To the Graduate Council:

I am submitting herewith a thesis written by Eugene E. Owusu entitled "A Comparative Study of Tennessee's Rapid Adjustment Program." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

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A COMPARATIVE STUDY OF TENNESSEE'S RAPID ADJUSTMENT PROGRAM

A Thesis

Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

Eugene E. Owusu

December 1985

AG-VET-MED.
Thesis
85
.0983

ACKNOWLEDGEMENTS

There are times when a writer's breadth of gratitude extends to so many people that mention of all individual names is not possible. The author wishes to say a word of gratitude to all those whose constructive role made this report possible.

I am grateful to the International Telephone and Telegraph Corporation for offering me a fellowship which provided funds for my maintenance and support during the course of my studies and to the Institute of International Education which administered the fellowship.

I express my deep indebtedness to Dr. Robert Ray, my major professor, whose untiring efforts, advice, encouragement and assistance made this study possible. I am also grateful to Dr. T. H. Klindt and Dr. Darrel Mundy for their counselling, critical comments and constructive suggestions.

Special appreciation is extended to Dr. Herbert Walch for providing data on former Rapid Adjustment farms and for his contribution in the development of the survey instrument.

I am indebted to my family and all my friends for their continued love, understanding, encouragement and sincere support. To all who have contributed towards the successful completion of this program, I am deeply grateful.

ABSTRACT

Programs in resource development in agriculture can be considered successful only if they define changes in farm systems that result in increased productivity and higher returns on resource use and if the increases are sustained over long periods.

This study was made to determine the performance of Rapid Adjustment participants after they had been terminated from the program to evaluate the effectiveness and some of the long-run effects of the program. Performance was operationalized and measured by such variables as the value of crops produced and livestock and livestock product sales; the proportion of land in high return crops; net worth; labor efficiency and size of business as measured by productive man work units.

Results of the study showed that 92 percent of former Rapid Adjustment participants are still farming.

All the physical and economic variables selected as proxies for performance showed increases between the fourth program year and 1984 when the survey was conducted. For example, the percentage of land in row crops increased from 15 percent in the benchmark year to 29 percent in the fourth program year and to 36 percent in 1984. In 1984, most of the labor on Rapid Adjustment farms was fully employed. The size and number of enterprises increased on Rapid Adjustment farms between the fourth program year and 1984, resulting both in increased labor efficiency and business size as measured by productive work units.

From the first through the fourth year on the program, the average value of crops produced increased by 68 percent; and since completing the program, the average value increased by 157 percent. Livestock and livestock product sales increased by 36 percent since completing the program compared with a 124 percent increase while participating in the program.

Most Rapid Adjustment farmers had a low level of financial leverage and average net worth increased 97 percent between the fourth program year and 1984.

Record keeping, adjustments in the combination of enterprises and in cultural and management practices and contact with farm management specialists were identified as the most beneficial aspects of the program.

From the results of the study, a conclusion was that management skills acquired by former cooperating farmers in the Rapid Adjustment program have been sustained and this had led to an enhancement in their business performance.

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CHAPTER I

INTRODUCTION

1.1 BACKGROUND INFORMATION AND STATEMENT OF THE PROBLEM

The Tennessee Valley is an area of diverse conditions in physical environment, in character and distribution of population and in economic levels. The Valley extends over 125 counties in seven states--Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee and Virginia--and contains a total of about 26,160,000 acres.

The beginning of agriculture in the Valley dates back to the eighteenth century when settlers pushed westward to lay claim to the Valley. Since then agriculture has been one of the principal activities of the people in the Valley both as an occupation and as a way of life (TVA, 1977). As characteristic of trends in U.S. agriculture, agriculture in the Valley has been continuously declining it its proportionate share of overall economic growth. The number of farmers has been declining in proportion to the total population, as well as in absolute numbers (TVA, 1954). In spite of the decline in the number of farmers, increased and intensive cultivation of the land up to the 1930's led to a loss of valuable topsoil and nutrients, with the attendant problem of low productivity. Incomes and general economic levels of the South, during this period, were the lowest in the nation. In many respects, the Tennessee Valley region was even lower than the rest of the South (Wengert, 1947). As an example, in 1934 the average spendable income per person (farm and otherwise) was $211 in the Valley region as compared with $486 for the United States. Agriculture in the region was

very depressed resulting in extremely low incomes in the rural areas. Rural living standards were in many regards far from adequate. Table 1 presents an illustration of the levels of some economic and social indicators for the Valley region during that period.

The lag in economic and social status of the Valley region in relation to the entire nation made it imperative for some kind of action to be taken at the local, state, and national level to improve upon the economic and social conditions that prevailed in the Valley. Finer (1944) stated that to restore the Valley to prosperity two things were needed:

1. the conversion of its potential into actual resources and
2. the preservation and reconstitution of existing resources which were steadily depreciating and were still in danger of complete destruction.

The concerted efforts of the Tennessee Valley Authority (TVA) and the land-grant universities of the region for three decades through the extension of knowledge in new farming practices, fertilizer application and farming technology to the farmers resulted in a revitalization of the land, which led to increases in production.

The dramatic mechanization of agriculture in the United States in later years caused agriculture not only to improve in terms of productivity and efficiency but also made the sector more complex and competitive. In response to this competition, farmers in the Tennessee Valley were confronted with the need for expansion in their operations and to make these operations more efficient. The cost-price squeeze necessitated that the farmers increase their levels of output and in-

Table 1. Selected economic and social indicators in the Valley region and the U.S., 1933-40.

	Tennessee Valley	U.S.A.
1. Acres of farm land/capita of farm population (1933).	13.4	71
2. Acres of open farm land exclusive of farm woodland/ capita of farm population (1933).	9.21	68
3. Value of farm production sold, traded or used by farm households (1940) per farm reporting.	$594	$1,309
4. Value of land and buildings per farm (1940)	$2,500	$5,518
5. Assessed valuation per capita total population (1940)	$416	$1,098
6. Average per capita income (1933)	$149	$ 368
Average per capita income (1939)	$239	$ 539
7. Expenditure for education in public schools in rural areas (1939-40) per pupil	$ 31.31	$ 63.61

SOURCE: U.S. Bureau of the Census and the U.S. Office of Education.

come in order to survive the competition and to stay in business (Walch, 1980). The need for effective planning in the attainment of greater efficiency became more acute. The application of an economic approach to farm organization at the farm level on individual farms was identified as a necessity.

Consequently, the thrust and challenge of TVA shifted from one of improving soil productivity to one of improving efficiency in production for the farmers to keep pace with the technological revolution that was occurring in the nation. In response to this emphasis on efficiency improvement, a new phase of the "Test-Demonstration Program" was ushered in. It was referred to as the Rapid Adjustment Program.

The Test-Demonstration farms had been a focal point at the farm level for most of TVA's agricultural activities and had provided the link between the TVA and the farm people in the Valley. This program, demonstrational as well as educational, served as a vehicle to guide the farmers of the Valley into making the kind of farm system readjustments essential to the development of agriculture in the Valley and for effective resource conservation and resource use on individual farms. The principal element of the Test-Demonstration Program was to demonstrate the role of fertilizer in the development of sound farm systems.

The Rapid Adjustment Program, on the other hand, seeks to emphasize intensive farm planning and management on a limited number of carefully selected farms. It utilizes the latest recommended production and management practices on selected representative farms to demonstrate solutions to adjustment problems (Walch, 1980). Accomplishments on

these representative farms would then serve to trigger other farmers into making use of these management practices where needed in their businesses. A major emphasis of the program has been directed toward obtaining information on methods of improving farm income through systematic farm planning.

1.2 THE NEED FOR THE STUDY

Farmer participation in the testing of new technologies and new farming systems is an essential and integral part of any resource development program. In all cases, on-farm tests are run under the management of researchers and management specialists to ensure proper control and effectiveness of the programs. Such trials may not reflect the true management characteristics of the technology or the farming system. This is because it is difficult to determine, in such pilot programs, whether success was due to the management skills of the farmer or those of the research and extension specialist. In the final analysis, the success of a farming operation will largely depend on the skills of the farmer, as it is he who will have to manage the operation.

The long-term viability of a farming system and its various components is of utmost importance to the farmer faced with a decision whether or not to adopt an innovation. As farm systems are designed, stability must be built into each element. Programs in resource development are considered successful when they define changes in farm systems that result in increased productivity, and higher returns on resource use and if these increases are sustained over long period resulting in the growth of farming businesses.

Various evaluation studies of the Rapid Adjustment Program have shown that the program objectives were realized. Net income, net worth, labor efficiency and returns to operator's labor and management all increased for most farms that were activated into the program, illustrating the pay-offs of comprehensive planning and management in the Rapid Adjustment Program.

Data published in 1984 by the Agricultural Extension Service of the University of Tennessee showed that for 81 Rapid Adjustment farms, average gross sales increased from $31,021 in the benchmark year to $81,351 in the fourth program year--an increase of 162 percent. Average net income and average net worth increased by 193 percent and 35 percent respectively for the same period. However, no studies and documentation of the performance of cooperating farmers after their termination from the program have been done to assess the long-run impact of the program. It is essential that a systematic evaluation be conducted to examine the benefits of the program to the participants after their graduation from the program. This evaluation could be useful in investigating whether or not the management skills former cooperators acquired during their enrollment in the program were sustained and whether or not these skills continued to lead to improvement in incomes and net worth. Such a study could also provide a greater understanding of some of the long run effects of the program.

1.3 OBJECTIVES OF THE STUDY

The principal objective of this study was to determine the performance of Rapid Adjustment farmers after they had been terminated from the program.

A secondary objective was to examine the current enterprise mix of these farms and the cultural practices employed to determine any noteworthy changes from the situation that existed during the period that the farmers participated in the program. Additionally, the study attempted to find out the proportion of Rapid Adjustment farmers that had dropped out of farming and the underlying reasons that caused their exit from farming.

The specific objectives of the study were:

1. to determine average gross sales, value of crops produced, and average net worth of the farms during the benchmark years, the fourth program years and the 1984 crop year;
2. to determine the average number of work units per worker and per farm, as well as the percentage of land in row crops for each of the three periods;
3. to identify the particular elements that have contributed to success, or otherwise, of the program and to make recommendations for improving upon the method of administration of the program to ensure sustenance and continuity in enhanced performance that is attained during the farmers' participation in the program.

1.4 RESEARCH METHODOLOGY

The data for this study were collected from two sources. Data for the benchmark and fourth program years were compiled from records at the Agricultural Extension Service of the Institute of Agriculture at the University of Tennessee. A mail type questionnaire was developed to obtain data for the 1984 crop year.

Questionnaires were mailed to the 67 farmers who had completed the program by January 1, 1979. The selection of this date was purposeful because a minimum period of five years after graduation from the program had elapsed. This five-year period was considered reasonable for the assessment of the sustenance of management practices. The questionnaire sought to obtain information about changes in operation, enterprise mix, output levels, machinery and equipment use, sources and quantities of labor usage, method of record keeping and the respondent assessment of the usefulness of the Rapid Adjustment Program.

Altogether, a total of three mailings were made to the group being studied. The first set of questionnaires, accompanied by a letter from the Agricultural Extension Service, was mailed to all the 67 former cooperators in the first week of May, 1985. This letter of transmittal was used for a dual purpose. First, it was to introduce the researcher and to solicit the cooperation of the respondents in completing and returning the questionnaires. Second, it was to assure the respondents that no names would be associated with the information that they provided and that their responses would be kept in absolute confidentiality. One week after the first mailing, a post card was mailed to each farmer to serve as a reminder. Two weeks after this, a second set of questionnaires were mailed to those whose responses had not been received. In the mailing of each set of questionnaires, self-addressed stamped envelopes were enclosed for the convenience of the respondents. Appendix A and B contain a copy of the cover letter and the questionnaire respectively.

1.5 ORGANIZATION OF THE STUDY

The work is divided into four chapters. The remaining chapters are organized as follows: Chapter II is devoted to the theoretical framework of the study. A review is made of the literature relating to the activities of the Tennessee Valley Authority and the land-grant colleges in promoting agricultural development in the Valley region. This is followed by a discussion on the role of management in the business of farming. Chapter III consists of the results and discussion of the study. Selected indicators of economic progress are examined to determine the performance of former Rapid Adjustment participants. Chapter IV summarizes the study and offers some conclusions based on the results.

CHAPTER II

REVIEW OF LITERATURE

2.1 TVA AND AGRICULTURE IN THE VALLEY REGION

The Tennessee Valley Authority was created by an act of the United States Congress in 1933 as a federal corporation charged with the development of the resources of the Tennessee Valley region. The scope and activities of TVA are summed up in the preamble to the statute as follows:

> To improve the navigability and to provide for the flood control of the Tennessee River; to provide for reforestation and the proper use of marginal lands in the Tennessee Valley; to provide for the agricultural and industrial development of the said Valley; to provide for the national defense by the creation of a corporation for the operation of Government properties at and near Muscle Shoals in the State of Alabama, and for other purposes. (TVA Act, 1933)

In addition to the general agriculture power spelled out in the preamble to the Act, the domain of TVA's involvement in agriculture was to include:

1. the proper use, conservation and development of the natural resources in the Tennessee River basin and its adjoining territory;
2. experimenting, testing and demonstration of fertilizer. This was to involve arranging with farmers and farm organizations for the large-scale practical use of new forms of fertilizers, and cooperation with agricultural experiment stations, demonstration farms, farmers and landowners for the testing of new fertilizers and fertilization practices.

3. prevention of soil erosion through the use of fertilization practices and other farm management methods; and
4. the manufacture of fertilizer by such processes as would lead to an improvement in quality and a cheapening of its prices.

The TVA had a dual responsibility: a regional responsibility involving the development of the resources in the Valley region and a national responsibility involving fertilizer research, development and production. In a foreward to the book, Valley of Tomorrow, Lee Greene characterizes TVA's role in agriculture as a subject of great controversy, "strongly supported by some and vigorously criticized by others." Even though neither the primary nor sole objective of TVA was agricultural development, the development of this sector had to be an important element in any effort directed towards the overall development of the Tennessee Valley. Developing agriculture, therefore, had to fall within the purview of the general regional responsibility of TVA. Since the Tennessee Valley region was predominantly rural and its economy agricultural based, to be successful TVA had to have a major emphasis and interest in addressing the lagging agricultural economy in the region.

Wengert (1947) stated that "there was a considerable pressure on the agricultural resources in the Valley region and trends for some years had showed that the pressure was increasing. This was compounded by an inadequate supply of capital to permit intensive development, as well as a larger under-employment of rural labor." He further indicated that farm size in the region was recognized to be too small, especially

in relation to prevailing land use and farm management practices. A major problem, which was consistent in the entire Valley region and with respect to all types of farming, was that farming systems were not adequately adjusted to the soils and other factors in the farm environment. Most of the Valley agriculture, further, was confined to a row-crop culture and this encouraged soil erosion. A major focus of the TVA agricultural program was, thus, the design of farming systems appropriate for the abatement of soil erosion and the subsequent improvement in the productivity of the soil. An immediate problem for TVA was to identify the means which would simultaneously prevent soil erosion and to improve the productivity of the land. In response to this task of improving millions of acres of overcropped, underfertilized, and severely eroded soils in the region, TVA created the National Fertilizer Development Center in Muscle Shoals, Alabama, for the development of new and better fertilizers.

In addressing these fundamental problems of soil fertility, TVA identified the crucial importance of phosphates and made this element a logical starting point for its fertilizer development program. The Authority recognized that:

1. the production of concentrated phosphates offered the best chance of arriving at "new types" of fertilizers; of improving, cheapening and establishing new fertilizer practices; and of contributing to the prevention of soil erosion;
2. natural rock phosphate is available in Tennessee and, through the use of the electric furnace method, utilization could be made of lower grade ores.

A major factor underlying TVA's choice of phosphate fertilizers was that many soils in the Valley region (and, indeed, in the entire United States) were so highly deficient in phosphorus that it had been characterized as the principal limiting factor in soil fertility (U.S.D.A., 1938).

Before the inception of TVA, chemical fertilizers had been used by farmers with the objective of increasing crop yields. No consideration was made as to the effects on the soil. The continuous use of these fertilizers, in the absence of good soil management and sound farming system had resulted in the degradation of the soil quality. As an alternative, TVA was to offer a program which emphasized phosphate and lime application to various crops in association with cover crops grown in rotations soundly related to the capabilities of the soils. This served as the pivot of the TVA fertilizer program. The various components of the program were:

1. research in fertilizer products and processes,
2. small-scale research in fertilizer use,
3. investigation and promotion of sound fertilizer practices on the farm, and
4. production and distribution of fertilizer products.

Test demonstrations on farms were identified as vehicles for the experimentation, extension and promotion of knowledge about appropriate fertilizer use and the development of sound farming systems.

2.1.1 Test-Demonstration Farms

Test-demonstration farms have been the primary means through which TVA sought to achieve an efficient land use practice and the

development of agriculture in the Valley region. The Authority relied on test-demonstration farmer experience to determine "the value, effect and best methods of use" and "economic returns" from fertilizer. There are two classes of test-demonstration farms:

1. unit test-demonstration farms: these involved farmers focusing on, and intensively stressing, sound farm management practices on individual farms,
2. area test-demonstration farms: these addressed groups of farms within defined geographic areas with consideration given to group problems and the relations of farm readjustments to community development.

The test aspects of the practical farms approach the problem of fertilizer testing on a comprehensive basis, including as an objective not merely immediate crop responses but the relation to the whole complex of agriculture and agricultural practices.

Unit Test - Demonstration Farms

These are very similar to traditional agricultural extension demonstration farms where selected farms serve as field laboratories and as sources of information and for dissemination of knowledge to other farmers. Recommended practices, procedures and enterprise mixes are undertaken on individual farms. It is expected that the outcome of these practices are observed by adjoining farmers; particularly, the role of phosphate fertilizers in the development of sound farming systems. The success of the demonstration is not measured simply by what happens to a particular farm or tract of land, or the quality of

it but also by the skill with which it is managed and that those in close association may take notice and be convinced of the usefulness of the new practices.

Area Test - Demonstration Farms

An area test-demonstration included a number of farms in the same community. They were started only when considerable progress had already been made by the test-demonstration on single or unit farms and where a considerable proportion of the farmers were interested. The objective here was to utilize the information and experience gained from unit test-demonstration farms in the solution of particular problems specific to particular agricultural communities. This provided the means for dealing with a variety of problems which could not be accomplished on an individual basis. These included such problems as those relating to machinery requirements, seed cleaning equipment, threshing machines and marketing; all of which could be dealt with more effectively on a community basis than on individual basis. Wengert (1952) charged that though the area test-demonstration served as a nucleus for revived community spirit and activity, there has been a minimum of interpretation and analysis of their experience.

2.1.2 Impact of TVA

The problem of measuring TVA's success by conventional cost-benefit techniques presents many fascinating professional challenges to economists and social scientists (Robock, 1972). It is, however, evident that the Authority has had a tremendous impact on agricultural

development in the Valley region. TVA's leadership and guidance led to the great consciousness among Valley farmers (and, in fact, most United States farmers) of the immense importance of phosphate to soil fertility and sound farm systems.

The test-demonstration programs have acted as the major single catalyst for change in Tennessee Valley agriculture. In 1934, farmers in the TVA region produced an average of $15.25 per harvested acre when the national average was $21.50. By 1974, the value of farm production per harvested acre had increased dramatically in the Valley region, with the average in the region well above the national average. Each Valley farmer produced $371 of farm products per acre of harvested cropland as against a national average of $269 per acre of harvested cropland.

A major contributing factor to the improved performance in Valley agriculture had been the adoption of improved chemical fertilizers and new farming methods. Farm product sales in the Valley region had increased from $113 million in 1934 to $547 million in 1959; and by 1974, the total value of farm products sold in the region had reached $1.6 billion (TVA, 1974).

A 1983 annual report of TVA showed that while on a five-year resource management program, an East Tennessee demonstration farmer increased his corn yield from 60 to 94 bushels per acre; and the average production of his 70-cow dairy herd increased from 11,230 pounds to 13,634 pounds.

TVA's efforts in agriculture have not been limited to production. The Authority has supported a number of marketing cooperatives with

financial and technical assistance. Rapid Adjustment farms and resource management farms helped to accelerate the adoption of new technology by many other farmers in the region. TVA has had a major involvement in soil erosion control through the encouragement and support (both technical and financial) of terracing and minimum tillage programs. Farm demonstration work also served the indirect prevention of soil erosion by encouraging the use of leguminous and other cover crops.

The benefits of the TVA experience to the people in the Valley region has been in such diverse areas as energy supply, economic and community development, and the development of natural resources. In the area of energy, the Authority has provided over the years, an adequate and reliable supply of electric power at a reasonably low and feasible cost. The expansion and availability of electric energy and the Authority's low-rate, high-use policy in energy distribution has been a major stimulus in economic growth and in the physical and social development of the Valley. Particularly the expansion in the supply of electric energy has been a very important source of farm power.

In natural resource development, the Authority has been instrumental in the conservation and development of forests, fisheries, and wildlife resources.

At the national level, TVA technology has contributed immensely to the development of most of the fertilizer that is used by American farmers today. This has been achieved through the Authority's liberal fertilizer patent policy which involves the payment of non-exclusive

royalty fees. This policy has permitted the fertilizer industry an easy access to TVA innovations in chemical fertilizers and the subsequent development and utilization of these fertilizers.

Despite its numerous accomplishments, TVA's performance has not been entirely satisfactory. The activities of the Authority have fallen short of the ideas and concepts of comprehensive regional planning and development which the Authority has come to symbolize. Wengert (1952) points out that "despite the TVA's basic philosophy and recognition of an integrated and comprehensive approach to regional problems, the Authority's preoccupation with phosphates had been to the neglect of other aspects of development in the region." According to him, such concerns as the role of agricultural credit, capital markets, as well as problems of farm size and tenure had not been given attention in the TVA program; and further, the Authority had shown very little interest in the enhancement and development of rural off-farm employment opportunities.

In a general appraisal of developments in the Valley region, it is difficult to segregate the contribution to economic and social advance of the TVA itself since the Authority has been but one participant among several other governmental and social agencies that have been involved with the development of the Tennessee Valley region. In many respects, however, TVA has played an important role by serving as a catalyst (through linkage and multiplier effects), encouraging and stimulating many aspects of development in the Tennessee Valley region.

2.2 COOPERATION BETWEEN THE TENNESSEE VALLEY AUTHORITY AND THE LAND-GRANT UNIVERSITIES OR COLLEGES (LGC)

The land-grant colleges were established by an act of the U.S. Congress in 1862 which granted lands from the public domain to each state for the establishment of Colleges of Agriculture. The specific purpose of the First Morrill Act, which led to the establishment of the LGC is stated as

> . . . the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the states may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life. (Works and Morgan, 1939)

The First and Second Morrill Acts, by emphasizing training in agriculture and mechanic arts, as evident from the above, compelled the LGC to be involved with agricultural development in many states. Consequently, the LGC of the Tennessee Valley States had been involved with agricultural development in the Valley region for several decades before the inception of the Tennessee Valley Authority. Traditionally, their efforts focused towards training local leaders, increasing agricultural knowledge, and the diffusion of accumulated information to the farmers and people of the Valley.

The functions of TVA as spelled out in the statute which established the Authority directed the Authority to undertake activities which not only were of interest to the LGC but which actually lay within some of the fields they were occupying. The particular objective of TVA of the proper use, conservation and development of agricultural resources

in the Tennessee Valley region coincided with many of the activities of the land-grant colleges. The realization of these common objectives led to a desire on the part of both TVA and the LGC to cooperate to complement each other's activities for the benefit of the people in the Valley region. Cooperation arose from a recognition by TVA that the land-grant colleges possessed many resources which included large staffs of highly trained and experienced specialists in administration, teaching, research and extension; extensive equipment and facilities in the way of buildings, laboratories, libraries, experimental farms, machinery, etc; large accumulations of experience and information on the problems in their respective areas; and the confidence and support of their respective states (Ball, 1939). It was positively recognized that a duplication of these resources by TVA was both unnecessary and wasteful. The resulting relationship between land-grant colleges of the Valley States and TVA led to the constitution of a coordinated and unified program of agricultural development in the Valley.

To facilitate the attainment of their joint objectives and to consolidate the complementary relationship among them led to the establishment of a coordinating committee of three persons comprising a representative each from the LGC, TVA and the U.S. Department of Agriculture. The purpose was to coordinate the activities of all groups and agencies involved in Valley agriculture and for the planning and implementation of agricultural adjustment activities in the region. The mutual advantages envisioned from the cooperation among all the various groups included the pooling of knowledge, facilities, personnel, the development of a single coordinated program, the avoidance of duplication of efforts, thus saving money and time.

The cooperative programs developed between TVA and the land-grant colleges of the Valley States have been in the areas of research and experimentation, education and test-demonstration. These involved research in phosphates, soil survey and classification, terracing and studies in farm products. In the TVA fertilizer program, the LGC were involved with laboratory experimentation of the physical, chemical and other properties of the elements, as well as field tests under different crop and soil conditions. TVA fertilizer distribution had been channelled to Valley farmers mostly through the land-grant colleges.

The LGC have been very instrumental in meeting demands for training in various disciplines, research and extension in agricultural economics, home economics, agricultural engineering, land-use classification, erosion control, etc. The LGC have played a vital role in most of TVA's activities in the Valley region, particularly in the area of test-demonstration. Some of their specific roles in the cooperative program developed with TVA included

1. sharing of responsibility with TVA for studying major problems in Valley region,
2. development of farm plans, provision of technical assistance, counselling and supervision of the cooperative programs, record keeping and analysis, and
3. distribution of TVA fertilizer at minimum cost to farmers involved with the cooperative programs.

This cooperation between the land-grant colleges and TVA provided a great deal of impetus to TVA programs and led to the comprehensive development that has characterized many of the resources in the Tennessee Valley.

2.3 THE ROLE OF MANAGEMENT IN THE BUSINESS OF FARMING

Economic trends in recent years have emphasized the need to make the most efficient use of resources in a farm business. Both technical efficiency and good business organization are prerequisites for success in farming. Various enterprises compete with each other for resources and the amount of any product that a farmer can produce is limited by scarcity of one or more resources. Farm management serves as a tool for placing available resources in their best use.

There are almost as many definitions of management as there are people who try to define them. Johnson (1982) defines management as "the active process of making decisions so that use of the available human and material resources of an organization is planned and controlled to achieve its specific objectives most efficiently." Foster and Erven (1981) define farm management as "the making, implementing, and accepting responsibility for decisions intended to continuously maximize, consistent with operator objectives, net returns to the resources a farmer owns or controls."

There is no single and concise definition of farm management which is comprehensive and descriptive of readily observed, real world phenomena. A common ingredient in the various definitions of farm management is that management is both an art and science of choice and decision making. Stanley (1979) supports this by indicating that farm management "is not a collection of papers nor long analysis consideration--but rather it is decision and action."

A major objective of management is to optimize economic returns for available resources. Heady (1948) acknowledges both micro and macro

roles of farm management and indicates that farm management serves

> to guide individual farmers in the best use of their resources in a manner compatible with the welfare of society . . . to provide fundamental analysis of the efficiency of farm resource combinations which can serve as a basis for bettering the public administration of resources where agricultural policy or institutions which condition production efficiency are concerned.

Farm management is a process involving:

1. observing and analyzing alternative courses of action,
2. deciding which course of action to follow,
3. taking the necessary steps to carry out the decision once it has been made,
4. bearing the responsibility for the outcome of the decision.

Beneke (1955) states that all management decisions involve substantially the above four processes, with different emphasis placed on each step by different managers and also according to the problem involved.

In farm management, there is the particular need for considering both the present and the future; the short run and the long run. Farm management is a continuous process of decision-making in that the farmer is constantly confronted with changing environmental and market conditions. Fluctuations in prices, weather variations and diseases, new farming methods, new technologies, changes in the people and institutions with which farmers deal all necessitate adjustments in farming operations in response to these changes. Change necessitates management; and management implies planning, organizing, directing and controlling resource use.

Planning is a basic, but complex, management function combining financial, physical and technical aspects for selecting and developing the best of the alternative ways of achieving stated objectives. Managers (including farmers) exercise their planning and controlling functions in specific but inter-related business areas including finance, personnel, production and marketing. Johnson (1982) points out that in farm management, stress has conventionally been placed on production, with less on finance and marketing; and little attention has been given to personnel management. To be a successful farm manager, however, one must be competent in business activities such as financial planning, personnel control and marketing.

Farm management advisors provide an important link in the chains of communication between farmers and government policymakers on one hand and between farmers and technical research workers on the other. Through farm planning and management, executive ability is utilized in the operating of the farm. However, planning and management are helpful only if action follows--only if farm plans are translated into practical activity.

In a changing economy, the basic functions of farm management have application to the selection of cropping systems, livestock programs and farming practices of all kinds. They also have application to choice in the amount of resources to use, the size of farm to operate, the purchase of a farm or machine or the selection of a marketing plan or date of sale.

The success of any farm business depends on the quality of the farmer as a decision maker. Successful management depends largely on

personal experience for the formulation of sound judgements. It depends upon the efforts and ability of the individual to utilize his experience to fully analyze and interpret situations.

Knowledge of facts and techniques alone may not be sufficient for the success of a farming operation. Nevertheless, the principles and techniques of management if properly applied should provide sound guidelines to promote an increased number of correct decisions.

2.4 THE RAPID ADJUSTMENT PROGRAM CONCEPT

The Rapid Adjustment Program is a cooperative program between the Tennessee Valley Authority and the land-grant institutions in the seven states in the Tennessee Valley region. As a management-oriented program, it emphasizes intensive farm planning and management on a limited number of carefully selected and representative farms to demonstrate solutions to adjustment problems.

The concept, developed in 1960 after a joint evaluation of the cooperative programs between TVA and the land-grant institutions, stemmed from a recognized need to assist cooperating farmers in the Test-Demonstration program to take the lead in making adjustments necessary to ensure economic efficiency and to become more competitive. It was designed to accelerate the rate of development on test-demonstration farms and, particularly, to guide the farmers in the Valley region into making the kind of resource adjustments that were deemed necessary for increasing their outputs and to maintain their income levels in order to stay in business.

The latest recommended production and management practices are employed on selected representative farms which have potential for

increased income and then to provide a feedback of these production and management practices which may be incorporated into the conventional resource development programs.

Wells (1968) summarized the reasons for Rapid Adjustment farms as:

1. to explore income and adjustment possibilities for other farmers in the Valley region having common resources and adjustment problems,
2. to serve as "innovators" in adjustment possibilities three to five years ahead of other test-demonstration farms and ten years or more ahead of the average farmer in making adjustments,
3. to serve as laboratories and demonstrations for both farmers and technical agricultural workers,
4. to serve as a source of data and experience for guiding needed adjustments on other test-demonstration farms.

2.4.1 Objectives of the Rapid Adjustment Program

The objectives of the Rapid Adjustment Program have been categorized into primary and secondary objectives. These were outlined by Ray and Hudson (1968) as

Primary Objectives:

1. to determine types and rates of adjustment possibilities for given sets of available resources representative of particular segments of agriculture,
2. to demonstrate income possibilities on efficiently-operated and well-managed units with different levels

of available resources within representative segments of agriculture.

Secondary Objectives:

1. to determine and demonstrate the value of fertilizer in facilitating farm adjustments and resource development,
2. to obtain new input-output data and to refine existing data for representative segments of agriculture,
3. to identify problems which are impeding agricultural adjustments on Rapid Adjustment farms and on which additional research is needed.

As stated by Walch (1980), these objectives emphasize the importance of the relationships which result from different resource supplies as well as from varying price levels. Further, they stress the importance of records and their analysis to identify problem areas as well as progress being made. And finally, they point out the need to pass this information along to other farmers who have problems similar to the ones dealt with by participating farmers. A major emphasis of the program is to obtain information on methods of improving farm income through the application and utilization of systematic farm planning and management.

2.4.2 Responsibilities of Cooperating Parties

The Rapid Adjustment Program was initiated in Tennessee on July 1, 1961. During the first year after the initiation of the program, most of the efforts were directed towards developing methodology, delineating responsibilities of TVA, the Institute of Agriculture, and the cooperating farmers.

Five major activities were undertaken during the second year and these involved:

1. preparation of enterprise budgets to be used in developing farm plans,
2. development of planning procedures, which involved the utilization of linear programming techniques,
3. outlining a system of record keeping to be employed by the participating farmers,
4. preparation of forms to be used for taking inventory of physical resources and benchmarking the status of the farms,
5. establishment of the procedure and criteria for participant selection.

The participants in the program--TVA, the farmer and the land-grant institution--signed an agreement in which their respective responsibilities were outlined. Though the agreement had no legal obligations, each party was expected to undertake its responsibilities in order to ensure the effectiveness of the program. As outlined in "Rapid Adjustment Farms . . . a new phase of the test-demonstration," the specific responsibilities of each party were as follows:

TVA

1. provides contractual funds to respective colleges for farm management and other personnel directly responsible for planning, supervising and analyzing results from the Rapid Adjustment farms;
2. provides limited amounts of TVA fertilizer at no cost to the farmer as a cushion against the risk involved in making

major adjustments in a short period of time and to insure that an optimum amount of fertilizer is used in the development of cropping programs;

3. assists with the selection of farms, aggregate studies, farm planning, record analysis and other liaison work that would help to make the program more effective.

The Land-Grant Institution

1. accepts responsibility, along with a representative from TVA, of selecting program participants,
2. shares responsibility with TVA for studying major problem areas and the assignment of priorities,
3. works out alternative plans for the farm and designates the most desirable one from the standpoint of income and other considerations,
4. furnishes supervision and counsel for putting the plan into effect, carries out cultural and management practices and keeps and analyzes farm records.

The Farmer

1. attempts, as far as possible, to carry out the plan proposed by college personnel,
2. agrees to the use of his farming operation for study by professional personnel and farmers,
3. keeps farm records and makes them available for study and reporting.

2.4.3 Selection Procedure

County Extension Service personnel play an important role in the selection of Rapid Adjustment farms. Farms are selected on the basis of major adjustment problems common among farms in given geographic areas. Guided by stipulated selection criteria, county extension agents nominate several farms as potential participants. Following a preliminary evaluation of these farms by the farm management personnel of the respective university and through consultation with TVA, Rapid Adjustment participants are selected. Final approval is contingent upon the development of long-run farm plans which are mutually acceptable to the cooperating farmer, the land-grant institution and the Tennessee Valley Authority. In the process of farm selection, benchmark data are collected to determine the status of the farm the year before the farm is activated into the Rapid Adjustment Program. Benchmark data represent detailed information about the farm regarding the amount and use of land, labor and capital. These data provide an insight into the management ability of the farm operator.

2.4.4 Tracing Progress Made by the Rapid Adjustment Program In Tennessee

A total of 92 farms have participated in the program as of January 1981. These include both crop and livestock farmers. The performance of these participants has been closely monitored by the Extension Service of the Institute of Agriculture during the program years.

Selected indices representing economic efficiency have been determined and these show that considerable progress has been made by most

Rapid Adjustment farmers in their farming operations. A study by Ray and Hudson (1968) analyzing the first six Rapid Adjustment farms showed that the performance of these farms were enhanced as a result of changes that were made in their operations. Average net worth, average return to operator labor and management and the percentage of land in row crops all increased between 1962 and 1966. Table 2 illustrates selected indicators of the progress made by the first six farms.

The progress made and the experience gained with the first six farms provided a great impetus for the program. Subsequent evaluation studies have shown consistent improvements in performance by Rapid Adjustment farmers. Data from Publication 833 (Walch, 1980) illustrate progress made by 65 Rapid Adjustment farmers as shown in Table 3.

Records for summarizing the first 81 Rapid Adjustment farms for four measures of economic progress show the pay-offs of the Rapid Adjustment Program. Table 4 presents the status of the first 81 Rapid Adjustment farms in Tennessee during the benchmark years and the four program years.

Benefits obtained from the Rapid Adjustment Program are not limited to the improvement in income and other economic factors on individual farms. The experience has been very valuable to the Extension Service personnel in general, and to the farm management specialists in particular. It has provided a means for different subject matter specialists to work together and thus to appreciate the vital importance of multidisciplinary approach to the solution of resource problems.

Table 2. Changes in efficiency factors for the first six Rapid Adjustment farms.

	Benchmark Year 1962	1963	1964	1965	1966
1. Returns to land, operator and family labor, owned capital and management ($)	3,500	7,000	7,050	12,050	12,000
2. Returns to operator's labor and management ($)	1,666	4,000	4,050	9,050	9,000
3. Net worth ($)	230,000	270,000	290,000	350,000	430,000
4. Ratio of assets to liabilities	2.4	2.7	2.9	3.2	3.7

Source: Agricultural Experiment Station, University of Tennessee, Bulletin 448, June 1968.

Table 3. Value of selected indicators for benchmark year and fourth program year for sixty-five Rapid Adjustment farms.

Indicator	Benchmark Year	Fourth Program Year
1. Average gross income ($)	22,231	64,005
2. Average net farm income ($)	4,673	17,927
3. Average net worth ($)	78,892	110,993
4. Value of crops produced ($)	8,227	19,374
5. Value of livestock produced ($)	16,849	49,346
6. Average number of work units/worker*	219	256
7. Average number of work units/farm*	345	489
8. Average percent of land in row crops	15	29

*A work unit is defined as one man working a 10 hour day.

Source: Agricultural Extension Service, University of Tennessee, Publication 833, March, 1980.

Table 4. Indicators of performance for 81 Rapid Adjustment farms for the benchmark and fourth program years.

Indicator	Benchmark Year	Fourth Program Year
1. Average gross sales($)	31,021	81,351
2. Average net farm income ($)	6,299	18,428
3. Value of crops and livestock produced ($)		
a. Crops	12,307	25,364
b. Livestock	23,876	67,941
4. Average net worth ($)	96,721	130,979

Source: Agricultural Extension Service, University of Tennessee, Publication No. 1132.

Ray and Hudson (1968) indicated that the demonstration value of the program caused many farmers to consider adjustments which had great potential for increasing farm income.

The program has also been used as a teaching experience for county extension staff. Rapid Adjustment farm days have been useful in informing other farmers of the need for farm reorganization to insure increased efficiency, as well as to agribusiness personnel that provide services to farmers.

A major benefit of the program has been the generation of farm planning information. Farm records that are kept by participating farmers have provided a stock of information that has been utilized in various publications for use by vocational and agricultural teachers, farm credit agencies and universities and colleges.

The Rapid Adjustment farms as a sequel to the test-demonstration farms have helped to accelerate growth in Tennessee agriculture through increased farm incomes and net worth, the adoption of technology, proper planning and management on many farms and increases in the stock of knowledge and experience of Extension Service personnel and farm management specialists.

CHAPTER III

RESULTS AND DISCUSSION

The results of the study are discussed in seven sections as outlined below:

1. Section 1 deals with a determination of the response rate of the mail survey.
2. Section 2 involves a discussion of the importance of the cultivation of high return crops and a determination of the proportion of land that is devoted to the production of these crops.
3. Section 3 examines the efficiency of labor usage and the size of the businesses as measured by productive man work units.
4. Section 4 includes a determination of the value of crops produced and livestock and livestock product sales during 1984, and a comparison with the benchmark and fourth program year values.
5. In Section 5 the average net worth status of former Rapid Adjustment participants is evaluated.
6. Section 6 deals with the Farm Records and method of record keeping that is employed on the farms that were studied.
7. Section 7 is devoted to the farmers' assessment of the benefits of the Rapid Adjustment Program to their farming operations and the identification of some of the shortcomings of the program.

3.1 SECTION 1 - MAIL SURVEY

A total of 67 questionnaires were mailed to all the participants who had completed the Rapid Adjustment Program as of January 1, 1979. Six farmers could not be located. Apparently these people had relocated or changed mailing addresses and their questionnaires were subsequently returned intact.

Completed questionnaires were received from 37 of the remaining 61 participants. This represented a response rate of approximately 61 percent, which according to Babbie (1970) is a good response. However, due to the small size of the population, a higher response rate would have been useful. The survey was administered during the planting season, which is a very busy time for farmers, and this probably affected the rate of response.

Thirty-four of the 37 farmers who responded are still actively farming. Two of the farmers had sold their farms and the remaining one has had his farm taken over by the Farmers Home Administration. Generally, data given in the questionnaires were useful in evaluating the farmers' current business situation compared to the period in which they cooperated in the program.

3.2 SECTION 2 - PRESENT LAND USE ON FORMER RAPID ADJUSTMENT FARMS

In general, the labor that a farmer devotes to row crops yields a higher return per hour than labor that is devoted to livestock enterprises. In the development of farm plans for the Rapid Adjustment Program, emphasis has been placed on shifting land from pasture and forage crop production to row crops where soil types would permit. This

is because, all other things being equal, the greater the percent of land devoted to high return crops, the greater the profitability of the farming operation. In Tennessee, cotton, corn, soybeans, tobacco, alfalfa and corn silage have been identified as the high return field crops. Because they tend to yield higher returns to labor, increases in the cultivation of such crops have been utilized as a measure of progress being made.

The percentage of land devoted to row crops was computed as follows:

$$\text{Percent of land in row crops} = \frac{\text{Acres in row crops}}{\text{Total acres of cropland on a farm}} \times 100$$

The percentage of land in row crops was determined for each of the farms. These values were summed and then divided by the total number of farms to obtain a value for the average percentage of land in row crops. Figure 1 presents the average percentage of land in row crops on Rapid Adjustment farms during the benchmark year, the fourth program year, and an estimate for 1984 based on the survey data. On the average, Rapid Adjustment farmers, after classifying their land according to its highest potential use, increased the acreage that they devote to high return field crops.

During the benchmark year, the farmers had an average of 15 percent of their land in high return crops. After making adjustments in their farming systems based on the plans developed for their farms, row crop acreage increased substantially. After four years on the program, an average of 29 percent of the land was devoted to high return crops. In 1984, the survey data indicated that the percentage of land in row crops had increased to 36 percent of the total farm acreage.

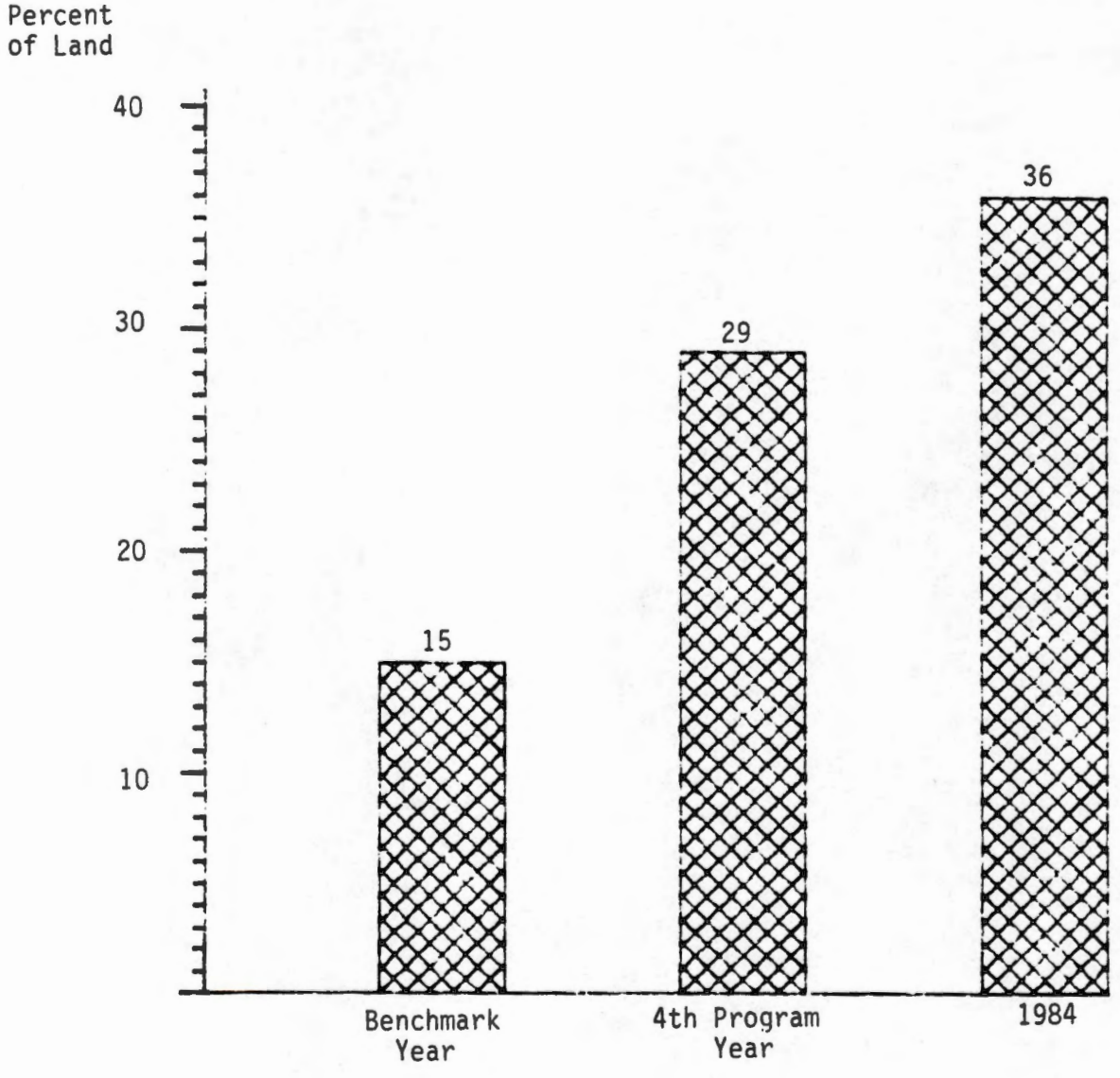


Figure 1. Average Percent of Land in Row Crops for Benchmark year, Fourth Program Year and an Estimate for 1984 Based on the Survey of Rapid Adjustment Farms in Tennessee.

Since completing the Rapid Adjustment program, the farmers continued to increase the proportion of land devoted to the cultivation of high return crops. The realization of the importance of high return crops has been vital in increasing gross and net income of Rapid Adjustment farmers while on the program and since they completed the program.

3.3 SECTION 3 - SIZE OF BUSINESS AND EFFICIENCY OF LABOR

The size of a business tends to be an important factor affecting profitability. Though larger is not necessarily better and increasing size may not assure increased profitability, cost per unit of production tends to decline as farms grow in size and derive the advantages of economies of size where they exist. Fixed costs per unit of output tend to decrease as farms grow in size and increase their output levels.

A measure which has been utilized in determining farm size in the Rapid Adjustment program is the Productive Work Unit. The number of productive work units measure the size of a farm in terms of the employment provided for labor. A productive work unit is the amount of work accomplished in a ten hour day, by an average worker employing typical production practices and equipment. Since each enterprise employs a specific number of work units, the number utilized will increase as enterprises get larger or more numerous. As the size of the farm business is increased, the net farm earnings should also increase, assuming the farm is productive, efficient and well organized. Productive work units can also be used as a measure of the efficiency of labor usage and in the determination of labor-saving technologies.

When work units are utilized as a measure of business size, the Rapid Adjustment farmers surveyed demonstrate progress since finishing the program. Figure 2 shows that during the benchmark year, the number of productive work units employed per farm was 345 work units. In the fourth program year, the number utilized had increased to 489 work units per farm; and in 1984 this had further increased to 518. The significance of this is that the farmers who participated in the program, on the average, have increased the size and/or number of their enterprises and thus the size of their businesses. The average number of work units per worker increased from 218 in the benchmark year to 256 in the fourth year in the program. In 1984 the number of work units per worker had increased to 278. It is assumed that the average farm operator works about 300 work units per year, and a full-time hired worker works about 250 work units per year. Based on 278 work units per worker in 1984, most of the labor on the Rapid Adjustment farms were fully employed.

3.4 SECTION 4 - VALUE OF CROPS PRODUCED AND LIVESTOCK AND LIVESTOCK PRODUCTS OF SALES

One of the objectives of the Rapid Adjustment Program and most certainly the main objective of participating farmers is to increase farm income. Two measures which affect farm income--the value of crops produced and livestock and livestock product sales--are considered in determining the effectiveness of the program.

The value of crops produced provides a measure for comparing the performance of a particular farm over time, and it is also a good measure

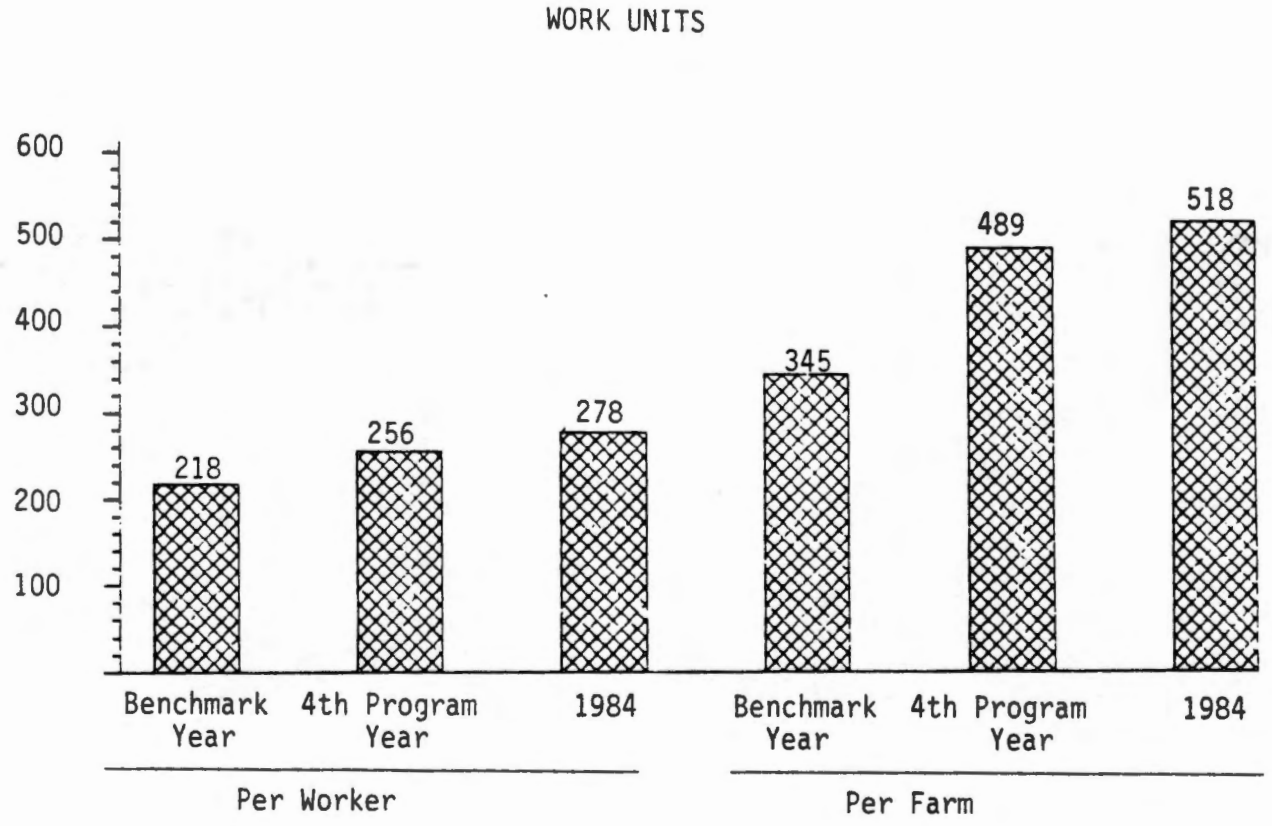


Figure 2. Average Number of Work Units per Worker and per Farm for Benchmark Year, Fourth Program Year and an Estimate for 1984 Based on the Survey of Rapid Adjustment Farms in Tennessee.

of the size of a business. It was calculated as the product of the quantity of a particular crop produced and the average annual price received by Tennessee farmers. The price quotations were obtained from the 1984 Annual Bulletin of the Tennessee Crop Reporting Service. As an example, if 2000 bushels of soybeans are produced by a farmer and the average annual price received is $7.17 per bushel, then the value of soybeans produced equals $14,340. The value produced of all crops on each farm was determined in this manner. To eliminate the effect of inflation, the value of crops produced on each farm was deflated with the appropriate index, setting 1977 as the base which equalled 100. The real values of crops produced were then summed and divided by the total number of farms to obtain the average value of crops produced for the benchmark year, the fourth program year and the 1984 crop year. The deflators used were obtained from a table of index numbers of prices received by Tennessee farmers published in the 1984 Annual Bulletin of the Tennessee Crop Reporting Service.

Figure 3 illustrates that during the benchmark year the average real value of crops produced was $17,290 and this increased to $29,070 during the fourth program year. In 1984, the average real value of crops produced increased to $75,292. The value of crops produced between the fourth program year and 1984 increased by almost two and a half times. Even though the value of crops produced may not indicate the profitability of the business, it does give a good comparison of production on a farm from year to year. The large increase in the real value of crops produced was due to reorganization in the farm operations

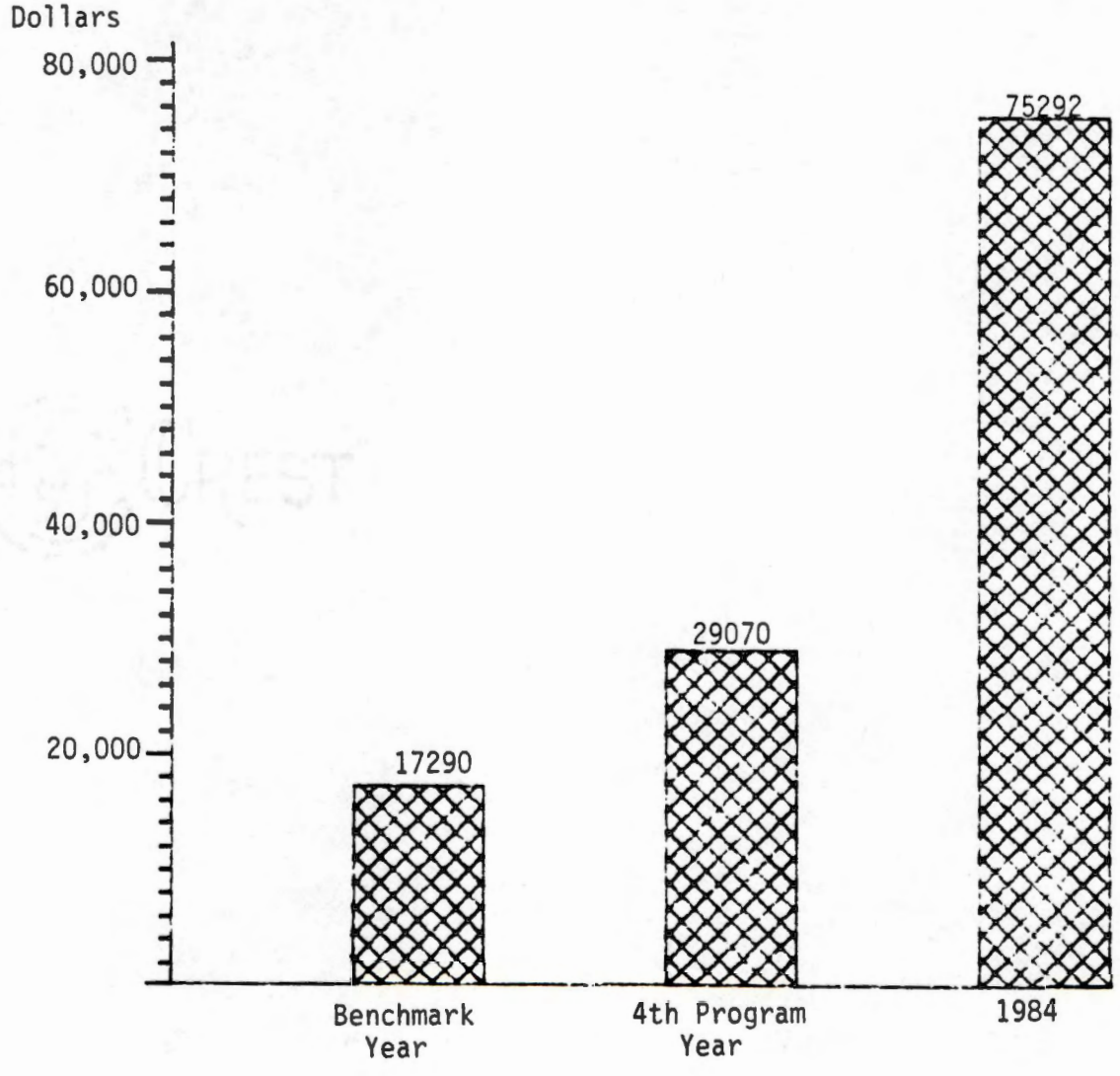


Figure 3. Average Value of Crops Produced during Benchmark Year, Fourth Program Year and an Estimate for 1984 Based on the Survey of Rapid Adjustment Farms in Tennessee.

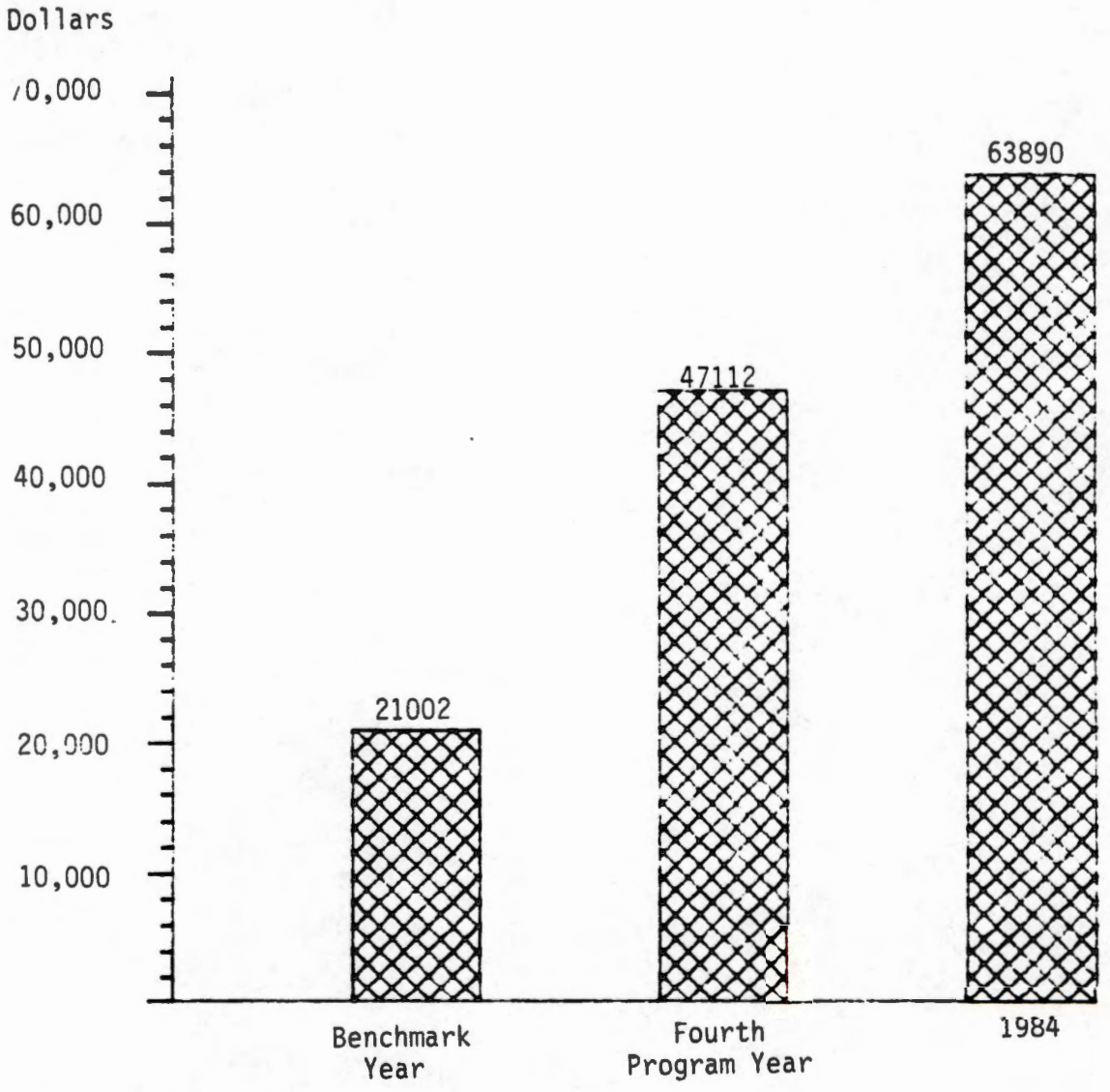


Figure 5. Average Gross Sales of Livestock and Livestock Products for Benchmark Year, Fourth Program Year and an Estimate for 1984 Based on the Survey of Rapid Adjustment Farms in Tennessee.

to insure increases in the proportion of land devoted to high return crops and improved cultural and management practices since the total acreage under cultivation changed by only a small amount.

Similarly, average real gross sales of livestock and livestock products during the benchmark year was $21,002, and at the end of the fourth program year the value had more than doubled to $47,112. In 1984, the average real gross sales of livestock and livestock products had increased to $63,890. The average real gross sales of livestock and livestock products is an important measure of progress in that it reflected on the value of net farm income and it also provided an indication of business size and records of expansion. The data showed that the average value of livestock and livestock products sold by Rapid Adjustment farmers had increased by 36 percent between the fourth program year and 1984.

When individual farms were analyzed, the average real value of crops produced increased on 88 percent of the farms between the fourth program year and 1984. Similarly, the average real gross sales of livestock and livestock products increased on 60 percent of the farms. In 1984, 23 percent of the farms did not produce any livestock and livestock products compared to their fourth program years.

3.5 SECTION 5 - NET WORTH

The net worth statement is a snapshot of the financial position of a farmer at a point in time. It provides a means for checking on the financial status of the farmer. By comparing net worth from year to year, an indication can be obtained about the financial progress that is being made by the farmer.

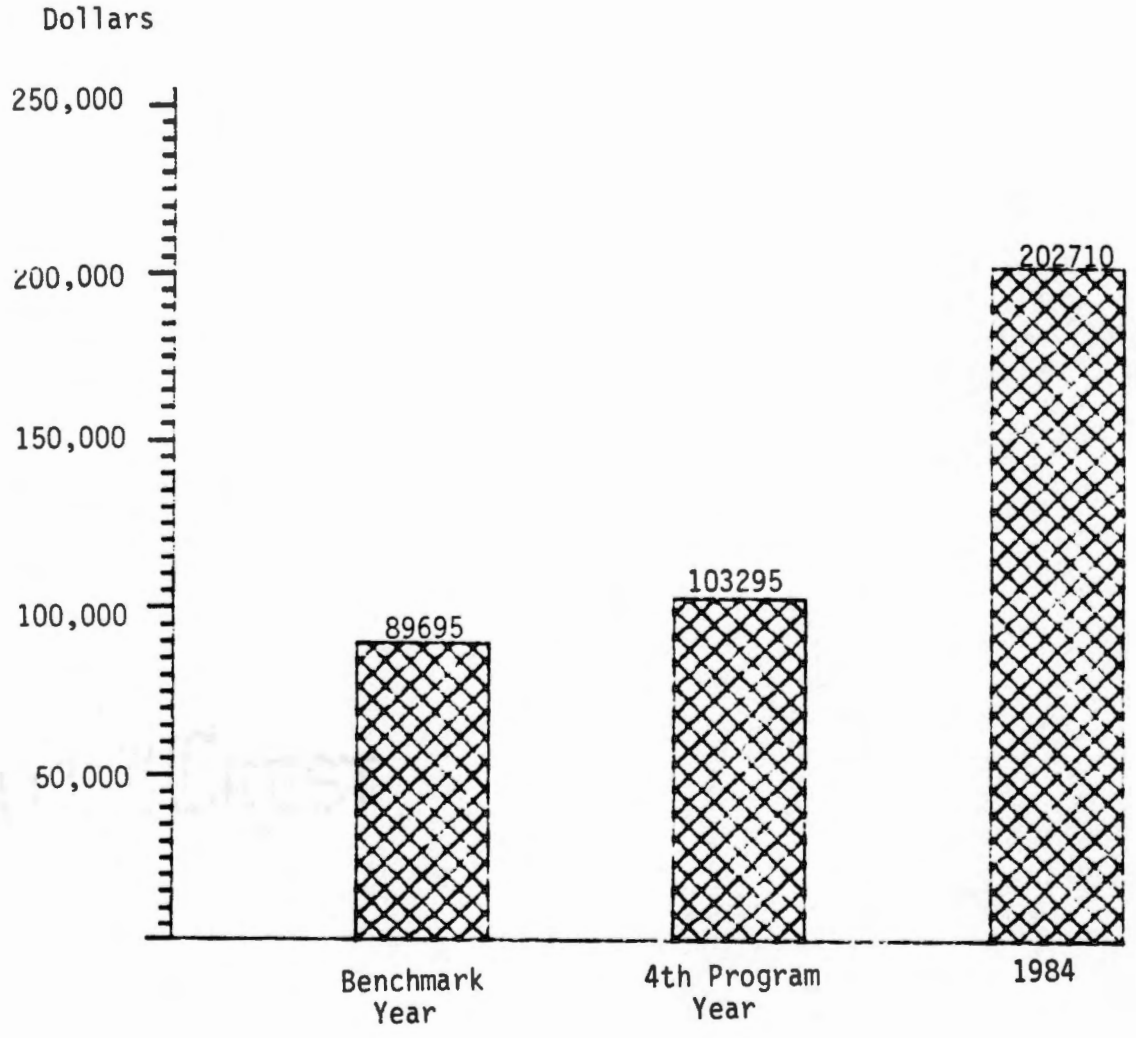


Figure 4. Average Net Worth for Benchmark Year, Fourth Program Year and an Estimate for 1984 Based on the Survey of Rapid Adjustment Farms in Tennessee.

The deflated or real net worth of individual farms for each of the three periods studied were computed as the difference between total assets and total liabilities. To account for capital gains in assets, the net worth for each farm and for each period was deflated with the appropriate deflator using 1972 as the base year. Index numbers of implicit price deflators for gross national product were employed.

The average net worth for each period was obtained by summing the net worth (in 1972 terms) on all farms and dividing by the total number of farms. The average net worth of the Rapid Adjustment farmers increased from $89,695 in the benchmark year to $103,295 after they completed the four-year program. In 1984 the average real net worth of the farmers had increased to $202,710, a 126 percent gain in real net worth from the time they began cooperating on the program. The average net worth during the fourth program year was underestimated because the value of the land, breeding livestock, etc., during the fourth program year were maintained at benchmark year levels.

The survey revealed that 87 percent of individual farms surveyed had increased their average net (in real terms) between the fourth program year and 1984. The increases in the net worth provide an indication that portions of the farmers' income were retained, which were used for expansion in their assets.

3.6 SECTION 6 - FARM RECORDS

Farm records provide the basis for analyzing the farm business. Such analysis is useful in pointing out the strengths and weaknesses

of a particular operation. In addition to providing information for tax purposes, the use of farm records assists in making needed adjustments on the farm. Good records assist cash control and the correct use of accurate records is an essential part of good management.

For these reasons, the Rapid Adjustment Program placed major emphasis on farm records; the recording of both physical and financial factors was stressed on all farms. All of the 34 Rapid Adjustment farmers still farming have made farm records an integral part of their businesses. Based on the survey data, 23 of the 34 farmers still keep their records according to the format that was employed during the period they participated in the program. The remaining 11 farmers indicated that the system of farm recording employed in the Rapid Adjustment Program was too laborious. Four out of this number now employ the Farm Business Program System compiled by Tennessee Farm Bureau; four keep only records that they consider important for tax purposes; and the remaining three use their bank statements to record their financial transactions.

3.7 SECTION 7 - ASSESSMENT OF RAPID ADJUSTMENT PROGRAM BY FORMER PARTICIPANTS

With the exception of one respondent who indicated that the Rapid Adjustment Program was only of minor benefit, all the other participants expressed that the program had been of immense benefit to their farming operations. The particular aspects of the program which were most valuable were in the areas of enterprise combination and record keeping. Most of the farmers indicated that the program introduced great vigor in their quest for increased farm income. The implementation of

the farm plans which resulted in different enterprise combinations had greatly boosted their earnings in the face of changing market conditions.

The informational value of the program in the form of new and latest practices had also been vital to the success of most of the farms.

Other aspects of the program which the farmers identified as very useful were the farm visits, soil testing and teaching of correct fertilization methods and practices. To most of the farmers, the supply of TVA fertilizer at minimum cost was less important as compared to the management practices which they learned while they were on the program.

Regarding some of the shortcomings of the program, about 50 percent of the farmers were of the opinion that the period of participation was not long enough given that they had to make major adjustments in their operations. According to almost half of the farmers, too much was done in too short a time.

Another shortcoming identified by about 30 percent of the farmers concerned farm tours. They felt that most of the farm tours were rushed, and ample time was not granted them for more informal learning. The number of farm visits was also considered inadequate by about one-fifth of the farmers.

Forty-nine percent of the participants were of the opinion that it would have been helpful if they had continued participating in the program. They, however, felt the fertilizer allotment would not be very valuable if they were still participating in the program.

The contact with the farm management personnel and other professionals and access to better information about the market and the economy are what they regard as particularly beneficial if they were to continue participating in the program. They believed that information received through continuous participation would assist them in better forecasting future economic trends and subsequently to adapt their operations accordingly.

3.8 SUMMARY OF RESULTS

The results of this study may be summarized in terms of three factors directly related to income and three factors that are indirectly related to income.

The principal findings may be summarized as follows:

1. Value of crops produced, livestock and livestock product sales, and net worth--all directly related to income--showed substantial increases while the farmers were participating in the program and also for the years since they completed their participation in the program.
2. The percent of land in row crops, the size of the business and labor efficiency as measured by work units per farm and per worker respectively, increased after cooperating farmers have been terminated from the program.
3. Keeping records continue to be an important activity on former Rapid Adjustment farms and the majority of former participants continue to keep records according to the format that was utilized during the program years.

4. Most of the former participants in the Rapid Adjustment Program indicated that the program had been very useful to them in carrying out needed adjustments in their farming operations.

CHAPTER IV

SUMMARY AND CONCLUSIONS

In the design of farm programs such as the Rapid Adjustment Program, it is important to ensure that the experiences and knowledge acquired by participants could be utilized in their farming operations after supervision of specialists has been withdrawn. This is important since the success of any farming operation would depend on the skills and abilities of the individual farmer as a decision-maker.

This study was undertaken to examine whether or not the management skills acquired by former participants in the Rapid Adjustment Program during the program years have been sustained and whether or not the experience continues to result in increases in income and net worth.

The objectives of the study were to determine the performance of former Rapid Adjustment participants during 1984; to determine the average value of crops produced and livestock sales, and net worth status of the farms; the percent of land devoted to high-return crops; and labor efficiency and business size as measured by productive work units; to identify the particular elements of the program that have been most useful to the participants including the participant assessment of the program benefits believed worthwhile, as well as the shortcomings of the program. The major limitation of the study is the lack of access to reliable data for the determination of real growth on Rapid Adjustment farms.

A mail survey was administered to all the 67 cooperating farmers who had completed the program as of January 1, 1979. A response rate of 61 percent was achieved. The study revealed that 92 percent of former Rapid Adjustment participants are still farming. The percent of land that was devoted to high-return crops increased from 29 percent during the fourth program year to 36 percent in 1984. During the four years on the program the percent of land in high return crops increased by 93 percent; while after participation in the program, the increase was an additional 24 percent.

Rapid Adjustment farmers continued to expand the size of their businesses during and after leaving the program. When business size was measured in terms of work units, continued progress was demonstrated. The number of work units per farm increased from 345 in the benchmark year to 489 in the fourth program year. In 1984 the number of work units per farm had increased to 518. Productive work units per worker increased from 256 in the fourth program year to 278 in 1984. Most of the labor on Rapid Adjustment farms were fully employed during 1984.

Both the value of crops produced and livestock and livestock product sales increased after the program years. During the four program years, average value of crops produced increased by 68 percent. However, in 1984, the average value of crops produced, in deflated terms, increased by 157 percent to $75,292.

While on the program, real livestock and livestock product sales increased by 124 percent. Since completing the program, livestock and livestock product sales increased by another 36 percent. In 1984,

there was no production of livestock and livestock products on 23 percent of the farms.

The most drastic relative increase in the variables examined occurred in the net worth status of the farmers. During the four years on the program average net worth increased by 15 percent; and from their fourth program year to 1984, net worth per farm increased by 97 percent to $202,710 (in deflated terms).

One significant observation about the Rapid Adjustment farmers was the low level of financial leverage. On the average the amount of debt as a percentage of total assets was only 23 percent. Sixty-eight percent of Rapid Adjustment farmers would be able to retain at least 75 percent of the sale price of their farms (including land, buildings, fences, equipment, etc.) after they had paid for all debts. The study revealed that 31 percent of the farmers had no liabilities. The low liability to asset ratio places most Rapid Adjustment farmers in sound financial condition.

Rapid Adjustment participants extensively make use of farm records in analyzing their businesses. One hundred percent of all the respondents keep records of physical and financial activities on their farms. However, only 64 percent still keep their records according to the format used during the program years.

The participants identified record keeping and the adjustments in the combination of enterprises as the most beneficial aspects of the program. The diffusion of new technologies and management practices have also contributed to the success of the program. Contact with

farm management specialists and other professionals in agriculture have been very valuable to the farmers.

The Rapid Adjustment Program has helped other farmers with ability and potential to expand and improve upon their performance. It has been a learning experience for farm management specialists and extension personnel, and it has also been useful in the generation of farm planning information.

The program can be utilized as an important source of promoting the idea that appropriate planning and management can substantially increase farm income and provide an answer to many farm problems.

A longer participation time would have been very useful since many farmers had to make major adjustments in their operations. There is the need for more education to insure better record keeping on Rapid Adjustment farms. It must be pointed out that the farmers who participated in the Rapid Adjustment Program were a highly select group of farmers who had the resource base and the potential to successfully make adjustments in their operations to improve upon their performance. The Rapid Adjustment Program experience would have usefulness in many different settings in both the developed and the developing countries.

Research is needed to determine the performance of Rapid Adjustment farmers vis-a-vis other farmers in the region. Further research is needed to determine how the experience of the Rapid Adjustment Program has been utilized by the land-grant institutions and the Tennessee Valley Authority. Research is also needed to determine the relative importance of the various efficiency factors (both economic and physical) in determining the performance of the farmers.

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APPENDIX

APPENDIX A

May 6, 1985

To: Former Rapid Adjustment Program Participants

Dear Sir:

You may recall that when we first discussed the Rapid Adjustment Program with you, we mentioned that the records would be available to students for research purposes. Mr. Eugene Owusu is a student in our graduate program. He is an international student from Ghana. Many of our students have a strong interest in the Rapid Adjustment Program because it is a government program and has some developmental aspects to it. They like to study the program and its effectiveness and perhaps speculate about the impact a similar program might have in their country.

A short questionnaire has been designed to give some insights concerning the long-run effects of the Rapid Adjustment Program. We would be very appreciative if you would take a few minutes to complete and return the questonnaire in the enclosed self-addresed stamped envelope. As in the past, all information is considered to be confidential. The questionnaire has an identification number for mailing purposes and also for ensuring complete confidentiality of your information. No names will be associated with any of the information used.

Thanks again. We have appreciated your interest in helping promote agriculture in Tennessee in the past and hope you will have the same desire to assist us in this effort.

Respectively,

Herbert N. Walch
Professor
Agricultural Economics

Robert M. Ray
Associate Professor
Agricultural Economics

APPENDIX B

A COMPARATIVE STUDY

OF THE

RAPID ADJUSTMENT PROGRAM EXPERIENCE

Please answer all questions. If you wish to comment on any question or qualify your answers, please feel free to use the space in the margins. Your responses will be kept in strict confidence.

Are you still farming?

A. YES (If YES, go to Section I)

B. NO (If NO, circle which of the following apply, and go to Section V)

1 RETIRED FROM FARMING

2 SOLD FARM

3 OTHER (Please specify) _____

_____

_____

SECTION I - PRESENT OPERATION - 1984 BUSINESS YEAR

1. How much land do you permanently own, rent in from others, and rent out to others?

_____ NUMBER OF ACRES OWNED (INCLUDE LAND RENTED OR LEASED TO OTHERS)

_____ NUMBER OF ACRES RENTED IN OR LEASED FROM OTHERS

_____ NUMBER OF ACRES RENTED OUT OR LEASED TO OTHERS.

2. What was the ownership arrangement of the farm for 1984? (Circle the number)

1 INDIVIDUAL

2 GENERAL PARTNERSHIP: FATHER-SON TYPE

3 GENERAL PARTNERSHIP: OTHER RELATIVE SUCH AS BROTHER

4 GENERAL PARTNERSHIP: UNRELATED PERSON(S)

5 OTHER (Please describe) _____

_____

_____

_____

3. Which of the following crops did you grow and how many acres of each did you produce during 1984? (Circle as many as apply)

		Number of Acres	Yield in 1984
1	CORN	_____	_____
2	SOYBEANS	_____	_____
3	COTTON	_____	_____
4	WHEAT	_____	_____
5	TOBACCO	_____	_____
6	GRAIN SORGHUM	_____	_____
7	CORN SILAGE	_____	_____
8	SMALL GRAIN SILAGE	_____	_____
9	ALFALFA HAY	_____	_____
10	MIXED HAY	_____	_____
11	PASTURE	_____	
12	OTHER (Please specify)	_____	_____

4. Which of the following livestock enterprises did you operate in 1984, and what was the production from these enterprises?

	Total number on farm in 1984	Number sold in 1984	Average sale weight
BEEF			
1. BROOD COWS	_____HEAD	_____HEAD AS CULLS	_____LB
2. FEEDER CALVES		_____HEAD	_____LB
3. FINISHED STEERS AND HEIFERS		_____HEAD	_____LB
SWINE			
1. BROOD SOWS	_____HEAD	_____HEAD AS CULLS	_____LB
2. FEEDER PIGS		_____HEAD	_____LB
3. MARKET HOGS		_____HEAD	_____LB
DAIRY			
1. COWS	_____HEAD	_____HEAD AS CULLS	_____LB
2. HEIFERS		_____HEAD	_____LB
3. CALVES		_____HEAD	_____LB
4. MILK		_____ CWT	
POULTRY			
1. BROILERS		_____HEAD	_____LB
2. EGGS		_____DOZEN	
OTHER LIVESTOCK			
1. _____	_____	_____	_____

SECTION II - ASSETS

1. What is your present valuation of your:
   1. LAND, BUILDINGS, AND FENCES _____ DOLLARS
   2. MACHINERY AND EQUIPMENT _____ DOLLARS
   3. LIVESTOCK _____ DOLLARS
   4. FEED, SEEDS AND SUPPLIES _____ DOLLARS
   5. NON-BUSINESS ASSETS SUCH AS YOUR DWELLING, HOUSEHOLD FURNISHINGS, ETC. _____ DOLLARS
   6. OTHER (Please specify) _____ _____ DOLLARS
2. If you sold your total farm today (land, buildings, fences, equipment, etc.), what percentage of the sale price would you be able to retain after all debts have been paid?

   _____PERCENT

SECTION III - LABOR

1. Which of the following sources of labor and how many hours of each were used on your farm in 1984? (Circle as many as apply) (Give number of hours)
   1. OWNER-OPERATOR _____HOURS/WEEK
   2. OTHER FAMILY MEMBERS AVAILABLE YEAR ROUND _____HOURS/WEEK
   3. OTHER FAMILY MEMBERS AVAILABLE SEASONALLY _____HOURS/SEASON
   4. FULL-TIME HIRED HANDS _____HOURS/WEEK
   5. PART-TIME SEASONAL HIRED HANDS _____HOURS/SEASON
   6. CUSTOM LABOR HIRED BY THE JOB _____HOURS/YEAR
   7. OTHER (Please specify)_____ _____HOURS/YEAR

SECTION IV - FARM RECORDS AND MANAGEMENT

1. Do you still keep your farm records as you did when you were a cooperator in the Rapid Adjustment Program?

   YES _____

   NO _____

   If NO, please state why _____

   _____

   _____

2. Was the Rapid Adjustment Program of any benefit to you in your farming operations? (Please explain)

_____

_____

_____

_____

_____

3. Please list some of the shortcomings of the Rapid Adjustment Program.

_____

_____

_____

_____

_____

_____

4. Would it have been helpful if you could have continued participating in the Rapid Adjustment Program on the same basis except without the fertilizer allotment? (Please give reasons)

_____

_____

_____

_____

_____

_____

SECTION V

Is there anything else you would like to tell us about your operation as well as your experience in the Rapid Adjustment Program? If so, please use this space.

SECTION VI

Please check _____ if you would like a copy of the report developed from this survey.

THANK YOU FOR YOUR KIND COOPERATION.

VITA

Eugene Ebenezer Owusu was born in Kukurantumi, Ghana, on October 14, 1955. He attended the Akosombo International School and graduated from Okuapemman Secondary School, Ghana, in June 1977. The following September he entered the Univeristy of Science and Technology in Ghana, and in June 1981 he received a Bachelor of Science degree in Agriculture with a specialization in Agricultural Economics. In September 1981 he was employed as a Teaching Assistant by the University of Science and Technology, Faculty of Agriculture, in the Department of Agricultural Economics and Farm Management.

He entered the Graduate School at the University of Tennessee, Knoxville in September 1983. In August 1985 he was granted the Master of Science degree with a major in Agricultural Economics.

The author is a member of the Gamma Sigma Delta honor society.