DEVELOPMENT OF A FINANCIAL SIMULATION MODEL FOR GRAIN ELEVATOR FIRMS

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DEVELOPMENT OF A FINANCIAL SIMULATION

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PREFACE

This study is concerned with the development of a financial planning simulation model for use by the managers of Oklahoma's country grain elevator firms. The primary objective is to develop a computerized model which will aid grain elevator managers in the analysis of alternative long-range operating plans. Development of the analysis of grain-related operations is an important component of this model.

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CHAPTER I

INTRODUCTION

The economic efficiency of the U.S. grain marketing system of the future is, to a considerable degree, begin determined today by country elevator managers. In order for their firms to be economically viable, these managers must operate their firms so that grain is collected, stored and transported in the most efficient manner. Performance of these basic functions at the local level provides the basis for the national grain marketing system.

In addition to performing these basic functions, many country elevator firms operate side line enterprises which provide supplies and services to grain producers. A number of these firms operate seed grain enterprises which may include the storage, cleaning, treating, and bagging of seed grains. Many firms operate fertilizer enterprises which handle bulk or bagged fertilizers and the delivery equipment needed. Other farm supplies usually consisting of small implements and tools along with fuels and other petroleum products are handled by a large number of country elevator firms. In addition to these enterprises which supply grain producing inputs, a number of firms operate livestock and poultry feed enterprises which include the handling, storage and processing of a wide range of basic feed ingredients as well as the supplying of commercially bagged feeds and feed supplements.

Also, many elevator firms are involved in other side line enterprises which are needed by agricultural producers at their particular locations.

Problem Statement

The success of a firm depends upon the ability of management to make sound decisions concerning everyday operations of the elevator and side line activities. More importantly, the future success of a firm depends on management's decisions concerning long-range facility improvement plans. These long-range plans generally require much consideration because country elevator firms operate in an environment of uncertain business conditions caused by a number of factors which affect the volume of grain handled as well as the demand for those supplies and services provided by side line enterprises. As with any agriculturally related industry much uncertainty is caused by weather conditions which affect the yields and harvested acres of grain. Government farm programs affect the number of acres planted and the length of storage and the movement of grain from the local elevator to terminal or export facilities. Finally the world supply-demand situation affects farmers' decisions concerning the acres planted and eventually the length of time grain is stored. These factors also affect the amount of seed wheat, fertilizer, fuel and other farm supplies handled by an elevator firm. Management must analyze these factors and develop forecasts of their probable impact when analyzing long-range capital expenditure plans.

This environment of uncertainty described above compels prudent managers to ask many "what if" type questions when analyzing the feasi-

bility of changes in a firm's operations. These questions are asked in order to evaluate the effects of proposed long-range changes under alternative assumptions concerning future business conditions. For example, the management of an elevator with a current storage capacity of 500,000 bushels may consider increasing the storage volume to 750,000 bushels. Some typical questions asked in this situation might be:

> What if the average length of time farmers store grain is reduced by one-third?
>
> What if the average number of bushels handled is reduced by 20 percent for three consecutive years?
>
> How would an expansion in storage capacity of 100,000 bushels compare with the proposed 250,000 bushel increase under various sets of conditions?

Obviously there are many of these "what if" type questions which could be asked when analyzing the feasibility of storage expansion. In addition to questions concerning alternative sizes and types of new or additional storage facilities, management commonly considers changes in the firm's receiving, handling, and transportation facilities. Similarly, management is faced with questions concerning the expansion of existing side line enterprises or the introduction of new enterprises. Finally, management may be given an opportunity to purchase another elevator facility in another location and cooperatives may wish to analyze the feasibility of merging with other cooperatives; again, many "what if" type questions must be considered in these situations.

Thorough analysis of these "what if" questions requires much information. To begin with, the most recent balance sheet and income statement are needed to show the present financial position, enterprise profitability, debt structure and available sources of funds.

Given the present condition of the existing facilities and equipment, management practices concerning employment, purchases, desired inventory levels, gross margins, customer services, and desired earnings distributions are needed to adequately describe the operation of the firm. Additionally, management's projections of future sales, costs, margins, volume of grain expected to be handled as well as the length of storage time must be incorporated into a feasibility analysis. Furthermore, future short term and long term debt requirements and many other important factors must be considered.

Management must spend much time analyzing the above mentioned information when considering long-range changes in the firm's operations. The current financial and operational condition of the firm is known with certainty and so the assembly of this information requires little time or study, but the consideration of many alternative changes under various assumptions concerning important future operational variables can easily become a time consuming and sometimes confusing process. Much time would be spent in calculating the results by hand. Due to the amount of information needed for the analysis and the wide range of alternative arrangements and assumptions which could be evaluated, calculation of the results by hand can easily result in a loss of detail in the analyses. Also, it is likely that some possible alternative courses of action may not actually be considered in depth due to the time required for such an analysis.

In recent years management of large corporations have increasingly used computer programs to aid them in their evaluation of alternative changes in their firms' operations. These simulation models, designed to simulate the operations of the firm, have become to be recognized as

important tools which management uses when analyzing these "what if" type questions associated with proposed changes in operations. Simulation models currently in use vary in construction for different types of industries because of the unique functions and operations performed by each industry class. Even within an industry the decision-aiding models used may vary because of differences in operations and interrelationships between functions within the individual firms. For these reasons, the types of models and their individual construction and capabilities vary depending upon the needs of the firm. But, although the types of models vary, many decision-aiding simulation models tend to exhibit similar general characteristics. Many simulation models used for planning purposes designate a base period as the starting point for the simulation of future operating periods. This base period refers to a firm's most recent accounting period or fiscal year from which the complete results of the period's operations and the ending financial statements completely describe the firm's position. This base period is the starting point for the simulation of the operations of future time periods. This base period financial data is processed by computer programs to reconstruct the initial financial condition of the firm from which the future periods are simulated. After the reconstruction of the base period data, this information is often printed so that it may be compared to the results of future simulated periods.

Following the reconstruction of the base period data, managerial data regarding operating variables is entered into the program. These operating variables are factors which are set by management. For example, desired inventory levels, gross margins and distribution of

earnings are factors over which management has control. In simulating future operations the levels of these variable may be set at traditional management practices, or these operating variables may be set at experimental levels in order to analyze the effects of new managerial policy or changes in business conditions. The managerial and base year data mentioned above provide the initial position of the firm and sets levels of management-determined variables for the simulation of future operations. The final set of data needed to complete the program concerns key operating variables over which management has little or no control. The levels of these variables are usually projected by management or are stochastically determined as discussed below.

Future sales, expenses, production costs and interest rates are key operating factors which are determined to a large degree by future business conditions. In the simulation of future operations these factors must be either projected by management or determined by other means. When these key variables are projected by management the process is termed 'deterministic simulation' because the factors are determined by management. In this process, results generated by the model are dependent upon management's projections of key operating variables. By varying these projections and considering alternative changes in operations under a wide range of business conditions. Alternatively future levels of key operating variables may be determined stochastically. This stochastic process utilizes knowledge of the past time trend of the key operating variable along with knowledge of its observed variation around this trend in order to estimate the key operating variable's probably magnitude in future time periods. In many cases, the stochastic process of projecting the levels of key

operating variables may add a greater degree of realism into the analysis by recognizing that the variability observed in the past may provide a basis for projecting the levels of these factors in future time periods. Both the deterministic and stochastic simulation models offer management the advantages of speed, detailed analysis of alternative changes, and clearly organized evaluation of the questions involved in the consideration of long-range changes in operations. Management is able to test many ideas before having to actually risk the capital needed for proposed changes.

Development of such a simulation model requires the time, money, programming expertise and computer facilities as well as knowledge of the operations of the firm and its decision-making environment. For these reasons few country elevator firms have the resources required to develop a financial planning simulation model. Furthermore, as stated earlier there are no general simulation models which can be successfully adapted for all types of industries. At the time of this writing no financial planning simulation model has been developed for the country elevator industry.

Objectives

The purpose of this research is to develop a financial simulation model which is to made available to country elevator managers through the Agricultural Economics Department of Oklahoma State University. The model is easily adapted to specific operations of individual country elevators. The model is to be used as an aid to elevator managers in the evaluation and analysis of "what if" type questions

are commonly asked when long-range changes in a firm's operations are considered.

Specifically, the objectives of this research are:

(1) To construct a firm financial simulation model which can be used as a decision making aid to managers of country elevator firms in analyzing long run operational changes.

(2) To demonstrate the model using actual firm data.

Organization of Study

The following chapters present the conceptual and empirical development of the financial simulation model for grain elevator firms. Chapter II contains the literature review and Chapter III presents the procedure used to develop the model. The conceptual organization of the model and the computer program is discussed in Chapter IV. Results of limited testing of the model along with a discussion of the computer output are the subjects of Chapter V. Chapter VI contains a summary of the study and conclusions with recommendations for future research.

CHAPTER II

REVIEW OF LITERATURE

Introduction

This review of previous work provides a brief background of the fundamental concepts, methodology and applications of simulation. As much as possible the discussion adheres to applications of simulation in agricultural economic research. Specifically the discussion is directed toward simulation as it can be applied toward the development of a financial simulation model which may be used by country grain elevators and farm supply firms for the purposes of long-range planning and decision-making.

This review of literature is divided into three parts. Presented first is a general discussion of simulation definitions, properties and popular techniques. This discussion explains why simulation models have been widely used in agricultural economic studies. The second segment relates briefly a number of the application of simulation models in agricultural economic research. The third segment reviews the literature relating to the development of financial simulation models.

A General Discussion of Simulation

This section first discusses various definitions of simulation which are found in the literature. Secondly, the dynamic and stochastic properties of simulation models are reviewed. The last two sections discuss widely used simulation techniques--Monte Carlo analysis and operational gaming models.

Simulation Definitions

Simulation is used to aid in the understanding of many systems of relationships. Simulation is used extensively in training, designing and experimentation, and it is also used greatly in the control of and forecasting the condition of dynamic systems composed of many variable relationships.

Precisely, what is simulation? The term 'simulation' is used quite freely because it has such wide practical application toward the analysis and evaluation of problems and questions associated with many systems of relationships. Agrawal and Heady (1, p. 26) state that "simulation is a reproduction under test conditions of a phenomena likely to occur in actual performance and that it (simulation) is an act of experimenting with the model of a system rather than directly with the system itself." Schubik (36) offers a more descriptive definition of simulation.

> A simulation of a system or an organism is the operation of a model or simulator which is a representation of the system or organism. The model is amenable to manipulation, which would be impossible, too expensive, or impractical to perform on the entity it portrays. The operation of the model can be studied and, from it, properties concerning the behavior of the actual system or its subsystem can be inferred (p. 909).

Schubik's definition applies to the use of simulation models to study physical, mathematical and logical systems. Indeed, physical simulation models (simulators) have been extensively used in the testing of aircraft and in the training of pilots and astronauts. These physical simulators offer the following advantages: (1) less risk of life; (2) less risk of expensive equipment; and (3) the trainee may be conditioned to a great number of circumstances which might take years of actual 'job' time to experience.

Naylor's (30) definition of simulation is more applicable to the way in which simulation is to be used in this research:

> Simulation is a numerical technique for conducting experiments on a digital computer, which involves certain types of mathematical and logical models that describe the behavior of a business or economic system (or some component thereof) over extended periods of time (p. 3).

Naylor's definition should be kept in mind because it expresses most clearly the meaning of simulation as it is applied to the development of a financial simulator model. In accordance with Naylor's definition, the model in this study is composed of mathematical and logical expressions and is programmed for a digital computer.

Dynamic Simulation Models

Naylor's definition of simulation cited earlier emphasizes that dynamic considerations are closely tied to the concept of simulation. He also defines dynamic models as those "mathematical models that deal with time-varying interactions (30, p. 18)." Similarly, Baumol defines economic dynamics; as the "study of economic phenomena in relation to preceding and succeeding events (4, p. 4)." Anderson

states that "a simulation model serves to track the state of a system as it is represented by ascribed simular state variables over simular time (2, p. 9)." Naylor (30) cites three well-known applications of simulation to economic dynamics: (1) simulation of business cycle and macroeconomic growth models; (2) simulation models of the firm; and (3) queuing, scheduling, inventory and job shop models. Dynamic considerations are inherent to the simulation of economic and business systems because events of one time period generally affect the operations of succeeding periods.

Anderson (2) discusses the synthesis of dynamic considerations in simulation models. He points out that while real time advances continuously, digital simulation models must be considered as "discrete-change models wherein time is advanced in unit or multiple increments.....only with analogue computer simulation models can simular variables be adjusted continuously (2, p. 11)." In this regard, attention must be given to input requirements and especially output demands.

There has been much written concerning the development, applications and benefits of dynamic simulation models in agricultural economic studies. Further information relating to dynamic models is found in Bonini (5), Orcutt (33), Shubik (36), Emshoff (17), Naylor (30, 31), and Anderson (2).

Stochastic Simulation Models

Stochastic simulation techniques provide the means to model systems (or parts of systems) in which some key variables have probability distributions. Any activity closely related to production agriculture

is directly affected by uncontrollable factors which affect the production and the marketing of agricultural products. Variables such as weather are never known with certainty but their probability distributions can generally be estimated. Therefore, any model simulating a process, activity or system affected by these variables can be enhanced by including stochastic processes of estimation in the model. Many agricultural economic models are affected by such variables, thus, simulation models with stochastic components are often considered to be practical tools of analysis. Anderson (2), Naylor (30, 31), Agrawal and Heady (1), Bonini (5), Dent (15), and Emshoff (17) discuss the development of stochastic simulation models and also provide excellent references and applications for further information.

Monte Carlo Analysis

Churchman (10) defines Monte Carlo analysis as a simulation technique for problems having a stochastic or probabilistic basis. Spurr and Bonni (37) state that "the Monte Carlo method is a means of simulating a real-world situation which involves probability elements (p. 422)." Agrawal and Heady (1) comment on the general use of this technique.

> ... in using the Monte Carlo approach for simulation purposes, we generate synthetic information to represent a real-world system by utilizing the existing knowledge about the structure of the system, the nature of the probability distribution of variables and so forth. We learn about the probability distribution of variables from actual experience, take samples from the distribution through a random process, and then obtain simulated data as a representative of the real situation. Use of random numbers helps in generating values having a probability distribution representing the real world (p. 268).

Naylor (30) points out that there are two different types of problems which give rise to the use of Monte Carlo analysis: (1) problems which involve some kind of stochastic process and (2) certain completely deterministic mathematical problems which cannot be solved easily (if at all) by strictly deterministic methods. An example of the first type of problem would be agriculturally related studies focusing on production and marketing problems which are affected by crop yields and other stochastic factors. In this sense Monte Carlo analysis can be used to estimate probable yields by randomly sampling from the factor's estimated probability distribution as perceived from experience. Naylor (30) points out that "consumer demand, production lead time and total investment in the economy are examples of economic variables which may be considered stochastic in nature (p. 4). The second type of problem solved using Monte Carlo analysis involves finding "solutions to higher order (greater than second order) difference equations and multiple integral problems...(p. 4)." Agrawal and Heady (1), Naylor (30), and Spurr and Bonni (37) provide excellent examples of practical applications of Monte Carlo analysis and also offer further references on this subject.

Operational Gaming

Naylor (30) states that the term 'operational gaming' refers to "those simulations characterized by some form of conflict of interest among players or human decision-makers within the framework of the simulated environment (p. 3)." Similarly, Anderson (2) says that "gaming models frequently possess many of the dynamic, stochastic and structural features of typical simulation models and have often been

termed 'simulations' (p. 8)." However, as Anderson points out, "there is one additional and distinguishing feature [of gaming models], namely direct human interaction in running the model (p. 8)."

Operational gaming models are used primarily as instructional tools but they also provide a means of studying decision-making systems by making possible the observation of both the environment in which the decisions are made and the decision-makers operating within the environment. Military games and business management games are two of the most widely used forms of operational gaming.

Simulation Applications in Agricultural Research

From the preceeding discussion it can be seen that simulation is an attractive analytical tool for use in agricultural studies. The number of agricultural simulation studies in the literature reflects the wide use of simulation in agricultural research. A review of simulation in agricultural economics by Anderson (2) lists over 350 reports, journal articles, books and bulletins which discuss simulation applications and techniques. An earlier review of simulation procedures and applications written by Johnson and Rausser (25) for an American Agricultural Economics Association symposium on quantitative methods also deals extensively with the subject. These reports by Anderson, and Johnson and Rausser list an extremely wide range of simulation applications in agriculture on both the microeconomic and macroeconomic levels.

At the micro level, the stochastic, dynamic nature of agricultural production makes simulation an especially valuable analytical tool to use in the analysis of farm firms and agricultural marketing

and supply firms directly affected by farm production. Agrawal and Heady (1) discuss the use of simulation in analyzing agricultural production decisions and compare simulation to other operations research methods. Zusmand and Armiad (41) used simulation to analyze farm planning decisions under varying weather conditions. Dalton (14) has illustrated the use of simulation for specifying farm investment plans with special reference to harvesting grain. Hinman and Hutton (24) developed a "General Agricultural Firm Simulator" for use in simulating agricultural production systems. For additional references to a wide range of simulation studies concerning farm enterprises and related activities see Anderson (2).

Simulation games have been widely used as instructional aids for both universities and private organizations. These games illustrate procedures for simulating important business relationships and processes. Eidman (16) has developed a farm management game in which the student farmer makes decisions concerning the enterprises to be included on his farm, subject to his acreage, capital and other restrictions. In this game, important variables such as yields, are stochastically determined. Fisher (19) developed a management game for rural banks. This game, in which individual bank managers compete for business, has been used as an instructional tool by both Oklahoma State University and by the Oklahoma Bankers Association. Griffin (22) developed a futures market game which uses daily futures market information in simulating the results of trades made by the 'student traders'. Oehrtman and Sanders (32) have developed a business management game in which teams of students compete for their share of the market. In this game the competing teams face decisions concerning

pricing, advertising, production, and inventories in imperfectly competitive product markets and also learn to interpret financial ratios and other indicators of the position of the firm.

In the macro level studies, much of the simulation work has focused on aggregate economic variables such as world food production, resource stocks, population and incomes. Other studies deal with rates of technological change in food and fiber production, off-farm migration rates and income elasticities for farm products. The levels of these economic variables are important in analyzing the agricultural situation in both developed and developing nations. Examples of macro simulation models are found in Anderson's (2) review in which he comments that simulation is particularly helpful in handling the vast number of variables and interrelationships involved in these aggregate studies.

Development of Financial Simulation Models

Prior to the development of the digital computer in the early 1950's computer systems were used by businesses to speed the laborous and costly time-consuming record-keeping and accounting processes. As computer technology advanced and more sophisticated programs evolved, the use of simulation as a managerial tool became more widely accepted. Bonini (5) in his dissertation presents a discussion of the early use of 'industrial dynamics' in analyzing business relationships. Forrester (18) and Ansoff (3) also discuss the attributes of industrial dynamic models as applied to the study of industries. As the term implies, industrial dynamics, as applied to the study of microeconomic systems, was concerned with the analysis and measurement of relation-

ships between key variables and important factors within and between firms. Much of the application was directed toward problems of a continuous or flowing nature; i.e., dynamic problems such as inventory and industrial production control. Industrial dynamic studies used computer systems for more than record-keeping. From these studies the advantages of using computer programs for the analysis of dynamic systems were recognized.

As computer systems became more sophisticated the knowledge and use of simulation models grew rapidly. Analyses using simulation techniques were soon applied to a variety of business and economic studies. In his treatment of management science simulation models, Naylor (31) discusses queuing, inventory, production, marketing, financial and corporate models and management games. In his discussion of financial simulation models, Naylor summarizes Clarkson's (11) trust investment simulation model, Hertze's (23) model of capital budgeting under risk, Mattessich's (27, 28) firm budgeting model and the Sun Oil Corporate Financial Model (21). Naylor's (31) brief overview of these models illustrates 4 different types of financial simulation models. Meire (29) and Emshoff (17) also discuss many business and economic applications of simulation models.

In the 1960's major business firms began to use financial simulation models to aid management in the analysis of short-range operations and in the development of long-range operating plans. George W. Gershefski (20) began constructing a financial simulation model for the Sun Oil Corporation in 1965. The objective of this model is "to provide management with a fast reliable method of forecasting the financial performance of the company based on any specific set of

anticipated conditions (21, p. 5)." Gershefiski (20) discusses the analytical construction and the computer programming of this very large, privately held model. The advantages of using this planning model, as cited by Gershefski are discussed later in this section.

Richardson (40) discusses how the management of Agway, Inc., a large regional farm supply and marketing cooperative operating in 12 northeastern states, uses a simulation model in developing their five-year plan of operation. The model used by Agway, Inc. is a privately held model ('PSG' - Planning Systems Generator) developed by their computer supply firm. Richardson discusses the use of the model in establishing and evaluating alternative long-range plans designed to meet the firm's objectives. Other examples of corporate financial models are found in Naylor (31).

M. R. Tyran's (38, 39) articles deal with the basic problems of developing financial simulation models as well as suggest procedures which help to alleviate these problems. Tyran also discusses the following advantages of using simulation models in long-run planning:

(1) Greater data handling capacity
(2) Shorter turn-around time
(3) Fewer computational errors
(4) Increased reality of the analysis by using stochastic programs
(5) Larger number of alternative plans can be evaluated
(6) Greater flexibility of budgeting procedures
(7) Greater ability to test the effects of external stimuli on the firm's operations

The above advantages are reinforced by Gershefski (20), Rupli (35), Candler (7), Burch (6), Richardson (40), Naylor (30, 31), and Dent (15).

In addition to the development of complete firm simulation models discussed above, a variety of important and related topics are found in the literature. Candler (7) discusses the impact of the changing

economic environment on managers of agricultural firms. Candler emphasizes the role computer planning models may have in aiding managers to evaluate alternative plans under uncertain business conditions. Carleton (8) compares analytical models for long-range planning while Chervany (9) investigates simulation of cash flow analysis. Cohen (12) presents a detailed discussion of simulation of the firm and Conway (13) comments on problems associated with digital simulation. In other areas Lifson (26) discusses simulation models for asset deployment and funds sources in balancing profit, liquidity and growth. Renborg (34) comments on problems and theories of agricultural firms which are important to the development of financial simulation models. Finally Rupli (35) discusses how profits may be improved through analyses using simulation models.

Summary

There has been much written on the development and application of simulation models in the field of agricultural economics. The nature of agricultural research problems often easily lend themselves to simulation analysis especially when the models are of a dynamic, stochastic nature.

A multitude of financial simulation models have been developed for the analysis and study of a variety of business relationships and problems. Some models are directed to the short-range problems such as queuing and inventory control while many models are developed to aid management in long-run planning and forecasting. Many models are developed for the analysis of specific financial problems such as cash

flow analysis or investment under conditions of uncertainty, and larger comprehensive models are developed to simulate the financial operations of entire firms.

In order to be an effective managerial tool a simulation model must closely simulate the entity or system of interest. A long-range planning model for use by managers or country elevators must be specifically designed to simulate the operations of these firms. Models simulating operations similar to those performed by grain elevator firms provide a base of ideas and information which can be drawn upon in the development of a financial simulation model specifically designed for country elevator operations.

CHAPTER III

PROCEDURE

Introduction

Research on the North Central Regional Project, NC-104 entitled "Systems Analysis of the Economics of Grain Marketing" is being conducted by several cooperating universities. In addition to analyzing many of the marketing, transportation and organizational problems of the U.S. grain marketing system, one specific objective of this project is to develop computerized decision-making models which will enable individual grain marketing firms to more completely and efficiently analyze decisions concerning operational changes under alternative economic conditions.

The Agricultural Economics Department at Oklahoma State University and the University of Missouri shared the responsibility of developing one of the simulation models for decision-making. The Department at the University of Missouir programmed an initial version of a computerized main program and subroutines, and also developed a detailed version of a feed mill enterprise subroutine.[1] The Department at Oklahoma State University was responsible for further refining the main program and subroutines, as well as conceptualizing and developing in detail that part of the computerized program for analyzing decision alternatives for grain elevators. This section of the program will hereafter be referred to as the Grain Volume Analysis.

This chapter presents the procedure used in constructing new additions to the model, major developments and important refinements of operations of the model.[2] It should be recognized that, when working with computer models, additions and refinements in any part of the model usually cause related modifications throughout the program. Such was the case with this research. As a result, minor improvements implemented to facilitate the additions and important refinements are not noted; only those areas of major research effort are discussed.

The following discussion briefly outlines the procedure that was followed through the research reported herein. The first section outlines the procedure used in developing and refining the main program and the second section discusses the procedure followed in developing and refining the subroutines.

Main Program

As stated earlier, one objective of this research was to refine and improve the main program. The first step taken to achieve this objective was to review the initial version of the program in order to understand the basic logical design of the model, the organization and sequence of operations and the programming techniques used. After familiarization with the over-all workings of the main program, the operations of each section were studied in depth. This analysis determined the need for additions to the program; this analysis also determined those sections and specific operations of the program which required major development and refinement. Presented first is the procedure used in developing additions and important improvements.

The second part outlines the procedure used in refining certain sections of the main program.

New Additions and Major Developments

Data Check Output (Firm)

This output was constructed to show at a glance the important assumptions upon which a particular analysis is based. This output was developed by:

1. Identifying the important user-determined variables to be printed;
2. Organizing this information into an easily read format;
3. Verifying the output by computer test runs.

Accounting System

The system of balance sheet accounts and accounting operations needed three major improvements. These were: (1) development of a workable set of accounting relationships; (2) revision of the sequence of accounting operations; and (3) development of a set of equity accounts for each form of business organization considered in the analysis.[3] The accounting system was improved by:

1. Developing accounting relationships according to generally accepted accounting theory;
2. Revising the sequence of accounting operations in relation to the timing of other program operations.
3. Developing a set of equity accounts for each form of business organization which compliments the taxation and distribution of earnings procedures;
4. Verifying the accounting operations by computer test runs.

New Investment Analysis

The new investment analysis was constructed to accomodate the analysis of new investments in any enterprise. The following steps explain the procedure used in developing this section:

1. Identify important investment information;
2. Establish the format to read the information into the computer;
3. Account for the new investment;
4. Verify by computer test runs.

New Investment Output

This section of output was developed to show in detail the new investment being analyzed by the model. The steps taken in developing this output were:

1. Identifying important information to be printed;
2. Organizing this information into an easily read format;
3. Verifying the output by computer test runs.

Grain Volume Analysis

Development of the Grain Volume Analysis was one of the primary objectives of this research. Since most country elevator firms derive a large portion of their revenue from the handling and storage of grain (primarily wheat in Oklahoma), the Grain Volume Analysis was developed to simulate the financial effects of handling and storing different volumes of grain. This section was developed to inlcude three alternative methods of anlaysis to fit the needs of most firms.[4] The procedure used to develop this analysis was as follows:

1. Study the grain handling and storage operations of country grain elevators;
2. Identify the operations to be included in the analysis;
3. Identify the data needed to simulate these operations;
4. Program the input of data and the simulation of operations;
5. Verify this section by computer test runs.

Grain Volume Analysis Output

This output was developed to show in detail the data, results and assumptions of the Grain Volume Analysis. This section of output was developed by:

1. Identifying important user-determined variables;
2. Organizing this information into an easily read format;
3. Verifying the output by computer test runs.

Computation of Income Taxes

The computer operations which calculate income taxes for corporate and cooperative firms received much development. The basic taxation procedures and the use of investment tax credits were extensively refined. The steps taken to develop taxation operation for corporations and cooperatives were as follows:

1. Study the Internal Revenue Code to learn basic considerations;
2. Consult with cooperative accounting specialists to learn taxation considerations for cooperative firms;
3. Identify those taxation procedures to be included in the model;
4. Program these operations for computer use;
5. Verify these operations by computer test runs.

Computation of Distribution of Earnings

The computer operations which distribute the firm's earnings received much development. To facilitate the inclusion of a more detailed distribution of earnings procedure a set of equity accounts was established for each form of business organization. The steps taken in the development of this section were:

1. Study generally accepted accounting theory to gain an understanding of the most common distribution of earnings procedures for sole proprietorships, partner-

ships and Subchapter 'S' corporations and regular corporations;
2. Study actual financial statements of cooperatives to learn the most commonly used cooperative distribution procedures;
3. Consult with cooperative tax specialists to learn the relationships between taxation procedures, state regulations and distribution of earnings for cooperatives;
4. Identify those distribution of earnings procedures to be included in the model;
5. Program these operations for computer analysis;
6. Verify these operations by computer test runs.

Taxation and Distribution of Earnings Output

This output was developed to show in detail the taxation and distribution of earnings information for each form of business organization. This section of output was developed for each form of business by:

1. Selecting the taxation calculations to be printed;
2. Selecting the distribution of earnings calculations to be printed;
3. Organizing this information into an easily read format;
4. Verifying the output by computer test runs.

Assembly of Equity Accounts

As stated earlier, a set of equity accounts was established to facilitate the distribution of earnings for each form of business organization. This section of operations assembles the equity accounts and adjusts for the distribution of earnings. The procedure followed in developing these operations were to:

1. Identify those equity accounts affected by the distribution of earnings;
2. Adjust these accounts according to the distribution of earnings;
3. Verify these operations by computer test runs.

Equity Account Analysis Output

The balance sheet output does not include a detailed presentation of the individual equity accounts. This section of output was developed for each form of business organization to clearly present the end-of-period equity accounts which are summed into a single account on the balance sheet. This output was developed by:

1. Selecting those equity accounts to be presented;
2. Organizing the printing of these accounts into an easily read format;
3. Verifying the output by computer test runs.

Simulation Summary Output

This output was developed to show the levels of important financial indicators each year of the analysis. This summary was developed by:

1. Selecting important financial indicators to include in the summary;
2. Programming the model to store these factors each year;
3. Organizing this information into an easily read comparative financial summary output;
4. Verifying the output by computer test runs.

Program Refinements

Initialization of Identifiers

The additional programming needed to incorporate the changes in the model required the use of a number of new identifiers.[5] Many of these identifiers were initialized in order to assure proper storage. The identifiers were initialized by:

1. Selecting those identifiers to be initialized;
2. Programming the model to initialize these identifiers to prescribed values;
3. Verifying the initialization by computer test runs.

Firm and Decision Data Input

Additional user-supplied data were needed to compliment the changes and additions to the program. The procedure used to program the model to read these data is as follows:

1. Identify the additional data needed;
2. Select the proper sections of the program in which to read the data;
3. Develop a format for reading the data;
4. Program the model to execute the reading of the data;
5. Verify the reading of data by computer test runs.

Loan Analysis

The logic of the short term loan analysis was altered. The new logic used contains no borrowing limit and operated using a 'minimum cash balance' concept. This analysis was developed by:

1. Studying the short term loan analysis logic of the original program;
2. Refining this logic to operate on a 'minimum cash balance' basis;
3. Programming this logic for computer analysis;
4. Verifying the operations by computer test runs.

Loan Analysis Output

The output generated by the loan analysis operations was altered to include results of the short term loan analysis as well as results of the long term loan analysis. This output was refined by:

1. Selecting important short term loan information to be printed.
2. Organizing this information into an easily read format compatible with the long term loan analysis output;
3. Verifying these operations by computer test runs.

Income and Expense Accounts

The firm's operating and service income accounts, other income accounts and other expense accounts were refined in order to simplify the data input operations and clarify the use of these accounts. Some subaccounts under these headings were transferred to more appropriate sections of the program. These refinements were made by:

1. Identifying the subaccounts to be transferred;
2. Executing these changes in the main program;
3. Verifying these operations by computer test runs.

Subroutines

The procedure followed in improving and refining the subroutines is similar to that used in the analysis of the main program. The first step taken was to review the initial version of each subroutine. The operations of each subroutine were studied in detail and the needed additions and refinements were made.

The model contains 11 subroutines, six of which are the enterprise subroutines: Feed; Seed; Grain; Fertilizer; Farm Supplies and Other. The initial versions of these subroutines were retained. Of the remaining five subroutines (Dprn, Loan, Reed, Update and Gause), the initial version of the Loan subroutine (computes interest and principal payments of long term loans) was retained while the other subroutines received additional development.

Discussed first in this section is the development of the Dprn subroutine (computes depreciation on enterprise assets) and the addition of the Gause subroutine (random number generator used in Grain Volume Analysis). Discussed second are the refinements made in the

Reed subroutine (reads enterprise data) and the Update subroutine (updates enterprise sales, purchases and inventories).

New Additions and Major Developments

Subroutine Dprn

This subroutine which calculates depreciation expense, accumulated depreciation and book value for individual enterprise assets was extensively rewritten. The calculations and logic were changed and additional options were included in the analysis. The procedure followed to develop subroutine Dprn was to:

1. Study the initial version of the subroutine;
2. Develop a new logic for the subroutine;
3. Derive calculations to compute depreciation expense, accumulated depreciation and book value by four methods (straight line, sum-of-years' digits, 200% declining balance, and 150% declining balance;
4. Investigate and implement the use of additional first year depreciation;
5. Consult I.R.S. references for popular options used under percentage declining balance methods;
6. Write the subroutine;
7. Make test runs to verify the computation and storage of depreciation figures.

Subroutine Gause

Gause is a 'canned' subroutine supplied by I.B.M. which generates random numbers. It was added to the program to be used in the Grain Volume Analysis. The procedure used to add this subroutine was to:

1. Make the necessary changes in the program (call statement, initialize seed value, etc.);
2. Make test runs to verify the distribution generated by the subroutine.

Refinements

Subroutine Reed

Two additions were made to this subroutine which reads enterprise data. First, a section in this subroutine was developed to print the depreciation data of each enterprise. Second, two additional income and expense accounts were added to the enterprise data. This was accomplished by:

1. Selecting depreciation data to be printed;
2. Arranging this data into an easily read format;
3. Programming the subroutine to read the additional income and expense accounts;
4. Verifying the reading of data and printing of depreciation data by computer test runs.

Subroutine Update

One change was made in this subroutine which updates expected sales, purchases and inventories for each enterprise. The refinement pertains to the purchase of goods when inventory levels exceed expected sales by a very small margin. This process is explained in detail in the model chapter. This refinement was accomplished by:

1. Studying the calculation of purchases in the initial version of the subroutine;
2. Developing the refined logic;
3. Implementing the change in the subroutine;
4. Verifying the computations by computer test runs.

Summary

This chapter outlines the procedure used in developing the model. It is recognized that the format used to discuss the procedure is not easily read and that in developing many parts of the model similar

steps were followed. Thus, the procedural steps presented here may seem redundant. But, the procedure is presented in this format in order to clearly show the way in which each section of the model was developed.

FOOTNOTES

[1]This detailed feed mill enterprise subroutine is not discussed in this thesis.

[2]Entirely new parts of the model developed in this research are referred to as 'new additions' to the model. Segments of the model which received extensive reconstruction are termed 'major developments'. Those parts of the model which received less extensive development are termed 'refinements' in the model.

[3]The three forms of business organization considered are: (1) sole proprietorship, partnership, and subchapter 'S' corporations; (2) regular corporations; and (3) cooperatives.

[4]The three methods included in the Grain Volume Analysis are: (1) Stochastic Method; (2) Yield Times Acres Method; (3) Volume Method.

[5]Memory locations in the computer are given names in Fortran programming. These names are referred to as 'identifiers' because they identify a specific memory location. The value of each identifier is either assigned by the programmer or calculated by the computer. To insure that proper value is stored in an identifier the identifier is often assigned a value at the beginning of the program. This process of assigning values to identifiers is referred to as the initialization of identifiers.

CHAPTER IV

THE MODEL

This chapter presents an overview of the Grain Elevator Firm Simulation Model.[1] Presented first is a general description of the model. Presented second is a discussion of each major computer step executed by the model. The steps are discussed in the sequence shown in the flow chart in Figure 1.[2]

Data requirements and computer output is not specifically discussed in this chapter. Data Input Forms which explain the data requirements are presented in Appendix A. Computer output is discussed in Chapter 5 which presents the demonstration of the model. Examples of computer output are shown in Appendix B.

General Description

The Grain Elevator Firm Simulation Model is a computerized simulation model written in the Fortran IV Computer Language and adapted to the IBM Model 370/158 computer. Its primary purpose is to provide information which will aid management of country grain elevators in their analysis of questions concerning long-range changes in operations by simulating the effects of alternative plans under a variety of projected economic conditions. Using the firm's most recent fiscal year financial statements, operating and investment data, and management's projections concerning future economic conditions as a base of

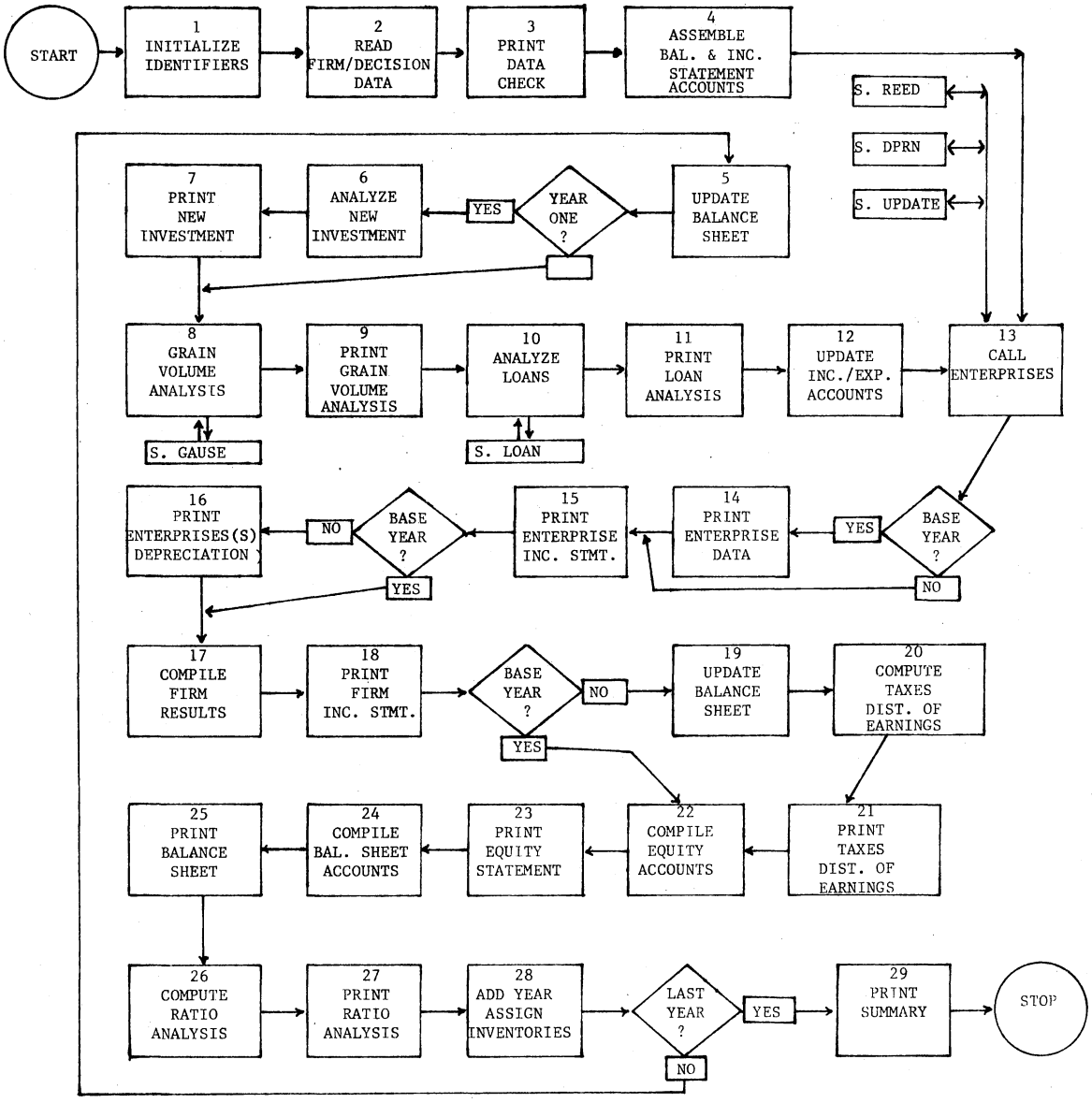

Figure 1. Flow Chart of Main Program

information, the model simulates the financial results of the firm's activities over a selected period of years. Projections and assumptions concerning operations, investments and future economic conditions may be varied in order to compare alternative plans under various operating conditions.

The model is designed to be flexible so that proposed operations of most country grain elevator firms may be analyzed. The model is designed to compute income taxes and distribute earnings for three alternative forms of business organization; these being: sole proprietorship, parternship, or Subchapter 'S' corporation; regular corporation; and cooperatives. Grain handling and storage operations may be simulated stochastically or deterministically. In addition to the analysis of grain operations six sideline enterprises may also be analyzed; these are: Feed; Seed; Grain; Fertilizer; Farm supplies; and Other Enterprises.[3] As desired by management any number or all of these enterprises may be included in the analyses. The model is also flexible in its length on analysis. From one to five periods may be simulated.

The model is designed to aid in the analysis of long-range changes in operations. Questions concerning expansion or disposal of grain storage facilities may be analyzed. Similarly, the model may be used to analyze questions concerning the addition, expansion or disposal of side line enterprises. With regard to the addition or expansion of facilities, the model may be used to compare different sizes of facilities with each size carrying a different estimated cost and revenue generating potential. Additionally, the effects of alternative financing arrangements may be compared in analyses involving an

additional investment. All of these types of questions may be evaluated under different assumptions concerning future economic conditions.

Another important use of the model concerns the evaluation of the impact of government farm programs on grain elevator firms. Government programs which affect farmers' decisions concerning acres of grain planted and harvested, volumes of grain stored and length of storage time have great impact on country grain elevator firms. The model may be used to help management access the impact of these types of government farm programs.

Step 1: Initialize Identifiers (a)

This step initializes certain identifiers to prescribed values to insure proper computer storage.

Step 2: Read Firm and Decision Data (a)

This step reads input data concerning the firm's financial position, base year operations and operating decisions. The Data Input Forms are shown in Appendix A.

Step 3: Print Firm and Decision Data (a)

This step prints important information and those assumptions upon which the analysis is based. An example of this output is shown in Appendix B.

Step 4: Assemble Firm Accounts (a)

The program uses a set of income, expense and balance sheet accounts. Each of these accounts is a summation of several subaccounts. This data is initially received in the subaccounts included in the Data Input Forms shown in Appendix A. This step assembles this information into the main accounts used by the program.

Step 5: Update Balance Sheet Accounts (c)

The first step in any simulated period is to execute end-of-period accounting adjustments. These adjustments could have easily been executed before the ending balance sheet is computed and printed. But, by placing these adjustments after the balance sheet is printed a more detailed account of the year's operations is presented. For example, if the accounts receivables calculated for the year's sales were collected before the balance sheet is printed, the account would have a zero balance on the balance sheet. By collecting the accounts receivables after the balance sheet is printed full disclosure of the accounts receivables is presented. The following accounting adjustments are executed in this step:

(1) Collect accounts receivable;

(2) Collect accrued storage charges;

(3) Pay accounts payable;

(4) Pay income taxes payable;

(5) Pay other current liabilities;

(6) Pay notes payable;

(7) Adjust for advances received from sales;

(8) Adjust for accrued expenses.

Step 6: Analyze New Investment

This step, executed only in the first simulated period, reads and assembles information concerning the cost, financing and depreciation of the new investment in equipment or facilities. This step also assigns depreciation data to the appropriate enterprise and accounts for the new investment by adding the value of the investment to the plant, property and equipment account and adding the amount of new long term notes to the long term debt account. New long term notes are assigned to the loan analysis and appropriate equity accounts are adjusted if any part of the new investment is financed internally.

Step 7: Print New Investment Information

This step prints important information concerning the new investment to show in detail the new investment being analyzed. Information printed includes the cost, financing and depreciation of the new investment asset. This step is executed only in the first simulated period. An example of this output is shown in Appendix B.

Step 8: Grain Volume Analysis (c)

The purpose of this step is to determine the revenue from wheat handling and storage operations in any simulated period. Revenues from handling and storage activities and dividends from terminal associates comprise the amount of total revenue.[4] The key factor used in determining these three sources of revenue is the volume of wheat handled. Estimation and use of this factor are discussed later in this section.

The Grain Volume Analysis is organized such that the origional function of the Grain Enterprise Subroutine is retained. This subroutine operates on a gross margin basis and is used to account for the storage, handling, purchase and sale of all grains except wheat.[5] Even though the wheat handling and storage operations are analyzed separately from the Grain Enterprise Subroutine, the results of the wheat analysis are presented along with the results from all other grain operations in the Grain Enterprise income statement. Likewise, the expenses of both wheat and other grain operations are compiled in the Grain Enterprise Subroutine and are presented in the income statement within the Grain Enterprise.

As stated above the key factor used in determining revenue from wheat operations is the volume of wheat handled. This factor may be determined by three alternative methods: (1) Stochastic Method; (2) Yield Times Acres Method; and (3) Volume Method. Each of these methods is explained in detail following a general description of the Grain Volume Analysis. Regardless of the method used to compute the volume of wheat handled, the procedure of determining the revenue from wheat handling and storage operations is essentially the same. This procedure is discussed below.

Handling Revenue

The volume of wheat handled, calculated by one of the three methods mentioned above is assumed to be the volume received by the firm during the harvest period. It is also assumed to be the total volume of wheat handled in each simulated year. To simplify the analysis, this volume

figure is assumed to be received at one point in time rather than over a period of several weeks.

To compute handling revenue the following equation is used:

Handling Revenue = Volume Handled x Handling Margin

The number of bushels handled is multiplied by the handling margin per bushel. This margin is a 'net' handling margin which represents the handling margin net of any transportation costs (per bushel) paid by the firm. Thus, if the handling margin charged by the firm is 53 cents per bushel and the transportation cost is 23 cents per bushel, the net handling margin for the firm is 30 cents.

Storage Revenue

The storage revenue is calculated in 'bushel-month' units and is based on management's assumptions concerning the percentage of wheat handled which is stored at harvest, wheat storage capacity of the local elevator and the yearly selling pattern of stored wheat. Management estimates the percentage of the volume handled which is stored at harvest. This percentage is multiplied times the volume handled to compute the volume of wheat stored; it is assumed that stored wheat is stored for at least one month. The volume handled less the volume stored is the volume of wheat sold at harvest. Wheat which is sold at harvest is assumed to be moved immediately and thus is not stored.

The calculations mentioned above compute the volume of wheat from the 'new crop' which is stored by the local firm. In addition to this storage volume the firm may have some of the previous year's wheat in local storage at harvest (carry-in volume). If so, the volume of wheat carried-in is added to the volume to be stored from the new crop to

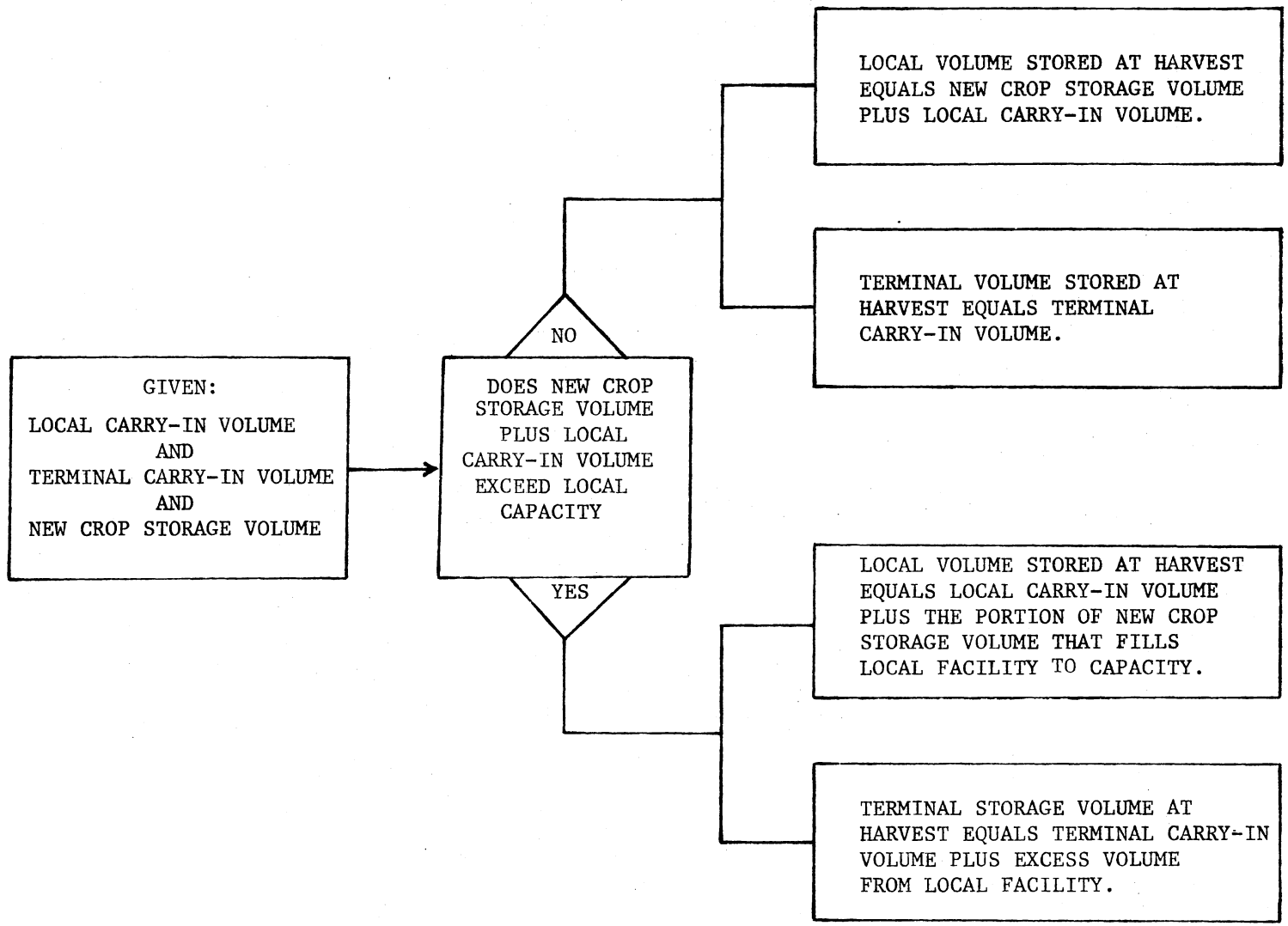

Figure 2: Volume Stored in Local and Terminal Facilities at Harvest

compute the total amount of wheat to be stored. At harvest time the firm may also have wheat stored in a terminal facility. This volume is the firm's carry-in in the terminal facility. As stated earlier, the harvest time is viewed as a single point in time. At this time the total amount of wheat stored by the firm is the total of local and terminal carry-in volumes plus the volume of the 'new crop' stored (Figure 2).

Prior to harvest, elevator managers may desire to move some wheat from the local facility to the terminal facility in order to make room for the new crop. Also, managers may desire to keep a specified number of bushels in local storage to blend with the earliest wheat received at harvest. These two considerations are included in the model by allowing management to specify a maximum volume of wheat to have in local storage prior to harvest. If, at the end of the storage year, the volume stored locally exceeds this maximum volume figure, the excess is moved to terminal storage. At the end of the 12 month storage period the firm may have wheat stored at the terminal facility. If so, the volume moved (excess over the specified maximum figure) is added to the volume in terminal storage to compute the local firm's carry-in volume in the terminal facility.

The selling pattern of the stored wheat is described by the storage time factor which is designed to allow management to estimate the timing of sales over a 12 month period. The 12 month period covers the time from one harvest to the next. The selling pattern is viewed as the schedule of wheat shipments because grain is assumed to be moved immediately from storage when it is sold. For each month of the 12 month period following harvest, management determines the percentage

of total volume stored at harvest which is expected to be in storage each month. Figure 3 illustrates an example of the storage time factor for one 12 month period. This illustration may be interpreted in the following manner:

(1) 100 percent of the total volume of wheat stored at harvest is stored for one month;

(2) 90 percent of the total volume of wheat stored at harvest is stored for two months;

(3) 85 percent of the total volume of wheat stored at harvest is stored for three months;

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.
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(12) 30 percent of the total volume of wheat stored at harvest is stored for 12 months.

It should be noted that the storage time factor for a specific 12 month period describes the selling pattern of not only the volume of the new crop stored, but also the local and terminal carry-in volumes from the previous year. Management determines a storage time factor for each simulated year.

The selling schedule and the local elevator's wheat storage capacity are used to compute bushel-months of storage in both the local and terminal facilities. While the storage time factor applies to the total volume stored in both local and terminal facilities, the model keeps separate account of local and terminal bushel-months of storage. As stated earlier, at harvest the volume of the new crop stored plus the local carry-in volume determine the volume needed to be stored at the local elevator. If the sum of these two volumes exceeds the wheat

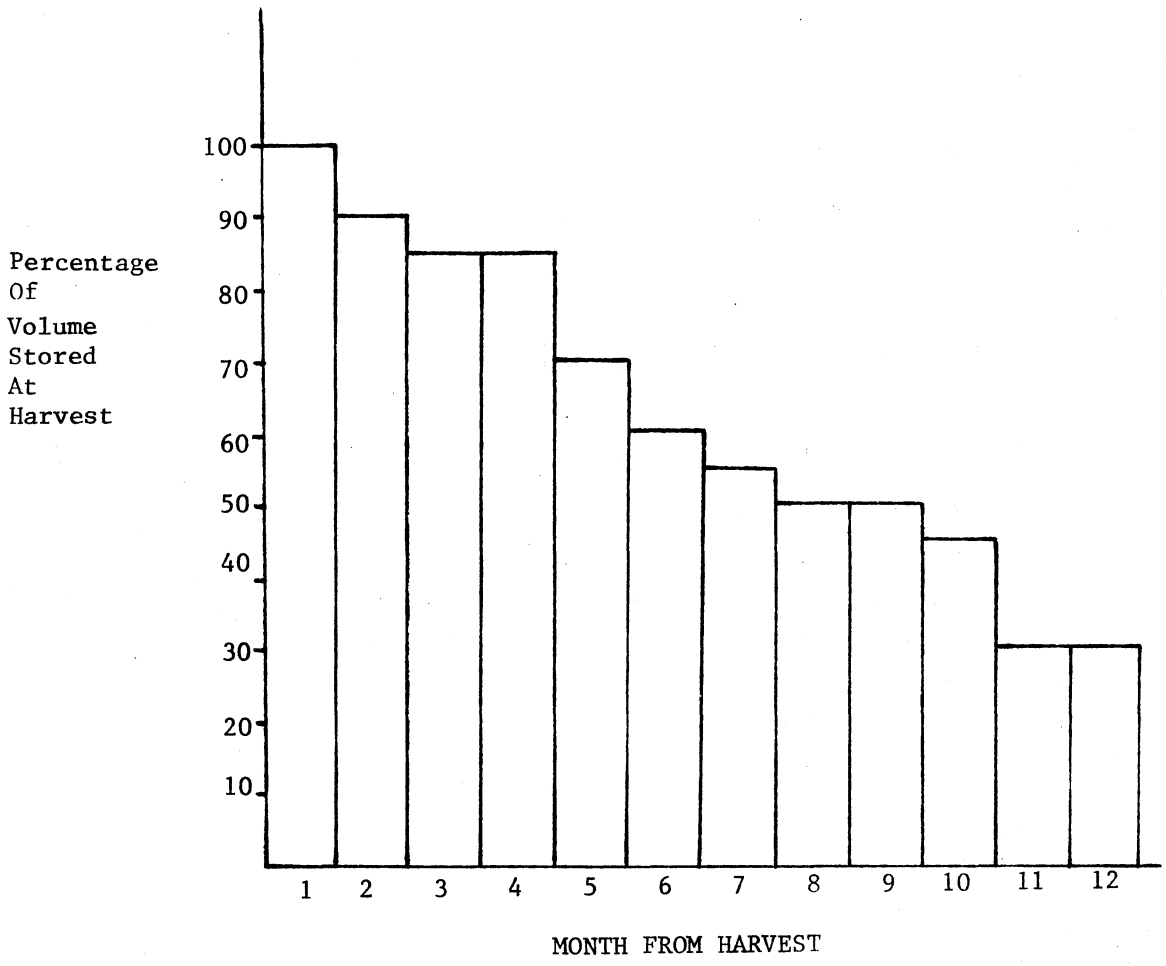

Figure 3. Storage Time Factor

storage capacity of the local elevator, the excess is moved to the terminal facility. Thus the total amount stored (at harvest) in the local facility is the lesser of the storage capacity or the volume needed to be stored locally. Similarly the total amount stored in the terminal facility is the terminal carry-in (if any) plus the excess volume moved from the local facility. Therefore, the total volume stored at harvest is the total volume stored locally plus the total volume stored in the terminal facilities. As stated above the storage time factor applies to the total volume stored at harvest (Figure 2).

Storage revenue is computed by compiling the total number of bushel-months of storage both in the local facility and in the terminal facility. This is accomplished by computing the bushel-months figure for each month of the 12 month period for both the local and terminal elevator facilities. The program analyzes each month of the 12 month period separately. Using the storage time factor the program computes the volume of wheat in storage each month and compares this figure to the volume in storage in the previous month. This determines the volume of grain moved between months. The program is designed so that the first wheat moved (sold) is removed from terminal storage because the storage fee paid by the local firm to the terminal is assumed to be equal to or greater than the storage fee the firm charges its customers. This means that the firm may break even or lose storage revenue by storing wheat in the terminal facility; thus, the first wheat sold is moved from the terminal facility in order to reduce storage revenue losses. The volume stored in the terminal facility is reduced as described by the storage time factor each month until the volume stored in the terminal is reduced to zero. At this time

movements of wheat are taken from the local facility. Wheat is assumed to be shipped from the facility as soon as it is sold and all wheat is stored for full month periods.

Figure 4 illustrates the use of the local storage capacity and storage time factor. The bushel-months of storage in the local facility (BML_i) and in the terminal facility (BMT_i) are shown for each of the 12 months, i = 1, 12. The program compiles the total bushel-months stored locally ($\sum_{i=1}^{12} BML_i$) and in the terminal ($\sum_{i=1}^{12} BMT_i$). Storage revenue is then calculated by subtracting the cost of storage in the terminal facility from the storage revenue collected by the firm:

$$\text{Storage Revenue} = \left[\sum_{i=1}^{12} BML_i + \sum_{i=1}^{12} BMT_i\right] \times R_1 - \sum_{i=1}^{12} BMT_i \times R_t.$$

R_1 is the storage fee per bushel per month received by the firm for storing customers' wheat and R_t is the storage fee per bushel per month paid by the firm for terminal storage. To account for shrinkage, spoilage and spillage, a "pencil shrink" factor is used. Management specifies the pencil shrink factor which is the percentage of wheat storage revenue lost due to shrinkage, spillage and spoilage. The storage revenue is reduced by this amount.

If desired by management a secondary wheat volume capacity may be specified if they wish to reserve storage space for another grain at some specified time after wheat harvest.[6] Figure 5 illustrates the use of the secondary wheat capacity. The month from harvest in which the second capacity takes effect is specified by management. In Figure 5 the second capacity takes affect at the end of the fifth month, however, the secondary capacity can be specified to take affect in any month. At that time if the volume stored locally exceeds the secondary capacity, the excess is moved into terminal storage; and for the remaining months,

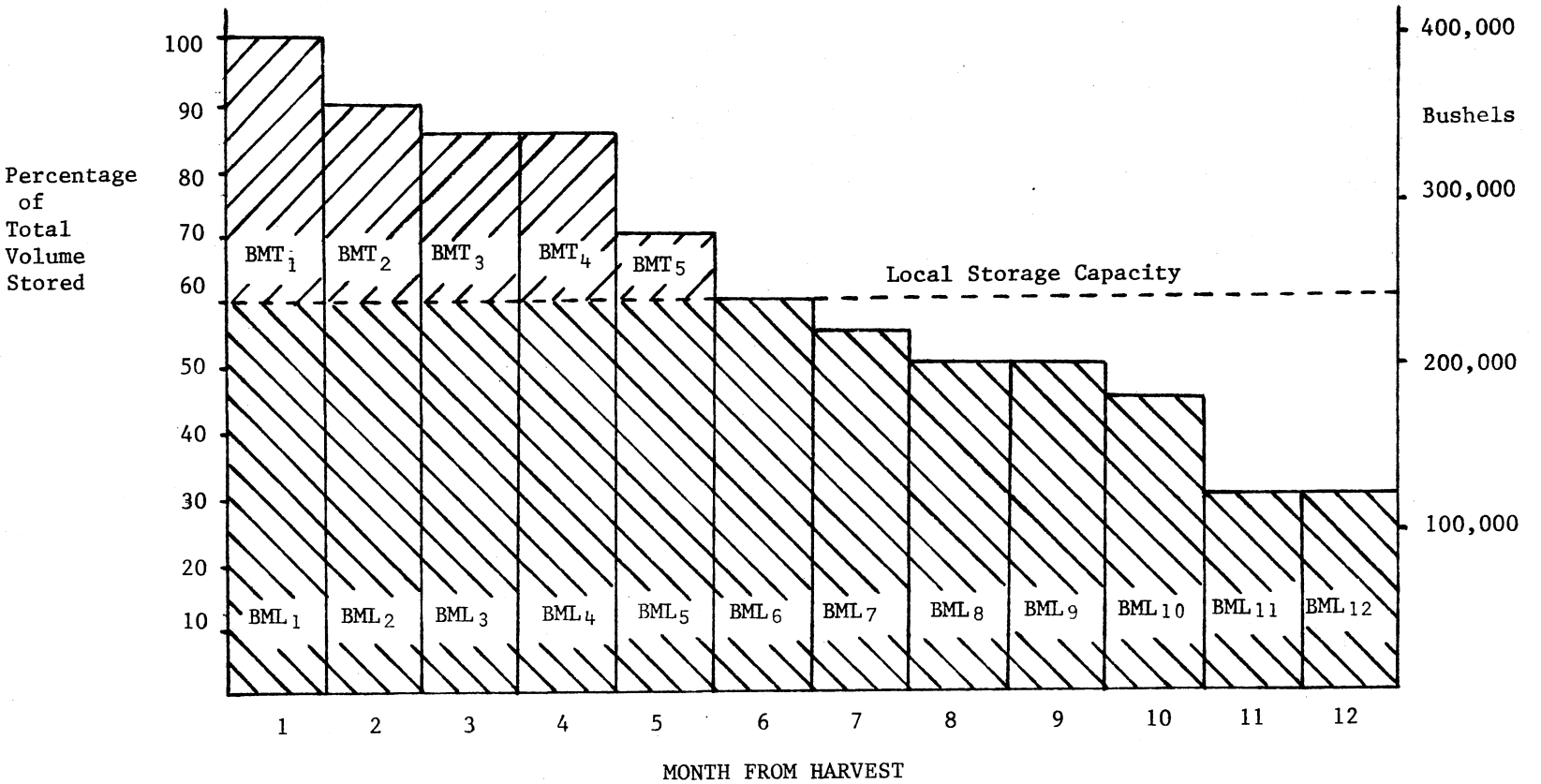

Figure 4. Storage Time Factor and Local Capacity

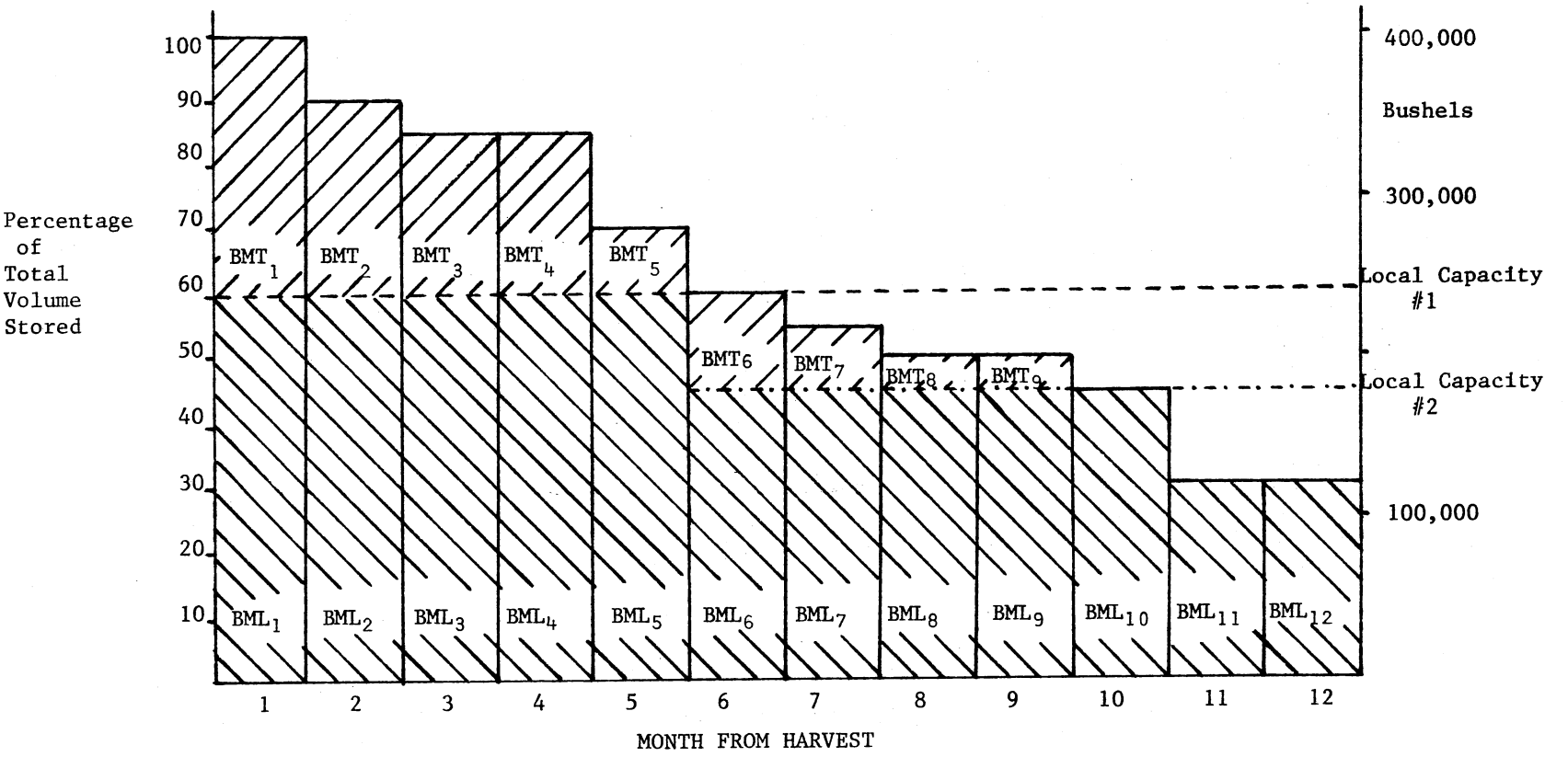

Figure 5. Storage Time Factor and Secondary Local Capacity

the secondary capacity is recognized as the local storage limit. It should be noted that storage and handling of the secondary grain is not accounted for in the Grain Volume Analysis. As with all other grains, the secondary grain is accounted for in the Grain Enterprise Subroutine.

Dividend Revenue

Dividends from regional or terminal associates may be received by the firm. The amount of this revenue is based on the volume of wheat sold by the firm to the associate. Management estimates the percentage of grain handled which will ultimently be sold to the regional or terminal associate. The management also estimates the dividend rate per bushel for each simulated period. Thus, the dividend revenue is computed by multiplying the number of bushels sold to the regional or terminal associate times the dividend rate per bushel.

Methods of Determining the Volume of Wheat Handled

As stated earlier, the program contains three alternative methods by which the volume of wheat handled may be computed. Management selects the method to be used in the analysis. These three methods are discussed below.

Stochastic Method

This method used information concerning historical trend of wheat yields in the firm's trade area along with the observed variance of yields about this trend to estimate wheat yields for the simulated periods. To compute the volume of wheat handled each year by the Stochastic Method, five pieces of information are needed in the program:

(1) Acres of wheat harvested in firm's trade area;

(2) Expected mean yield per acre in the trade area;

(3) Standard deviation of yield per acre in the trade area;

(4) A random number;

(5) Volume of wheat handled option selected.

A detailed discussion of each piece of information mentioned above is presented following a general discussion of the stochastic process.

The stochastic process uses the following equation to calculate wheat yields:

Yield = Mean Yield + Random Number x Standard Deviation

The mean yield is the mean yield expected by management in the trade area for the period being simulated. The random number is provided by Gause Subroutine which generates random numbers from a Gaussian Distribution (normal distribution with mean of zero and standard deviation of one). The random numbers generated range between plus three and minus three standard deviations from the mean of zero of the Gaussian Distribution. The standard deviation is the standard deviation of yields in the trade area. Using the above equation, if the expected mean yield is 25 bushels per acre and the standard deviation of the mean yield is 5 bushels per acre, the greatest possible range of yields is from 10 to 40 bushels per acre:

$$10 = 25 + (-3) \times 5$$

$$40 = 25 + (+3) \times 5$$

The yield used in this method is highly dependent on the random number generated from the probability distribution. The resulting yield figure is used in the following equation:

Volume Handled = Yield Per Acre x Acres

The volume handled is calculated by multiplying the stochastically determined yield by the numbers of acres in the trade area.

There are several alternative ways in which the Stochastic Method may be used in the analysis. The information needed and the optional uses are discussed in detail below.

Acres Harvested in Trade Area. The term trade area is used to define the number of wheat acres served by the firm in a given geographical area. It is assumed that all wheat harvested by customers of the firm in the trade area is handled by the firm. Management may divide the volume handled in a previous year by the average yield in the area that year. This calculation shows approximately the number of acres harvested by customers in the trade area in that year. If this procedure is repeated for several years, management should be able to estimate the number of acres harvested by customers in its trade area.

There are several ways in which the acreage factor may enter the analysis. Acres may be assumed constant for each simulated year in order to observe the affects of yield variability. Acres may be set at high or low levels in order to view the effects of certain economic, governmental or weather related conditions as well as the effects of the gain or loss of customers. Acres may also be varied over the years as deemed reasonable by management. The number of acres in the firm's trade is estimated by management for each simulated year.

Expected Mean Yield. Expected mean yields are needed for each year of the analysis. An analysis of historic wheat yields for each county in Oklahoma was performed to provide management with projected

mean yields and a measure of the variability of yields. These figures serve as a guideline for management and are included in the material provided to users of the model. This analysis was not necessary to the development of the simulation model. Its purpose is to provide management with estimates of future mean yields and a measure of past yield variation.

The projected mean yields are based on separate analysis of each county's reported mean yield from years 1945-1975.[7] For each county a trend line was fitted to the data using a computerized regression analysis program.[8] This packaged program was used to fit four separate equations to the data using time (in years) as the independent variable and the mean yield as the dependent variable. The four estimated equations are:

(1) Linear, $Y = A + BX$

(2) Natural Log, $LN(Y) = A + BX$

(3) Double Log, $LN(Y) = A + BLN(X)$

(4) Time Lag, $Y = A + BY(T-1) + CX$

Figure 6 illustrates the trend lines fitted by the above equations. For each county, the best fitting equation was selected using the highest "F statistic" as the selection criteria. The selected equation was then used to project mean yields for years 1976-1990. These projected mean yields by county for years 1977-1981 are supplied to management to serve as an aid if needed during the completion of the Data Input Forms. Management may feel that the projected county average yields are not representative of the firm's trade area. If so, management may adjust the yield figures used in the analysis to

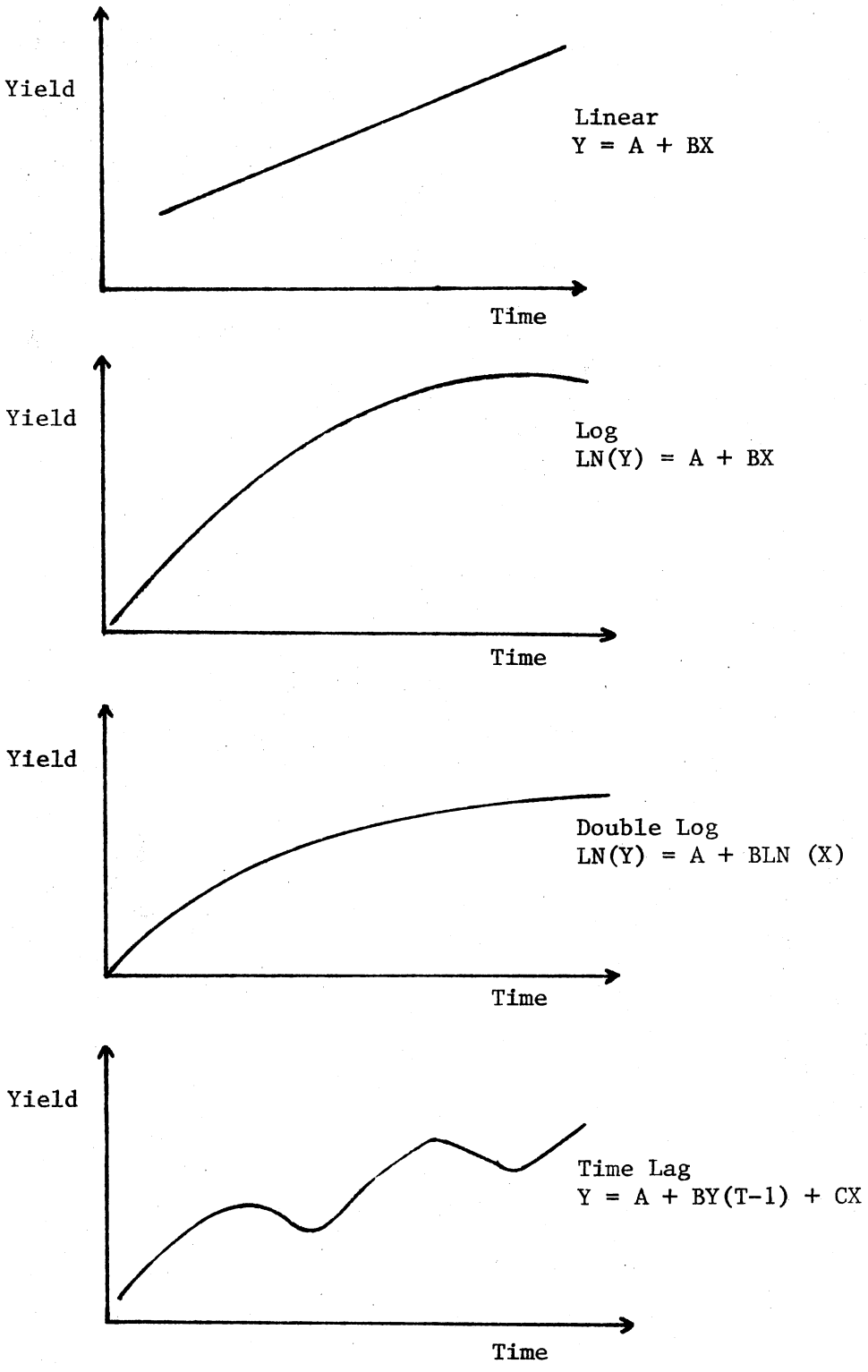

Figure 6. Regression Equations Fitted to Yield Data

more closely represent management's expectations. As stated earlier, the projections developed herein are to serve only as a guideline to management and may be adjusted as management feels necessary.

Standard Deviations. The computerized regression analysis program also computes the standard deviation of the best fitting equation. These measures of yield variability, like the projected yields, are to served as a guideline to management and thus may be adjusted as management feels necessary. But, it should be noted that the stochastic process selects random numbers which range from plus three to minus three standard deviations of the mean. If three times the standard deviation of the mean yield is greater than the mean yield, there is a possibility that a negative yield will be generated. To avoid negative yields in the analysis, management should make sure that three times the standard deviation of the mean yield does not exceed the mean yield. The standard deviation of the mean yield computed by the regression analysis program are supplied to management to serve as an aid if needed during the completion of the Data Input Forms.

Random Numbers (Subroutine Gause).[9] Random numbers are provided by Subroutine Gause which generates random numbers from a normal distribution with mean of zero and standard deviation of one.[10] This Gaussian Distribution is shown in Figure 7. The range of the random numbers is from -3.0000 to +3.0000 with numbers selected in discrete intervals of four decimal places. As defined by the normal distribution, 68.27 percent of the random numbers generated will lie in the interval between minus one and plus one standard deviations of the mean; 95.45 percent will lie between minus two and plus two standard

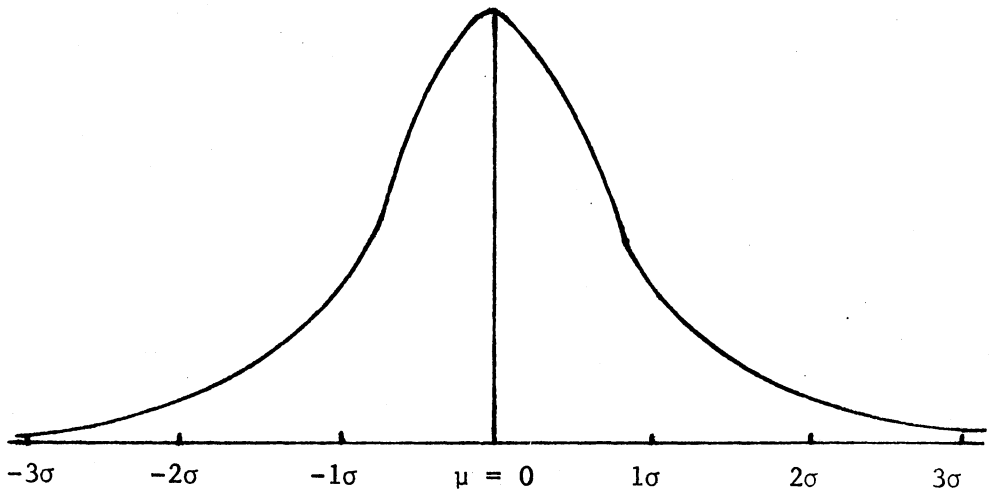

Figure 7. Gaussian Distribution

deviations of the mean; and 99.73 percent will lie between minus three and plus three standard deviations of the mean.[11]

The random number generator, Subroutine Gause, is given a seed value which initilaizes the random number selecting process. With a given seed value, the sequence of numbers generated is always the same. The seed value may be changed to generate a new sequence of numbers. For example, assume that 20 yields are analyzed each year over a five year analysis (100 numbers generated). This same sequence of 100 numbers is generated in the following five year analysis unless the seed value is changed. If the seed value is changed, a new sequence of numbers is generated. This reoccuring sequence of numbers is advantageous when management desires to retain the stochastic determination of yields but wants to isolate the effects of other factors. If management desires to view several separate stochastic analyses, the seed value may be changed to generate a new sequence of numbers for each analysis.

Options. There are several options concerning the use of the stochastic determination of yields. First, a single yield may be determined each period to observe a likely pattern of yields over the simulated years. This may be accomplished by generating and analyzing one yield each year or by generating and analyzing up to 25 yields each year and selecting a particular yield to be used in the analysis. For example, 25 yields may be generated and analyzed using the results of the first yield generated. This gives the same effect as generating one yield per period but provides more information to management.

Management can compare the results of the first iteration to any of the other 25 iterations to see whether the first yield generated was a high, low or some average yield for that period.

Second, from 1 to 25 yields may be generated and analyzed and management may choose the minimum, maximum or mean yield to be used in the analysis. If the change in operations is to be analyzed under the best probable conditions each period, the maximum yield is selected. For the poorest probable conditions the minimum yield is selected. Selection of the mean yield indicates average conditions are to prevail. It should be noted that the minimum, maximum or mean selection refers to the yield and thus the volume handled and under almost all conditions to total revenue from wheat operations.

Yield Times Acres Method

This method uses the following equation to compute the volume handled:

$$\text{Volume Handled} = \text{Yield} \times \text{Acres}$$

Management simply estimates the expected yield and harvested wheat acres in the trade area for each year of the analysis. Using this method the effects of yields may be viewed while acres are held constant over the period of analysis. Management may evaluate plans under a variety of yield-acreage combinations.

Volume Method

Under this method management simply estimates the volume of wheat to be handled each period. Different volumes may be analyzed without specific regard to acreage and yield factors. This method is designed

to be used when managers desire to analyze the impact of specific volumes handled. The Volume Method is also easily used in analyses in which the volume of wheat handled is not of great consequence to the results of the simulation.

Step 9: Print Grain Volume Analysis (c)

This step prints the results of the Grain Volume Analysis and the information and assumptions on which the analysis is based. Examples of this output are shown in Appendix C.

Step 10: Loan Analysis (c)

This step computes the amount of short term operating debt needed for the period and computes the amount of long term interest and principal payments which are due in the period. Management estimates a minimum cash balance to be maintained for the period. If the cash balance falls below this level the amount needed to meet the minimum balance is borrowed. This step then calls Subroutine Loan which calculates the interest and principal payments which are due in the year being simulated.

Subroutine Loan

Subroutine Loan is called each year by the main program to compute the interest and principal payments due that period for each individual long term loan. The data used by Subroutine Loan is read in the main program. For each loan the remaining life, interest rate, unpaid balance and type of loan are read into the program as data. Figure 8 presents the flow chart for Subroutine Loan.

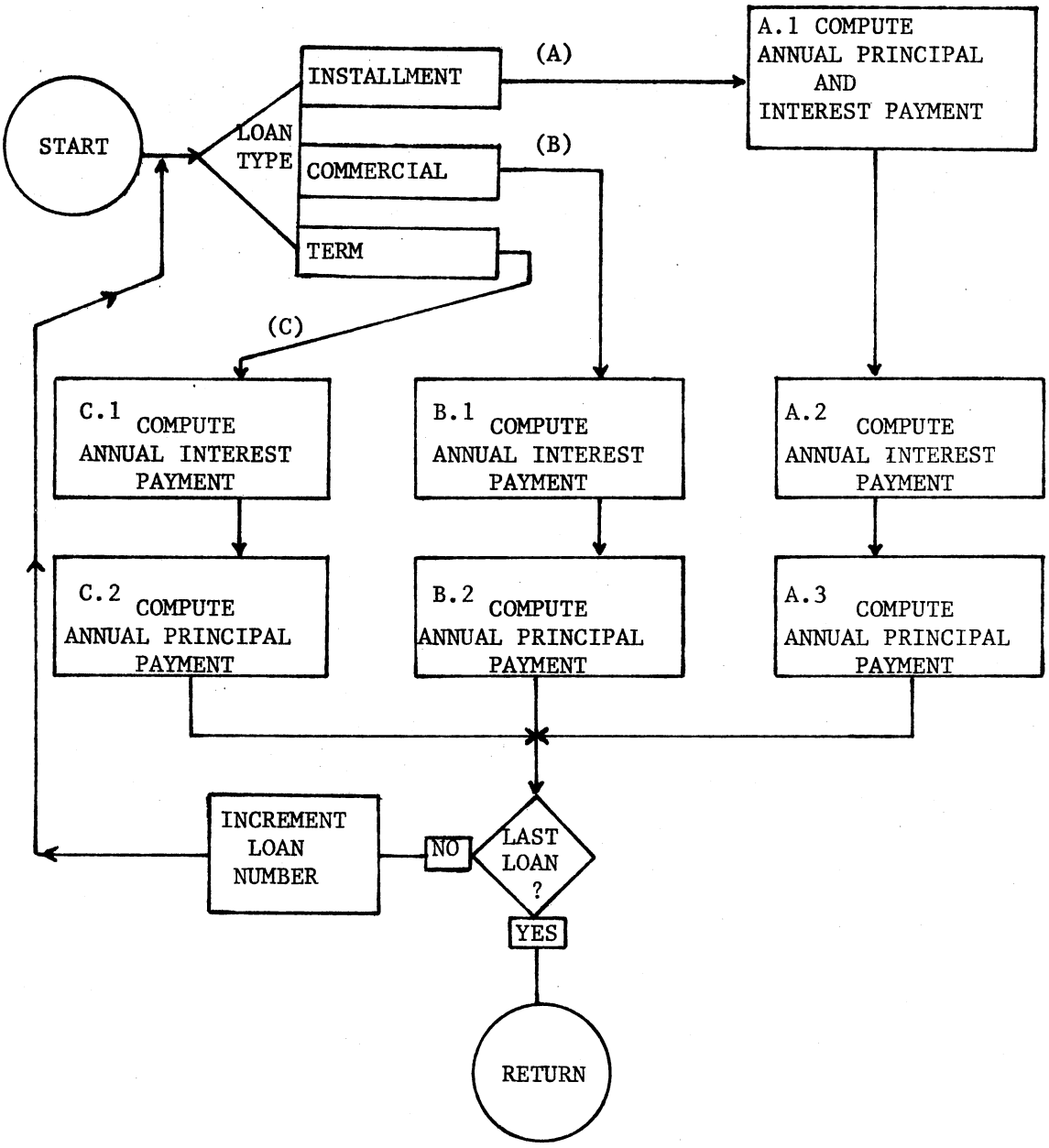

Figure 8. Flow Chart of Subroutine Loan

Subroutine Loan considers three types of loans:

1) Installment Loan - an amortized loan with equal annual payments. Over the life of the loan the prinicpal component of the payment increases while the interest component decreases.

2) Commercial Loan - consists of equal annual principal payments with interest paid on the remaining unpaid balance. Over the life of the loan the principal payment remains constant while the interest payment decreases as the unpaid balance decreases.

3) Term Loan - an arrangement in which only interest payments are made each year; the principal is paid in a lump sum at the termination of the loan's life.

Step 11: Print Loan Analysis (c)

This step prints the results of short and long term loan analyses. An example of this output is shown in Appendix B.

Step 12: Update Income and Expense Accounts (c)

This step updates direct and indirect expense accounts for the enterprises used in the analysis and updates overhead expense, other expense, other income, and operating and service income accounts for the firm. These accounts are updated using management determined annual growth rates. Interest expense is updated by totaling the amounts of short and long term interest payments due in the period.

Step 13: Call Enterprise Subroutines (b)

This step calls the Enterprise Subroutines included in the analysis. These are the: Feed; Seed; Grain; Fertilizer; Farm Supplies; and Other Enterprises. Management specifies the enterprises to be included in the analysis; all, none or any combination of these enterprises may be analyzed.

The Enterprise Subroutines for the six enterprises are identical. The data requirements, calculations and computer output are the same for each enterprise. Thus, in the following discussion, no reference is made to a particular Enterprise Subroutine. The discussion is applicable to the analysis of all enterprises.

Each enterprise may consist of a number of product subclasses. Management may list the desired product subclasses on the first page of each enterprise's input forms as shown in the Data Input Forms in Appendix A. For each product subclass the following base year information is needed:

(1) Sales;

(2) Purchases;

(3) Physical Units of Sales;

(4) Beginning Inventory;

(5) Ending Inventory.

If product subclass records are not available, total enterprise figures may easily be used. Using the sales and cost of sales information mentioned above, the Enterprise Subroutine computes revenues on a gross margin basis. This means that the gross profit on sales in each simulated year is calculated to be a percentage of total enterprise sales.

This percentage or gross margin is specified by management for each enterprise. The gross margin is not specified for each subclass of products within an enterprise; an average gross margin for all products within the enterprise is used.

Enterprise sales and expenses are calculated each period on a growth rate basis. For each enterprise management specifies an annual growth rate for sales and for each of the 14 direct and indirect expense categories.

Inventories are maintained and purchases are calculated using the "average number of days-in-inventory figure. Purchases are calculated to meet the projected sales for the period in accordance with the beginning inventory and the desired level of ending inventory which is calculated using the "days-in-inventory" figure specified by management.

The Enterprise Subroutine calls Subroutine Reed in the base year to supply the enterprise base year information. Subroutine Dprn is called each simulated year to provide detailed depreciation information. Subroutine Update is called each simulated year to update sales, purchases and inventories.

The flow chart in Figure 9 presents a simple outline of the Enterprise Subroutine. The same steps are executed for all six individual Enterprise Subroutines. The basic steps shown in the flow chart are presented below.

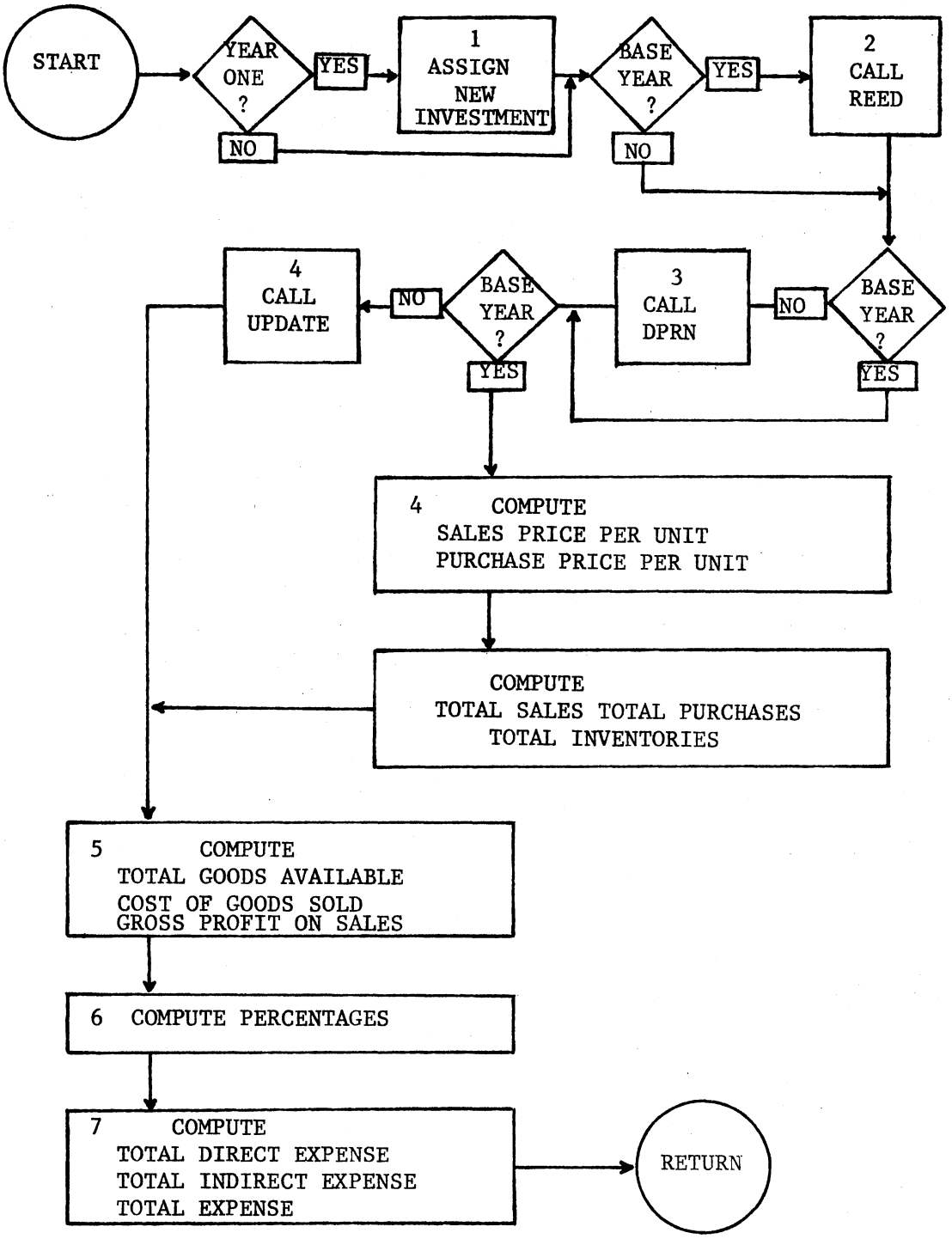

Figure 9. Flow Chart of Subroutine Enterprise

Assign New Investment Data

This step assigns new investment, depreciation and operating data and is executed in the base year by the appropriate Enterprise Subroutine.

Call Subroutine Reed

Subroutine Reed is called only in the base year by each of the six enterprises to read the enterprise data needed in the analysis. This subroutine also organizes the enterprise expense accounts by assembling the subaccounts presented in Data Input Forms into the 14 major expense accounts. The steps executed by Subroutine Reed are briefly presented below. The steps discussed follow the flowchart pictured in Figure 10.

Read Sales, Purchases and Inventory Data

The following base year information is read for each subclass of products handled by the enterprise:

(1) Sales;

(2) Purchases;

(3) Physical Units of Sales;

(4) Beginning Inventory;

(5) Closing Inventory.

This step also reads the days-in-inventory figure and the gross margin figure and the annual growth rate for sales.

Read Other Income and Other Expense Data

This step reads base year other income and other expense accounts and their annual growth rates.

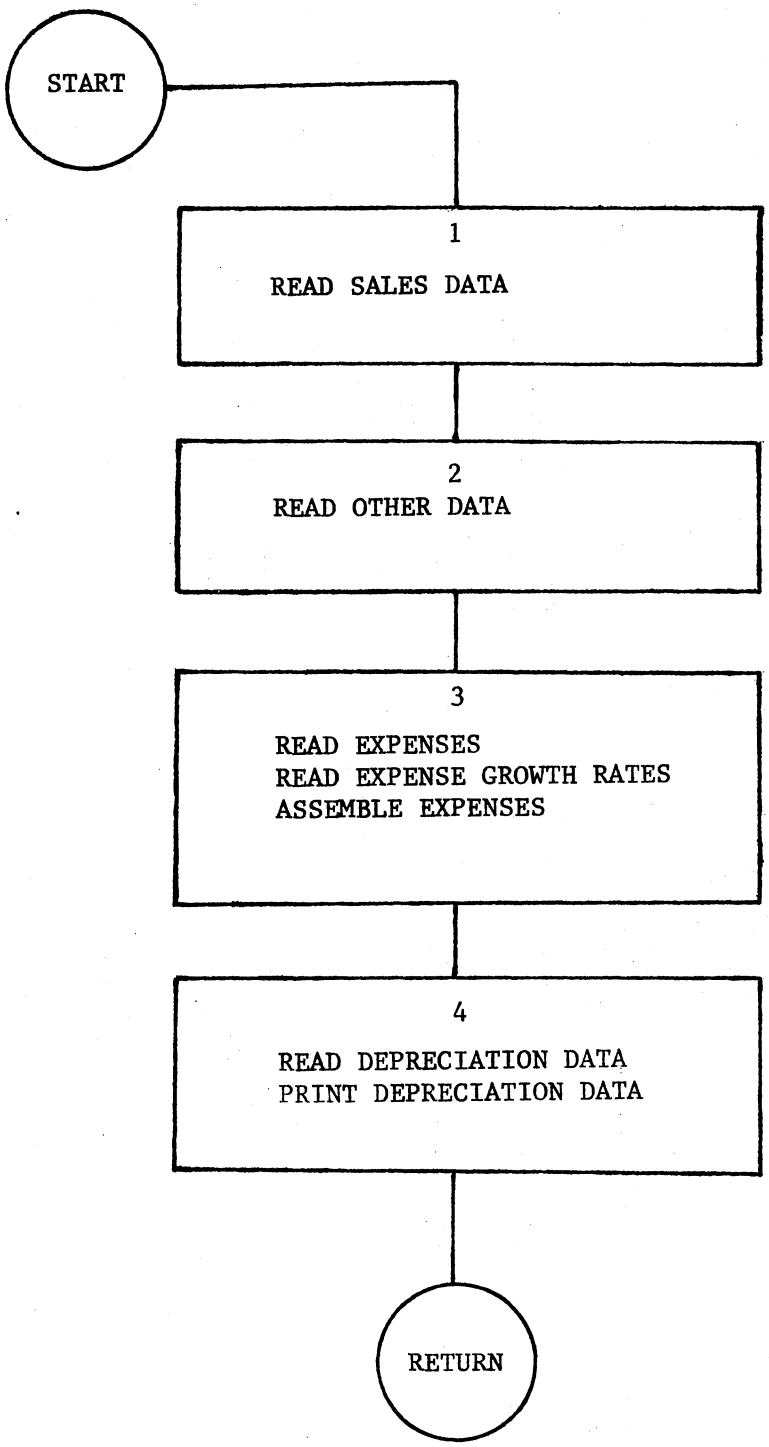

Figure 10. Flow Chart of Subroutine Reed

Read and Assemble Expense Data

This step reads the direct and indirect expense accounts contained in the Enterprise Information section of the Data Input Forms. These subaccounts are assembled into the 14 major direct and indirect expense accounts used by the program. The annual growth rates for the 14 direct and indirect expense accounts are also read into the model.

Read and Print Depreciation Data

The depreciation data for the enterprises's assets, as shown in the Data Input Forms in Appendix A, is read and important depreciation information is printed. An example of this output is shown in Appendix B.

Call Subroutine Dprn

Subroutine Dprn computes depreciation expense, accumulated depreciation and book value for the depreciable assets of each enterprise. The information needed for computing depreciation is read into the model by Subroutine Reed.

Each enterprise may have four categories (classes) of assets: (1) buildings; (2) machinery and equipment; (3) autos and trucks; and (4) warehouses. Within each category there may be up to ten specific assets. The maximum number of assets within a category may be changed by redimensioning appropriate arrays in the computer program.

Subroutin Dprn is called by each enterprise subroutine in each simulated year except the base year. All computation of transferred depreciation figures is computed and stored in memory the first time

Subroutine Dprn is called. In all remaining simulated years the appropriate stored figures are compiled and transferred to the Enterprise Subroutine.

Subroutine Dprn is programmed to calculate depreciation by four methods: (1) Straight-line; (2) Sum-of-Years Digits; (3) 200% Declining Balance (4) 150% Declining Balance. The user selects the method to be used for each specific asset. If salvage value is considered, the amount of salvage value is included in the input data. If additional first year depreciation is considered, this decision is also included in the input data. Subroutine Dprn contains no test to insure that the assets meet the I.R.S. requirements for additional first-year depreciation, so this option is used only when indicated by the user.

The Declining Balance Methods (200% and 150%) contain three widely used options:

1) Declining Balance Depreciation is calculated in the 'regular' manner.
2) All remaining book value is depreciated at the end of the asset's life.
3) Switch from Declining Balance to Straight-line when conditions are met. The conditions are: Internal Revenue Code allows a company to switch from Declining Balance to Straight-line whenever the Straight-line annual depreciation on the remaining book value is greater than the Declining Balance amount.

The decision to use any of these options rests with the management who indicates the option to be used.

The following steps as presented in the flowchart in Figure 11 outline the procedure followed for computing depreciation by each method.

Compute Depreciation Schedule for Previous Years

The depreciation data for each asset reflects the status of the asset in the first year of its life. From this point the program develops the asset's depreciation schedule. This step computes the depreciation schedule from the first year of life to the first simulated year of the analysis. These figures (previous depreciation expense, previous book value and previous accumulated depreciation) are used to compute depreciation figures for the simulated years.

Compute Depreciation Schedule for Simulated Years

This step computes the appropriate depreciation figures for the simulated years. This step takes into account the possibility that the life of an asset may extend beyond the number of years simulated or that the life of an asset may expire before the end of the simulation analysis. These values are computed and stored in the first simulated year. In subsequent simulated years, the appropriate figures are retrieved from storage and thus are computed only once.

Compile Total Depreciation for Class of Assets

This step compiles and stores total depreciation figures for each class of assets for each simulated period. The figures stored for each simulated year for each enterprise are:

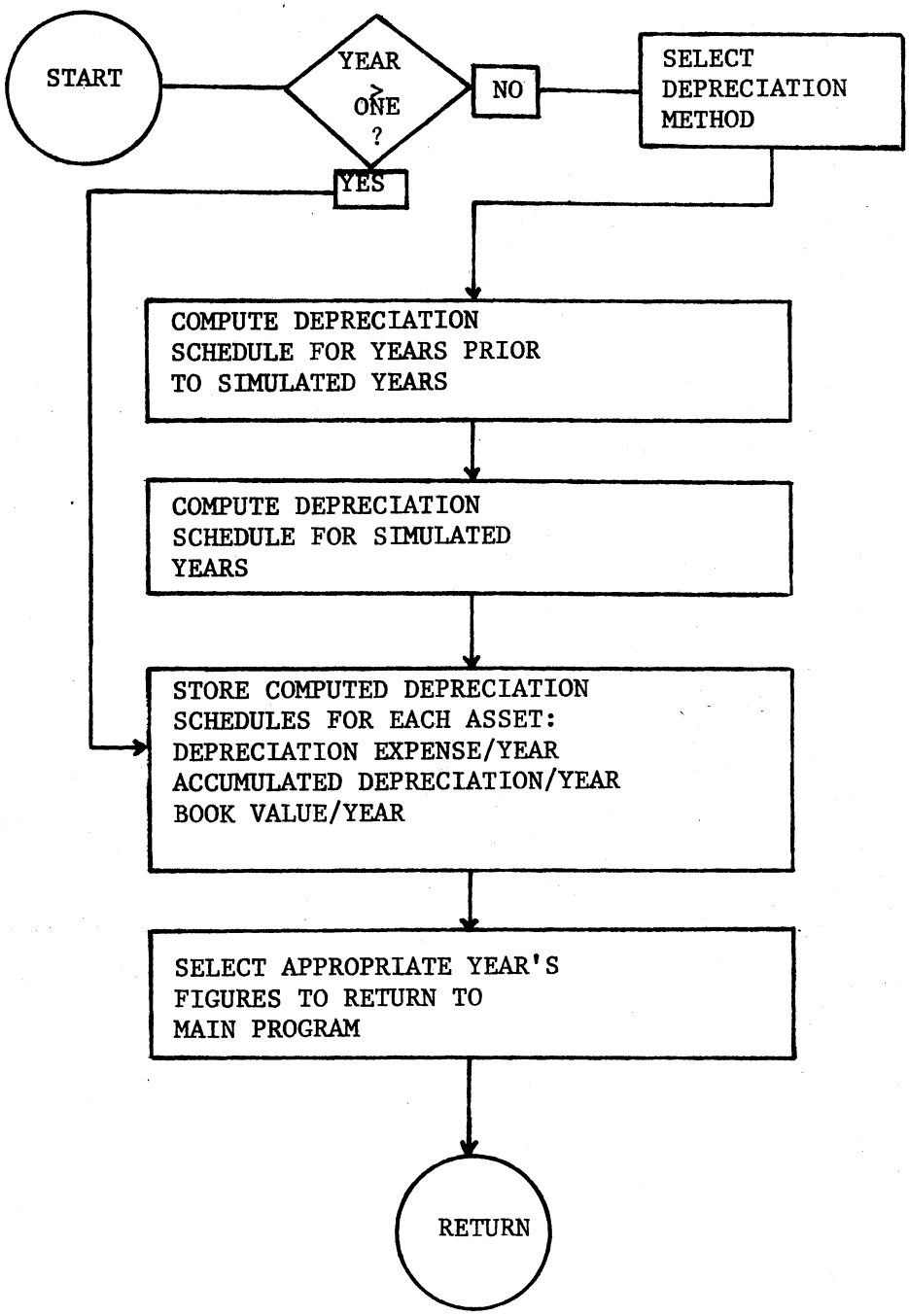

Figure 11. Flow Chart of Subroutine Dprn

(1) Depreciation expense per asset class;

(2) Book Value per asset class;

(3) Accumulated depreciation per asset class.

Compile Total Depreciation for the Enterprise

This step is executed each period Dprn is called. The needed values are stored in memory. This step compiles the following total enterprise figures for each simulated period:

(1) Total depreciation expense;

(2) Total book value;

(3) Total accumulated depreciation.

Compute Sales, Purchases and Inventories (Subroutine Update)

In the base year, these figures are computed directly from the base year data in the Enterprise Subroutine. In simulated years these figures are updated by annual growth rates and are computed in Subroutine Update.

Subroutine Update is an integral step in the deterministic simulation process. Subroutine Update is called each simulated year to update and compute enterprise sales, purchases and inventories. The flowchart in Figure 12 shows Subroutine Update's major steps which are discussed below.

Update Sales

For all enterprises except Farm Supplies and Other Enterprise, this step updates total sales by first increasing the sales price per unit for each subclass of products by the annual growth rate. The physical

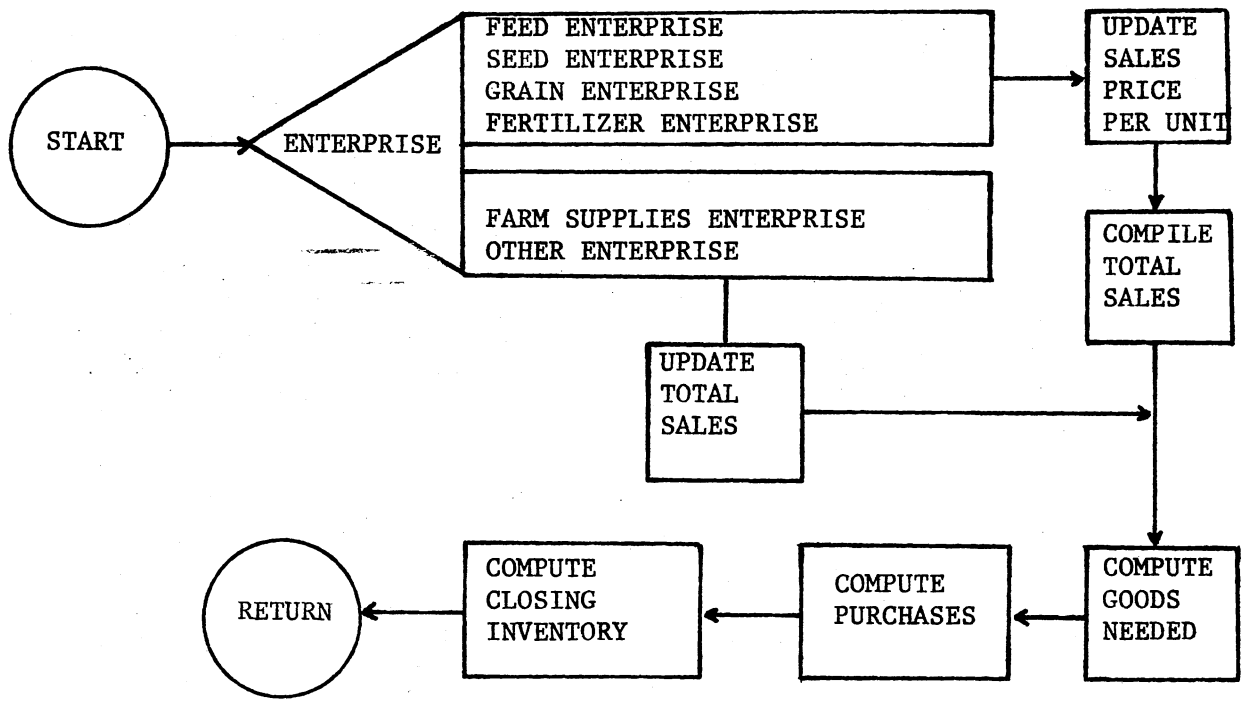

Figure 12. Flow Chart of Subroutine Update

units of sales for the product subclasses remain at the quantity specified for the base year. Thus, for a subclass the updated sales figure is calculated by multiplying the updated price per unit times the units of sales. The updated sales figures for each subclass of products are summed to compute the updated total sales for the enterprise.

Sales of the Farm Supplies and Other Enterprises are updated on a total sales basis. The previous year's total sales are updated using the specified annual growth rate.

Compute Goods Needed, Inventories and Purchases

Based on the updated enterprise sales figure (be either method discussed above) this step first computes the amount of goods needed to meet the updated sales by using the gross margin specified by management. The amount of goods needed to meet the sales may be viewed in terms of the cost of goods sold. Next the desired level of ending inventory is determined using the days-in-inventory figure specified by management. The percentage of the year in which goods are in inventory is calculated by dividing the days-in-inventory figure by 365. This percentage is multiplied times the total sales for the year to compute the ending inventory. Given the cost of goods sold and the beginning inventory (previous year's ending inventory) the program computes the amount of purchases necessary to meet the desired level of ending inventory.

Compute Gross Profit on Sales

Using the information calculated in the previous step by either the Enterprise Subroutine or the Update Subroutine, total goods available for sale are calculated by adding purchases to the beginning inventory. The ending inventory is subtracted from the total goods available for sale to calculate cost of goods sold. Then, the cost of goods sold is subtracted from total sales to compute gross profit on sales.

Compute Percentages

This step computes percentages which express each item in the cost of goods sold section as a percentage of total sales. The specific percentages computed are:

(1) Purchases/Total Sales;

(2) Beginning Inventory/Total Sales;

(3) Ending Inventory/Total Sales;

(4) Goods Available for Sale/Total Sales;

(5) Cost of Goods Sold/Total Sales;

(6) Gross Profit on Sales/Total Sales.

Compute Expenses

Total direct expenses are computed by totaling the direct expense component of each of the 14 main expense categories. The total indirect expenses are computed in the same manner. Total direct expenses and total indirect expenses are summed to calculate total enterprise expenses.

Step 14: Print Enterprise Data (a)

This step prints management's assumptions and information which are important to enterprise operations. Important data is printed for each enterprise included in the analysis. An example of this output is shown in Appendix B.

Step 15: Print Enterprise Income Statement (b)

This step prints an income statement for each enterprise. In the base year, base year operating figures provided by management are printed to show the results of operations in the base year. In simulated years, the results of simulated operations are printed. An example of this output is shown in Appendix B.

Step 16: Print Enterprise Depreciation Analysis (b)

This step prints depreciation information by class of assets for each enterprise included in the analysis. Total depreciation expense for the year, total book value and total accumulated depreciation are printed for each class of assets. This output information shows a breakdown of total depreciation expense for each enterprise. An example of this output is shown in Appendix B.

Step 17: Compile Firm Operating Results (b)

This step compiles firm operating results from the operations of each enterprise.

Step 18: Print Firm Income Statement (b)

This step prints the results of the firm's operations for the year. The income statement presents net firm income before payment of income taxes. An example of this output is shown in Appendix B.

Step 19: Update Balance Sheet Accounts (c)

This step accounts for payment of long term principal payments, change in inventories and accounts for the year's operations. The operating profit is adjusted for accounts receivable, uncollectable accounts and accounts payable.

Step 20: Compute Taxation and Distribution of Earnings

This step computes income taxes and the distribution of earnings for three forms of business organization: (1) sole proprietorship, partnership or Subchapter S corporation; (2) corporation; and (3) cooperative. The taxation and distribution of earnings procedures for each of these three forms of business organization are discussed below.

Sole Proprietorship, Partnership or Subchapter S Corporation

An entity organized as a sole proprietorship, partnership or Subchapter S corporation does not pay income taxes. The owner of a business reports the taxable income from the business on his personal income tax return. Likewise, a partner in a business follows the same procedure. The earnings of a corporation formed as a Subchapter S corporation are not taxed to the entity but are taxed to the shareholders of the corporation. There are certain qualifications which a

corporation must meet in order to elect to be taxed as a Subchapter S corporation.[12] For purposes of this model it is assumed that a business formed as a Subchapter S corporation meets I.R.S. requirements and that all income and net operating losses are passed on to its shareholders, whether or not the income is actually distributed.[13]

Since these forms of business organization are not subject to income tax, all earnings are available for distribution to owner(s) or shareholders. Management determines the percentage of earnings to be distributed. This amount is withdrawn from the earnings, and the earnings which are not distributed are credited to the owner(s) equity account. Compensentating entries are made to the cash account balance. In case of a loss, owner(s) or shareholders do not receive dividends and the equity and cash accounts are reduced by the amount of the loss.

Corporation

Earnings of a corporation are taxed at corporate rates. The amount of investment tax credit to be applied to the income tax is specified by management for each simulation period. Thus the amount of income taxes payable is reduced by the amount of investment tax credit.

Income after taxes is available for distribution. Management determines the percentage of after tax income to be distributed to shareholders. This amount is subtracted from the after tax income. The remaining balance is considered to be available for allocation. Management specifies the percentage of this balance to be placed in reserve. This amount is subtracted from the retained earnings and is placed in the reserve account. Compensating entries are made in the

the cash account. In case of a loss, shareholders receive no dividends and the retained earnings is reduced by the amount of loss. If the loss exceeds the retained earnings, the corporation's common stock is reduced by the amount of the excess. Compensating entries are made in the cash account.

Cooperative

Cooperatives may operate under exempt or non-exempt status for Federal income tax purposes.[14] Since the large majority of grain elevator cooperatives operate under the non-exempt status, the taxation and distribution of earnings procedures used by the model are fitted to the non-exempt cooperative.

For taxation purposes, the federal requirements for non-exempt cooperatives state that: (1) tax deduction is allowed for true patronage refunds; (2) interest (stock dividends) is considered to be taxable income; and (3) extraneous income is taxable to the cooperative.[15] The federal requirements also state that: (1) the patronage refund to be allowed as a deduction for income tax purposes must be a true patronage refund and must be made pursuant to be a pre-existing obligation requiring the distribution; (2) a true patronage refund is a refund that is returned to the patrons on whose business the patronage refund was created; (3) patronage refunds must be made by departments (of the firm) or by commodity (divisions); and (4) extraneous income is not to be distributed to members.[16]

A cooperative is required by state law to maintain and/or contribute to a statutory reserve fund for the protection of the stockholders' equity. If the business fails to make a profit, the decrease in assets

(cash for example) must be balanced by a decrease in equity. This decrease in equity is reflected in a decrease in the statutory reserve and not in a decrease in stockholders' equity. More information concerning the statutory reserve and loss distribution is contained later in this section.

The amount of the statutory reserve to be maintained (the fulfillment level), as set by state law, is usually prescribed to equal some percentage of the stockholders' equity. In Oklahoma the fulfillment level is set at 100 percent of stockholders' equity.[17] The cooperative is required each fiscal year to contribute to the reserve unless the reserve fund meets or exceeds the required level or unless the business does not profit. The amount of the contribution, also set by state law, is usually prescribed to equal some percentage of after-tax income. In Oklahoma the law sets the amount of the contribution to be the larger of ten percent of after-tax income or an amount equal to the business transacted with non-members.[18] In most cases very little non-member business is transacted so that the amount of the statutory reserve contribution is calculated as a percentage of after-tax income.

As mentioned above the statutory reserve contribution is usually computed as a percentage of after-tax income. With this understanding it is obvious that the amount of income tax must be known before after-tax income and, finally, the statutory reserve contribution can be calculated. Furthermore, taxable income must be compiled before the income tax can be computed. As stated earlier, any income not allocated to members in the form of patronage refunds (cash or stock credit) plus any extraneous income and interest income (stock dividends)

comprise the taxable income of a cooperative. The non-allocated portion of taxable income is generally comprised of the contribution to the statutory reserve and the non-allocated earnings. Since the purpose of this model is to evaluate the financial impact of alternative changes in the firm's operations, only true non-allocated earnings and the contribution to the statutory reserve are considered to comprise taxable income. These two factors, computed basically from the firm's net profit, are more reflective of changes in the firm's financial position since most of the firm's income is derived from operations and not from interest income or extraneous sources. Changes in operations should (in most cases) have insignificant impact on extraneous and interest income. As a result, extraneous income and interest income are not included in the calculation of taxable income.

As mentioned above, non-allocated earnings is comprised of two factors: (1) statutory reserve contributions; and (2) true non-allocated earnings. Stated another way, non-allocated earnings (or taxable income) is equal to after-tax income less patronage refunds. This means that the amount of the statutory reserve contribution and the amount of patronage refunds must be known in order to compute taxable income because patronage refunds are based on after-tax income less the contribution to the statutory reserve and true non-allocated earnings are affected by patronage refunds. Calculation of the contribution to the statutory reserve has previously been explained and the calculation of patronage refunds and true non-allocated earnings is shown below.

The amount of patronage refunds may not exceed the maximum refundable amount (after-tax income less contribution to the statutory

reserve). Federal laws governing the taxation of cooperatives require that a least 20 percent of total patronage refunds must be refunded in cash in order for the patronage refund to be considered a deduction from taxable income.[19] Any portion of the maximum refundable amount not allocated to patronage refunds (cash refund and stock credits) is considered as true non-allocated earnings in the sense that is is not allocated to members in the form of patronage refunds. The following schedule may clarify this distributive procedure:

Income Before Taxes

(-) Taxes

Income after Taxes

(-) Contribution to Statutory Reserve

Maximum Amount Available for Patronage Refunds

(-) Patronage Refunds

True Non-allocated Earnings

To summarize briefly, cooperative taxable income is comprised of the contribution to the statutory reserve and true non-allocated earnings. True non-allocated earnings are based on the maximum refundable amount less patronage refunds. The maximum refundable amount is based on after-tax income less the contribution to the statutory reserve. The contribution to the statutory reserve is prescribed to be some percentage of after-tax income.

From the above paragraph it is easily seen that the calculation of cooperative income tax is not a straightforward procedure. The statu-

tory reserve contribtuion and true non-allocated earnings must be known in order to compute taxable income and thus the income tax, but the after-tax income figure must be known in order to derive these two components of taxable income. This problem can be solved by allowing the contribution to the statutory reserve to equal some percentage (Ps) of after-tax income and allowing true non-allocated earnings to equal some percentage of the maximum refundable amount. Actually the percentage of maximum refundable amount to be given in patronage refunds (Pd) is supplies by management. It follows then that the true non-allocated earnings is equal to (1 - Pd) times the maximum refundable amount. This sequence of calculations is shown below:

Item		Equation
Income Before Taxes	(B)	Known
(-) Taxes	(T)	(Tr)(TI) or B - A
Income After Taxes	(A)	Derived
(-) Contri. to S. Res.	(S)	(A)(Ps)
Maximum Refundable Amount	(R)	(A)(1 - Ps)
(-) Patronage Refunds	(P)	(A)(1 - Ps)(Pd)
True Non-Allocated Earnings	(N)	(A)(1 -Ps)(1 - Pd)

where,

TI = Taxable Income = S + N

Tr = Tax Rate

Ps = Percentage of After-Tax Income Contributed to Statutory Reserve

Pd = Percentage of Maximum Refundable Amount to be Refunded

The program uses the standard schedule of corporate tax rates, i.e., income of $25,000 or less is taxed at 22 percent and income over $25,000 is taxed at 48 percent. The effect of the temporary tax rates as prescribed by the 1974 Tax Revision Act are discussed later. The tax equation is derived using the following logic. Both components of taxable income are based on after-tax income, so after tax income is first derived as shown below. The appropriate tax rate is selected by using a defaulting procedure. The first after-tax income equation is based on the 22 percent rate. If the tax calculated exceeds $5,500 (22 percent of $25,000) it is known that the taxable income exceeds $25,000 and the 48 percent rate should be applied to the excess. In this case the tax is recalculated using the second tax equation which allows that $25,000 be taxed at the 22 percent rate and any excess be taxed at the 48 percent rate. Derivation of the first tax equation is shown below using the variables as defined previously, and where Tr equals 22 percent. Starting with

$$B = A + T \tag{1.1}$$

$$T = (Tr)(TI) = (.22)(TI) \tag{1.2}$$

$$S = (A)(Ps) \tag{1.3}$$

$$N = (A)(1 - Pd)(1 - Ps) \tag{1.4}$$

$$TI = S + N \tag{1.5}$$

substitute equations (1.3) and (1.4) into (1.5) yielding

$$TI = (A)(Ps) + (A)(1 - Pd)(1 - Ps) \tag{1.6}$$

and then substitute equation (1.6) into (1.2) giving

$$T = (.22)[(A)(Ps) + (A)(1 - Pd)(1 - Ps)]. \quad (1.7)$$

Substituting equation (1.7) into (1.1) gives

$$B = A + (.22)[(A)(Ps) + (A)(1 - Pd)(1 - Ps)] \quad (1.8)$$

and solving equation (1.8) for A yields

$$A = B/[1.22 - (.22)(Pd) + (.22)(Pd)(Ps)]. \quad (1.9)$$

Using B, Pd and Ps (factors which are known), equation (1.9) calculates after-tax income for taxable incomes of $25,000 or less. Similarly, the after-tax income equation for taxable incomes which exceed $25,000 is derived below. Again starting with

$$B = A + T \quad (2.1)$$

$$T = (Tr)(TI) = (.22)(TI) + (.26)(TI - 25,000) \quad (2.2)$$

$$S = (A)(Ps) \quad (2.3)$$

$$N = (A)(1 - Pd)(1 - Ps) \quad (2.4)$$

$$TI = S + N \quad (2.5)$$

substitute equations (2.3) and (2.4) into (2.5) yielding

$$TI = (A)(Ps) + (A)(1 - Pd)(1 - Ps) \quad (2.6)$$

and then substitute equation (2.6) into (2.2) giving

$$T = (.22)[(A)(Ps) + (A)(1 - Pd)(1 - Ps)] + (.26)[(A)(Ps) + (A)(1 - Pd)(1 - Ps) - 25,000]$$

which when simplified yields

$$T = (A)[.48 - (.48)(Pd) + (.48)(Pd)(Ps)] - 6,500. \quad (2.7)$$

Substituting equation (2.7) into (2.1) gives

$$B = A + (A)[.48 - (.48)(Pd) + (.48)(Pd)(Ps)] - 6,500 \qquad (2.8)$$

and solving equation (2.8) for A yields

$$A = (B + 6,500)/[1.48 - (.48)(Pd) + (.48)(Pd)(Ps)]. \qquad (2.9)$$

Using B, Pd and Ps (factors which are known), equation (2.9) calculates after-tax income for taxable incomes greater than $25,000.

The above equations, (1.9) and (2.9) may be adapted to include the amount of investment credit (CRDINV). The derivation is the same as above except the tax equation becomes: (T) = (Tr)(TI) - CRDINV. The after tax income equations including investment credit are

$$A = (B + CRDINV)/[1.22 - (.22)(Pd) + (.22)(Pd)(Ps)] \qquad (3.1)$$

and

$$A = (B + 6,500 + CRDINV)/[1.48 - (.48)(Pd) + (.48)(Pd)(Ps)]. \qquad (3.2)$$

Equations (3.1) and (3.2) would not be valid when investment credit exceeds the amount of tax. To avoid this situation a CUTOFF figure is calculated which shows the maximum amount of investment credit allowable. Actually, CUTOFF is the appropriate tax liability without consideration of investment credit. Whenever CRDINV exceeds CUTOFF, the tax liability is zero and the after-tax income equation is not executed. The CUTOFF equations for (3.1) and (3.2) respectively are

$$CUTOFF = (.22)(B)(1 - Pd)(1 - Ps) + (.22)(B)(Ps) \qquad (4.1)$$

and

$$CUTOFF = (.48)(B)(1 - Pd)(1 - Ps) + (.48)(B)(Ps) - 6,500. \quad (4.2)$$

The program may easily be modified to calculate income taxes using the temporary schedule of corporate tax rates as prescribed by the 1974 Tax Revision Act, i.e., income of $25,000 or less is taxed at 20 percent and income ranging from $25,001 to $50,000 is taxed at 22 percent and income over $50,000 is taxed at 48 percent. If these tax rates are used in the model, the appropriate equations for taxable incomes of $25,000 or less are

$$A = (B + CRDINV)/[1.20 - (.20)(Pd) + (.20)(Pd)(Ps)] \quad (5.1)$$

and

$$CUTOFF = (.20)(B)(1 - Ps) + (.20)(B)(Ps). \quad (5.2)$$

If taxable income is within the range of $25,001 to $50,000, equations (5.3) and (5.4) are used to calculate the tax.

$$A = (B + 500 + CRDINV)/[1.22 - (.22)(Pd) + (.22)(Pd)(Ps)] \quad (5.3)$$

$$CUTOFF = (.22)(B)(1 - Pd)(1 - Ps) + (.22)(B)(Ps) - 500 \quad (5.4)$$

If taxable income exceeds $50,000 equations (5.5) and (5.6) are used to compute the tax.

$$A = (B + 13,500 + CRDINV)/[1.48 - (.48)(Pd) + (.48)(Pd)(Ps)] \quad (5.5)$$

$$CUTOFF = (.48)(B)(1 - Pd)(1 - Ps) + (.48)(B)(Ps) - 13,500 \quad (5.6)$$

In case of a loss, the firm pays no income taxes and does not contribute to the statutory reserve. The maximum refundable amount is zero, thus the amount to be refunded to patrons in the form of cash

dividend and stock credits is zero. Also there are no non-allocated earnings to be added to the retained earnings account. The amount of the loss is subtracted from the statutory reserve account and a compensating entry is made to the cash account. If the loss exceeds the balance of the statutory reserve the statutory reserve will have a negative balance. This reduces the balance of the total retained earnings account by actually reducing the balance of the other retained earnings account (the total retained earnings account has two components which are the statutory reserve and other retained earnings).[20]

Step 21: Print Taxes and Distribution of Earnings (c)

This step prints the computation of taxes and the distribution of earnings computed in the previous step. Examples of this output for each form of business organization are shown in Appendix C.

Step 22: Compile Equity Accounts (b)

This step compiles the equity accounts and adjusts for the distribution of earnings and any stock retirements. A cooperative may retire stock by one of three alternative methods. The Data Input Forms in Appendix A present the alternatives available for the distribution of earnings and cooperative stock retirements.

Step 23: Print Equity Accounts (b)

This step prints the equity section of the balance sheet in full detail. The balance sheet lists only the balance of the firm's total equity. Examples of this output are shown in Appendix C.

Step 24: Compile Balance Sheet Accounts (b)

This step compiles the balance sheet subaccounts into the main accounts to be printed.

Step 25: Print Balance Sheet (b)

This step prints the ending balance sheet. An example of this output is shown in Appendix B.

Step 26: Compute Ratio Analysis (b)

This step computes the following financial ratios.

1. Liquidity ratios:
   - Current ratio;
   - Liquid ratio.
2. Solvency ratios:
   - Liabilities/assets;
   - Liabilities/equity;
   - Fixed assets/equity.
3. Profitability ratios:
   - Gross return on sales for the firm;
   - Gross return on sales for each enterprise;
   - Net return on gross income;
   - Net return on assets;
   - Net return on equity.
4. Miscellaneous ratios:
   - Average inventory turnover for the firm;
   - Average inventory turnover for each enterprise;
   - Operating expenses/gross profit.

Step 27: Print Ratio Analysis (b)

This step prints the ratio analysis computed in the previous step. An example of this output is shown in Appendix B.

Step 28: Execute End of Period Program Adjustments (b)

This step increments the year-count for the program and assigns the ending inventory levels to the beginning inventory levels of the following period.

Step 29: Print Simulation Summary

This step prints a summary of important information from each simulated year after the last year's simulation is completed. An example of this output is shown in Appendix B.

FOOTNOTES

[1]The initial version of the main program and subroutines was developed by Gary T. Devino and Herman Harrison, Agricultural Economics Department, University of Missouri, Columbia, 1975.

[2]In order to clarify the sequence of operations as presented in the flowchart a lower case alphabetic letter is enclosed in parentheses at the end of the title of each step discussed in this chapter. Those steps executed only in the base year are denoted by '(a)'. Steps executed in the base year and each simulated year are denoted by '(b)'. Those steps executed only in simulated years are denoted by '(c)'.

[3]The Grain Volume Analysis determines storage, handling and dividend revenue from wheat operations. The Grain Enterprise Subroutine determines the revenue from all other grain operations.

[4]The term 'terminal associate' refers to marketing, processing and storage associations of which the local firm may be a member.

[5]The Grain Enterprise Subroutine is explained in detail in Step 13 of this chapter.

[6]The secondary wheat storage capacity reduces the storage space available for wheat and increases the space available for the storage of other grains. Secondary grain(s) are those grains to be stored in the space made available by the secondary wheat storage capacity. The storage revenue generated from the storage of these other grains is accounted for in the Grain Enterprise Subroutine.

[7]Oklahoma State Board of Agriculture. Oklahoma Wheat: Acreage, Yield and Production. Oklahoma Crop and Livestock Reporting Service, Oklahoma City, Oklahoma, 1945-1975.

[8]Ray, Daryll E., Revised Manual for Martin's Computer Algorithm for Estimating the Parameters of Selected Classes of Non-Linear, Single Equation Models. Stillwater: Oklahoma State University, Agricultural Experiment Station Research Report P-674, November 1972.

[9]Subroutine Gause was developed by J.P. Chandler, Computer Science Department, Oklahoma State University, 1968.

[10]Brennan, Michael J., Jr., Preface to Econometrics. Cincinnati Ohio: South-Western Publishing Company, 1969, pp. 271-272.

[11]Ibid.

[12]Internal Revenue Code of 1954, Subchapter S - Election of Certain Small Business Corporations As To Taxable Status, (Prentice-Hall Federal Tax Guide, Englewood Cliffs: New Jersey, 1977), Code Volume.

[13]U.S. Department of the Treasury. Tax Guide for Small Business, Internal Revenue Service, Publication 334, 1976 ed., Ch. 9, pp 56.

[14]Internal Revenue Code of 1954, Sec. 521 - Exemption of Farmers' Cooperatives from Tax, (Prentice-Hall Federal Tax Guide, Englewood Cliffs: New Jersey, 1977), Code Volume.

[15]Ibid., Subchapter T - Cooperatives and Their Patrons.

[16]Ibid., Subchapter T - Cooperatives and Their Patrons.

[17]Oklahoma Statutes, 1970 ed. (St. Paul, Minn, 1971), Vol 1, Title 2, Ch. 4, Sec 361L.

[18]Ibid.

[19]Internal Revenue Code of 1954, Subchapter T - Cooperatives and Their Patrons, (Prentice-Hall Federal Tax Guide, Englewood Cliffs: New Jersey, 1977), Code Volume.

[20]A cooperative may carry a loss back three years and/or forward five years. The loss is carried back to the third previous year and is applied against any taxable income in that year in order to derive a tax refund for that year. If any loss is still distributable, the remainder of the loss is carried back to the second previous year and is applied against any taxable income in that year in order to derive another tax refund for that year. If any loss remains to be distributed, it may be carried forward in the same mannger. Any tax refunds received are placed in the statutory reserve account to help restore the loss. As can be seen by this procedure a $20,000 loss (out of statuatory reserve fund) will not earn a $20,000 tax refund to restore the fund to its previous level.

If the loss exceeds the statuatory reserve fund, the remainder of the loss will be shown as a decrease in the "other retained earnings" account. If the loss exceeds the amount of these two accounts, the retained earnings is shown at a negative balance and thus reduces the value of members' equity.

Currently the I.R.S. is reviewing the practice of extracting the loss from the statuatory reserve account. The I.R.S. would like to take the loss from the members' capital stock and equity credit balance. This ruling is forthcoming.

CHAPTER V

DEMONSTRATION OF THE MODEL

This chapter presents a demonstration of the model using actual firm data to evaluate a potential investment in an additional wheat storage facility. Discussed first is the data used in the analyses. Following the presentation of the data, the results of the analyses based upon projected lengths of storage time and volumes of wheat handled are compared and summarized. In order to preserve the anonumity of the firm, the name, location or any other information which might identify the firm is not presented.

Description of the Firm

The firm is a privately owned business and is operated by the owners. Located in the major wheat producing area in Central Oklahoma, the firm's main source of income is derived from the handling and storage of wheat. The firm typically handles more wheat than it can store. Excess wheat to be stored is moved to a terminal facility.

In addition to the wheat handling and storage operations, the firm operates feed, seed, grain, fertilizer and farm supplies enterprises. In the feed enterprise the firm custom mixes livestock feed and also handles commercially prepared livestock and poultry feeds and feed supplements. The seed enterprise accounts for only a minor share

of the firm's business. The other grains handled and stored in the grain enterprise are mostly used to provide the basic ingredients for the custom feed mixing operation. The fertilizer and farm supplies enterprises were recently added to the firm's operation and at the present time account for a small share of the firm's business.

The question to be evaluated in this analysis concerns the purchase of additional grain storage facilities located adjacent to the firm's present facilities. The present wheat storage facility has a capacity of 200,000 bushels and the new facility would add an additional 600,000 bushels to wheat storage capacity for a combined wheat storage capacity of 800,000 bushels. The new facility does not include any additional or new side line activities.

Simulation Data

Base Year Data

Data concerning the firm's base year operations and financial condition are presented in the computer output in Appendix B. Base year operating statements for each enterprise show the sales, purchases, and beginning and ending inventories along with operating expenses for the base year. These figures are combined with base year overhead expenses and other income and expense items for the firm to present the result of total operations of the base year. The firm's equity account balances and ending balance sheet for the base year present the initial level of these accounts for the simulation analysis.

Management's Projections

Management's projections concerning the distribution of earnings, annual growth rates for income and expense accounts (not allocated to specific enterprises), and other operating and accounting data are presented in Table I. Table II presents management's projections concerning the operations of each enterprise. For each enterprise the gross margin, days-in-inventory, annual growth rates for sales and direct expenses are shown in Table II. Management's projections concerning wheat handling and storage operations are presented in Table III. As discussed in the following section, management feels that the most important factors affecting the operations of their firm are the volume of wheat handled each year and the length of time wheat is stored. In order to more clearly analyze the effects of various volumes of wheat handled, the projections presented in Tables I, II, and III are not changed in the analysis. Table IV presents management's projections of the volume of wheat handled in each simulated year. Management first specified their best estimate of the volume of wheat which they expected their firm to handle in the five simulated years. This volume is referred to as the volume expected to be handled or the "expected volume". Management also specified what they thought to be a more conservative estimate of the volume handled. This volume is referred to as the "low volume". The expected volume and low volume projections for each year of the analysis are presented in Table IV. Table V presents management's projections of expected harvested wheat acres, expected mean yield per acre and standard deviation of yields. This information is used in the stochastic determination of the volume

TABLE I

MANAGEMENT'S PROJECTIONS OF OPERATING DATA
FOR THE FIRM FOR THE FIVE YEAR
SIMULATION ANALYSIS

PROJECTION	%
Percentage of After-Tax Income Allocated to Dividends	0.0
Percentage of Allocatable Retained Earnings Placed in Reserve	0.0
Percentage of Sales on Credit Terms	5.0
Percentage of Purchases on Credit Terms	2.0
Short Term Interest Rate	9.5
Annual Growth Rate for Operating and Service Income	0.0
Annual Growth Rate for Other Income	6.0
Annual Growth Rate for Other Expenses	0.0
Annual Growth Rate for Overhead Expenses	
Salaries and Wages	10.0
Payroll Taxes	5.0
Employee Benefits	5.0
Depreciation	0.0
Rent	10.0
Repairs	15.0
Insurance	15.0
Taxes and Licenses	10.0
Utilities	20.0
Advertising	20.0
Travel and Entertainment	10.0
Supplies	10.0
Professional Services	20.0
Miscellaneous Expenses	10.0

TABLE II

MANAGEMENT'S PROJECTIONS OF OPERATING DATA
FOR EACH ENTERPRISE FOR THE FIVE YEAR
SIMULATION ANALYSIS

PROJECTION	FEED	SEED	GRAIN	FERTILIZER	F.SUPPLIES
	%	%	%	%	%
Percentage of Gross Margin	10.20	8.00	10.10	13.33	33.33
Average Days in Inventory	7.00	19.00	10.00	14.00	70.00
Annual Growth Rates for Sales					
Year 1	15.00	15.00	10.00	30.00	30.00
Year 2	12.00	15.00	10.00	15.00	25.00
Year 3	10.00	10.00	5.00	15.00	25.00
Year 4	10.00	10.00	5.00	15.00	25.00
Year 5	10.00	10.00	5.00	15.00	25.00
Annual Growth Rates for Direct Expenses					
Salaries and Wages	10.00	10.00	10.00	10.00	10.00
Payroll Taxes	5.00	5.00	5.00	5.00	5.00
Employee Benefits	5.00	5.00	5.00	5.00	5.00
Depreciation	0.00	0.00	0.00	0.00	0.00
Rent	0.00	0.00	0.00	10.00	0.00
Repairs	15.00	15.00	15.00	15.00	0.00
Insurance	15.00	15.00	15.00	15.00	15.00
Taxes and Licenses	0.00	0.00	0.00	0.00	0.00
Utilities	20.00	20.00	20.00	20.00	20.00
Advertising	0.00	0.00	0.00	0.00	0.00
Travel and Entertainment	0.00	0.00	0.00	0.00	0.00
Supplies	10.00	10.00	10.00	0.00	0.00
Professional Services	0.00	0.00	0.00	0.00	0.00
Miscellaneous	10.00	10.00	10.00	10.00	10.00

TABLE III

MANAGEMENT'S PROJECTIONS OF OPERATING DATA
FOR WHEAT OPERATIONS FOR THE FIVE YEAR
SIMULATION ANALYSIS

Projection	Units	Simulated Year 1	2	3	4	5
Percentage of Wheat Stored at Harvest	%	90	90	90	90	90
Shrinkage Factor	%	.5	.5	.5	.5	.5
Maximum Local Carry-In	bu.	150,000	125,000	100,000	100,000	100,000
Local Elevator Capacity	bu.	800,000	800,000	800,000	800,000	800,000
Net Handling Change	$/bu/mo	.17	.17	.18	.18	.19
Local Storage Charge	$/bu/mo	.020	.020	.0225	.0225	.025
Terminal Storage Charge	$/bu/mo	.020	.020	.0225	.0225	.025

TABLE IV

MANAGEMENT'S PROJECTIONS OF EXPECTED AND LOW VOLUMES OF WHEAT HANDLED IN EACH YEAR OF THE FIVE YEAR SIMULATION ANALYSIS

Projection	Simulated Year 1	2	3	4	5
			Bushels		
Expected Volume Handled	800,000	500,000	550,000	550,000	600,000
Low Volume Handled	700,000	400,000	450,000	450,000	450,000

TABLE V

MANAGEMENT'S PROJECTIONS OF EXPECTED WHEAT ACRES, EXPECTED MEAN YIELDS AND STANDARD DEVIATION OF YIELDS FOR THE STOCHASTIC ANALYSIS

Projection	Simulated Year 1	2	3	4	5
Expected Wheat Acres	35,000	30,000	25,000	23,000	24,000
Expected Mean Yield Per Acre	23	23.5	24	24.5	24.5
Standard Deviation of Yields	4.863	4.863	4.863	4.863	4.863

handled. The "expected wheat acres" is management's best estimates of the number of acres of wheat which will be harvested in the firm's trade area for the five simulated years. Likewise, the "expected mean yield" is management's best estimate of the mean wheat yield in the trade area over the simulated years. The standard deviation of yields was provided to management in the Data Input Forms as explained previously. These projections of acres, yields and standard deviations as presented in Table V are used for all stochastic analyses. Table VI presents management's projections of the length of time wheat is stored in each simulated year. Management first specified their best estimate of the length of time which they expect wheat will be stored in their facility over the simulated years. This storage time projection is referred to as the "expected storage time". Management also specified what they thought to be a more conservative estimate of the length of storage time. This lower storage time projection is referred to as the "low storage time". The expected and low storage time projections are presented in Table VI. The projections in Tables IV, V, and VI are used in the analysis as described in the following section.

Simulation Analysis

The objective of this analysis is to provide information which will aid management in analyzing the financial implications of purchasing additional grain storage facilities. Management specified the cost of the new facilities to be $600,000. The down payment of $50,000 is borrowed for one year at an interest rate of nine percent. The balance of $550,000 will be paid in five equal payments of $110,000 and interest will be paid on the unpaid balance each year at a rate of nine percent.

TABLE VI

MANAGEMENT'S PROJECTIONS OF LOW AND EXPECTED LENGTHS OF STORAGE TIME FOR THE FIVE YEAR SIMULATION ANALYSIS

PROJECTION	NUMBER OF MONTHS AFTER HARVEST											
	1	2	3	4	5	6	7	8	9	10	11	12
Expected Storage Time:	Percentages											
Year 1	100	95	95	90	85	85	70	65	65	60	55	50
Year 2	100	90	85	75	70	65	50	50	40	35	35	30
Year 3	100	85	80	80	70	60	50	45	40	35	30	25
Year 4	100	85	80	80	70	60	50	45	40	35	30	25
Year 5	100	85	80	80	70	60	50	45	40	35	30	25
Low Storage Time:												
Year 1	100	65	60	60	55	55	40	40	40	35	35	30
Year 2	100	70	65	65	60	55	45	40	30	30	25	25
Year 3	100	75	75	70	65	60	45	40	35	30	25	20
Year 4	100	75	75	70	65	60	45	40	35	30	25	20
Year 5	100	75	75	70	65	60	45	40	35	30	25	20

As stated earlier, management is interested in how alternative volumes of wheat handled and lengths of storage time affect the financial condition of the firm with the new investment in wheat storage facilities. The first part of the analysis analyzes the effects of different volumes of grain handled under both expected and low lengths of storage time while the second section compares the effects of the two specified lengths of storage time under alternative volumes handled.

Effect of Volume Handled

In order to demonstrate the effect of different volumes of wheat handled under expected lengths of storage time six separate analyses were used. The "E" attached to the analyses number indicates that the analysis is based on expected lengths of storage time. Each of these analyses used the same base year information and operating projections presented in Tables I, II, and III. The analyses differ in the determination of the volume of wheat handled. For ANALYSES 1-E, 2-E, and 3-E the handling volume is determined stochastically using the results of the first, second and third replications respectively. The handling volume used in ANALYSIS 4-E is the mean handling volume derived from 25 stochastic replications. The handling volumes used in ANALYSES 5-E and 6-E are respectively the expected and low handling volumes specified by management. The results of these six analyses are presented in Table VII.

When studying the results presented in Table VII the following comments should be noted. First, handling and storage charges as presented in Table III increase over the five year analysis. Thus, if equal volumes are handled in the first and fifth years the handling

TABLE VII

SUMMARY OF SELECTED FINANCIAL INDICATORS FOR EACH YEAR OF THE SIMULATION ANALYSIS FOR THE SIX ANALYSES BASED ON EXPECTED STORAGE TIME*

ITEM	SIMULATED YEAR 1	2	3	4	5
			THOUSAND		
Volume Handled (Bu.):					
ANALYSIS 1-E	716	392	545	577	667
ANALYSIS 2-E	535	404	561	460	483
ANALYSIS 3-E	627	744	431	695	588
ANALYSIS 4-E	787	680	599	524	569
ANALYSIS 5-E	800	500	550	550	600
ANALYSIS 6-E	700	400	450	450	450
Handling Revenue ($):					
ANALYSIS 1-E	122	67	98	86	127
ANALYSIS 2-E	91	69	101	83	92
ANALYSIS 3-E	107	127	78	125	112
ANALYSIS 4-E	134	116	108	94	108
ANALYSIS 5-E	136	85	99	99	114
ANALYSIS 6-E	119	68	81	81	86
Storage Revenue ($):					
ANALYSIS 1-E	138	94	108	92	127
ANALYSIS 2-E	110	90	108	90	99
ANALYSIS 3-E	124	136	100	121	122
ANALYSIS 4-E	149	135	125	103	116
ANALYSIS 5-E	150	111	113	104	120
ANALYSIS 6-E	136	94	95	86	93
Income After Taxes ($):					
ANALYSIS 1-E	68	27	55	45	89
ANALYSIS 2-E	37	25	55	41	54
ANALYSIS 3-E	53	79	42	82	81
ANALYSIS 4-E	80	74	72	59	77
ANALYSIS 5-E	81	46	60	60	81
ANALYSIS 6-E	65	28	40	38	48

TABLE VII (Continued)

ITEM	SIMULATED YEAR 1	2	3	4	5
			THOUSAND		
Stockholders' Equity ($):					
ANALYSIS 1-E	121	148	203	248	337
ANALYSIS 2-E	90	115	170	210	264
ANALYSIS 3-E	106	185	228	309	391
ANALYSIS 4-E	133	207	279	338	415
ANALYSIS 5-E	135	180	241	301	382
ANALYSIS 6-E	118	146	186	224	273
			RATIOS		
Current Ratio:					
ANALYSIS 1-E	1.04	.55	.49	.41	.62
ANALYSIS 2-E	.31	.35	.39	.31	.34
ANALYSIS 3-E	.78	1.03	.47	.77	.77
ANALYSIS 4-E	1.19	1.25	1.04	.88	.88
ANALYSIS 5-E	1.20	.99	.69	.67	.73
ANALYSIS 6-E	1.00	.54	.30	.32	.33
Liquid Ratio:					
ANALYSIS 1-E	.66	.14	.25	.21	.46
ANALYSIS 2-E	-.34	.06	.20	.13	.19
ANALYSIS 3-E	.30	.81	.12	.58	.55
ANALYSIS 4-E	.88	.97	.70	.56	.61
ANALYSIS 5-E	.86	.61	.40	.43	.52
ANALYSIS 6-E	.61	.16	.04	.13	.16

*For ANALYSES 1, 2 and 3 the volume handled is determined stochastically using the results of the first, second and third replications respectively. For ANALYSIS 4 the stochastic mean of 25 replications is used. ANALYSES 5 and 6 use management's projections of expected and low volume handled respectively.

revenue received in the fifth year is larger due to the increase in the handling charge. Second, storage revenue is determined by the initial volume of wheat stored each period (volume handled times the percentage stored plus local and terminal carry-in volume), the length of storage time and the storage charge each year. These factors which affect the computation of storage revenue should be noted when comparing storage revenues for different years. Third, the income after taxes is based on taxable income of the total firm's operations and is not based solely on storage and handling revenues. Fourth, the firm does not pay dividends to stockholders. The stockholders are the firm's owners (management) and they receive salaries. Thus, the stockholders' equity is increased each year by the amount of after-tax income. Finally, the current ratio is computed by dividing current assets by current liabilities whereas the liquid ratio is computed by dividing current assets less inventories by current liabilities. These inventories are not related to wheat activities since the firm does not own the stored wheat. The inventory figure is comprised of the inventories resulting from the firm's feed, seed, other grain, fertilizer and farm supplies enterprises. These comments should be kept in mind when evaluating the results of the six analyses presented in Table VII discussed below.

Table VII presents the results of the six analyses under the expected lengths of storage time projected by management. This table allows comparisons to be made of the effects of different volumes handled. As can be seen from the table, within any year a higher handling volume results in higher handling and storage revenues. With all other net income of the firm assumed to be identical for any volume

handled within a year, a higher volume handled results in a higher after-tax income and a higher level of stockholders' equity. This relationship is also reflected in the resulting current and liquid ratios. Table VII also shows that the handling volumes generated stochastically are generally within or reasonably near the range of volumes handled defined by management's projections of expected and low volumes handled. This range of volumes handled provides a comparison of the effects of expected and low handling volumes. By summing the handling revenues of ANALYSIS 5-E over the five simulated years, the total handling revenue amounts of $533,000. Similarly, the total summation of handling revenues of ANALYSIS 6-E over the five simulated years amounts to $435,000. Thus, over the five years simulated the handling revenue generated from the expected volume handled (ANALYSES 5-E) exceeds the handling revenue generated from the low volume handled (ANALYSIS 6-E) by $98,000, ($533,000-$435,000). Using this same procedure to compare the effects of expected and low volumes handled on storage revenue and after-tax income, it can be seen that over the five year simulation the difference in storage revenues is $94,000 and the difference in after-tax income is $109,000.

Effect of Length of Storage Time

Table VIII presents the results of the six analyses based on the low lengths of storage time as projected by management in Table VI. To signify that these analyses are based on low storage time projections an 'L' is attached to the numbers one through six (ANALYSES 1-L through 6-L). Table VIII may be interpreted exactly as Table VII because only the storage time projection is changed. Therefore, the volumes handled

TABLE VIII

SUMMARY OF SELECTED FINANCIAL INDICATORS FOR EACH YEAR OF THE SIMULATION ANALYSIS FOR THE SIX ANALYSES BASED ON LOW STORAGE TIME*

ITEM	SIMULATED YEAR 1	2	3	4	5
			THOUSAND		
Volume handled (Bu.):					
ANALYSIS 1-L	716	392	545	477	667
ANALYSIS 2-L	535	404	561	460	483
ANALYSIS 3-L	627	744	431	695	588
ANALYSIS 4-L	787	680	599	524	569
ANALYSIS 5-L	800	500	550	550	600
ANALYSIS 6-L	700	400	450	450	450
Handling Revenue ($):					
ANALYSIS 1-L	122	67	98	86	127
ANALYSIS 2-L	91	69	101	83	92
ANALYSIS 3-L	107	127	78	125	112
ANALYSIS 4-L	134	116	108	94	108
ANALYSIS 5-L	136	89	99	99	114
ANALYSIS 6-L	119	68	81	81	86
Storage Revenue ($):					
ANALYSIS 1-L	95	70	90	79	112
ANALYSIS 2-L	76	66	91	77	86
ANALYSIS 3-L	85	104	85	106	106
ANALYSIS 4-L	102	102	105	88	100
ANALYSIS 5-L	103	83	94	89	105
ANALYSIS 6-L	93	70	79	74	81
Income After Taxes ($):					
ANALYSIS 1-L	45	100	44	36	70
ANALYSIS 2-L	19	7	45	32	45
ANALYSIS 3-L	32	62	32	71	70
ANALYSIS 4-L	55	56	60	48	66
ANALYSIS 5-L	47	31	48	49	70
ANALYSIS 6-L	43	11	29	30	39

TABLE VIII (Continued)

ITEM	SIMULATED YEAR 1	2	3	4	5
			THOUSAND		
Stockholders' Equity ($):					
ANALYSIS 1-L	98	108	152	188	266
ANALYSIS 2-L	72	79	123	155	200
ANALYSIS 3-L	86	147	180	251	321
ANALYSIS 4-L	108	164	224	272	338
ANALYSIS 5-L	110	141	189	238	308
ANALYSIS 6-L	96	107	136	166	205
			RATIOS		
Current Ratio:					
ANALYSIS 1-L	.58	.16	.28	.25	.44
ANALYSIS 2-L	-.91	.09	.24	.19	.23
ANALYSIS 3-L	.09	.76	.20	.55	.51
ANALYSIS 4-L	.83	.85	.60	.50	.54
ANALYSIS 5-L	.86	.53	.39	.42	.49
ANALYSIS 6-L	.51	.17	.12	.19	.21
Liquid Ratios:					
ANALYSIS 1-L	.04	-.18	.08	.08	.31
ANALYSIS 2-L	-1.99	-.17	.08	.04	.10
ANALYSIS 3-L	-.64	.55	-.07	.39	.34
ANALYSIS 4-L	.37	.59	.34	.27	.35
ANALYSIS 5-L	.42	.20	.16	.23	.32
ANALYSIS 6-L	.06	-.16	.09	.03	.07

* For ANALYSES 1, 2 and 3 the volume handled is determined stochastically using the results of the first, second and third replication respectively. For ANALYSIS 4 the stochastic mean of 25 replications is used. ANALYSES 5 and 6 use management's projections of expected and low volume handled respectively.

and the resulting handling revenues are identical for Tables VII and VIII. When these two tables are compared it is seen that the lower storage time projection results in lower storage revenues, lower after-tax incomes and lower levels of stockholders' equity for each volume handled. These results are also reflected in the magnitude of the financial ratios. Management's projections of volumes handled again provide a comparison of the effects of the expected and low lengths of storage time. By summing the storage revenues of ANALYSES 5-E over the five simulated years, the total storage revenues amounts to $598,000. Similarly the total summation of storage revenues of ANALYSIS 5-L over the five simulated years amounts to $474,000. Thus, over the five years simulated the storage revenues generated from the expected length of storage time (ANALYSIS 5-E) exceeds the storage revenues generated from the low lengths of storage time (ANALYSIS 5-L) by $124,000 ($598,000-$474,000). Using this same procedure to compare the effects of expected and low lengths of storage time resulting from the low handling volume projection (ANALYSES 6-E and 6-L) it can be seen that over the five year simulation storage revenues generated from the expected length of storage time (ANALYSIS 6-E) exceed storage revenues generated from the low lengths of storage time (ANALYSIS 6-L) by $108,000, ($504,000-$396,000).

Summary

This chapter demonstrates the use of the model using actual firm data to aid management of the firm in the process of analyzing the potential financial implications of purchasing additional grain storage

facilities. This demonstration of the model does not attempt to make recommendations to management concerning the purchase of the new facilities. The purpose of the model is to provide management with information which will aid them in their analysis of long-range changes in operations. Management uses the information provided by the model in evaluating the feasibility of investing in addition wheat storage facilities.

The information provided by the results of the analysis shows the effects of volumes handled and lengths of storage time under the assumptions and projections specified by management. After evaluating these results management may ask additional "what if" questions concerning the financing of the investment and the operating projections. For example, management may desire to analyze the new investment using a ten year loan instead of the five year loan included in the analysis. Similarly, management may desire to evaluate the investment under a different set of grain operations projections. The model can easily be used to provide management with information which will aid in the analysis of these additional questions.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

The long-range operating questions faced by the management of grain elevator firms must be analyzed under uncertain future business conditions. This uncertainty is caused by weather conditions, government farm programs and policies, and grain producers' planting, harvesting and storage decisions. Inclusion of these factors in the analysis of long-range operating questions makes the decision-making process a tedious, time-consuming and often complicated process if all alternatives are thoroughly evaluated.

The management of large corporations must analyze long-range operating questions in a similar decision-making environment. In recent years corporate managers have increasingly used computerized simulation models as tools of analysis in the evaluation of these long-range plans for operations. These simulation models have proven to be effective managerial tools because they offer management the advantages of speedy and precise calculations at a low cost in the detailed evaluation and comparison of alternative long-range plans under a range of specified assumptions concerning future business conditions.

At this time no such long-range planning model exists in the public domain for the management of grain elevator firms. Planning models

for firms in other industries are specifically designed to simulate the unique operations of the individual firms and are not readily adaptable to the operations of other firms. Moreover, these corporate planning models are privately held and are not available for use outside the firm.

The development of a planning model requires time, funding, computer programming expertise and computer facilities as well as knowledge of the firm's operations. For these reasons few, if any, grain elevator firms have the resources to develop a simulation model to aid management in the analysis of long-range planning questions. The purpose of this research was to develop a long-range planning model to aid management of Oklahoma's grain elevator firms in the their long-range decision-making. Specifically the objectives were to: (1) develop a firm financial simulation model which will provide additional information to be used in feasibility analyses of long-range changes in operations; and (2) demonstrate the model using actual firm data.

Model Description

The Grain Elevator Firm Simulation Model is designed to aid elevator managers analyze questions concerning long-range changes in their firms' operations. these questions may concern additional grain handling and storage facilities as well as side line enterprise operations dealing with feed, seed, grain, fertilizer and farm supplies. The model is designed to be flexible so that the operations of most grain elevator firms may be effectively analyzed.

Three types of data are needed for the analysis. First, information is needed to provide the financial condition of the firm at the beginning of the analysis. This information is referred to as 'base year' data because this is the information upon which the analysis is based. The base period is usually designated to be the firm's most recent fiscal period for which records are complete. For this base period, the ending balance sheet and revenues and expenses from sales of products and services are needed. Secondly, information concerning the firm's present operations are needed. This information includes long term loans, depreciation schedules of major assets, accounting and business practices such as percentage of purchases and sales on credit terms, percentage of accounts receivable which are not collectable and typical distribution of earnings procedures. The above two types of information describe the firm's financial position and typical operations for the base period. The third type of information needed concerns management's "what if" questions or assumptions about future business conditions. This information includes growth rates for sales and expenses and future interest rates, storage fees and handling margins. Also included in this information is the cost of any new equipment or facilities and alternative financing arrangements. Evaluation of alternative changes in operations generally involves changing these "what if" assumptions contained in the third type of information while the description of the firm's financial condition and basic operations remain the same.

The model uses these three types of data mentioned above to obtain the results from simulated operations in future years. Future years' sales and expenses are updated each year using annual growth rates and

base year data specified by management. The results of all simulated operations are linked together by an accounting system which updates the set of income and expense accounts.

The analysis of the firm's wheat storage and handling operations is an integral and important part of the model. The volume of wheat handled may be deterministically or stochastically estimated and both of these methods include several alternative types of analyses so that management may use this part of the program to analyze a wide range of "what if" questions concerning grain handling and storing operations of the firm.

The computer output generated by the model first presents management's "what if" assumptions concerning operations of the firm and enterprises so that those assumptions upon which the analyses are based are clearly presented. The computer output next presents the results of firm and enterprise operations for the base year. Presented next are the initial balances of equity accounts and the base year ending balance sheet and ratio analysis. For each simulated year the output first shows the results of the Grain Volume Analysis and those assumptions upon which the analysis is based. Included in the Grain Volume Analysis output are the volumes handled and stored, revenues from handling, storage and dividends and important assumptions concerning handling and storage charges, carry-in volumes, elevator capacity and length of storage time. The Grain Volume Analysis is followed by a presentation of the firm's loan analysis and the results of enterprise operations. The results of enterprise operations are summed together with other income and expense items and are printed to show the results for total firm operations. Next, the taxation and dis-

tribution of income information is presented and this is followed by updated equity accounts, an ending balance sheet for total firm operations and financial ratios. Following the output from the final simulated year, a summary of financial indicators is presented for each simulated year.

Demonstration of the Model

The demonstration of the model included herein is limited to one type of analysis for which the model was developed. Actual firm data was used to analyze the possible financial implications of purchasing additional grain storage factilities. For this analysis, management of the actual firm was interested in how the volume of wheat handled and the length of time wheat is stored in the next five years would affect the profits from the new investment and the firm. For this analysis, management chose to vary only the volumes of wheat handled and the storage time factor. All other projections were set at levels which management expected to prevail over the period of analysis.

The effect of the volume of wheat handled was shown by comparing the results of management's projections of expected and low volumes handled. Volumes handled were also determined stochastically to present the results of three possible sets of volumes handled based on management's projections of the expected number of harvested wheat acres, expected mean yields and variability of yields for the five simulated years. The analysis also presented results of the mean volume handled of 25 stochastic replications generated each year of the analysis. The financial conditions of the firm resulting from these six different

volumes handled as specified by management and stochastically determined were compared and evaluated.

The effect of the length of storage time was shown by comparing the financial condition of the firm resulting from different volumes of grain handled under both expected and low lengths of storage time as projected by management. This comparison demonstrated how the financial condition of the firm is affected by producers' decisions to store grain.

Conclusions

This initial attempt to develop a financial planning model for Oklahoma grain elevator frims yielded a satisfactory model not only to be applied in its present form, but also to be used as a reference point for further refinement. The Grain Volume Analysis developed in the model provides a useful method of analyzing the effects of projected volumes handled and lengths of storage time, two factors which are very important to grain elevator operations.

The design of the model is flexible so that detailed records for each enterprise may be included in the analysis. If detailed sales and expense data are not available the model can easily be used with sales and expense summary information for each enterprise. If records of expenses are kept for the firm and are not allocated to each enterprise, the firm may desire to allocate expenses when using the model. Such was the case in the data used to demonstrate the model. Management of the firm allocated all expenses except labor expense on the basis of enterprise sales in relation to total firm sales, and labor expenses were allocated on the basis of labor requirements of each

enterprise. Enterprises which management had felt were very profitable turned out to be less profitable than expected. This process of allocation, in itself, proved to be beneficial in management's long-range planning process.

The model as presently developed contains the potential for alternative comparative analyses. Realistically, no firm would ever desire to evaluate and compare all alternatives which could be analyzed by the model. Doing so would make the results very hard to compare. In using the model, those projections which are not of crucial importance to the question involved should be specified and remain unchanged for the analysis. This allows a clearer comparison of the results of alternative projections that are important to the question being analyzed.

The current direct cost of computer processing is approximately $2.00 for each analysis. For the 12 analyses processed in the demonstration of the model the cost was about $24.00. Total time required to key-punch the data cards from the input forms was about two hours for the 12 analyses. This information shows that the program is very efficient and economical to use. The time required for management to complete the input forms will vary for each individual firm depending on the availability of records and the type of analyses involved. Management spent approximately four hours completing the input forms for the analysis presented in this research.

Implications for Further Research

With substantial additional effort, several improvements could be made in the model. First, a better criteria for borrowing short term working capital could be developed. The present model uses a minimum cash balance specified by management to be maintained by the firm. A more realistic simulation of short term operating capital needs could account for the interest expense which results from borrowed capital which is necessary to cover the purchase of grain at harvest. There exists an important time lag between the time grain is purchased from the producer and the time the money from the sale of that grain is actually received by the firm. The interest expense resulting from this lag is dependent on the volume of grain sold and the length of time between purchase and actual receipt of money from the sale. These two factors could be used to establish a more meaningful short term borrowing criteria.

A second possible improvement in the model concerns the development of criterion which describe the firm's machinery and equipment replacements. At present the model does not include a method of replacing the firm's assets during the five-year simulated period. This may result in an overstatement of the firm's cash account if the firm actually replaces some assets each period. Realistically, some portion of the net income after distribution should be allocated to the replacement of machinery and equipment. In some cases this improvement in the model would reduce the level of the cash account and result in a more meaningful interpretation of the current and liquid ratios.

Third, use of the model could be enhanced by expanding the use of the stochastic process to determine the sales of fertilizer, seed and other grains. Relationships between wheat yields, acres harvested and the sales of fertilizer, seed and other grains could be established and included in the model. This improvement would present a more realistic estimation of the sales of these enterprises.

Finally, supplementary information concerning construction and operating costs of different sizes and types of grain storage facilities could be provided to management who are interested in the analysis of the purchase or construction of additional grain storage facilities. Comparison of different types and sizes of additional facilities under specified projections concerning volumes handled and storage patterns would aid management in the selection of new or additional facilities. Likewise, supplementary information concerning the construction and operating costs of different sizes and types of side line enterprise facilities could be provided to management who are interested in the analysis of the purchase or construction of an additional side line enterprise. Comparison of different sizes and types of additional side line enterprise facilities under specified projections concerning enterprise sales would aid management in the selection of new or additional enterprise facilities.

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APPENDIXES

APPENDIX A

DATA INPUT FORMS

GRAIN ELEVATOR FIRM FINANCIAL SIMULATION MODEL

DATA INPUT FORMS

Name of Firm _____

Mailing Address _____

_____

Manager _____

Phone Number _____

Date _____

FIRM INFORMATION

(1) Number of Simulation Periods (Circle) 1 2 3 4 5

(2) Type of Analysis (Circle) 1 2

(3) Legal Form of Business (Circle) 1 2 3

(4) Number of Enterprises 6

Enterprises Analyzed:

Feed _____
Seed _____
Grain _____
Fertilizer _____
Farm Supplies _____
Other _____

(5) Base Year Wheat Handling, Storage, and Dividend Income $_____

(6) Operating and Service Income:

Grinding, Rolling, Pelleting, and Mixing Feed $_____
Cleaning and Treating Seed $_____
Custom Application $_____
Equipment Rental $_____
Trucking $_____
Other $_____

(7) Other Income:

Interest Income	$_____
Finance Charges to Debtors	$_____
Dividends(Not Related to Grain Operations)	$_____
Rental Income	$_____
Gain on Disposal of Fixed Assets	$_____

(8) Other Expenses:

Other Expense #1	$_____
Other Expense #2	$_____
Loss on Disposal of Fixed Assets	$_____

(9) Growth Rates:

Operating and Service Income	_____ %
Other Income	_____ %
Other Expenses	_____ %

(10) Interest Expense for Base Year $_____

(11) Overhead Expenses and Growth Rates:

	EXPENSE	%GROWTH
Salaries and Wages	$_____	_____ %
Payroll Taxes	$_____	_____ %
Employee Benefits	$_____	_____ %
Depreciation	$_____	_____ %
Rent	$_____	_____ %
Repairs	$_____	_____ %
Insurance	$_____	_____ %
Taxes	$_____	_____ %
Utilities	$_____	_____ %
Advertising	$_____	_____ %
Travel and Entertainment	$_____	_____ %

(12) Loan Information:

	LOAN 1	LOAN 2	LOAN 3	LOAN 4
Unpaid Balance	$_____	$_____	$_____	$_____
Interest Rate	_____ %	_____ %	_____ %	_____ %
Remaining Life	_____ yrs.	_____ yrs.	_____ yrs.	_____ yrs.
Type (Circle)	1 2 3	1 2 3	1 2 3	1 2 3

(13) Short Term Interest Rate _____ %

(14) Percentages:

% of Total Sales On Credit	_____ %
% of Accounts Receivable that are not collectible	_____ %
% of Purchases On Credit	_____ %

(15) INITIAL BALANCE SHEET INFORMATION

CURRENT ASSETS		CURRENT LIABILITIES	
Cash on Hand		Notes Payable - Banks	
Cash in Banks		- Other	
		Current Portion Long Term Debt	
Marketable Securities			
		Accounts Payable - Trade	
Accounts Receivable - Customer		- Other	
- Other		Outstanding Drafts	
Notes Receivable		Employee Taxes Withheld	
Finance Notes Receivable		Taxes Collected -- Sales, etc.	
Allowance for Doubtful Accounts		Dividends Payable	
Margin Deposits			
		Advances Received for Sales	
Advances Paid on Purchases			
		Accrued Property Taxes	
Accrued Storage Charges		Salaries and Wages	
		Interest Expense	
Inventories		Payroll Taxes	
		Storage Expenses	
Prepaid Insurance		Other Accrued Expenses	
Rent			
Interest		Federal Income Taxes Payable	
Other Prepaid Expenses		State Income Taxes Payable	
Other Current Assets		Other Current Liabilities	

(15) INITIAL BALANCE SHEET INFORMATION

LONG TERM ASSETS

Notes Receivable - Non Current _____
Board of Trade Memberships _____

Land _____

Buildings and Elevator Properties _____
Accumulated Depreciation _____

Machinery and Equipment _____
Accumulated Depreciation _____

Autos and Trucks _____
Accumulated Depreciation _____

Office Furniture and Equipment _____
Accumulated Depreciation _____

Other Property, Plant, and Equipment _____
Accumulated Depreciation _____

Intangibles _____

Other Long Term Assets _____

LONG TERM LIABILITIES

Long Term Debt (Source A) _____
Long Term Debt (Source B) _____
Long Term Debt (Source C) _____
Other Long Term Debt _____
Deferred Income Tax _____
Deferred Investment Credit _____

EQUITY: PROPRIETORSHIP, PARTNERSHIP, SUBCHAPTER 'S' CORP.

Owner's Equity _____
Other Equity _____

EQUITY: CORPORATION

Preferred Stock _____
Common Stock _____
Additional Paid-In Capital _____
Retained Earnings _____
Other Equity _____
Reserve _____

EQUITY: COOPERATIVE

Capital Stock and Equity Credits _____
Patronage Refunds - Current Year _____
Statuatory Reserve _____
Other Retained Earnings _____
Total Retained Earnings _____
Other Equity _____

	Year 1	Year 2	Year 3	Year 4	Year 5
(16) Investment Tax Credit	$_____	$_____	$_____	$_____	$_____

(17) Information for Taxation and Distribution of Earnings:

A. Proprietorship, Partnership, or Subchapter 'S' Corp.
% of Net Income Withdrawn by Owners (Shareholders) Each Year _____%

B. Corporation
% of After Tax Income Distributed as Dividends Each Year _____%
% of Allocatable Retained Earnings Placed in Reserve Each Year _____%

C. Cooperative
Statutory Reserve Fulfillment Percentage _____%
Statutory Contribution Percentage _____%
Percentage of the Amount Available For Patronage Refunds Distributed _____%
Percentage of Patronage Refund Given in Cash _____%

(18) Cooperative Stock Retirement:

Stock Retirement Option (Circle) 0 1 2

OPTION 1.	Year 1	Year 2	Year 3	Year 4	Year 5
Stock Retired Each Year	$_____	$_____	$_____	$_____	$_____

OPTION 2.

Percentage of Stock Retired Each Year _____%

GRAIN VOLUME ANALYSIS INFORMATION

		MANAGEMENT PROJECTIONS FOR YEAR				
		1	2	3	4	5
(1)	Acres in Trade Area					
(2)	Local Carry-In Vomume For Year 1					
(3)	Terminal Carry-In Volume For Year 1					
(4)	Maximum Local Carry-Out Volume					
(5)	Wheat Storage Capacity #1					
(6)	Wheat Storage Capacity #2					
(7)	Month From Harvest Capacity #2 Takes Effect					
(8)	Percentage of Wheat Stored At Harvest					
(9)	Percentage of Wheat Sold to Regional Associate					
(10)	Percentage of Storage Revenue Lost to Shrinkage					
(11)	Regional Associate Dividend Per Bushel					
(12)	Handling Charge (Margin) Per Bushel/Month					
(13)	Storage Charge to Customers Per Bushel/Month					
(14)	Storage Charge Paid to Terminal Per Bushel/Month					

(15) Storage Time Factor:

MONTH	(JUN) 1	(JUL) 2	(AUG) 3	(SEP) 4	(OCT) 5	(NOV) 6	(DEC) 7	(JAN) 8	(FEB) 9	(MCH) 10	(APR) 11	(MAY) 12
YEAR 1	100											
YEAR 2	100											
YEAR 3	100											
YEAR 4	100											
YEAR 5	100											

	MANAGEMENT PROJECTIONS FOR YEAR				
	1	2	3	4	5
(16) Grain Volume Analysis Method					
(16A) Yield Probability Method:					
Number of Replications					
Variation					
Average Yield Per Acre					
Result Selection					
Specific Replication					
(16B) Yield Times Acres Method:					
Yield Per Acre					
(16C) Volume Method:					
Volume Handled					

ENTERPRISE INFORMATION

(1) Enterprise (Circle) FEED SEED GRAIN FERTILIZER FARM SUPPLIES OTHER

(2) Sales Information:

PRODUCT SUBCLASS	SALES $	PURCHASES $	PHYSICAL UNITS OF SALES	BEGINNING INVENTORY $	ENDING INVENTORY $
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
TOTAL (OPTIONAL)					

(3) Average Number Of Days The Merchandise Is In Inventory _____ days

(4) Percentage Gross Margin _____ %

(5) Other Income For Base Year And Annual Growth Rate $_____ _____ %

(6) Other Expense For Base Year And Annual Growth Rate $_____ _____ %

	Year 1	Year 2	Year 3	Year 4	Year 5
(7) Growth Rate For Sales	_____ %	_____ %	_____ %	_____ %	_____ %

(8) EXPENSE INFORMATION:

	DIRECT EXPENSE	INDIRECT EXPENSE	OVERHEAD EXPENSE	DIRECT GROWTH RATE	INDIRECT GROWTH RATE
1. Salaries And Wages	$	$	$	%	%
2. Payroll Taxes	$	$	$	%	%
3. Employee Benefits	$	$	$	%	%
4. Depreciation	$	$	$	%	%
5. Rent	$	$	$	%	%
6. Repairs and Maintenance	$	$	$	%	%
7. Insurance	$	$	$	%	%
8. Property Taxes	$	$	$	%	%
9. Utilities	$	$	$	%	%
10. Advertising	$	$	$	%	%
11. Travel and Entertainment	$	$	$	%	%
12. Supplies	$	$	$	%	%
13. Professional Services	$	$	$	%	%
14. Miscellaneous Expenses	$	$	$	%	%

(9) ENTERPRISE DEPRECIATION

NUMBER BUILDINGS	NUMBER MACH & EQUIP	NUMBER AUTOS & TRUCKS	NUMBER WAREHOUSES

BUILDINGS 1							
ASSET NUMBER	AGE	PURCHASE PRICE	DEPRECIABLE LIFE	METHOD	SALVAGE VALUE	FYD	OPTION
1							
2							
3							
4							
5							
MACHINERY & EQUIP 2							
1							
2							
3							
4							
5							
AUTOS & TRUCKS 3							
1							
2							
3							
4							
5							
WAREHOUSES 4							
1							
2							
3							
4							
5							

NEW INVESTMENT INFORMATION

(1) Enterprise To Which Investment Applies (Circle) 1 2 3 4 5 6

(2) Depreciation Information:

Number of Buildings _____
Number of Machinery and Equipment _____
Number of Autos and Trucks _____
Number of Warehouses _____

ASSET CLASS	ASSET NUMBER	AGE	PURCHASE PRICE	DEPRE. LIFE	METHOD	SALVAGE VALUE	FYD	OPTION

(3) Financing Information:

Total Cost _____
Amount Borrowed _____
Amount Financed Internally _____

(4) Loan Information:

LOAN NUMBER	AMOUNT BORROWED	INTEREST RATE	LENGTH	TYPE
1				
2				

APPENDIX B

COMPUTER OUTPUT

ENTERPRISE DATA CHECK

	* FEED *	* SEED *	* GRAIN *	* FERT *	* FS *	* OTHER *
DAYS IN INVENTORY	7.00	19.00	10.00	14.00	70.00	0.00
% GROSS MARGIN	10.20	8.00	10.10	13.33	33.33	0.00
GROWTH RATE FOR OTHER INCOME	0.00	0.00	0.00	0.00	0.00	0.00
GROWTH RATE FOR OTHER EXPENSES	0.00	0.00	0.00	0.00	0.00	0.00
GROWTH RATE FOR SALES IN YEAR 1	0.15	0.15	0.10	0.30	0.30	0.00
GROWTH RATE FOR SALES IN YEAR 2	0.12	0.15	0.10	0.15	0.25	0.00
GROWTH RATE FOR SALES IN YEAR 3	0.10	0.10	0.05	0.15	0.25	0.00
GROWTH RATE FOR SALES IN YEAR 4	0.10	0.10	0.05	0.15	0.25	0.00
GROWTH RATE FOR SALES IN YEAR 5	0.10	0.10	0.05	0.15	0.25	0.00

GROWTH RATES FOR MAJOR EXPENSES	DIR	IND	DIR	IND	DIR	IND	DIR	IND	DIR	IND	DIR	IND
SALARIES AND WAGES	0.10	0.00	0.10	0.00	0.10	0.00	0.10	0.00	0.10	0.00	0.00	0.00
PAYROLL TAXES	0.05	0.00	0.05	0.00	0.05	0.00	0.05	0.00	0.05	0.00	0.00	0.00
EMPLOYEE BENEFITS	0.05	0.00	0.05	0.00	0.05	0.00	0.05	0.00	0.05	0.00	0.00	0.00
DEPRECIATION	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RENT	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00
REPAIRS	0.15	0.00	0.15	0.00	0.15	0.00	0.15	0.00	0.00	0.00	0.00	0.00
INSURANCE	0.15	0.00	0.15	0.00	0.15	0.00	0.15	0.00	0.15	0.00	0.00	0.00
TAXES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UTILITIES	0.20	0.00	0.20	0.00	0.20	0.00	0.20	0.00	0.20	0.00	0.00	0.00
ADVERTISING	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TRAVEL AND ENTERTAINMENT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUPPLIES	0.10	0.00	0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PROFESSIONAL SERVICES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MISCELLANEOUS EXPENSE	0.10	0.00	0.10	0.00	0.10	0.00	0.10	0.00	0.10	0.00	0.00	0.00

FIRM DATA CHECK

FORM OF BUSINESS	CORPORATION
	(DECIMAL PERCENTAGES)
% OF AFTER-TAX INCOME ALLOCATED TO DIVIDENDS	0.00
% OF ALLOCATABLE RETAINED EARNINGS PLACED IN RESERVE	0.00
INTEREST RATE FOR SHORT TERM LOANS	0.0950
% OF SALES ON CREDIT	0.05
% OF ACCOUNTS RECEIVABLE NOT COLLECTABLE	0.00
% OF PURCHASES ON CREDIT	0.02
GROWTH RATE FOR OPERATING AND SERVICE INCOME	0.00
GROWTH RATE FOR OTHER INCOME	0.06
GROWTH RATE FOR OTHER EXPENSES	0.00
GROWTH RATES FOR OVERHEAD EXPENSES	
SALARIES AND WAGES	0.10
PAYROLL TAXES	0.05
EMPLOYEE BENEFITS	0.05
DEPRECIATION	0.00
RENT	0.10
REPAIRS	0.15
INSURANCE	0.15
TAXES	0.10
UTILITIES	0.20
ADVERTISING	0.20
TRAVEL AND ENTERTAINMENT	0.10
SUPPLIES	0.10
PROFESSIONAL SERVICES	0.20
MISCELLANEOUS EXPENSE	0.10

DEPRECIATION DATA FOR THE FEED ENTERPRISE

AGE	LIFE	PURCHASE PRICE	SALVAGE VALUE	METHOD	AFYDP(1=YES)	DDB(1=TAKE;2=SWITCH)
1.	25.	6058.04	0.00	1.	0.	0.
3.	7.	12130.00	930.00	1.	0.	0.
7.	20.	16764.00	0.00	1.	0.	0.

DEPRECIATION DATA FOR THE SEED ENTERPRISE

AGE	LIFE	PURCHASE PRICE	SALVAGE VALUE	METHOD	AFYDP(1=YES)	DDB(1=TAKE;2=SWITCH)
7.	20.	16764.00	0.00	1.	0.	0.

DEPRECIATION DATA FOR THE GRAIN ENTERPRISE

AGE	LIFE	PURCHASE PRICE	SALVAGE VALUE	METHOD	AFYDP(1=YES)	DDB(1=TAKE;2=SWITCH)
7.	10.	9011.45	811.45	1.	0.	0.

DEPRECIATION DATA FOR THE FERTILIZER ENTERPRISE

AGE	LIFE	PURCHASE PRICE	SALVAGE VALUE	METHOD	AFYDP(1=YES)	DDB(1=TAKE;2=SWITCH)

DEPRECIATION DATA FOR THE FARM SUPPLIES ENTERPRISE

AGE	LIFE	PURCHASE PRICE	SALVAGE VALUE	METHOD	AFYDP(1=YES)	DDB(1=TAKE;2=SWITCH)
1.	25.	605.40	0.00	1.	0.	0.

ANALYSIS FOR THE BASE YEAR

FEED DEPARTMENT

DEPARTMENTAL ANALYSIS	OPERATIONS FOR THIS PERIOD ONLY		
	(--- $$ ---)	(--- $$ ---)	% (SALES)
SALES		264500.	100.00
COST OF GOODS SOLD			
BEGINNING INVENTORY	24482.		9.26
PURCHASES	237500.		89.79
TOTAL GOODS AVAILABLE	261982.		99.05
LESS ENDING INVENTORY	24482.		9.26
COST OF GOODS SOLD		237500.	89.79
GROSS PROFIT ON SALES		27000.	10.21

FEED DEPARTMENT

DEPARTMENTAL ANALYSIS	DIRECT EXPENSES ($$)	INDIRECT EXPENSES ($$)	($$)
GROSS PROFIT FOR THE OPERATION			27000.
OPERATING EXPENSES			
SALARIES AND WAGES	20000.	0.	
PAYROLL TAXES	815.	0.	
EMPLOYEE BENEFITS	64.	0.	
DEPRECIATION	2438.	0.	
RENT	0.	0.	
REPAIRS	5070.	0.	
INSURANCE	761.	0.	
TAXES	0.	0.	
UTILITIES	2000.	0.	
ADVERTISING	0.	0.	
TRAVEL AND ENTERTAINMENT	0.	0.	
SUPPLIES	1500.	0.	
PROFESSIONAL SERVICES	0.	0.	
MISCELLANEOUS EXPENSE	3000.	0.	
TOTAL OPERATING EXPENSES			35648.
OPERATING PROFIT			-8648.
OTHER INCOME FOR THE ENTERPRISE			0.
OTHER EXPENSES FOR THE ENTERPRISE			0.
NET PROFIT			-8648.

ANALYSIS FOR THE BASE YEAR

SEED DEPARTMENT

DEPARTMENTAL ANALYSIS	OPERATIONS FOR THIS PERIOD ONLY		
	(--- $$ ---)	(--- $$ ---)	% (SALES)
SALES		100000.	100.00
COST OF GOODS SOLD			
BEGINNING INVENTORY	467.		0.47
PURCHASES	98500.		98.50
TOTAL GOODS AVAILABLE	98967.		98.97
LESS ENDING INVENTORY	467.		0.47
COST OF GOODS SOLD		98500.	98.50
GROSS PROFIT ON SALES		1500.	1.50

SEED DEPARTMENT

DEPARTMENTAL ANALYSIS	DIRECT EXPENSES	INDIRECT EXPENSES	
	(--- $$ ---)	(--- $$ ---)	(--- $$ ---)
GROSS PROFIT FOR THE OPERATION			1500.
OPERATING EXPENSES			
SALARIES AND WAGES	2000.	0.	
PAYROLL TAXES	88.	0.	
EMPLOYEE BENEFITS	7.	0.	
DEPRECIATION	820.	0.	
RENT	0.	0.	
REPAIRS	500.	0.	
INSURANCE	82.	0.	
TAXES	0.	0.	
UTILITIES	200.	0.	
ADVERTISING	0.	0.	
TRAVEL AND ENTERTAINMENT	0.	0.	
SUPPLIES	500.	0.	
PROFESSIONAL SERVICES	0.	0.	
MISCELLANEOUS EXPENSE	1000.	0.	
TOTAL OPERATING EXPENSES			5197.
OPERATING PROFIT			-3697.
OTHER INCOME FOR THE ENTERPRISE			0.
OTHER EXPENSES FOR THE ENTERPRISE			0.
NET PROFIT			-3697.

ANALYSIS FOR THE BASE YEAR

GRAIN DEPARTMENT

DEPARTMENTAL ANALYSIS	OPERATIONS FOR THIS PERIOD ONLY		
	(--- $$ ---)	(--- $$ ---)	% (SALES)
SALES		322625.	100.00
COST OF GOODS SOLD			
BEGINNING INVENTORY	28462.		8.82
PURCHASES	290000.		89.89
TOTAL GOODS AVAILABLE	318462.		98.71
LESS ENDING INVENTORY	28462.		8.82
COST OF GOODS SOLD		290000.	89.89
GROSS PROFIT ON SALES		32625.	10.11

GRAIN DEPARTMENT

DEPARTMENTAL ANALYSIS	DIRECT EXPENSES	INDIRECT EXPENSES	
	(--- $$ ---)	(--- $$ ---)	(--- $$ ---)
GROSS PROFIT FOR THE OPERATION			32625.
OPERATING EXPENSES			
SALARIES AND WAGES	10000.	0.	
PAYROLL TAXES	419.	0.	
EMPLOYEE BENEFITS	33.	0.	
DEPRECIATION	838.	0.	
RENT	0.	0.	
REPAIRS	4000.	0.	
INSURANCE	391.	0.	
TAXES	0.	0.	
UTILITIES	800.	0.	
ADVERTISING	0.	0.	
TRAVEL AND ENTERTAINMENT	0.	0.	
SUPPLIES	500.	0.	
PROFESSIONAL SERVICES	0.	0.	
MISCELLANEOUS EXPENSE	200.	0.	
TOTAL OPERATING EXPENSES			17181.
OPERATING PROFIT			15444.
OTHER INCOME FOR THE ENTERPRISE			0.
OTHER EXPENSES FOR THE ENTERPRISE			0.
TOTAL STORAGE,HANDLING AND DIVIDEND REVENUE			50000.
NET PROFIT			65444.

ANALYSIS FOR THE BASE YEAR

FERTILIZER DEPARTMENT

DEPARTMENTAL ANALYSIS	OPERATIONS FOR THIS PERIOD ONLY		
	(--- $$ ---)	(--- $$ ---)	% (SALES)
SALES		112500.	100.00
COST OF GOODS SOLD			
BEGINNING INVENTORY	12503.		11.11
PURCHASES	97500.		86.67
TOTAL GOODS AVAILABLE	110003.		97.78
LESS ENDING INVENTORY	12503.		11.11
COST OF GOODS SOLD		97500.	86.67
GROSS PROFIT ON SALES		15000.	13.33

FERTILIZER DEPARTMENT

DEPARTMENTAL ANALYSIS	DIRECT EXPENSES ($$)	INDIRECT EXPENSES ($$)	($$)
GROSS PROFIT FOR THE OPERATION			15000.
OPERATING EXPENSES			
SALARIES AND WAGES	3000.	0.	
PAYROLL TAXES	110.	0.	
EMPLOYEE BENEFITS	9.	0.	
DEPRECIATION	0.	0.	
RENT	410.	0.	
REPAIRS	1500.	0.	
INSURANCE	103.	0.	
TAXES	0.	0.	
UTILITIES	300.	0.	
ADVERTISING	0.	0.	
TRAVEL AND ENTERTAINMENT	0.	0.	
SUPPLIES	0.	0.	
PROFESSIONAL SERVICES	0.	0.	
MISCELLANEOUS EXPENSE	500.	0.	
TOTAL OPERATING EXPENSES			5932.
OPERATING PROFIT			9068.
OTHER INCOME FOR THE ENTERPRISE			0.
OTHER EXPENSES FOR THE ENTERPRISE			0.
NET PROFIT			9068.

ANALYSIS FOR THE BASE YEAR

FARM SUPPLIES DEPARTMENT

DEPARTMENTAL ANALYSIS	OPERATIONS FOR THIS PERIOD ONLY		
	(--- $$ ---)	(--- $$ ---)	% (SALES)
SALES		10500.	100.00
COST OF GOODS SOLD			
BEGINNING INVENTORY	9936.		94.63
PURCHASES	7035.		67.00
TOTAL GOODS AVAILABLE	16971.		161.63
LESS ENDING INVENTORY	9936.		94.63
COST OF GOODS SOLD		7035.	67.00
GROSS PROFIT ON SALES		3465.	33.00

FARM SUPPLIES DEPARTMENT

DEPARTMENTAL ANALYSIS	DIRECT EXPENSES	INDIRECT EXPENSES	
	(--- $$ ---)	(--- $$ ---)	(--- $$ ---)
GROSS PROFIT FOR THE OPERATION			3465.
OPERATING EXPENSES			
SALARIES AND WAGES	2000.	0.	
PAYROLL TAXES	88.	0.	
EMPLOYEE BENEFITS	7.	0.	
DEPRECIATION	0.	0.	
RENT	0.	0.	
REPAIRS	0.	0.	
INSURANCE	82.	0.	
TAXES	0.	0.	
UTILITIES	48.	0.	
ADVERTISING	0.	0.	
TRAVEL AND ENTERTAINMENT	0.	0.	
SUPPLIES	0.	0.	
PROFESSIONAL SERVICES	0.	0.	
MISCELLANEOUS EXPENSE	200.	0.	
TOTAL OPERATING EXPENSES			2425.
OPERATING PROFIT			1040.
OTHER INCOME FOR THE ENTERPRISE			0.
OTHER EXPENSES FOR THE ENTERPRISE			0.
NET PROFIT			1040.

BASE YEAR

ANALYSIS FOR TOTAL OPERATION	OPERATIONS FOR THIS PERIOD ONLY		
	(--- $$ ---)	(--- $$ ---)	% (SALES)
SALES OF MERCHANDISE		810125.	100.00
COST OF GOODS SOLD			
BEGINNING INVENTORY	75850.		9.36
PURCHASES	730535.		90.18
TOTAL GOODS AVAILABLE	806385.		99.54
LESS ENDING INVENTORY	75850.		9.36
COST OF GOODS SOLD		730535.	90.18
GROSS PROFIT ON SALES		79590.	9.82
OPERATING AND SERVICE INCOME		0.	0.00
GROSS PROFIT FOR TOTAL OPERATION		79590.	9.82

ANALYSIS FOR TOTAL OPERATION	DIRECT EXPENSES	INDIRECT EXPENSES	OVERHEAD EXPENSES	
	(--- $$ ---)	(--- $$ ---)	(--- $$ ---)	(--- $$ ---)
GROSS PROFIT FOR TOTAL OPERATION				79590.
OPERATING EXPENSES				
SALARIES AND WAGES	37000.	0.	16700.	
PAYROLL TAXES	1520.	0.	683.	
EMPLOYEE BENEFITS	120.	0.	54.	
DEPRECIATION	4096.	0.	5511.	
RENT	410.	0.	0.	
REPAIRS	11070.	0.	1000.	
INSURANCE	1419.	0.	4749.	
TAXES	0.	0.	4150.	
UTILITIES	3348.	0.	1000.	
ADVERTISING	0.	0.	1755.	
TRAVEL AND ENTERTAINMENT	0.	0.	500.	
SUPPLIES	2500.	0.	3980.	
PROFESSIONAL SERVICES	0.	0.	750.	
MISCELLANEOUS EXPENSE	4900.	0.	9472.	
TOTAL OPERATING EXPENSES				116687.
OPERATING PROFIT				-37097.
OTHER INCOME				6000.
OTHER EXPENSES				0.
INTEREST EXPENSE				6414.
TOTAL STORAGE,HANDLING AND DIVIDEND REVENUE				50000.
NET PROFIT				12489.

DETAILED EQUITY SECTION OF THE BALANCE SHEET

BASE YEAR

PREFERRED STOCK		$ 0.00
COMMON STOCK		6800.00
ADDITIONAL PAID-IN CAPITAL		12573.93
TOTAL CONTRIBUTED CAPITAL		$ 19373.93
RETAINED EARNINGS :		
FREE AND AVAILABLE	$ 33956.11	
RESERVE	0.00	
TOTAL RETAINED EARNINGS		33956.11
TOTAL STOCKHOLDERS EQUITY		$ 53330.04

BASE YEAR

BALANCE SHEET

ASSETS	($$)	% (TOTAL)	LIABILITIES AND EQUITY	($$)	% (TOTAL)
CURRENT ASSETS			CURRENT LIABILITIES		
CASH	-40830.	-17.9	NOTES PAYABLE	0.	0.0
MARKETABLE SECURITIES	0.	0.0	ACCOUNTS PAYABLE	29754.	13.0
RECEIVABLES	83215.	36.4	ADVANCES RECEIVED FROM SALES	0.	0.0
ADVANCES PAID ON PURCHASES	0.	0.0	ACCRUED EXPENSES	0.	0.0
ACCRUED STORAGE CHARGES	0.	0.0	INCOME TAXES PAYABLE	0.	0.0
INVENTORIES	75850.	33.2	OTHER CURRENT LIABILITIES	1599.	0.7
PREPAID EXPENSES	0.	0.0			
OTHER CURRENT ASSETS	4846.	2.1	TOTAL CURRENT LIABILITIES	31353.	13.7
TOTAL CURRENT ASSETS	123081.	53.9			
			LONG TERM LIABILITIES		
LONG TERM ASSETS			LONG TERM DEBT	143750.	62.9
			DEFERRED INCOME TAXES	0.	0.0
INVESTMENTS AND OTHER ASSETS	0.	0.0	DEFERRED INVESTMENT CREDIT	0.	0.0
PROPERTY, PLANT AND EQUIPMENT	104357.	45.7			
INTANGIBLES	0.	0.0	TOTAL LONG TERM LIABILITIES	143750.	62.9
OTHER LONG TERM ASSETS	995.	0.4			
TOTAL LONG TERM ASSETS	105352.	46.1	EQUITY	53330.	23.3
TOTAL ASSETS	228433.	100.0	TOTAL LIABILITIES AND EQUITY	228433.	100.0

BASE YEAR

RATIO ANALYSIS

LIQUIDITY RATIOS:	
CURRENT RATIO	3.93
LIQUID RATIO	1.51

SOLVENCY RATIOS:	
LIABILITIES/ASSETS	0.77
LIABILITIES/EQUITY	3.28
FIXED ASSETS/EQUITY	1.98

PROFITABILITY RATIOS:	THIS PERIOD
GROSS RETURN ON SALES	9.8%
FEED	10.2%
SEED	1.5%
GRAIN	10.1%
FERTILIZER	13.3%
FARM SUPPLIES	33.0%
OTHER DEPARTMENTS	0.0%
NET RETURN ON GROSS INCOME	2.0%
NET RETURN ON ASSETS	5.5%
NET RETURN ON EQUITY	23.4%

MISCELLANEOUS RATIOS:	THIS PERIOD
AVERAGE INVENTORY TURNOVER	9.6
FEED	9.7
SEED	210.9
GRAIN	10.2
FERTILIZER	7.8
FARM SUPPLIES	0.7
OTHER DEPARTMENTS	0.0
OPERATING EXPENSES/GROSS PROFIT	146.6

NEW INVESTMENT

AGE	LIFE	PURCHASE PRICE	SALVAGE VALUE	METHOD	AFYDP(1=YES)	DDB(1=TAKE;2=SWITCH)
0.	15.	600000.00	50000.00	4.	0.	1.

TOTAL COST	600000.00
AMOUNT FINANCED INTERNALLY	0.00
AMOUNT BORROWED	600000.00
DEBT SOURCE A	50000.00
INTEREST RATE (PERCENT)	9.00
LENGTH IN YEARS	1.00
TYPE OF LOAN	TERM
DEBT SOURCE B	550000.00
INTEREST RATE (PERCENT)	9.00
LENGTH IN YEARS	5.00
TYPE OF LOAN	COMMERCIAL

LOAN ANALYSIS FOR YEAR 1

SHORT TERM DEBT ANALYSIS

MINIMUM CASH BALANCE NEEDED	$ 15000.00
BEGINNING CASH BALANCE	11032.32
NEW SHORT TERM DEBT NEEDED TO REACH THEMINIMUM CASH REQUIREMENT	3967.68
LONG TERM DEBT DUE THIS PERIOD	221373.80
TOTAL SHORT TERM DEBT TO BE PAID THIS PERIOD	225341.40

LONG TERM DEBT ANALYSIS

LOAN NO.	TYPE OF LOAN	INTEREST RATE	UNPAID BALANCE	REMAINING LIFE	PRINCIPAL PAYMENT	INTEREST PAYMENT
1	TERM LOAN	9.500 PERCENT	0.00	0 YEARS	50000.00	4750.00
2	TERM LOAN	0.000 PERCENT	25000.00	2 YEARS	0.00	0.00
3	INSTALLMENT	9.500 PERCENT	57376.14	4 YEARS	11373.86	6531.25
4	TERM LOAN	9.000 PERCENT	0.00	0 YEARS	50000.00	4500.00
5	COMMERCIAL	9.000 PERCENT	440000.00	4 YEARS	110000.00	49499.98
	TOTAL PRINCIPAL AND INTEREST PAYMENTS FOR THIS PERIOD				221373.80	65281.22

5 YEAR SUMMARY

ITEM	YEAR 1	2	3	4	5
FEED ENTERPRISE NET PROFIT	-8633.17	-9136.98	-10407.77	-11918.65	-12113.69
% OF FIRM NET PROFIT	-6.19	-7.05	-8.35	-11.96	-8.89
SEED ENTERPRISE NET PROFIT	3502.82	4344.43	4800.64	5291.28	5817.63
% OF FIRM NET PROFIT	2.51	3.35	3.85	5.31	4.27
GRAIN ENTERPRISE NET PROFIT	244553.40	218954.90	205498.80	175171.70	204507.90
% OF FIRM NET PROFIT	175.36	169.04	164.82	175.77	150.12
FERTILIZER ENTERPRISE NET PROFIT	12865.79	15005.31	17484.12	20354.76	23677.54
% OF FIRM NET PROFIT	9.23	11.58	14.02	20.42	17.38
FARM SUPPLIES ENTERPRISE NET PROFIT	1853.69	2718.42	3838.62	5282.18	7134.34
% OF FIRM NET PROFIT	1.33	2.10	3.08	5.30	5.24
OTHER ENTERPRISE NET PROFIT	0.00	0.00	0.00	0.00	0.00
% OF FIRM NET PROFIT	0.00	0.00	0.00	0.00	0.00
VOLUME OF GRAIN HANDLED (BUSHELS)	787140.	680080.	598570.	524390.	569084.
GRAIN STORAGE,HANDLING AND DIVIDEND INCOME	282783.90	250251.10	232294.80	197351.10	223582.30
% OF GRAIN ENTERPRISE INCOME	115.63	114.29	113.04	112.66	109.33
% OF FIRM NET PROFIT	202.77	193.20	186.31	198.03	164.12
FIRM NET PROFIT BEFORE TAXES	139460.60	129530.00	124683.30	99658.81	136228.20
INCOME TAXES	59941.10	55174.43	52847.99	40836.23	58889.56
INCOMEAFTER TAXES	79519.50	74355.63	71835.31	58822.58	77338.69
DIVIDENDS PAID	0.00	0.00	0.00	0.00	0.00
TOTAL STOCKHOLDERS EQUITY	132849.40	207205.00	279040.30	337862.90	415201.60
NET WORKING CAPITAL	144393.30	133729.50	126259.10	107971.40	120878.00
NET PLANT PROPERTY AND EQUIPMENT	639483.30	580109.40	525685.50	476536.50	432997.10
LONG TERM DEBT	522370.10	399921.80	251284.40	126351.50	0.06
CURRENT RATIO	1.19	1.25	1.04	0.88	0.88
LIQUID RATIO	0.66	0.97	0.70	0.56	0.61

APPENDIX C

ADDITIONAL COMPUTER OUTPUT

GRAIN VOLUME ANALYSIS

YEAR 1

REP NO.	YIELD (B/A)	VOLUME HANDLED (BU)	STORED AT HARVEST (BU)	*** VOLUME IN (BU/MO)	STORED *** OUT (BU/MO)	VOLUME TO TERMINAL (BU)	HANDLING REVENUE ($$)	STORAGE REVENUE ($$)	DIVIDEND REVENUE ($$)	TOTAL REVENUE ($$)
1	20.46	716151.	794536.	6952184.	317814.	0.	121745.60	138348.30	0.00	260094.00
2	15.28	534717.	631245.	5523391.	252498.	0.	90901.88	109915.30	0.00	200817.20
3	17.91	626910.	714219.	6249411.	285687.	0.	106574.60	124363.10	0.00	230937.80
4	23.73	830632.	897568.	7703204.	509544.	0.	141207.30	153293.60	0.00	294500.90
5	23.42	819545.	887590.	7653638.	467806.	0.	139322.50	152307.30	0.00	291629.80
6	27.26	953955.	1008559.	8126959.	1101353.	0.	162172.20	161726.30	0.00	323898.60
7	28.13	984628.	1036165.	8213918.	1266991.	0.	167386.70	163456.80	0.00	330843.50
8	23.58	825351.	892816.	7680153.	489107.	0.	140309.60	152834.90	0.00	293144.50
9	19.40	679006.	761105.	6659666.	304442.	0.	115430.90	132527.20	0.00	247958.10
10	15.07	527411.	624669.	5465852.	249868.	0.	89659.75	108770.30	0.00	198430.10
11	27.36	957494.	1011744.	8136991.	1120465.	0.	162773.90	161926.00	0.00	324699.90
12	19.75	691410.	772269.	6757350.	308908.	0.	117539.60	134471.10	0.00	252010.80
13	20.82	728576.	805719.	7050034.	322287.	0.	123857.90	140295.50	0.00	264153.50
14	31.99	1119554.	1157598.	8586112.	2005905.	0.	190324.10	170863.50	0.00	361187.70
15	15.90	556422.	650779.	5694314.	260312.	0.	94591.63	113316.70	0.00	207908.30
16	14.60	511145.	610030.	5337760.	244012.	0.	86894.56	106221.30	0.00	193115.80
17	31.13	1089436.	1130492.	8511047.	1832950.	0.	185204.10	169369.70	0.00	354573.80
18	22.31	780888.	852799.	7453592.	349517.	0.	132750.90	148326.30	0.00	281077.30
19	24.94	872736.	935462.	7886988.	672486.	0.	148365.00	156950.90	0.00	305315.90
20	15.41	539474.	635526.	5560851.	254210.	0.	91710.50	110660.80	0.00	202371.30
21	20.52	718162.	796346.	6968022.	318538.	0.	122087.50	138663.50	0.00	260751.10
22	28.78	1007336.	1056602.	8278295.	1389612.	0.	171247.00	164738.00	0.00	335985.00
23	26.92	942280.	998052.	8093860.	1038309.	0.	160187.50	161067.60	0.00	321255.10
24	23.63	826911.	894220.	7686960.	495144.	0.	140574.80	152970.30	0.00	293545.10
25	23.96	838426.	904585.	7737226.	539709.	0.	142532.40	153970.60	0.00	296503.10

	VOLUME HANDLED (BU)	HANDLING REVENUE ($$)	STORAGE REVENUE ($$)	DIVIDEND REVENUE ($$)	TOTAL REVENUE ($$)
MINIMUM	511145.	86894.56	106221.30	0.00	193115.80
MEAN	787140.	133813.70	148970.10	0.00	282783.90
MAXIMUM	1119554.	190324.10	170863.50	0.00	361187.70
VARIANCE	31997600000.00				
STANDARD DEVIATION	178878.60				

THIS ANALYSIS USES THE MAXIMUM RESULTS

GRAIN VOLUME ANALYSIS

YEAR 1

REP NO.	YIELD (B/A)	VOLUME HANDLED (BU)	STORED AT HARVEST (BU)	*** VOLUME IN (BU/MO)	STORED *** OUT (BU/MO)	VOLUME TO TERMINAL (BU)	HANDLING REVENUE ($$)	STORAGE REVENUE ($$)	DIVIDEND REVENUE ($$)	TOTAL REVENUE ($$)
1	20.46	716151.	794536.	6952184.	317814.	0.	121745.60	138346.30	0.00	260094.90
2	15.28	534717.	631245.	5523391.	252498.	0.	90901.88	109915.30	0.00	200817.20
3	17.91	626910.	714219.	6249411.	285687.	0.	106574.60	124363.10	0.00	230937.80
4	23.73	830632.	897568.	7703204.	509544.	0.	141207.30	153293.60	0.00	294500.90
5	23.42	819545.	887590.	7653638.	467806.	0.	139322.50	152307.30	0.00	291629.80
6	27.26	953955.	1008559.	8126959.	1101353.	0.	162172.20	161726.30	0.00	323898.60
7	28.13	984628.	1036165.	8213918.	1266991.	0.	167386.70	163456.80	0.00	330843.50
8	23.58	825351.	892816.	7680153.	489107.	0.	140309.60	152834.90	0.00	293144.50
9	19.40	679006.	761105.	6659666.	304442.	0.	115430.90	132527.20	0.00	247958.10
10	15.07	527411.	624669.	5465852.	249368.	0.	89659.75	108770.30	0.00	198430.10
11	27.36	957494.	1011744.	8136991.	1120465.	0.	162773.90	161926.00	0.00	324699.90
12	19.75	691410.	772269.	6757350.	308908.	0.	117539.60	134471.10	0.00	252010.80
13	20.82	728576.	805719.	7050034.	322287.	0.	123857.90	140295.50	0.00	264153.50
14	31.99	1119554.	1157598.	8586112.	2005905.	0.	190324.10	170863.50	0.00	361187.70
15	15.90	556422.	650779.	5694314.	260312.	0.	94591.63	113316.70	0.00	207908.30
16	14.60	511145.	610030.	5337760.	244012.	0.	86894.56	106221.30	0.00	193115.80
17	31.13	1089436.	1130492.	8511047.	1832950.	0.	185204.10	169369.70	0.00	354573.80
18	22.31	780888.	852799.	7453592.	349517.	0.	132750.90	148326.30	0.00	281077.30
19	24.94	872736.	935462.	7886988.	672486.	0.	148365.00	156950.90	0.00	305315.90
20	15.41	539474.	635526.	5560851.	254210.	0.	91710.50	110660.80	0.00	202371.30
21	20.52	718162.	796346.	6968022.	318538.	0.	122087.50	138663.50	0.00	260751.10
22	28.78	1007336.	1056602.	8278295.	1389612.	0.	171247.00	164738.00	0.00	335985.00
23	26.92	942280.	998052.	8093860.	1038309.	0.	160187.50	161067.60	0.00	321255.10
24	23.63	826911.	894220.	7686960.	495144.	0.	140574.80	152970.30	0.00	293545.10
25	23.96	838426.	904583.	7737226.	539709.	0.	142532.40	153970.60	0.00	296503.10

	VOLUME HANDLED (BU)	HANDLING REVENUE ($$)	STORAGE REVENUE ($$)	DIVIDEND REVENUE ($$)	TOTAL REVENUE ($$)
MINIMUM	511145.	86894.56	106221.30	0.00	193115.80
MEAN	787140.	133813.70	148970.10	0.00	282783.90
MAXIMUM	1119554.	190324.10	170863.50	0.00	361187.70
VARIANCE	31997500000.00				
STANDARD DEVIATION	178878.60				

THIS ANALYSIS USES THE MEAN RESULTS

GRAIN VOLUME ANALYSIS

YEAR 1

REP NO.	YIELD (B/A)	VOLUME HANDLED (BU)	STORED AT HARVEST (BU)	*** VOLUME IN (BU/MO)	STORED *** OUT (BU/MO)	VOLUME TO TERMINAL (BU)	HANDLING REVENUE ($$)	STORAGE REVENUE ($$)	DIVIDEND REVENUE ($$)	TOTAL REVENUE ($$)
1	20.46	716151.	794536.	6952184.	317814.	0.	121745.60	138348.30	0.00	260094.00
2	15.28	534717.	631245.	5523391.	252498.	0.	90901.88	109915.30	0.00	200817.20
3	17.91	626910.	714219.	6249411.	285687.	0.	106574.60	124363.10	0.00	230937.80
4	23.73	830632.	897568.	7703204.	509544.	0.	141207.30	153293.60	0.00	294500.90
5	23.42	819545.	887590.	7653638.	467806.	0.	139322.50	152307.30	0.00	291629.80
6	27.26	953955.	1008559.	8126959.	1101353.	0.	162172.20	161726.30	0.00	323898.60
7	28.13	984628.	1036165.	8213918.	1266991.	0.	167386.70	163456.80	0.00	330843.50
8	23.58	825351.	892816.	7680153.	489107.	0.	140309.60	152834.90	0.00	293144.50
9	19.40	679006.	761105.	6659666.	304442.	0.	115430.90	132527.20	0.00	247958.10
10	15.07	527411.	624669.	5465852.	249868.	0.	89659.75	108770.30	0.00	198430.10
11	27.36	957494.	1011744.	8136991.	1120465.	0.	162773.90	161926.00	0.00	324699.90
12	19.75	691410.	772269.	6757350.	308908.	0.	117539.60	134471.10	0.00	252010.80
13	20.82	728576.	805719.	7050034.	322287.	0.	123857.90	140295.50	0.00	264153.50
14	31.99	1119554.	1157598.	8586112.	2005905.	0.	190324.10	170863.50	0.00	361187.70
15	15.90	556422.	650779.	5694314.	260312.	0.	94591.63	113316.70	0.00	207908.30
16	14.60	511145.	610030.	5337760.	244012.	0.	86894.56	106221.30	0.00	193115.80
17	31.13	1089436.	1130492.	8511047.	1832950.	0.	185204.10	169369.70	0.00	354573.80
18	22.31	780888.	852799.	7453592.	349517.	0.	132750.90	148326.30	0.00	281077.30
19	24.94	872736.	935462.	7886988.	672486.	0.	148365.00	156950.90	0.00	305315.90
20	15.41	539474.	635526.	5560851.	254210.	0.	91710.50	110660.80	0.00	202371.30
21	20.52	718162.	796346.	6968022.	318538.	0.	122087.50	138663.50	0.00	260751.10
22	28.78	1007336.	1056602.	8278295.	1389612.	0.	171247.00	164738.00	0.00	335985.00
23	26.92	942280.	998052.	8093860.	1038309.	0.	160187.50	161067.60	0.00	321255.10
24	23.63	826911.	894220.	7686960.	495144.	0.	140574.80	152970.30	0.00	293545.10
25	23.96	838426.	904583.	7737226.	539709.	0.	142532.40	153970.60	0.00	296503.10

	VOLUME HANDLED (BU)	HANDLING REVENUE ($$)	STORAGE REVENUE ($$)	DIVIDEND REVENUE ($$)	TOTAL REVENUE ($$)
MINIMUM	511145.	86894.56	106221.30	0.00	193115.80
MEAN	787140.	133813.70	148970.10	0.00	282783.90
MAXIMUM	1119554.	190324.10	170863.50	0.00	361187.70
VARIANCE	31997560000.00				
STANDARD DEVIATION	178878.60				

THIS ANALYSIS USES THE MINIMUM RESULTS

GRAIN VOLUME ANALYSIS

YEAR 1

REP NO.	YIELD (B/A)	VOLUME HANDLED (BU)	STORED AT HARVEST (BU)	*** VOLUME IN (BU/MO)	STORED *** OUT (BU/MO)	VOLUME TO TERMINAL (BU)	HANDLING REVENUE ($$)	STORAGE REVENUE ($$)	DIVIDEND REVENUE ($$)	TOTAL REVENUE ($$)
1	20.46	716151.	794536.	6952184.	317814.	0.	121745.60	138348.30	0.00	260094.00
2	15.28	534717.	631245.	5523391.	252498.	0.	90901.88	109915.30	0.00	200817.20
3	17.91	626910.	714219.	6249411.	285687.	0.	106574.60	124363.10	0.00	230937.80
4	23.73	830632.	897568.	7703204.	509544.	0.	141207.30	153293.60	0.00	294500.90
5	23.42	819545.	887590.	7653638.	467806.	0.	139322.50	152307.30	0.00	291629.80
6	27.26	953955.	1008559.	8126959.	1101353.	0.	162172.20	161726.30	0.00	323898.60
7	28.13	984628.	1036165.	8213918.	1266991.	0.	167386.70	163456.80	0.00	330843.50
8	23.58	825351.	892816.	7680153.	489107.	0.	140309.60	152834.90	0.00	293144.50
9	19.40	679006.	761105.	6659666.	304442.	0.	115430.90	132527.20	0.00	247958.10
10	15.07	527411.	624669.	5465852.	249868.	0.	89659.75	108770.30	0.00	198430.10
11	27.36	957494.	1011744.	8136991.	1120465.	0.	162773.90	161926.00	0.00	324699.90
12	19.75	691410.	772269.	6757350.	308908.	0.	117539.60	134471.10	0.00	252010.80
13	20.82	728576.	805719.	7050034.	322287.	0.	123857.90	140295.50	0.00	264153.50
14	31.99	1119554.	1157598.	8586112.	2005905.	0.	190324.10	170863.50	0.00	361187.70
15	15.90	556422.	650779.	5694314.	260312.	0.	94591.63	113316.70	0.00	207908.30
16	14.60	511145.	610030.	5337760.	244012.	0.	86894.56	106221.30	0.00	193115.80
17	31.13	1089436.	1130492.	8511047.	1832950.	0.	185204.10	169369.70	0.00	354573.80
18	22.31	780888.	852799.	7453592.	349517.	0.	132750.90	148326.30	0.00	281077.30
19	24.94	872736.	935462.	7886988.	672486.	0.	148365.00	156950.90	0.00	305315.90
20	15.41	539474.	635526.	5560851.	254210.	0.	91710.50	110660.80	0.00	202371.30
21	20.52	718162.	796346.	6968022.	318538.	0.	122087.50	138663.50	0.00	260751.10
22	28.78	1007336.	1056602.	8278295.	1389612.	0.	171247.00	164738.00	0.00	335985.00
23	26.92	942280.	998052.	8093860.	1038309.	0.	160187.50	161067.60	0.00	321255.10
24	23.63	826911.	894220.	7686960.	495144.	0.	140574.80	152970.30	0.00	293545.10
25	23.96	838426.	904583.	7737226.	539709.	0.	142532.40	153970.60	0.00	296503.10

	VOLUME HANDLED (BU)	HANDLING REVENUE ($$)	STORAGE REVENUE ($$)	DIVIDEND REVENUE ($$)	TOTAL REVENUE ($$)
MINIMUM	511145.	86894.56	106221.30	0.00	193115.80
MEAN	787140.	133813.70	148970.10	0.00	282783.90
MAXIMUM	1119554.	190324.10	170863.50	0.00	361187.70
VARIANCE	31997560000.00				
STANDARD DEVIATION	178878.60				

THIS ANALYSIS USES THE RESULTS OF REPLICATION NUMBER 3

DATA

ACRES IN TRADE AREA	35000.	ACRES
% OF VOLUME HANDLED STORED AT HARVEST	0.90	
LOCAL CARRY-IN VOLUME AT HARVEST	100000.	BUSHELS
TERMINAL CARRY-IN VOLUME AT HARVEST	50000.	BUSHELS
MAXIMUM LOCAL CARRY-OUT VOLUME THIS PERIOD	150000.	BUSHELS
% OF VOLUME WHICH IS SOLD TO TERMINAL (MAY RECIEVE DIVIDENDS)	0.00	
HANDLING CHARGE	0.1700	$/BUSHEL
DIVIDEND RATE	0.0000	$/BUSHEL
STORAGE CHARGE TO CUSTOMERS	0.0200	$/BUSHEL/MONTH
STORAGE CHARGE PAID TO TERMINAL	0.0200	$/BUSHEL/MONTH
% OF TOTAL GRAIN REVENUE LOST DUE TO SHRINKAGE	0.0050	
ELEVATOR CAPACITY 1	800000.	BUSHELS
ELEVATOR CAPACITY 2	0.	BUSHELS
MONTH FROM HARVEST IN WHICH CAPACITY 2 TAKES EFFECT	0	

% OF TOTAL VOLUME STORED WHICH IS IN STORAGE EACH MONTH FROM HARVEST :

(MO)	1	2	3	4	5	6	7	8	9	10	11	12
(%)	1.00	0.95	0.95	0.90	0.85	0.85	0.70	0.65	0.65	0.60	0.55	0.50

GRAIN VOLUME ANALYSIS

YEAR 1

REP NO.	YIELD (B/A)	VOLUME HANDLED (BU)	STORED AT HARVEST (BU)	*** VOLUME IN (BU/MO)	STORED *** OUT (BU/MO)	VOLUME TO TERMINAL (BU)	HANDLING REVENUE ($$)	STORAGE REVENUE ($$)	DIVIDEND REVENUE ($$)	TOTAL REVENUE ($$)
	23.00	805000.	874500.	7578367.	423300.	0.	136850.00	150809.40	0.00	287659.40

DATA

ACRES IN TRADE AREA	35000.	ACRES
% OF VOLUME HANDLED STORED AT HARVEST	0.90	
LOCAL CARRY-IN VOLUME AT HARVEST	100000.	BUSHELS
TERMINAL CARRY-IN VOLUME AT HARVEST	50000.	BUSHELS
MAXIMUM LOCAL CARRY-OUT VOLUME THIS PERIOD	150000.	BUSHELS
% OF VOLUME WHICH IS SOLD TO TERMINAL (MAY RECIEVE DIVIDENDS)	0.00	
HANDLING CHARGE	0.1700	$/BUSHEL
DIVIDEND RATE	0.0000	$/BUSHEL
STORAGE CHARGE TO CUSTOMERS	0.0200	$/BUSHEL/MONTH
STORAGE CHARGE PAID TO TERMINAL	0.0200	$/BUSHEL/MONTH
% OF TOTAL GRAIN REVENUE LOST DUE TO SHRINKAGE	0.0050	
ELEVATOR CAPACITY 1	800000.	BUSHELS
ELEVATOR CAPACITY 2	0.	BUSHELS
MONTH FROM HARVEST IN WHICH CAPACITY 2 TAKES EFFECT	0	

% OF TOTAL VOLUME STORED WHICH IS IN STORAGE EACH MONTH FROM HARVEST :

(MO)	1	2	3	4	5	6	7	8	9	10	11	12
(%)	1.00	0.95	0.95	0.90	0.85	0.85	0.70	0.65	0.65	0.60	0.55	0.50

GRAIN VOLUME ANALYSIS

YEAR 1

REP NO.	YIELD (B/A)	VOLUME HANDLED (BU)	STORED AT HARVEST (BU)	*** VOLUME IN (BU/MO)	STORED *** OUT (BU/MO)	VOLUME TO TERMINAL (BU)	HANDLING REVENUE ($$)	STORAGE REVENUE ($$)	DIVIDEND REVENUE ($$)	TOTAL REVENUE ($$)
		800000.	870000.	7552492.	408000.	0.	136000.00	150294.50	0.00	286294.50

DATA

ACRES IN TRADE AREA	0.	ACRES
% OF VOLUME HANDLED STORED AT HARVEST	0.90	
LOCAL CARRY-IN VOLUME AT HARVEST	100000.	BUSHELS
TERMINAL CARRY-IN VOLUME AT HARVEST	50000.	BUSHELS
MAXIMUM LOCAL CARRY-OUT VOLUME THIS PERIOD	150000.	BUSHELS
% OF VOLUME WHICH IS SOLD TO TERMINAL (MAY RECIEVE DIVIDENDS)	0.00	
HANDLING CHARGE	0.1700	$/BUSHEL
DIVIDEND RATE	0.0000	$/BUSHEL
STORAGE CHARGE TO CUSTOMERS	0.0200	$/BUSHEL/MONTH
STORAGE CHARGE PAID TO TERMINAL	0.0200	$/BUSHEL/MONTH
% OF TOTAL GRAIN REVENUE LOST DUE TO SHRINKAGE	0.0050	
ELEVATOR CAPACITY 1	800000.	BUSHELS
ELEVATOR CAPACITY 2	0.	BUSHELS
MONTH FROM HARVEST IN WHICH CAPACITY 2 TAKES EFFECT	0	

% OF TOTAL VOLUME STORED WHICH IS IN STORAGE EACH MONTH FROM HARVEST :

(MO)	1	2	3	4	5	6	7	8	9	10	11	12
(%)	1.00	0.95	0.95	0.90	0.85	0.85	0.70	0.65	0.65	0.60	0.55	0.50

STATEMENT OF OWNER(S) EQUITY AND DISTRIBUTION OF INCOME

YEAR 1

OWNER(S) CAPITAL,BEGINNING		$ 145027.00
NET INCOME	$ 153984.80	
LESS WITHDRAWALS	-115488.50	
INCREASE IN CAPITAL		38496.25
OWNER(S) CAPITAL,ENDING		$ 183523.20

DISTRIBUTION OF EARNINGS AND TAXES FOR A CO-OP

YEAR 1

INCOME BEFORE TAXES		$ 274982.30
LESS : INCOME TAXES		5915.13
INCOME AFTER TAXES		$ 269067.20
LESS : STATUATORY RESERVE ADDITION		26906.73
MAXIMUM REFUNDABLE AMOUNT		$ 242160.50
PATRONAGE REFUNDS :		
CASH DIVIDEND	$ 48432.09	
STOCK CREDIT	193728.30	
TOTAL PATRONAGE REFUNDS		242160.50
NONALLOCATED EARNINGS		$ 0.00

EQUITY SECTION OF BALANCE SHEET

CAPITAL STOCK AND EQUITY CREDITS		$ 107517.00
LESS STOCK RETIRED		10751.70
CAPITAL STOCK AND EQUITY CREDITS		$ 96765.25
PATRONAGE REFUNDS : CURRENT YEAR	$ 242160.50	
LESS : CASH PAYMENT	48432.09	
PATRONAGE REFUND IN STOCK CREDIT		193728.30
RETAINED EARNINGS :		
STATUATORY RESERVE	$ 61906.73	
OTHER RETAINED EARNINGS	2510.00	
TOTAL RETAINED EARNINGS		64416.73
TOTAL STOCKHOLDRES EQUITY		$ 354910.30

INCOME TAX AND INVESTMENT CREDIT COMPUTATION

YEAR 1

NET INCOME BEFORE TAXES		$ 139460.60
INCOME TAXES	$ 60441.10	
LESS INVESTMENT CREDIT	500.00	
INCOME TAXES PAYABLE		59941.10
NET INCOME		$ 79519.50

STATEMENT OF RETAINED EARNINGS

RETAINED EARNINGS, BEGINNING	$ 33956.11
ADD : NET INCOME	79519.50
TOTAL	$ 113475.50
LESS : DIVIDENDS PAID	0.00
AVAILABLE FOR ALLOCATION	$ 113475.50
LESS : ADDITION TO RESERVE	0.00
RETAINED EARNINGS, ENDING	$ 113475.50

DETAILED EQUITY SECTION OF THE BALANCE SHEET

PREFERRED STOCK		$ 0.00
COMMON STOCK		6800.00
ADDITIONAL PAID-IN CAPITAL		12573.93
TOTAL CONTRIBUTED CAPITAL		$ 19373.93
RETAINED EARNINGS :		
FREE AND AVAILABLE	$ 113475.50	
RESERVE	0.00	
TOTAL RETAINED EARNINGS		113475.50
TOTAL STOCKHOLDERS EQUITY		$ 132849.40

VITA

Monty Joe Elsener

Candidate for Degree of

Master of Science

Thesis: THE DEVELOPMENT OF A FINANCIAL SIMULATION MODEL FOR GRAIN ELEVATOR FIRMS

Major Field: Agricultural Economics

Biographical:

Personal Data: Born in Frederick, Oklahoma, December 25, 1951, the son of W.A. and Elizabeth Elsener.

Education: Graduated from Tipton High School, Tipton, Oklahoma in May, 1970; received the Bachelor of Science degree from Oklahoma State University in May, 1974, with a major in Agricultural Economics; completed the requirements for the Master of Science degree from Oklahoma State University in May, 1977, with a major in Agricultural Economics.

Professional Experiences: Served as a Research Assistant at Oklahoma State University from January, 1975 to present date.