second year:	—	—	XXXXX		
3.1 Applied 240 kgs. or more N per chia	1	2	XXXXX	76	
3.2 Applied 60 kgs. or more P_2O_5 per chia	1	2	XXXXX	77	
3.3 Applied 200 kgs. or more K_2O per chia	1	2	XXXXX	78	
4. Plowed at least 40 cm. deep	1	2		79	
5. Planted before mid-September (1966)	1	2	XXXXX	80	O
6. Density of 40,000 to 45,000 plants per chia	1	2		1-8	Same as Deck J
				9-10	Same as Deck K
7. Used the calcium carbide treatment to promote early flowering and fruiting	1	2		11 12 13	
8. Used an approved method to control mealy bug and pineapple wilt:	—	—	XXXXX	14	
Placed cuttings in parathion solution before planting	1	2		15	
Placed cuttings in a solution containing copper sulfate before planting	1	2		16	
Removed infected plants from field and burned	1	2		17	
Other (**Specify**)	1	2		18	
				19	
				20	
				21	Same as Deck J
				22	Same as Deck J
				23	
				24	Blank
				25	Blank

Plant Nutrient	**Common Commercial Fertilizer**
240 kgs. N	1140 kgs. Ammonium Sulfate (21%) 1200 kgs. Calcium-Ammonium Nitrate (20%) 520 kgs. Urea (46%)
60 kgs. P_2O_5	330 kgs. Calcium Superphosphate (18%)
200 kgs. K_2O	335 kgs. Potassium Chloride (60%)

11 CASSAVAS

11. CASSAVAS: Improved Practices—1967 Crop	Adopted? Yes	Adopted? No	Year of First Use	
1. First year crop raised by farmer after graduation	—	—		26
2. Fertilization - lst year:	—	—	××××××	
2.1 Applied at least 65 kgs. N per chia	1	2	××××××	27
2.2 Applied at least 50 kgs. P_2O_5 per chia	1	2	××××××	28
2.3 Applied at least 150 kgs. K_2O per chia	1	2	××××××	29
3. Fertilization - 2nd year:	—	—	××××××	
3.1 Applied at least 90 kgs. N per chia	1	2	××××××	30
3.2 Applied at least 70 kgs. P_2O_5 per chia	1	2	××××××	31
3.3 Applied at least 180 kgs. K_2O per chia	1	2	××××××	32
4. Density: 21,000—23,000 plants per chia	1	2		33
5. Used rotation system to prevent spot disease	1	2		34
6. Controlled giant cricket with:	—	—	××××××	35
Endrin	1	2		36
Other (**Specify**)	1	2		37
				38
				39
				40
				41 Blank

Plant Nutrient	**Common Commercial Fertilizer**
65 (90) kgs. N	310 (425) kgs. Ammonium Sulfate (21%) 325 (450) kgs. Calcium Superphosphate (20%) 140 (195) kgs. Urea
50 (70) kgs. P_2O_5	275 (385) kgs. Calcium Superphosphate (18%)
150 (180) kgs. K_2O	250 (300) kgs. potassium Chloridc (60%)

12 CORN

12 CORN: Improved Practices—1967 Crop	Adopted? Yes	Adopted? No	Year of First Use	
1. First year crop raised by farmer after graduation	—	—		42
2. Variety:	—	—	××××××	43
Tainan No. 5 (Hybrid)	1	2		44
Other (**Specify**)	1	2		45
Don't know variety	1	2		46
3. Fertilization:	—	—	××××××	
3.1 Applied 80 - 110 kgs. N per chia	1	2	××××××	47
3.2 Applied 40 - 60 kgs. P_2O_5 per chia	1	2	××××××	48
3.3 Applied 40 - 60 kgs. K_2O per chia	1	2	××××××	49
4. Relay interplanted with rice (paddy corn)	1	2		50
5. Planted 2 seeds per hole (if 2 grew, 1 was removed)	1	2		51
6. Planted 50,000 to 60,000 plants per chia	1	2		52
7. Controlled European corn borer with·	—	—	××××××	53
Sevin	1	2		54
EPN	1	2		55
Other (**Specify**)	1	2		56
				57
				58
				59
				60 Blank

Plant Nutrient	**Common Commercial Fertilizer**
75 (115) kgs. N	350 (550) kgs. Ammonium Sulfate (21%) 375 (575) kgs. Calcium-Ammonium Nitrate (20%) 165 (250) kgs. Urea (46%)
35 (65) kgs. P_2O_5	200 (350) kgs. Calcium Superphosphate (18%)
40 (50) kgs. K_2O	70 (85) kgs. Potassium Chloride (60%)

VII. LIVESTOCK INFORMATION:

36. Which livestock did you raise on your farm in 1967?
(Place an "X" in the appropriate blanks.)

(1) Swine	61	
(2) Poultry	62	
(3) Dairy Cattle	63	
(4) Others (draft animals, fish, goats, sheep, beef cattle, etc.)	64	

36.1 If you checked Item (2) Poultry above, then indicate the number of poultry raised on your farm during the calendar year 1967.

(1) Number of chickens raised	65	
(2) Number of ducks raised	66	
(3) Number of turkeys raised	67	
(4) Number of geese raised	68	
(5) Number of other poultry raised	69	
(6) Total poultry raised	70	

37. Which one of the below-listed livestock enterprises brought you the most gross income in 1967? ( ) 71

(1) Swine

(2) Poultry

(3) Dairy Cattle

(4) Other **(Specify)**

[Instructions for completing the livestock information section:

1. Complete the poultry information section on Pages 29 and 30 only if the total poultry raised in 1967 (Question 36.1, response 6) was 50 fowl or more.

2. Complete each of the livestock sections on Pages 27-28 and 31-33 which the graduate has checked in Question 36.

3. Record all weights in kilograms.]

13 SWINE

A. Size of Business

0	0 Kind of Swine		1 Beginning Inventory 1-1-67 No.	2 Purchased in 1967 No.	3 Purchased in 1967 Ave. Wt. (Kgs.)	4 Litters Farrowed & Total Piglets No.	5 Pigs Weaned No.	6 Sold in 1967 For Breeding No.	7 Sold in 1967 For Feeding No.	8 Sold in 1967 For Feeding Ave. Wt. (Kgs.)	9 Sold in 1967 For Slaughter No.	10 Sold in 1967 For Slaughter Ave. Wt. (Kgs.)	11 Consumed on Farm No.	12 Consumed on Farm Ave. Wt. (Kgs.)	13 Died No.	14 Ending Inventory 12-31-67 No.	15 Animal Unit Equivalents	16 ** Total Animal Units
1	* Mature Breeding Stock	Female				(Litters)	×××××										.33	
2		Male				×××××	×××××										.33	
3	Weaned Stock	Female				×××××											.2	
4		Male				×××××											.2	
5		Castrated				×××××		×××××									.2	
6	Suckling Pigs					(Piglets)	×××××										.1	
7	Totals					×××××											×××××	

72	
73	
74	
75	
76	
77	Blank
78	Blank
79	Blank
80	P
1-8	Same as Deck J
9-10	Same as Deck K

* Mature stock is of breeding age

** Calculate total animal units in the following manner:

(1) Multiply the number of swine sold (Cols. 6, 7, and 9) by the animal unit equivalent based on the sales weight of the animal (see table on right).

(2) Multiply the ending inventory by the animal unit equivalents (Col. 15).

(3) Add the products of calculations (1) and (2).

(4) If no swine were sold, average the beginning and ending inventories (Cols. 1 and 14) and multiply by the animal unit equivalents (Col. 15).

Sales Weights (Kgs.)	Animal Unit Equivalent
0 - 75	.1
76 -125	.2
126 -175	.3
176 -225	.4
226 or over	.5

B. Swine Management Practices

1. In which year after graduation did you first begin raising swine? _____ 11

2. Which breed of swine did you raise in 1967: (1) Native, ( ) 12
(2) 2-way cross, (3) 3-way cross, (4) Western purebred, or (5) Mixed

3. In which year since graduation did you first raise this breed of swine? _____ 13

4. In which heat period did you first breed your gilts in 1967: ( ) 14
(1) lst, (2) 2nd, (3) 3rd, or (4) 4th or later

5. At which age did you wean your pigs in 1967? (1) 4 weeks or younger, ( ) 15
(2) 5 to 6 weeks, (3) 7 to 9 weeks, or (4) 10 weeks or older

6. At which age in 1967, did you castrate your male pigs which were not being kept for breeding purposes? (1) 4 weeks or younger, ( ) 16
(2) 5 to 8 weeks, (3) 9 to 12 weeks, (4) 13 weeks or older

C. Improved Practices and Adoption Rates

13 SWINE: Improved Practices—1967	Adopted? Yes	Adopted? No	Year of First Use		
1. Used complete set of guard rails or farrowing stalls to prevent crushing young pigs	1	2		17	
2. Clipped needle teeth at birth	1	2		18	
3. Administered iron shots or provided fresh soil to piglets before they were 1 week old.	1	2		19	
4. Purchased concentrated feedstuffs to supplement home grown feeds	1	2		20	
5. Raised all swine on concrete floors	1	2		21	Same as Deck J
				22	Same as Deck J
6. Used artificial insemination in breeding all or most of the gilts and sows	1	2		23	
				24	
7. Controlled intestinal parasites by worming with:	—	—	××××××	25	
Piperazine	1	2		26	
Other (**Specify**)	1	2		27	
Don't know compound	1	2		28	
				29	
				30	
				31	
				32	Blank

14 POULTRY

A. Size of Business

0	0 Kind of Poultry	1 Breed Name	2 Breed Year First Raised	3 * Beginning Inventory 1-1-67 No.	4 Poultry Purchased in 1967 Mature Birds No.	5 Poultry Purchased in 1967 Chicks No.	6 Poultry Hatched in 1967 No.	7 Eggs Sold in 1967 For Hatching No.	8 Eggs Sold in 1967 For Other Than Hatching No.	9 Poultry Consumed on Farm in 1967 Eggs No.	10 Poultry Consumed on Farm in 1967 Birds No.	11 Poultry Sold in 1967 Mature Birds No.	12 Poultry Sold in 1967 Chicks No.	13 Died No.	14 * Ending Inventory 12-31-67 No.	15 ** Total Animal Units No.	
1	Chickens (Layers-Foreign Origin)																
2	Chickens (Meat Birds-Foreign Origin)																
3	Chickens (Native or Dual Purpose)																
4	Ducks (Egg Production)																
5	Ducks (Meat or Dual Purpose)																
6	Turkeys																
7	Geese																33
8	Other (Specify)																34
9	Totals																35

* Inventories are to include only mature birds.

** Each mature bird equals .01 animal units. To calculate total animal units, add the number of mature birds sold (Col. 11) to the ending inventory (Col. 14). Multiply this sum by the animal unit equivalent .01. If no mature birds were sold, average the beginning inventory (Col. 1) and ending inventory (Col. 14) and multiply this sum by the animal unit equivalent .01.

B. Poultry Management Practices

	Kind of Chickens	Type of Production System in 1967				First Year System was Used	
		Did Not Raise	Grazing	Floor	Cage		
1	Layers-Foreign Origin	1	2	3	4		36
2	Meat Purpose-Foreign Origin	1	2	3	4		37
3	Native or Dual Purpose	1	2	3	4		38

C. Improved Practices and Adoption Rates
(Complete only those sections which apply)

14 POULTRY: Improved Practices—1967	Adopted? Yes	Adopted? No	Year of First Use	
CHICKENS (Both Egg and Meat Birds)				
1. Fed a commercially formulated laying (or growing) ration	1	2		39
2. Used metal or plastic waterers	1	2		40
3. Used an antibiotic in the drinking water	1	2		41
4. Vaccinated all chicks against Newcastle disease and CRD or fowl cholera before 4 weeks of age	1	2		42
5. Used a burial pit, incinerator, or deep burying to dispose of dead birds	1	2		43
DUCKS (Both Egg and Meat Birds)				
1. Vaccinated all ducks against fowl cholera when 6 to 8 weeks old	1	2		44
2. Raised ducks in confinement	1	2		45
3. Used a burial pit, incinerator, or deep burying to dispose of dead birds	1	2		46
TURKEYS				
1. Fed at least a 26 percent protein starter ration for the first 6 to 8 weeks	1	2		47
2. Vaccinated poults against fowl pox when 1 to 2 weeks old	1	2		48
3. Raised Beltsville small white turkeys	1	2		49
4. Used a burial pit, incinerator, or deep burying to dispose of dead birds	1	2		50
				51
				52
				53
				54

15 DAIRY CATTLE

A. Size of Business

0	Kind of Dairy Cattle	1 Beginning Inventory 1-1-67	2 Purchased in 1967	3 Cows Freshened & Calves Born	4 Milk Produced: Sold	5 Milk Produced: Spoiled Milk	6 Milk Produced: For Farm Cons.	7 Sold in 1967: For Breeding	8 Sold in 1967: For Slaughter	9 Died (Include Calves Which Died After Birth)	10 Ending Inventory 12-31-67	11 Animal Unit Equivalents	12 ** Total Animal Units	
		No.	No.	No.	Kgs.	Kgs.	Kgs.	No.	No.	No. No.	No.			
1	*Milk Cows											1.0		55
2	Young Stock (1 year or over)			XXXXX								.5		56
3	Calves (under 1 year)											.25		57
4	Totals			XXXXX										58

* Includes all female dairy cattle which are of breeding age. This includes bred heifers and both dry and milking cows.

** Calculate total animal units by averaging beginning and ending inventories (Cols. 1 and 10) and multiplying the average by the animal unit equivalents (Col. 11).

How much milk did you sell during calendar year 1967?

1. Grade 1 raw milk_____kgs.
2. Grade 2 raw milk_____kgs.

3. Total milk sold _____kgs.

B. Dairy Management Practices

1. In which year after graduation did you first begin raising dairy cattle?_____ 59
2. Which breed of dairy cattle did you raise in 1967?_____ 60
3. In which year did you first raise this breed of dairy cattle? 61
4. At which age did you have your heifers bred in 1967?_____ months. 62
5. Did you feed concentrate rations to your cows in 1967? (1) No, (2) Yes ( ) 63
6. If "Yes", is the quantity related to the amount of milk produced? ( ) (1) No, (2) Yes 64
7. If "Yes", what is the relationship?_____ 65

C. Improved Practice and Adoption Rates

15. DAIRY CATTLE: Improved Practices—1967	Adopted? Yes	Adopted? No	Year of First Use	
1. Provided green roughage or silage to cattle during every day of 1967	1	2		66
2. Maintained an exercise yard or pasture for dairy cattle	1	2		67
3. Washed cows udders with a warm chlorine solution just prior to milking	1	2		68
4. Examined milk sample for abnormalities before milking and discarded sample	1	2		69
5. Started selling milk from newly freshened cows on or after the seventh day after calving	1	2		70
6. Maintained milk production and feed consumption records for each individual cow	1	2		71
7. Utilized only stainless steel milk cans	1	2		72

73
74
75
76 Blank
77 Blank
78 Blank
79 Blank
80 Q

16 OTHER LIVESTOCK

A. Other livestock raised on farm in 1967:

0	0	1	2	3	4	5	6	7
	Kind of Livestock (Include Draft Animals)	Beginning Inventory 1-1-67		Ending Inventory 12-31-67		Animal Unit Equivalents		** Total Animal Units
		*Mature Stock	Young Stock	Mature Stock	Young Stock	Mature Stock	Young Stock	
		No.	No.	No.	No.			No.
1								
2								
3								
4								
5								
6	Totals							

1-8	Same as Deck J
9-10	Same as Deck K
11	
12	
13	
14	
15	
16	
17	Blank
18	Blank
19	Blank
20	Blank
21	Same as Deck J
22	Same as Deck J

* Mature stock is livestock which is of breeding age.

** Calculate total animal units by averaging beginning and ending inventories (Cols. 1-4) and multiplying the average by the animal unit equivalents (Cols. 5 and 6). Animal unit equivalents for livestock are as follow: Mature water buffaloes or draft cows (1); mature milking goats .5; and mature rabbits (.01). Animal units for fish are not to be calculated.

1. Did you raise fish on your farm in 1967? (1) No, (2) Yes ( )

2. If "Yes", how many kilograms of fish were produced on your farm? _____ kgs. ( )

VIII. FARM RECORDS

38. Did you keep farm records during calendar year 1967? (1) No, (2) Yes ( ) 23

39. If "Yes" to Question 38: Which kind of farm records did you keep in 1967?
(Circle 1 if "Yes"; circle 2 if "No".)

Kind of Farm Records	Kept in 1967? Yes	No	
(1) Provincial Farmers' Association Farm Record Book (Advanced Class)	1	2	24
(2) Provincial Farmers' Association Farm Record Book (Intermediate Class)	1	2	25
(3) Provincial Farmers' Association Farm Record Book (Elementary Class)	1	2	26
(4) Running account (daily record of income & expenses)	1	2	27
(5) Farm receipts	1	2	28
(6) Non-farm receipts	1	2	29
(7) Farm expenses (including labor)	1	2	30
(8) Household expenses (including farm privileges)	1	2	31
(9) Inventories	1	2	32
(10) Crop production records	1	2	33
(11) Livestock production records	1	2	34
(12) Farm map	1	2	35
(13) Other (**Specify**)	1	2	36
			37
			38 Blank

IX. PARTICIPATION IN FORMAL ORGANIZATIONS

(Interviewers: The following questions are to be asked about each of the below-listed organizational groups. Circle the appropriate answers.)

(Hand the respondent the green card and ask:)

40. Have you attended any meeting (services) of any of these groups or organizations **(those listed on this page and on the green card)** during calendar year 1967?

(If "Yes", then ask:) Would you say you attended regularly or occasionally? **(Circle answers)**

40.1 Were you a member of any of these organizations, regardless of whether or not you had attended these meetings, during calendar year 1967? **(Circle answers)**

40.2 Were you a committee member of any of these organizations during calendar year 1967? **(Circle answers)**

40.3 Were you an elected officer of any of these organizations during calendar year 1967? **(Circle answers)**

(The above questions apply only to the graduate's participation during calendar year 1967.)

Organization	Attendance			Member	Committee Member	Elected Officer	Total Score		
	Regularly	Occasionally	Never						
Farmers' Association:	—	—	—	—	—	—	××××		
Farm discussion group	3	2	0	1	4	5		39	
Rice growing farm discussion group	3	2	0	1	4	5		40	
Sugar cane growing farm discussion group	3	2	0	1	4	5		41	
Pest control team	3	2	0	1	4	5		42	
Small agricultural unit	3	2	0	1	4	5		43	
FA representative	3	2	0	1	4	5		44	
FA board of directors	3	2	0	1	4	5		45	
FA supervisory body	3	2	0	1	4	5		46	
Others:	—	--	—	—	—	—	××××		
Irrigation unit	3	2	0	1	4	5		47	
Marketing cooperative	3	2	0	1	4	5		48	
Parent and teacher association	3	2	0	1	4	5		49	
Representative to township assembly	3	2	0	1	4	5		50	
Other (**Specify**)	3	2	0	1	4	5		51	
Other (**Specify**)	3	2	0	1	4	5		52	
								53	Blank
								54	

Total Score _____

41. Were you involved in any of the following extension activities during calendar year 1967?

	Yes	No	
a. Pilot farmer family selected by FA	1	2	55
b. Supervisor of poor farmers	1	2	56
c. Voluntary supervisor of 4-H Club	1	2	57
d. Commissioner of village extension supervision group	1	2	58
e. Commissioner of township/hsiang extension supervision group	1	2	59
Total Score_____			60

X. SUCCESS IN FARMING

61 Blank

42. You hear a lot of ideas about what it takes to be successful in farming these days. We have collected some of these views. I would like to ask you whether you believe each is of no, some, or much importance over the long run.

(Interviewers, read the item and then read "No, Some, or Much" until a pattern is set, making sure that the graduate is thinking in terms of what he believes instead of in terms of what he does)

Item	Importance			No Opinion	
	No	Some	Much		
01 Will of the gods or God's will	1	2	3	9	62
02 Luck	1	2	3	9	63
03 Doing mostly what other farmers do	1	2	3	9	64
04 Hard work	1	2	3	9	65
05 Using latest scientific farm information	1	2	3	9	66
06 Saving money	1	2	3	9	67
07 Education	1	2	3	9	68
08 Management	1	2	3	9	69
09 Family help in the field	1	2	3	9	70
10 Plenty of production credit	1	2	3	9	71
11 Own experience	1	2	3	9	72

42.1 If you had to pick one of the above (**read items circled as of "much importance**") as most important to success in farming which one would you pick? (**Enter number**) ( ) 73–74

42.2 Second most? ( ) 75–76

Total Score_____ 77

43. Thinking of yourself and your major farm enterprise compared to other farmers around here, do you think you are faster or slower than the average to try new farm practices? ( )

(1) Faster
(2) Slower
(3) About average

78	
79	Blank
80	R

XI. EDUCATION AND FARMING

1-8	Same as Deck J

Now we want to learn about your educational background and whether or not you believe it to have been of value in improving your own farming performance. Also, whether or not your education has helped you to participate in formal organizations.

9-10	Same as Deck K
11	Blank

44. Have you ever been a 4-H Club member? ( )

(1) No, (2) Yes If "Yes", complete the following table:

Type of 4-H Club	Past Member? Yes	Past Member? No	No. of Years a Member
44.1 School 4-H Club	1	2	
44.2 Village 4-H Club	1	2	

12	
13	
14	

(Note: In the Chinese interview schedule, the interviewer is instructed at this point to "Hand the graduate the extra pages containing Questions 45 through 54.4. As soon as the graduate has answered these questions, check to make sure all questions have been answered and proceed to Questions 55 throuh 66." No duplicate sets of Pages 37-42 have been printed with English version.)

45. Why did you attend the particular senior middle school from which you graduated? ( )

15-16	

(01) My personal interest and choice
(02) Influence of schoolmates or friends
(03) Parent's designation
(04) Teacher's advice
(05) Could not afford to go to a school farther away from home
(06) Failed to pass examination to academic school
(07) No reason given given by graduate
(08) Other (**Specify**)

(V-A school graduates only.)

16. Did you take an entrance examination for a school other than the V-A school from which you graduated? (1) No, (2) Yes ( ) — 17

46.1 If "Yes": Which kind of school was it? ( )

(1) Academic
(2) Normal
(3) Vocational Commercial
(4) Vocational Industrial
(5) Other (**Specify**) _____ — 18

(Academic graduates only.)

47. Was the school from which you graduated your first choice when you took the entrance examination? (1) No, (2) Yes ( ) — 19

47.1 If "No": Which school was your first choice? ( ) — 20

(1) Provincial _____ — 21 Same as Deck J
(3) City _____
(5) Hsien — 22 Same as Deck J
(6) Other (**Specify**) _____

48. During what period of your life did you decide that you would be engaged in either full or part-time farming? ( )

(1) Before entering senior middle school
(2) During senior middle school
(3) After graduation from senior middle school
(4) During college
(5) Other (**Specify**) _____ — 23

49. If you knew that you were going to farm and had an opportunity to go to senior middle school again, which school program would you select as being most appropriate? ( )

(1) Academic middle school
(2) V-A school
(3) Other (**Specify**) _____ — 24

50. Concerning your answer to Question 49: What is your most important reason for selecting this particular school program as being most appropriate for prospective farmers? ( )

Best theoretical training:

(01) In basic science
(02) In applied sciences (agriculture)
(03) In basic general knowledge

Most practical training:

(04) In "how to do" skills
(05) In problem solving
(06) In the development of good work habits

Best personal contacts:

(07) With agricultural organizations
(08) With key persons of importance to farmers

Other

(09) **(Specify)** _____ 25-26

51. If you wished to have your sons become farmers, which kind and level of education would you encourage them to complete? ( )

Middle School

(01) Junior level academic or less
(02) 5-year level V-A
(03) Senior level V-A
(04) Senior level academic

Junior College

(05) Agriculture
(06) Other

4-Year College

(07) Agriculture
(08) Other

Other

(09) **(Specify)** _____ 27-28

52. Explain why you selected the particular kind and level of education (in Question 51) for your sons who you wish to become farmers. _____

_____ 29-30

53-54. Please check in the space provided **each course** or subject area that you remember having studied in senior middle school. Then place in the ( ) the number that corresponds to how you feel about the subject being either "**Not Important, Important,** or **Very Important**" to you in farming (i.e., in farm management, crop and livestock production, rural organization participation, etc.)

53. (**Academic graduates only.**)

Subject Areas	Have Studied	Not Important	Important	Very Important		
01 Chinese		(1)	(2)	(3)	( )	31
02 English		(1)	(2)	(3)	( )	32
03 Civics		(1)	(2)	(3)	( )	33
04 History		(1)	(2)	(3)	( )	34
05 Geography		(1)	(2)	(3)	( )	35
06 Mathematics		(1)	(2)	(3)	( )	36
07 Physics		(1)	(2)	(3)	( )	37
08 Chemistry		(1)	(2)	(3)	( )	38
09 Biology (Natural Science)		(1)	(2)	(3)	( )	39
10 Physical Education		(1)	(2)	(3)	( )	40
11 Music		(1)	(2)	(3)	( )	41
12 Art		(1)	(2)	(3)	( )	42
13 Industrial Arts (Handicraft)		(1)	(2)	(3)	( )	43
Others (write names):						44-57 0
28 _____		(1)	(2)	(3)	( )	58
29 _____		(1)	(2)	(3)	( )	59
30 _____		(1)	(2)	(3)	( )	60

Please rank the 3 courses which you think have helped you the most in farming. 61-63 0

64-66 Blank

53.1 The most helpful ( ) 67-68

53.2 Second ( ) 69-70

53.3 Third ( ) 71-72

53.4 Why has the course which you listed as "the most helpul" been so valuable to you? _____

_____ 73

54. **(V-A graduates only.)**

	Subject Areas	Have Studied	Not Important	Important	Very Important			
01	Chinese		(1)	(2)	(3)	(	)	31
02	English		(1)	(2)	(3)	(	)	32
03	Civics		(1)	(2)	(3)	(	)	33
04	History		(1)	(2)	(3)	(	)	34
05	Geography		(1)	(2)	(3)	(	)	35
06	Mathematics		(1)	(2)	(3)	(	)	36
07	Physics		(1)	(2)	(3)	(	)	37
08	Chemistry		(1)	(2)	(3)	(	)	38
09	Biology (Natural Science)		(1)	(2)	(3)	(	)	39
10	Physical Education		(1)	(2)	(3)	(	)	40
11	Music		(1)	(2)	(3)	(	)	41
12	Art		(1)	(2)	(3)	(	)	42
13	Industrial Arts (Handicraft)		(1)	(2)	(3)	(	)	43
14	Crops		(1)	(2)	(3)	(	)	44
15	Horticulture		(1)	(2)	(3)	(	)	45
16	Soil and Fertilizer		(1)	(2)	(3)	(	)	46
17	Disease and Pests		(1)	(2)	(3)	(	)	47
18	Animal Husbandry		(1)	(2)	(3)	(	)	48
19	Veterinary Science		(1)	(2)	(3)	(	)	49
20	Forestry		(1)	(2)	(3)	(	)	50
21	Agricultural Civil Engineering		(1)	(2)	(3)	(	)	51
22	Farm Management		(1)	(2)	(3)	(	)	52
23	Agricultural Meteorology		(1)	(2)	(3)	(	)	53
24	Farm Products Processing		(1)	(2)	(3)	(	)	54
25	Farm Mechanics		(1)	(2)	(3)	(	)	55
26	In-School Farm Practice		(1)	(2)	(3)	(	)	56
27	Home Farm Projects		(1)	(2)	(3)	(	)	57
	Others (write names):							58-60 0
31	_____		(1)	(2)	(3)	(	)	61
32	_____		(1)	(2)	(3)	(	)	62
33	_____		(1)	(2)	(3)	(	)	63

Please rank the 3 courses which you think have helped you the most in farming. 64-66 Blank

54.1 The most helpful ( ) 67-68

54.2 Second ( ) 69-70

54.3 Third ( ) 71-72

54.4 Why has the course which you listed as "the most helpful" been so valuable to you? _____ 73

We want to learn how you feel concerning how the total senior middle school program, which you experienced, has related to farming. Rather than asking the questions for "Yes" or "No" answers, we are asking you to indicate according to a 4-space scale how well the statements on these cards describe how you feel about each statement. For example, placing the statement card in square number:

(1) means you completely disagree,

(2) means you partially agree but are more in disagreement than agreement,

(3) means you partially disagree but are more in agreement than disagreement,

(4) means you completely agree.

(Interviewers: Hand the graduate the blue cards containing Questions 55 through 61. The graduate is to read each card carefully and then place the card in the square on the answer sheet which best describes how he feels about the statement. Be sure to record each answer in the interview schedule. Record a "9" in the parenthesis if the graduate has no opinion.)

55. "Your middle school senior courses were too theoretical." ( )

Does not describe: (1): (2): (3): (4): Does describe

56. "Exams placed too much emphasis on memorization". ( )

Does not describe: (1): (2): (3): (4): Does describe

57. "Not enough time was spent in the laboratory." ( )

Does not describe: (1): (2): (3): (4): Does describe

58. "Not enough time was spent in field work." ( )

Does not describe: (1): (2): (3): (4): Does describe

59. "Middle schools, like the kind in which you attended, should have offered classes to farmers." ( )

Does not describe: (1): (2): (3): (4): Does describe

74	Blank
75	Blank
76	Blank
77	Blank
78	Blank
79	Blank
80	S
1-8	Same as Deck J
9-10	Same as Deck K
11	
12	
13	
14	
15	

(Academic graduates only)

60. "For persons like yourself engaged in farming, the kind of middle school education which you received is more valuable than is a V-A school senior-level education." ( ) 16

Does not describe: (1): (2): (3): (4): Does describe

(V-A graduates only)

61. "For persons like yourself engaged in farming, the kind of middle school education which you received is more valuable than is an academic school senior-level education." ( ) 17

Does not describe: (1): (2): (3): (4): Does describe

(Take blue cards from the graduate)

We have asked you how you feel about your own middle school program. Now, we want to know your feelings concerning how today's senior programs, of the kind of middle school which you attended, are related to farming. We will use the 4-space scale again; however, this time we will use the yellow cards.

(Interviewers: Hand the graduate the yellow cards containing Questions 62 through 66. The graduate is to read each card carefully and then place the card in the square on the answer sheet which best describes how he feels about the statement. Be sure to record each answer in the interview schedule. Record a "9" in the parenthesis if the graduate has no opinion.)

62. "Today's senior courses in the kind of middle school which you attended are too theoretical." ( ) 18

Does not describe: (1): (2): (3): (4): Does describe

63. "Exams still place too much emphasis on memorization." ( ) 19

Does not describe: (1): (2): (3): (4): Does describe

64. "Not enough time is spent in the laboratory." ( ) 20

Does not describe; (1): (2): (3): (4): Does describe 21 Same as Deck J 22 Same as Deck J

65. "Not enough time is spent in field work." ( ) 23

Does not describe: (1): (2): (3): (4): Does describe

66. "Middle schools, like the kind you attended, should offer classes to farmers today." ( ) 24

Does not describe: (1): (2): (3): (4): Does describe

(Take yellow cards from the graduate)

(Interviewers: Visit the township public office and obtain the crop information which you need.)

(Interviewers: Now visit the township farmers' association and have the general manager, or the head of the extension division, rate this graduate in terms of performance by answering the below-listed Questions. Assure the respondent that his answers are confidential; for research purrposes only.)

67. In your opinion, how does this farmer's crop farming performance compare with that of other crop farmers in your township? ( )

    (1) Top one-fourth
    (2) Second one-fourth
    (3) Third one-fourth
    (4) Bottom one-fourth

68. In your opinion, how does this farmer's livestock farming performance compare with that of other livestock farmers in your township? ( )

    (1) Top one-fourth
    (2) Second one-fourth
    (3) Third one-fourth
    (4) Bottom one-fourth

69. In your opinion, how does this farmer's participation in formal organizations compare with that of other farmers in your township? ( )

    (1) Top one-fourth
    (2) Second one-fourth
    (3) Third one-fourth
    (4) Bottom one-fourth

25	
26	
27	
28–79	Blank
80	T

(End of interview)

SUPPLEMENTARY DATA SHEET NO. 1

Crop	**Productive Man-Work Units	Labor Requirement Units Per Crop Chia
I-Rice		
*Paddy Rice	101	3
Upland Rice	81	2
II-Food Crops		
*Sweet Potato	93	2
*Wheat	87	2
*Corn	94	2
*Soybean	73	2
Red Bean	65	2
Multiflora Bean	46	1
Broad Bean	119	3
*Green Bean	77	2
*Fresh Edible Sugar Cane	166	4
III-Industrial Crops		
*Peanut	122	3
*Sugar Cane	260	6
Tea	205	5
*Tobacco	632	13
Sesame	75	2
Rapeseed	141	3
*Cassava	88	2
Ramie	694	14
*Flax	69	2
*Jute	231	5
*Cotton	218	5
Citronella	101	3
Sisal	116	3
Peppermint	127	3
IV-Vegetable Crops		
Radish	146	3
Potato	177	4
Onion	177	4
Dasheen	140	3
Green Garlic	355	8
Garlic	137	3
Water Chestnut	355	8
*Asparagus	850	17
Szechuan Mustard	148	3
Ginger(immature shoots)	634	13
Ginger	374	8
*Cabbage	183	4
Leaf Mustard	177	4
Pai-Tsai	94	2
Chinese Cabbage	133	3
Oriental Pickling Melon	127	3
Cucumber	420	9
*Watermelon	173	4
Melon	224	5
Wax Gourd	159	4
Squash	113	3
Tomato	225	5
*Mushroom (per 100 ping)	271	6
Pea	165	4
V-Fruits		
*Banana	285	6
*Pineapple	180	4
*Ponkan (bearing)	1,074	22
Ponkan (non bearing)	—	9
Tankan	150	3
Orange	229	5
Pommelo	412	9
Papaya	555	12
Guava	250	5
Mango	200	4
Lichee	140	3
*Longan	220	5
Grape	824	17
VI-Green Manure Crops	—	.4

*Listed in Column 1 on Page 11.

**Source: Farm Management Handbook, pp. 31 and 33. Published by the Taiwan Provincial Department of Agriculture and Forestry with funds provided by the Joint Commission on Rural Reconstruction, August, 1967.

SUPPLEMENTARY DATA SHEET NO. 2

CHEMICAL FORMULAS AND APPROXIMATE PLANT NUTRIENT CONTENTS OF FERTILIZERS IN TAIWAN

Fertilizer	Formula	Commercial N%	P_2O_5%	K_2O%
Ammonium Sulfate	$(NH_4)_2SO_4$	21		
Calcium Cyanamide	$CaCN_2$	20		
Ammonium Sulfate-Nitrate	$(NH_4)_2SO_3 \cdot NH_4NO_3$	26		
Ammonium Nitrate	NH_4NO_3	33		
Calcium Ammonium-Nitrate	$NH_4NO_3 \cdot CaCO_3$	20		
Urea	$CO(NH_2)_2$	46		
Ammonium Phosphate	$NH_4H_2PO_4 \cdot (NH_4)_2SO_4$	16	20	
Calcium Superphosphate	$CaH_4(PO_4)_2$		18	
Potassium Sulfate	K_2SO_4			50
Potassium Chloride	KCL			60
Nitrophosphate		16	14	

Source: A. B. Lewis, "The Rice-Fertilizer Barter Price and the Production of Rice in Taiwan, Republic of China (1949—1965)," p. 124. Reprinted from the Journal of Agricultural Economics, Number 5, published by the Research Institute of Agricultural Economics, Taiwan Provincial Chung Hsing University, Taichung, Taiwan, China, June, 1967.

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