# MANAGERIAL EFFICIENCY OF CASSAVA FARMERS

BY

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THESIS

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TO

MY FATHER

LATE C.MADHAVAN PILLAI

FORMER MUNICIPAL CHAIRMAN

NAGERCOIL

## DECLARATION

I hereby declare that this thesis entitled **"Managerial efficiency of cassava farmers"** is a bonafide record of research work done by me during the course of research work and this thesis has not previously formed the basis for the award to me of any degree, diploma, associateship or any other similar title of any other University or society.

Vellayani
11.12.1991.

**M.ANANTHARAMAN**

# CERTFICATE

Certified that this thesis entitled "**Managerial efficiency of cassava farmers**" is a record of Research work done independently by **Sri.M.Anantharaman** under my guidance and supervision and it has not previously formed the basis for the award of any degree, fellowship or associateship to him.

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# INTRODUCTION

"With a gradual decline in the size of farm holdings, the efficiency of small farm management holds the key to progress of agriculture. Yield is the product of interaction between the genetic engineering of rice plant and the management efficiency of small farmers"

- M.S. Swaminathan (1989)

Agriculture in India can be traced back to antiquity and from time immemorial the agriculturist has been considered to be the linchpin of the social chariot. Agriculture plays a dynamic role in the economic development of the country with more than 40 per cent of the total national income contributed by agriculture and allied sectors. Rapid growth of population makes it necessary for the country to expand agricultural production.

Five year plans undertaken by the Government as well as the scientific break-through in the agricultural front have resulted in spectacular increase in the agricultural production with a compound growth rate of 2.5 per cent per annum over the last three decades. The food production in the country has seen a great leap from 50 million tonnes in the fiftees to 175 million tonnes in the eightees. The dream of self-sufficiency in agricultural production has come true as a result of improved seeds, irrigation, fertilizer technologies and other complementary inputs.

With this comfortable agricultural situation it was argued that the physical targets of production be raised upwards. But the question arise how far they are economically profitable from the stand point of absolute benefits to farmers. According to Kahlon and Singh (1980), there is empirical evidence to show that in most cases, the marginal cost of additional production has been rising from year to year and this is happening not only in those regions of the country where the new technology has not spread on a massive scale but even in those regions which form the bastion of the Green Revolution. Faced with rising average cost of production of almost all the agricultural commodities, Indian agricultural economy is becoming a high-cost economy.

Singh (1980) pointed out that the release of large number of agricultural innovations which are being communicated to farmers by a number of agencies and change agents through variety of channels, the effect of such innovations and the communications is not always well pronounced as evinced by farmers' inadequate knowledge, understanding skills and sometimes unfavourable attitude leading to delayed or no action by farmers. The above statement was evidently proved by research studies conducted by De and Bangarva (1986), Ingle et al. (1987), Saxena et al. (1990) and Singh (1990) which indicated tremendous gap between knowledge production and knowledge utilisation. This tremendous gap needs to be viewed not only in the background of lapse in extension machinery and profitability attribute of the technologies but also in the inabilities of the farmers to derive profits from the use of technology.

Most of the technological developments aim at increasing physical production potential with little regard to cost of production (Kahlon and Singh, 1980). As such, the gap between economic potential and the physical production goes on widening. Secondly, the real world economic optimum with limited resource supplies falls short of the conceivable economic potential with abundant resource supplies. No wonder the tendency towards achieving higher production by the influencial group of farmers persists. Thus, the scarce resource face acute maldistribution from society's point of view. It should not however, dilute the attention from the production focus which has to be ensured to raise the production to meet the challenge of population explosion. The point to be considered is that the higher production should not be at the cost of high cost of production which invariably pulls down higher profits but should result from optimum cost leading to increased profits.

Management plays a vital role in determining the cost of production as well as obtaining higher levels of profits (Kahlon and Singh, 1980). Realising the importance of management in agriculture, Hagan (1962) pleaded for allocating more resources and efforts towards improving managerial capacity and performance of individual farm operators. Chowdhary *et al.* (1968) concluded that management had decisive influence in determining the level of income. A variation of 12-13 per cent in gross income and 19-36 per cent in net income were reported to have been explained by management input. Ray and Bora (1987) opined that agricultural technologies are in general quick maturing, high yielding and profitable, provided they are properly managed. Management development is therefore, essential for the farmers to obtain full benefits of the technology and the investments made by them in farming enterprise.

A large majority of our people mistakenly believe that our farms are small, capital investment is low and farming appears to be regarded as way of life, and that management has no application in our agriculture (Singh, 1977). As our agriculture is moving from the subsistence to the commercial level with the advent of agricultural technologies coupled with upward trend in farm prices, farmers are using more and more cash inputs than they did a few years ago. Belshaw (1974) rightly stated that farming today is becoming more complex and complicated and therefore, management is a key to face these problems. All these factors call for efficient management on the part of farmers to survive and succeed in the present day world of competition.

Randhawa and Heady (1963) indicated the inability of small farmers to make good decisions and suggested for educating the farmer and changing the factors causing conservativeness. Johl and Kapur (1973) stated that managerial ability of farmers can be improved appreciably through extension education programmes in farm management. Swanson and Claar (1984) also opined that extension needs to teach farmers management and decision making skills as new technology inevitably places more demand on these abilities. Chari and Nandapurkar of its drought tolerance and its ability to grow on poor soils. Cassava is a cheap source of food in terms of calories. Cassava worth one rupee is estimated to yield as much as twice the calories supplied by rice of equal value and the average yield of calories per hectare under cassava is several times larger than that of rice (Amma, 1980). Apart from being a staple food, cassava tubers are increasingly used as raw materials in starch, sago and animal feed industries (Ghosh, et al., 1988d).

The area under cassava in India makes up 2.3 per cent of the world's cassava area and 0.[illegible] per cent of India's total cropped area (Subramanian, 1986). Though the area under cassava and its production do not occupy a very important position in the Indian agricultural economy, because of the geographical concentration of production, it is an important crop in the agricultural economy of few states, especially Kerala and Tamil Nadu (George, 1988). It has been reported that cassava supplied nearly 700 kilo calories per day to about 25 million people in Southern India (Ghosh, 1987). Being a crop having the ability to grow in poor soils under near drought conditions and not being season-bound under tropical climate, it is an attractive crop for the poor farmers in developing countries (Ghosh, 1984). In the cassava growing areas 70-80 per cent of the growers have less than 0.4 hectare of land on an average and cassava used to be the main staple diet for many low-income households (George, 1988). Although cassava forms a staple food, its importance as a raw material for industrial products in India cannot be underestimated. Srivastava and Phandis (1982) estimated that cassava starch production which stood at two lakh tonnes was double the maize starch production in India.

With all the attributes of genetic nature mentioned above in its favour combined with its contribution to the agricultural economy, the present day position of cassava crop has been rather baffling as indicated by its growth trends. During the last decade the area under this crop has come down drastically from 3.58 lakh hectares during 1978 to 2.69 lakh hectares in 1988 registering nearly 2.5 per cent reduction in area per annum. Lakshmi and Pal (1986) found that area and production of cassava had negative compound growth rate, - 1.3 per cent and - 0.7 per cent respectively, for the period 1970-1984. Many reasons were attributed to this phenomenon, but the major one was the replacement of traditionally grown cassava area by other commercial crops. Observing this trend Lakshmi and Pal (1988) commented that one of the major changes taking place in Kerala is the gradual shifting of area from food crops like rice and cassava to plantation crops like rubber, coconut etc. George (1987) held the view that with the increasing returns from plantation crops like rubber and coconut, there has been a tendency to bring even marginal lands under rubber and coconut resulting in the decline of area under cassava.

Anticipating the food and industrial requirements to be met from cassava, the National Commission on Agriculture (1976) projected a production of 40 million tonnes of cassava from an area of one million hectares. In view of tough competition from other remunerative crops for the limited cultivable area available, achieving the target set by National Commission on Agriculture or atleast avoiding further decline in the area under cassava is going to be a hard task unless cassava crop enterprise is made monetarily a competitive one. The possible way out to realise higher returns from cassava crop which is mostly cultivated by small farmers with meagre resource-base befall largely on improving the managerial efficiency of this group of farmers.

The extension education efforts in improving the managerial efficiency of farmers in farm or crop enterprises attain its purpose and objective only when they are backed by sound information on various aspects of managerial efficiency of farmers. Past research studies conducted on management factors of farmers (Krishna and Gupta (1962) on management input in farming, Suryanarayana (1965) on management under varying farming conditions, Kahlon and Acharya (1967) on management input in farming, Chowdhary et al. (1968) on management factor in agriculture, Harinath (1971) on management factor in rice farms, Chari and Nandapurkar (1987) on managerial ability of farmers, and Bora (1989) on management attributes of farmers) either treated management merely in economic relationship of input and output or were specific to a particular crop or failed to view management in terms of farmers' behaviour.

The studies enlisted above neither gave much importance to the measurement of managerial efficiency nor developed a measuring device on scientific procedure that has got practical applicability in any crop enterprise in general. The two major cassava growing states of Kerala and Tamil Nadu present an entirely different picture in the productivity of cassava crop. While the productivity in Kerala is more or less stagnant around 17 tonnes per hectare since 1970-71, the same has exhibited an increasing trend in Tamil Nadu with the present level at 30 tonnes (George, 1988). Information on managerial efficiency of cassava farmers belonging to these two states could throw light on the reasons responsible for this difference. In addition, knowledge on relationship of socio-psychological and situational factors with managerial efficiency and managerial constraints will be of much use to the change agents in formulating strategies for the development of farmers.

Against this background, the present study was formulated with the following specific objectives.

OBJECTIVES OF THE STUDY

1. To develop and standardise a scale to measure managerial efficiency of farmers.
2. To measure the managerial efficiency of cassava farmers in Kerala and Tamil Nadu with the developed scale.
3. To delineate the important components of managerial efficiency of cassava farmers.

4. To study the relationship of socio-psychological and situational factors with the managerial efficiency of cassava farmers.

5. To identify the managerial constraints as perceived by the cassava farmers.

SCOPE OF THE STUDY

This is a poineering study of its kind wherein managerial efficiency of farmers is viewed in various dimensions of management. The scale developed would be applicable in measuring managerial efficiency of farmers in any single crop enterprise and the whole farm with suitable modifications. The managerial efficiency components brought out by the study would form a broader basis in formulating course content in training and other extension education programmes. The findings of the study would be helpful in suggesting the most important managerial components which need extension education support. The study would throw light on the socio-psychological and situational factors of farmers associated with the managerial efficiency and managerial constraints which would help in designing the management development programmes for farmers.

LIMITATIONS OF THE STUDY

The present research formed a part of the doctorate degree programme which was single student investigation and hence it has all the limitations of time, money and other resources. These limitations determined the restricted selection of districts and villages as the locale of the study and also forced to restrict the sample size. However, careful and rigorous procedure have been adopted to carry out the research systematically.

The study covered only cassava farmers whose main objective was to sell cassava, and hence generalisation of the findings would be directly applicable to this group of farmers. The study was based on the expressed responses of the farmers, which may not be free from their individual biases and prejudices. There could be some distortion in the interpretation of the responses of farmers though every care was taken to collect the information without any loss.

Inspite of these, it is believed that the findings depicted and the conclusions drawn could stand the test of more rigorous field observation.

# THEORETICAL ORIENTATION

## 2. THEORETICAL ORIENTATION

The objective of this chapter is to develop concept of managerial efficiency and to establish the theoretical framework for the study based on ideas and concepts gathered from review of existing literature of both theoretical and empirical nature. As research studies directly pertaining to managerial efficiency of farmers in general and cassava farmers in particular were few, the review of the literature on related aspects of managerial efficiency was also made. The literature reviewed is organised and presented under different parts as shown below. At the end of each part, generalisations have been made to develop the concepts used in this study.

2.1. Concept of management and farm management

2.2. Managerial functions

2.3. Managerial components

2.4. Concept of efficiency

2.5. Concept of managerial efficiency

2.6. Relationship of socio-psychological and situational factors with managerial efficiency of farmers

2.7. Managerial constraints

2.8. Theoretical model of the study

### 2.1. CONCEPT OF MANAGEMENT AND FARM MANAGEMENT

Managerial efficiency was considered as a derivative consisting of two concepts viz., management and efficiency. To develop the concept of managerial efficiency it, therefore, became necessary to analyse these component terms.

### 2.1.1. Management

Webster's third new international dictionary defined management as the act of managing; judicious use of means to accomplish ends. In the Oxford dictionary, meaning of management is given as the action or manner of managing; the application of skill and care in the manipulation, use, treatment or control (of things and persons) or in the conduct (of an enterprise, operation etc.). Encyclopaedia of social sciences described management as the process by which the execution of a given purpose is put into operation and supervised. The combined output of various types of grades of human effort by which the process is effectual is again known as management. Again, the combination of those persons who together putforth this effort in any given enterprise is also known as management.

Appley (1943) defined management as getting things done through the efforts of other people. Similar was the view held by Banerjee (1981) and George (1985). Kimball and Kimball (1947) stated that management embraces all duties and functions that pertain to the initiation of an enterprise, its financing, the establishment of all major policies, the provision of all necessary equipment, outline of the general forms of organisation under which the enterprise is to operate. Fayol (1949) viewed management broadly as the conduct of a business through a continuous process of improvement and optimisation of resources via the essential management functions. To

Niles (1956), good scientific management achieves a social objective with the best use of human and material, energy and time and with satisfaction for the participants and public.

Terry (1968) defined management by stating 'management is accomplishing a pre-determined objective through efforts of other people. Hodge and Johnson (1970) and Glueck (1977) also held the same view. Another definition given by Terry (1968) is that management is a distinct process of planning, organising, actuating and controlling performed to determine and accomplish the objectives. Gupta (1969) stated that management is the creation and control of technological and human environment of an orgnisation in whch human skills and capacities of individuals and groups find full scope for their effective use in order to accomplish the objectives for which an enterprise has been set up.

Johannsen and Page (1983) stated that management is effective use and coordination of resources such as capital, plant, materials and labour to achieve defined objectives with maximum efficiency. Haynes (1981) viewed management as essentially a decision making process and to manage well, a manager has to take right decisions at right time. Koontz et al.(1986) conceptualised management as the design of environment in which people working together in groups can accomplish objectives and he meant design as the application of knowledge to a practical problem for the purpose of determining the best possible result for that situation. Massie (1987) viewed management as the process by which a cooperative group directs action towards common goal.

To Chari and Nandapurkar (1987), management was the effective use of people, money, equipment, materials and methods. Aggarwala (1989) defined management as the process or act of directing operation of an organisation or segment of it, to realise the established aims.

### 2.1.2. Farm management

The concepts and definitions on farm management, crop enterprise management and agri-business management are presented here.

Efferson (1953) defined farm management as the organisation and operaton of the farm in the context of efficiency and profit. Forster (1953) viewed farm management as the ways and means of organising land, labour and capital and application of technical knowledge and skill in order that the farm may be made to yield the maximum net returns. Tandon (1958) stated that farm management is concerned with business principles of farming from the point of view of individual farm.

Kennedy (1965) stated that farm management is concerned with problem solving and decision making. Kahlon and Acharya (1967) and Harinath (1971) considered management with regard to crop enterprises as decision making and implementing these decisions. According to Drillon (1971), agri-business management is the sum total of all operations involved in the manufacture and distribution of farm supplies, production activities on the farm and the storage, processing and distribution of farm commodities. According to Castle *et al.* (1972)

farm management is concerned with the decisions which affect the profitability of farm business.

According to Osburn and Schneeberger (1978), management is viewed as those activities of farmers relating to the organisation and operation of a firm for the attainment of specific ends. Barry et al. (1979) referred to farm management as the acquisition and use of capital resources by an individual firm which includes identifying and selecting promising investment opportunities as well as financing choice of these investments. Johannsen and Page (1983) related agricultural business management to production, processing, storage, transportation and distribution of farm supplies and produce.

A perusal of foregoing concepts on management revealed that eventhough there is some variation in form and perspective, there is a general agreement on the essence of management. Whatever variation observed are due to differences in the type of environment of management. However, there is a clear-cut convergence in the concept that management is primarily performing certain functions/activities to achieve the target/ objective in an enterprise. Consequently, in the present study also management has been considered as a set of managerial activities undertaken to achieve the goal.

## 2.2. MANAGERIAL FUNCTIONS

As management is viewed as a set of functions to be performed, managerial functions of farmers as viewed by various authors were reviewed and are presented here.

Johnson and Haver [illegible] pointed out observation, decisions, action and acceptance of responsibility as functions of farmers. Neilson (1961) stated that improvement of managerial ability of farmers needs formulation of goals, definition of a problem, collection of information, specification and analysis of alternatives, decision making, taking action bearing responsibility and evaluating outcomes. According to Heady and Jensen (1962), managerial function of farmers are: decision on crop combination, amount of resources, best production practices, profitable size of farm or enterprise, utilisation of hired labour and timing of crop production. Hedges (1963) considered farm management as deciding farm enterprises and resource allocation, coordinating farm plans with laws, regulation and institutional forces, planning for capital investments and their financing, procuring and productions.

Barger (1967) mentioned that planning, execution and review are the functions of the manager. Hardaker et al. (1970) viewed technical decision, trading decisions, financial decisions and personnel management as important functions of farm managers. Harinath (1971) included decision making, extension contact, supervision, preparatory cultivation, seeds and sowing, plant protection, marketing and cooperative services as components of management factor.

Castle et al. (1972) considered developing ideas and making observations, analysis, decision making, action and acceptance of responsibility as functions of farmers and he suggested that for successful management, farmers should perform better on farm management information, capital, land, crop, livestock and machinery.

Johl and Kapur (1973) mentioned finance, farm resources, labour, farm machinery and building and risk and uncertainty as important areas of management for farmers. Wills (1973) considered finance, operation and marketing as major parts of management of agri-business. Wortman (1976) considered the management in areas of planning and controlling, accounting, finance and marketing and sale for successful business. Haridasan (1977) included planning, organisational aspects, personnel management, direction and control, labour welfare, financing, marketing and storing as components of managerial process of rubber growers.

Singh (1977) stated that managerial functions of farmers are observing, analysing, decision making and accepting responsibility. Osburn and Schneeberger (1978) mentioned that farmers are responsible for all areas of management such as technical, commercial, financial and accounting activities. Duft (1979) stated that planning, organising, directing and coordinating as functions of management of agri-business. Kahlon and Singh (1980) included synthesising and integrating technical information, farming resources, marketing, technical and economic risk into somekind of production and income optimum as the functions of farm management. Kay (1981) suggested that farmers need to concentrate on the management of land, labour, machines, capital and credit, risk and uncertainty. According to Buckett (1981) planning and controlling of production, financial, marketing and staffing are important managerial functions.

Eyre (1982) ascribed marketing , production, purchasing, finance and personnel management as functions of manager. Chari and Nandapurkar (1987) included planning, organising, human relationship, supervision, communication, coordination and control as components of managerial ability of farmers. Milligan and Standon (1989) suggested that managers are expected to perform setting objectives, compile information, decisions in buying and selling, controlling finance and organise the use of resources.

From the foregoing reviews, it becomes clear that the specific managerial functions are many. Nevertheless, considering the application part of managerial functions in farm situations, all the specific functions could be summarised as: farmers need to plan, produce and market complemented with suitable strategies on information, finance, labour and risk management. In view of this, managerial functions in terms of components such as planning, labour management, information management, financial management, risk management, production management and marketing management are considered essential for the farmers. It would be worthwhile to review the views and works of different authors on these components in order to delineate the activities related to these components. These reviews are furnished in the pages that follow.

## 2.3. MANAGERIAL COMPONENTS

### 2.3.1. Planning

Partenheimer and Bell (1961) stated that farmer needs to plan production and resource use and to attempt to predict or formulate exepectations about how changes in economic, social and physical conditions affect the production. According to him, there are atleast five areas in which expectations may be required for making decisions: price and market conditions for inputs and outputs, production response, new techniques, action and attitude of people and conditions of institutional environment. Pasto (1961) indicated that the process of planning involves appraisal of existing farm resources, their use - pattern and efficiency, appraisal of various production practices, evaluation of various alternate plans for their feasibility and profitability. May (1968) mentioned that operational planning deals with planning aspects of managing current operations with a view to maximise short-term market opportunities and optimising employment of assets.

Barnard and Nix (1973) emphasised that producers should have objectives for otherwise, there would be nothing to guide between alternative courses of action. Johl and Kapur (1973) stated that all business undertakings plan their production, marketing operations in respect to what to produce, how to produce and when and where to sell. According to Singh (1977), the process of planning involves the following steps: appraisal of existing farm resources, their use-pattern and efficiency, appraisal of various production activities, preparing and evluating alternate plans for their feasibility and profitability.

According to Kahlon and Singh (1980) farm planning entails what is to be done, what are the resource requirement and how to accomplish the objectives. Kay (1981) defined farm planning as making decisions and choices and a plan represents particular way of combining or organising resources like land, labour and capital.

### 2.3.2. Labour management

Hardaker *et al.* (1970) suggested hiring and firing workers, directing and supervising the workers are the major tasks in personnel management in farms. Barnard and Nix (1973) mentioned that men management is the most important aspect in running farm business and defined man management as the skill of controlling and energising an employee in the execution of his tasks so that employees efforts, sense of responsibility and the attention to detail are the best possible in the circumstances.

Johl and Kapur (1973) pointed out that increasing the efficiency of hired labourers is an important consideration to the farmers. Some of the methods which have been found useful in increasing the labour efficiency are: enlarging the size of farm business, planning labour distribution, enterprise combination, improving farm and field layout, providing incentives and training for the workers and farm work simplification. Nagaraja and Swamy (1989) also considered these methods for improving labour efficiency.

Kahlon and Singh (1980) pointed out that labour is one of the most predominant resources of the farm. The efficient use of labour is a prime issue with farm management. The labour resource on farms constitute farmer himself, his family, and the permanent and hired labourers. Management of labour involves estimation of labour requirement, adjustment in cropping pattern, increasing the working time and incentives. Kay (1981) suggested that if labour is treated as an inanimate object, productivity and efficiency suffer and measures of labour efficiency like tillable acres per person, labour cost per tillable acre and work units per person are useful in comparing and evaluating farm business.

According to Harsh *et al.* (1981) labour management deals with labour needs of individual enterprises, scheduling available labour supply, allocation of work to labourers apart from aspects of human relations. Padmanabhan (1981) found that quantity of work output per day, quality of work done, interest and skill in doing work were the important criteria for evaluating the agricultural labourers efficiency.

### 2.3.3. Information management

According to Johnson and Haver (1953), farmers need information on price structures and changes, production methods, technological development, behaviour and capacity of people associated with farm business, economic, political and social situations in which a farm business operates. Johnson and Lard (1961) found that the types of farm information used were price, production, new developments, human, institutional and home technology. Mawby and Haver (1961) deduced five types of information essential in farm decision making namely, prices, production methods, technological changes, institutional arrangements and human relation and interrelationships.

Thomas and Knight (1961) found that majority of farmers obtained information on price and considerable proportion of farmers got information on production and human elements. Harsh *et al.* (1981) pointed out that the farmers require varied types of information to make decisions according to type of farm, location and resources available to the operator. Singh and Kumar (1983) found that a majority of farmers required information on components like inputs, markets, credit and subsidies. Olsson (1988) opined that the farm manager seeks, receives, classifies and adjusts his activity on the basis of a lot of information concerning the developments in environment, market signals and new knowledge regarding production techniques.

### 2.3.4. Financial management

Hardaker *et al.* (1970) stated that financial management comprises both obtaining and using capital and credit wisely. Johnson (1971) mentioned that functions of financial management are financial planning, managing assets, raising funds and meeting special problems. Sharma and Sidhu (1972) pointed out that adoption of improved technology needs cash funds for the purchase of inputs. The proportion of cash inputs to total inputs in farm business has increased substantially in the recent past and the same trend is expected to continue in the future. This increased demand for cash funds added to the importance of rational financial management of available funds. Without proper financial management, the farmer sooner or later finds himself in difficulties.

Johl and Kapur (1973) stated that financial management deals with acquisition and use of capital and a judicious management of finances of a farm business is very important for increasing the outcome of the farm. To Wills (1972), financial management is concerned with all financial transactions in firm. Singh and Singh (1975) indicated that managerial ability of the farmer is significant in the field of credit planning and judgement of farmers' credit management ability is a pre-requisite for minimising risks. According to Kotia(1978) farm accounts can provide the farmer with useful guidelines for making, revising and modifying their plans and thus improving their financial and operating affairs.

Osburn and Schneeberger (1978) described financial activities of farmers as acquisition and use of capital, forecasting future needs and arranging for their finance. Kahlon and Singh (1980) stated that the management of capital resources along with its efficient organisation with other farm resources is very important for the farmers. Bari (1981) related cash management to the management of cash available in such a way as to achieve the generally accepted objectives of the business. In a broad sense, it is the manager's ability to recognise cash problems before they arise to solve them when they arise.

According to Buckett (1981) farmers should examine all sources of capital, decide how much capital is required, when it is wanted and which source should be used during the planning stage and development of capital in accordance with plan. Coy (1982) related financial accounting to recording and analysing information in monetary terms with reference to the transaction of farm business. Massie (1987) defined financial management as the operational activity of a business that is responsible for obtaining and effectively utilising the funds necessary for efficient operation. The objective of financial management is to ensure that adequate cash is on hand to meet required current and capital expenditure and otherwise to assist in maximising profits.

### 2.3.5. Risk management

Pasto (1961) listed the following methods to overcome risk and uncertainty: selecting reliable enterprises, forward contract, flexibility, diversification, safety margin, asset management, maintaining resources and adjustment to uncertain availability of inputs. Johl and Kapur (1973), Singh (1977) and Kahlon and Singh (1980) also suggested these methods to overcome risk.

Partenheimer and Bell (1961) stated that the nature of farming is such that farmer has to plan production and resources use in an atmosphere of imperfect knowledge. Uncertainty gives rise to actions designed to increase returns which accrue from correct anticipation of the future and by planning in line with such expectations. Rae (1977) pointed out that only certainty in crop production and marketing is its uncertainty. Managers must analyse problems and take decisions with less than perfect knowledge about how these decisions will turn out in the future. The methods of analysing non-certain decisions problems consists of defining problems, specifying several courses of action, identifying important sources of non-certainty, making a list of values that these non-certain events could take, and for each course of action budgeting a measure of performance.

Banerjee (1981) mentioned that farming operations suffer from certain inherent risk not present in the business world, which can be distinguished as natural and ecological, operational and administrative, economical, local and situational risks. The possible ways of combating risks are analysing previous experience for price trend and possible performance of new technology, insurance, diversification, prior arrangements with processors and industries.

### 2.3.6. Production management

Hardaker et al.(1970) included what to produce and how to produce as technical decision of farm production. Wills (1973) stated that production refers to all those activities in which the firm is engaged in producing goods and services. Hicks et al. (1975) described poduction management as the process which includes product design, plant location, plant layout, purchasing, inventory control and production scheduling. According to Osburn and Schneeberger (1978), production knowhow, production in time and adapting production process to changing economic and technical conditions are the technical activities in a farm.

Stoner (1982) pointed out that production management entails planning the production, establishing courses of action and procedures to achieve the objectives, organising the human and capital resources to produce good, directing and leading the personnel to be productive, monitoring and controlling the production. Massie (1987) referred production/operation management to the technical aspects of a firm. Koontz et al. (1986) used the synonymous words operation and production management to refer to those activities necessary to manufacture products.

### 2.3.7. Marketing management

Thakur (1974) found that selling produce directly to the consumers fetched the highest price to farmers followed by sale through retailers, wholesalers and commission agents. According to Hicks et al. (1975) marketing includes buying, selling, standardisation, grading, transportation, storage, risk taking, gathering market information and financing in market. Rae (1977) stated that marketing management consists of price determination, choice of market channels, storage decisions, transportation decisions and use of marketing intelligence in the case of crop management. Bittel (1978) considered marketing management as the sum of all activities that convert market concept into bottom line results.

Osburn and Schneeberger (1978) mentioned that commercial activities of farmers include all buying and selling, storage handling, marketing of commodities and market forecasting. Buckett (1981) stated that successful marketing is one of the key functions of management and at the operational stage it is necessary to make use of every opportunity to market to best advantage, market contracts may be negotiated and produce has to be selected in right condition at the right market. Harsh et al. (1981) pointed out that marketing has become much more complex with more marketing options now available to farmers and more people involved in marketing process. Although individual farmer cannot alter marketing system, he does have various price options available to him. A farmer's marketing programme contains: what, how, when and where to market.

According to Buell (1985), marketing management is the setting of market goals considering resources and market opportunities and planning and execution of activities required to meet the goals. Greenlay (1986) mentioned that marketing planning involves marketing objectives, environmental appraisal, marketing strategy, tactics and control. Massie (1987) viewed marketing management as regulating the level, timing and character of demand for one or more product of the firm and it consists of planning, organising, controlling and implementing of marketing programmes and strategies.

2.4. CONCEPT OF EFFICIENCY

In this part of theoretical orientation the reviews on efficiency, the second component of the concept of managerial efficiency, are presented. The term effectiveness was also considered for review owing to the fact that it is a closely related term on which a great deal of work has been done. According to Pitman English dictionary, the word efficient, the adjective form of efficiency means capable; competent; able to get results and the word effective, adjective form of effectiveness means having the power to produce desired result. New comprehensive international dictionary of the English language gives the meaning of efficiency as the character of being efficient or effective; the ratio of the work done.

Farrell (1957) defined efficiency as the ability to produce a given level of output at low cost. Therefore, efficiency of an individual may be measured as the ratio of least cost to actual cost in order to produce unit output. According to Clark and Gottfried (1957), efficiency in general usage means the quality of competance, capability, effectiveness or productivity, the ability to produce desired result. Florence and Brown (1958) meant efficiency as output from total of inputs. Wyllie (1960) defined efficiency as capacity or ability of any persons, process or thing to reach whatever end desired. Etizioni (1964) gave the definition of effectiveness as the degree to which organisation realise its goal. Efficiency was defined by Shah (1965) as an index or ratio of returns divided by the total efforts utilised. According to Heady (1968) efficiency is the convergence of potential in the real. Johanssen et al. (1968) meant efficiency as the effectiveness of performance of the right thing at right way and place and effectiveness as achievement of the objectives in terms of best possible interpretation of trading circumstances and potential profitability.

According to Amey (1969) efficiency is a loose term and a host of different concepts of efficiency come really to mind. Efficiency is an elusive concept, one in which an economist, an engineer and a policy maker all have greater stakes. To an engineer, it means ratio of output to input, or output to theoretical capacity, while a cost accountant uses the standard cost to actual cost, an economist refer it as firm's success in producing as large as possible an output from a given set of inputs. Radhakrishna (1969) expressed that efficiency is by definition a relative concept. Castle et al. (1972) stated that the most measures of efficiency specify the relationship of one input to output without any consideration of the quality of input.

Drucker (1974) stated that efficiency is concerned with doing things right and concerns itself with the input of effort into all areas of activity and effectiveness is concerned with doing right things. Lerner and Ben (1975) denoted efficiency as the highest output from given input. Watson (1977) stated that an action is efficient if it satisfies the motive of the aim and effective if it accomplishes specific aims. Mali (1978) defined efficiency as related to resource utilisation and effectiveness as related to performance. Houck (1979) referred efficiency as the length of time required and the level of direct expenditure incurred to perform an operation. Kahlon and Singh (1980) referred efficiency as the ratio of output to input and stated that efficiency measures are designed to visualise the outcome as envisaged by the objective or goals of an activity in relation to the efforts made. Hicks and Gullett (1981) described efficiency as doing things accurately and with minimum use of time and resources and effectiveness as doing these things necessary to accomplish the objective.

Bhattacharya (1983) stated that effectiveness is achieving objectives and efficiency refers to cost of effectiveness. Hitt et al. (1983) wrote that efficiency measures to determine whether the organisation is meeting its short term targets while effectiveness refers to how well an organisation reaches its objective over a period of time. Suresh (1983) stated that efficiency is a relative concept. It cannot be defined accurately and precisely because efficiency of any economic activity will vary according to working units and motivation of decision making units. Different meanings are attributed to the terms like capacity or ability to do things well. It is commonly accepted as an index ratio or percentage. In this sense the term is a measuring rod to gauage the ratio of performance in terms of numerator and denominator. In general efficiency has been recognised as an index of performance of the degree of achievement to economic course of action.

Collin (1986) meant efficiency as ability to work well or to produce right results or the right work quickly and effectiveness to producing results. Koontz et al. (1986) viewed efficiency as achievement of the ends with least amount of resources and effectiveness as the achievement of objectives. Sengupta (1986) defined efficiency as the ratio of wanted outputs to valued inputs. Ghosh et al. (1988a) gave the meaning of efficiency as maxium output with minimum input of labour and capital and effectiveness as the extent to which an action or activity achieves its stated purpose. Mohan (1988) stated that efficiency is the measure of quality of execution of an activity whereas effectiveness is the measure of extent of contribution which an activity makes to the overall endeavour for the achievement of the pre-determined goal.

The literature reviewed revealed that there existed little agreement among authors on the meaning and concept of efficiency as well as effectiveness. The notion of efficiency and effectiveness are widely employed in management literature and yet there is rarely any specificity about the meaning of these two terms.

Despite, varied meanings ascribed to these terms, the views expressed could be broadly categorised as those referring to: a) producing results or goal (Clark and Gottfried, 1957; Wyllie, 1960; Etizioni, 1964; Watson, 1977; Hitt et al., 1983), b) performance or doing right things (Johanssen et al., 1968; Drucker, 1974; Hicks and Gullett, 1981; Suresh, 1983; Collin, 1986; Mohan, 1988), c) output in relation to inputs which is a combination of first two categories (Farrell, 1957; Florence and Brown, 1958; Shah, 1965; Amey, 1969; Castle et al., 1972; Lerner and Ben, 1975; Kahlon and Singh, 1980; Sengupta, 1986; Ghosh et al., 1988a).

As far as producing result/goal and doing right things are concerned most authors had referred efficiency and effectiveness to have the above meanings. But in the case of the third category of meaning 'output in relation to input', there had been consistency among the authors that this refers to the term efficiency only. This shows that effectiveness is more concerned with output/goal/result per se. and efficiency with output/goal/result in relation to input. Effectiveness is concerned with output only if the objective is to achieve mere output or result, and if the objective itself is to achieve output with effective use of input, it brings out the output-input relationship thus getting blended with the concept efficiency as far as the third category of meaning is concerned. This has been rightly pointed out by Sinha (1980) that the terms effectiveness and efficiency are used interchangeably. In the light of the above discussion, efficiency is conceived as performing right things (input) to achieve the determined goal (output).

## 2.5. MANAGERIAL EFFICIENCY

In this part, the concept of managerial efficiency and related concepts are presented. At the end, managerial efficiency for the study was conceptualised in the light of generalisations made on management and efficiency.

Marschak and Andrews (1944) referred managerial efficiency to the achievement of maximum output with given inputs or a given output with given inputs or a given output with minimum inputs. This notion is close to the definition given by Farrell (1957) on technical efficiency that it measures a firm's success in producing maximum output from given set of inputs. Hall and Winston (1959) came up with a definition of another closer term 'target efficiency' which indicates how much a particular firm has to increase its outputs in order to reach the best in particular measurement. According to Martin et al. (1960), farm managerial ability was considered to consist of ability to achieve favourable input-output results, ability to choose the optimum combinations, ability to determine and obtain control at the lowest cost and ability to market the output profitably.

Rao (1965) viewed efficiency in farming in a region as having wide connotation; the most efficient farm may be the one with best cropping pattern, as the one in which the farmer obtains maximum yield or one giving maximum income or highest return per worker. Radhakrishna (1969) defined efficient farmer as one who produces an unit of output at low cost. But the farmer who produces only small output per unit of input at a low cost cannot obviously be called as an efficient farmer. This leads to another concept of efficiency viz., maximum yield per unit of input. But just as minimum cost with minimum yield of output, say, per acre cannot be considered as efficiency, higher yield accompanied by high cost of production cannot also be termed as efficiency. Bessell (1970), while discussing about managerial efficiency of farmers, evolved a concept of operating efficiency of farmers which he viewed as farmer's performance in relation to other farmers.

Brittan and Hill (1975) stated that agricultural efficiency is taken to be at a maximum when the greatest possible product is achieved from a given stock of resources. Hebbar (1975) operationally defined managerial ability as those factors which contribute to efficient maintenance of the estate with consistently higher productivity. Similar definition was also given by Shanmugappa (1978).

Piparaiya et al. (1977) defined managerial effectiveness as the achievement of goals which contribute to the overall objective of the organisation through optimum utilisation of resources. Morse and Wagner (1978) defined an effective manager as one who is aware of the kinds of behaviour and who then chooses to engage himself appropriately to the environment, the management job, the situation and his own preferences. Brodie and Bennett (1979) and Langford (1979) attempted to explain the diversity over the meaning of managerial effectiveness and according to them, it does not lend itself easily to the often expected clear-cut and non-ambiguous definition as is found in sciences and hence, is open to the accusations that there are as many opinions as there are experts. This difficulty of definition is apparent if one glances through the literature which seems to be in danger of falling into circulatory trap. It is very easy to talk about what a manager does and then to say that an effective manager does those things effectively.

For Margerison (1981), managerial effectiveness implies the extent to which a manager behaves appropriately to the needs of the situation. Suresh (1983) stated that managerial efficiency implies the quality of inputs and capacity to do things relatively better than similar resources. According to Hales (1986), managerial effectiveness is the extent to which what managers actually do matches with what they are supposed to. Ghosh et al. (1988b) meant managerial effectiveness as the extent to which a manager achieves the productivity on output requirement of his or her position.

There is some degree of elusiveness in the concept of managerial efficiency also. Burgoyne (1976) concluded that the vast amount of research devoted to discovering the concept of managerial effectiveness had failed to produce anything generally acceptable whether by definition or for the purpose of measurement.

However, reviews on managerial efficiency did reveal that the overall content of efficiency resembled same as that of the one reflected in the reviews of efficiency. In the case of managerial efficiency, the term efficiency was associated with manager. According to Collin (1986), the word managerial is an adjective referring to managers. In the Oxford dictionary the word managerial means- of or pertaining to or characteristic of a manager especially of a manager of commercial enterprise.

A manager had to perform management functions and management in this study is conceptualised as a set of managerial activities undertaken to achieve the goal. Efficiency is conceived as performing right thing to achieve the pre-determined goals. Thus combining the two concepts, the derived concept of managerial efficiency refers to managers performing right managerial activities to achieve the determined goal. In the derived concept of two elements namely manager and goal/objective had to be clarified, for which literature reviewed and conclusion arrived are presented in the following pages.

### 2.5.1. Concept of farmers as managers

Webster's third new international dictionary gives the meaning of manager as - one that manages; a person who conducts, directs or supervises something. Heady and Jensen (1962) stated that every farmer is a manager, because he has to make decisions regarding the organisation and management of farm in the immediate future. According to Hedges (1963) manager means the person responsible for the entire management function in contrast to subordinate individual who carries out specified duties. The same view was held by Singh(1977). Johannsen et al.(1968) meant manager as one who organises work and directs its completion through the service of others. Barnard and Nix (1973) considered that in farming, farm is the firm and farmer is the manager and the entrepreneur. Buckett (1981) viewed that on many farms the owner of the business or the person who carries the ultimate risk, provides most of the management skills either as a tenant of his own land or some one else's. Chari and Nandapurkar (1987) were of the opinion that farmers as the manager of agriculture enterprise are expected to maximise the profits.

The view expressed by various management experts on manager indicated that manager is a person who executes, organises, and takes responsibility of management functions. Invariably there is an undivided opinion that farmer is a manager of the enterprise he undertakes as he does the job stated above. As a corollary to it, the study also considered all the farmers as managers.

### 2.5.2. Nature of objective of management

From the explanation provided in the previous parts, it is evident that managerial functions are performed to achieve the determined goal. It becomes imperative at this juncture to arrive at the nature of objective considered for the study.

Tandon (1958) stated that the main objective of farm management is to secure maximum continuous profit. Martin et al. (1960), Kahlon and Acharya (1967), Chowdhary (1968), Singh and Singh (1975), Singh (1977), Suresh (1983) and Chari and Nandpurkar (1987) supported the view that farmers should apply basic business principles to maximise the profit from the farm or crop.

Bora (1986) identified management attributes of farmer as related to profitability in farming. Kandker (1988) viewed that goal of good management is to maximise returns. Sagar et al.(1988) stated that successful management of a livestock holding is the corner stone for economic returns from it. Olsson (1988) opined that farmer who is able to combine fulfilment of his own goals with the fulfilment of basic economic goals can be considered successful.

However Papandreou (1952) and Williamson (1964) suggested that the manager like any other individual seeks to maximise utility and that a variety of goals including power, control, prestige and the desire for a quiet life may be included in his utility function. Sampath(1979) described that farming though a private enterprise of farmers suffers from diversified objectives. According to him, all studies had been carried out using the concept of average farmers' objective as profit making. He claimed that it is not the proper approach in the context of dualistic agriculture where capitalistic (profit-oriented) as well as subsistence farmers (home use-oriented) are in existence.

Harsh et al.(1981) pointed out that the definition of management recognise that farmers may have multiple or varying goals. A goal of profit maximisation is usually assumed for manager. However, farmers can have other goals such as business survival, growth, leisure, social acceptance or maintenance of one's health.

Eventhough there existed a difference of opinion as to the nature of management goals, there is a general acceptance by large majority that profitability becomes primary objective in the case of private enterprises especially of farming. In the light of changing scenario of Indian agriculture from subsistence to enterprising farming, maximising the profit could be a single broadly accepted goal. Furthermore, analysing the efficiency of farmers would not be meaningful if diversified goals are considered. This has been rightly pointed out by Suresh (1983) who observed that a criterion of evaluation is necessary to measure the efficiency is possible for intersectoral and intra-analysis only if the objectives are uniform. In view of the above reasons, the study conceived profit maximisation from the crop enterprise as the objective of management by the farmers.

The works in the area of farmers as managers and the objective of managing farm enterprise permit the conclusion that farmers can be considered as managers who had to perform managerial functions in order to realise maximum profit. These functions could be considered as right ones, if they contribute to profit maximisation. Farmers capable of undertaking such managerial functions can be said managerially efficient. Thus the concept of managerial efficiency derived for the study refers to farmers' capability or ability in performing managerial activities which would contribute to profit maximisation in a crop enterprise.

## 2.6. RELATIONSHIP OF SOCIO-PSYCHOLOGICAL AND SITUATIONAL FACTORS WITH MANAGERIAL EFFICIENCY OF FARMERS

In this part, relationship of various factors with management aspect of farmers is presented. It may be noted here that studies directly on the relationship of managerial efficiency were scanty and hence, factors as related to adoption behaviour of farmers were considered. It is taken as an alternative measure since adoption of certain practices formed part of managerial efficiency measurement and most of the studies had indicated a strong positive correlation between management factor of farmers and their adoption behaviour.

Shanmugappa (1978), Thimmappa (1981) and Sainath (1982) found a positive relationship between adoption behaviour and farmers' managerial ability. Studies of Bhaskaran (1979), Rannorey (1979), Reddy (1979), Kamarudheen (1981), Kappattanavar (1983), Reddy (1983b) Renukaradhya (1983), Sreekumar (1985) and Syamala (1988) had shown a significant association between management orientation and adoption behaviour of farmer.

According to Rogers (1983), an individual's behaviour with regard to innovation-diffusion may be explained by two types of variables a) the individuals's personality, and b) the nature of his social system. The former one is socio-psychological and the latter one is situational in nature. Hence, these two groups of factors were considered for the study.

Although many socio-psychological and situational factors have been reported to be related with either management orientation or adoption behaviour, the following factors were chosen for detailed review since these factors had been frequently reported to be discriminating among farmers of various enterprises.

### 2.6.1 Socio-psychological factors

#### 2.6.1.1. Age

Age is directly related to the farmer's exposure and experience in farming and thus helping them in taking efficient decisions and execution.

Reddy (1983a), Badachickar (1985) and Sreekumar (1985) found an association between age and management orientation of farmers. But the study of Saraf (1983) showed no relationship. Khan *et al.* (1989) found that age had a significant effect on dairy management of farmers. Walker *et al.* (1983) also found a positive relationship between age and returns to management.

Studies showing the nature of relationship of age with adoption behaviour of farmers are enumerated below.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A. Cassava crop** | | |
| Ravi | (1979) | No relationship |
| Sivaramakrishnan | (1981) | No relationship |
| Ogunfiditimi | (1981) | No relationship |
| Anantharaman *et al.* | (1985) | Positive relationship |
| Olowu *et al.* | (1988) | No relationship |

B. Other farm enterprises

| | | |
|---|---|---|
| Geethakutty | (1982) | Positive relationship |
| Yadav and Jain | (1984) | Positive relationship |
| Raju | (1984) | Negative relationship |
| Godhandapani | (1985) | Negative relationship |
| Wilson and Chaturvedi | (1985) | Negative relationship |
| Lalitha | (1986) | No relationship |
| Kumar | (1986) | No relationship |
| Kumari | (1989) | No relationship |

2.6.1.2. Education

Formal education develops mental power and character of individuals. In the present day world of dynamic information, acquiring and processing it for application may demand formal educational background of farmers.

Beal and Sibley (1967) had pointed out that individual's ability to read and write and the amount of formal education would effect the manner in which he gathers the data and relates himself to this evironment. Reddy (1983a) found that education was positively associated with management orientation while Sreekumar (1985) reported a negative relation ship. Walker *et al.* (1983) had come with the finding that education was positively related to better managers. Jamison and Moock (1984) found a positive relationship with efficiency of farmers. Kalirajan and Shand (1985) stated that education was not a significant factor to performance of farmers. Reddy and Reddy(1985) concluded that education had significant relationship with small scale entrepreneurs' success level. The study of Bora (1989) showed a positive relationship with returns to management.

Studies showing the nature of relationship between education and adoption behaviour are enumerated below.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A. Cassava crop** | | |
| Ravi | (1979) | No relationship |
| Ogunfiditimi | (1981) | Positive relationship |
| Sivaramakrishnan | (1981) | No relationship |
| Olowu *et al.* | (1988) | No relationship |
| **B. Other farm enterprises** | | |
| Thimmappa | (1981) | No relationship |
| Sainath | (1982) | No relationship |
| Saraf | (1983) | No relationship |
| Sreekumar | (1985) | Positive relationship |
| Lalitha | (1986) | No relationship |
| Reddy | (1987) | Positive relationship |
| Pandurangaiah | (1987) | Positive relationship |
| Reddy and Reddy | (1988) | Positive relationship |

#### 2.6.1.3. Social participation

It refers to the nature of involvement of farmers in social organisations which may help farmers to have contact with fellow-farmers and other connected with farming.

While Reddy (1983a) reported that there was a significant association between management orientation and social participation, findings of Saraf (1983) and Sreekumar (1985) revealed no relationship.

The studies showing the nature of relationship with adoption behaviour are enumerated below.

| **Author and Year** | | **Nature of relationship** |
|---|---|---|
| **Other farm enterprises** | | |
| Kittur | (1976) | Negative relationship |
| Pamadi | (1980) | Negative relationship |
| Thimmappa | (1981) | Positive relationship |
| Sainath | (1982) | Positive relationship |
| Raju | (1984) | Negative relationship |
| Lalitha | (1986) | Negative relationship |
| Pandurangaiah | (1987) | Positive relationship |
| Kumari | (1989) | Negative relationship |

#### 2.6.1.4. Closeness with agricultural support system

Development of farming and skills involved in the management of crops rely much on the extent to which the farmer makes contact with developmental personnel of various agencies and organisations related to agriculture. There were only few studies directly on this variable. Hence, studies showing association of farmers' extension agency contact are also presented.

Reddy (1983a), Renukaradhya (1983) and Sreekumar (1985) found a positive relationship between management orientation and extension agency contact. Bora(1989) found a positive relationship between closeness with agricultural support system and returns to management. Khan *et al.* (1989) revealed that extension agency had significant effect on dairy management. Studies showing the nature of relationship between extension agency contact and adoption behaviour are presented below.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A. Cassava crop** | | |
| Ravi | (1979) | Positive relationship |
| Ogunfiditimi | (1981) | Positive relationship |
| Olowu *et al.* | (1988) | Positive relationship |
| **B. Other farm enterprises** | | |
| Reddy | (1983a) | Positive relationship |
| Reddy and Reddy | (1985) | Positive relationship |
| Suresh | (1987) | Positive relationship |

### 2.6.1.5. Mass media participation

The current mass media boom has made possible for the farmer to have both accessibility to various media as well as timely information. Nowadays agriculture and allied aspects do enjoy considerable coverage in mass media which may ultimately influence the managerial behaviour of farmers.

Reddy (1983a) found that there was significant association between management orientation and mass media participation. The study by Bora(1989) showed a positive relationship between utilisation of mass media and returns to management.

Studies showing the nature of relationship with adoption behaviour is presented below.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A. Cassava crop** | | |
| Ravi | (1979) | No relationship |
| Anantharaman *et al.* | (1985) | Positive relationship |
| **B. Other farm enterprises** | | |
| Nanjayyan | (1985) | No relationship |
| Wilson and Chaturvedi | (1985) | Positive relationship |
| Lalitha | (1986) | No relationship |
| Suresh | (1987) | Positive relationship |

### 2.6.1.6. Orientation towards competition

It is the orientation of individuals to place oneself in a competitive situation in relation to others for projecting one's excellance in respective fields. This is considered to be a basic motivating force which may lead farmers to attain excellance in comparison to other farmers.

Badachickar (1985) stated that competition orientation of farmers had a positive relationship with management orientation. Bora (1989) revealed a positive relationship between orientation towards competition and returns to management.

As far as the relationship of this variable with adoption behaviour is concerned Singh (1989) reported a positive relationship.

2.6.1.7. Coordination in purchase of inputs

Present day agriculture which aims at profit making needs not only technical knowledge but also an array of physical inputs to meet the goal. Since most of the inputs are produced externally, timely and adequate purchase of inputs is essential for better management.

Bora (1989) found that farmer's coordination in purchase of input was directly correlated with returns to management.

2.6.1.8. Extension participation

Many extension programmes are organised by development agencies and input dealers for dissemination of information as well as product promotion. Farmers stand to gain a lot of information by participation in such activities which would help them in implementing profitable technologies in their farm.

Reddy (1983a) found that extension participation was associated with management orientation.

The relationship with adoption behaviour is presented below.

| Author and Year | | Nature of relationship |
|---|---|---|
| **Other farm enterprises** | | |
| Baadgoenkar | (1983) | No relationship |
| Nataraju and Chennegowda | (1986) | Positive relationship |
| Pandurangaiah | (1987) | Positive relationship |

| | | |
|---|---|---|
| Suresh | (1987) | Positive relationship |
| Reddy and Reddy | (1988) | No relationship |

2.6.1.9. Innovation-proneness

It is the interest and desire of persons to seek changes in techniques and introduce such changes in their avocations. Innovative farmers are more inclined to try new methods and ideas in the endeavour of managing the enterprise.

Reddy (1983a) and Badachickar (1985) revealed that innovation-proneness was positively related with management orientation of farmers. Chari and Nandapurkar (1987) indicated a positive relationship between this variable and managerial ability of farmers. Bora (1989) found a positive relationship with returns to management while Sagar (1989) found a significant contribution of this variable to farmer's productivity.

The nature of relationship of this variable with adoption behaviour is listed below.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A. Cassava** | | |
| Ravi | (1979) | Positive relationship |
| **B. Other farm enterprises** | | |
| Philip | (1984) | No relationship |
| Suresh | (1987) | Positive relationship |
| Kumari | (1989) | No relationship |
| Singh | (1989) | Positive relationship |

Badachickar (1985) indicated that economic motivation of farmers was positively related to management orientation. The nature of relationship with adoption behaviour is presented below.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A. Cassava crop** | | |
| Sivaramakrishnan | (1981) | Positive relationship |
| **B. Other farm enterprises** | | |
| Tyagi and Sohal | (1984) | Positive relationship |
| Singh and Ray | (1985) | Positive relationship |
| Haque | (1989) | Positive relationship |
| Kumari | (1989) | No relationship |

### 2.6.1.12. Level of aspiration

Aspiration is the desired status of individuals in present and future in various spheres and it is directly concerned with one's orientation towards a goal. Farmers manage their various enterprises suitably to satisfy their level of aspiration.

Sagar (1989) found a positive relationship between level of aspiration and productivity. The nature of relationship with adotpion behaviour of farmers is shown below.

| Author and Year | | Nature of relationship |
|---|---|---|
| **Other farm enterprises** | | |
| Rajendran | (1978) | Positive relationship |
| Sushama *et al.* | (1981) | Positive relationship |
| Reddy and Reddy | (1988) | Positive relationship |

### 2.6.1.13. Credit-orientation

Credit institutions play a crucial role in making available the required capital essential for the management of crop enterprise. Farmer's degree of orientation to avail credit may influence their style of managing the crop.

Kapattanavar (1983) found that there existed a positive relationship between management orientation and credit-orientation. Studies showing relationship of adoption behaviour with credit facilities utilisation are as follows.

| Author and Year | | Nature of relationship |
|---|---|---|
| **Other farm enterprises** | | |
| Bhaskaran | (1978) | No relationship |
| Pillai | (1978) | No relationship |
| Perumal and Mariappan | (1982) | Positive relationship |
| Al-Mogel | (1985) | Positive relationship |

### 2.6.1.14. Market perception

Trustworthy markets easily accessible to farmers can contribute to both the transition from traditional agriculture as well as functioning of modern agrictulture. The farmers perception of the existence of markets for the produce and his confidence in remunerative prices difinitely tell upon his efficiency in management.

The relationship of market perception of farmers with adoption behaviour is reported below.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A. Cassava crop** | | |
| Ravi | (1979) | Positive relationship |
| Sivaramakrishnan | (1981) | Positive relationship |
| **B. Other farm enterprises** | | |
| Nair | (1969) | Positive relationship |
| Naidu | (1978) | No relationship |

### 2.6.1.15. Infrastructural facilities

Business has internal and external managerial functions and it is the external managerial roles that assume crucial importance particularly in relation to procurement of finance, raw materials and marketing of produce (Basu and Moulik, 1979). infrastructural facilities responsible for providing agricultural inputs to farmers affect very much the functioning of farmers when they undertake crop cultivation. Studies showing the relationship of infrastructural facilities and adoption behaviour of farmers are presented below.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A Cassava crop** | | |
| Sivaramakrishnan | (1981) | Positive relationship |
| **B. Other farm enterprises** | | |
| Palaniswamy | (1984) | Positive relationship |
| Wilson and Chaturvedi | (1985) | Positive relationship |
| Kumari | (1989) | Positive relationship |

### 2.6.1.16. Attitude towards scientific management in crop enterprise

Thurstone (1946) defined attitude as the degree of positive or negative affect associated with some psychological objects. For managing a crop enterprise efficiently, farmers should have favourable mental orientation towards scientific management principles involved in a crop enterprise. As there was no study directly dealt on this variable, farmer's attitude towards various aspects of farming were reviewed. Kamarudheen (1981) observed a positive relationship between management orientation and attitude towards demonstrated cultivation practices.

Studies on the relationship of attitude of farmers and adoption behaviour are as follows.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A. Cassava crop** | | |
| Sivaramakrishnan | (1981) | Positive relationship |
| **B. Other farm enterprises** | | |
| Surendran | (1982) | Positive relationship |
| Balan | (1987) | Positive relationship |
| Singh | (1989) | Positive relationship |

### 2.6.1.17. Knowledge on scientific management in crop enterprise

English and English (1961) defined knowledge as a body of understood information possessed by an individual or by a culture. Knowledge is one of the important components of behaviour and hence, it would play a vital role in performing the job. A farmer equiped with better information on management principles may contribute to his efficiency in management.

Abraham (1980) stated that effective managers were found to have more technical knowledge. Kamarudheen (1981) found that management orientation of farmers was positively related to knowledge level of farmers. Managerial ability of farmers was found to be positively related to knowledge about farming (Chari and Nandapurkar, 1987). Bora (1989) and Sagar (1989) indicated that farmer's knowledge on cultivation was positively related to returns to management and productivity, respectively.

Studies on the relationship between knowledge of farmers on various agricultural practices and adoption are as here under.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A. Cassava crop** | | |
| Sivaramakrishnan | (1981) | Positive relationship |
| Ananthraman *et al.* | (1985) | Positive relationship |
| **B. Other farm enterprises** | | |
| Sethy *et al.* | (1984) | Positive relationship |
| Haque | (1989) | Positive relationship |
| Singh | (1989) | Positive relationship |

## 2.6.2. Situational factors

### 2.6.2.1. Cultivated holding

Cultivated holding has a direct bearing on farmer's economic conditions which speaks on farmer's capacity of input utilisation as well as managerial styles thus effecting the efficiency.

Rasthora (1974) stated that farm business and disposable income did not exhibit positive relationship with size of holding. Walker *et al.* (1983) found a negative association with returns to management whereas Bora (1989) found a positive relationship. While Reddy (1983a) found a positive relationship between farm size and management orientation, Saraf (1983) and Sreekumar (1985) found no relationship. Khan *et al.* (1989) found a significant effect of farm size on dairy management.

| Author and Year | | Nature of relationship |
|---|---|---|
| **A Cassava crop** | | |
| Ravi | (1979) | No relationship |
| Ogunfiditimi | (1981) | Positive relationship |
| Anantharaman *et al.* | (1985) | Positive relationship |
| Olowu *et al.* | (1988) | Positive relationship |
| **B. Other farm enterprises** | | |
| Naidu | (1978) | No relationship |
| Reddy | (1983a) | Positive relationship |
| Saraf | (1983) | No relationship |

| | | |
|---|---|---|
| Raju | (1984) | Positive relationship |
| Reddy and Reddy | (1988) | Positive relationship |
| Kumari | (1989) | No relationship |

2.6.2.2 <u>Area under cassava crop</u>

Like cultivated holding, area allocated for particular crop would have definite influence on managerial decisions on various aspects of crop cultivation.

Sivaramakrishnan (1981) found a positive relationship between adoption and area under cassava. Anantharaman et al. (1985) reported that area under cassava had a substantial indirect effect on adoption.

2.6.2.3. <u>Tenancy status</u>

Tenancy status is the proportion of land under tenancy to total cultivated holding of a farmer, Tenancy status may speak of farmer's aptitude to cultivation and profit making.

Bora (1989) found that there was a positive correlation of status of land ownership and returns to management. Similar nature of relationship was observed by Sagar (1989) between land ownership status and produtivity. Singh (1989) found no association between status of land ownership and adoption of fertilizers.

2.6.2.3. <u>Fragmentation</u>

Fragmentation is the extent to which one's cultivated holding is situated in discontinuous pattern. It is hypothesised that the intensity of fragmentation would interfere with managerial efficiency of farmers.

Binns (1966) said that almost all improved changes in agricultural method and organisations will be greatly impeded by irrational fragmentation. Tripathy (1977) and Pillai (1983) found that fragmentation was associated with technological gap among farmers with regard to rice and soil conservation technology, respectively.

2.6.2.5. **Irrigation potential**

Irrigation is an important asset contributing to productivity and income generation. Availability of irrigation source may force the farmers to take dynamic managerial decisions ultimately affecting the efficiency of farmers.

Bora (1989) reported that irrigation potential was positively related with the factor returns to management and Sagar (1989) found positive relation between irrigation potential and productivity.

The nature of relationship of this variable with adoption behaviour is presented as follows.

| Author and Year | | Nature of relationship |
|---|---|---|
| **Other farm enterprises** | | |
| Perumal and Mariappan | (1982) | Positive relationship |
| Shivaraja | (1986) | Positive relationship |
| Singh | (1989) | Positive relationship |

2.6.2.6. **Family size**

It is the number of dependent members an individual has. Family size not only necessiates augmenting income but also provides man-power for farm operations.

Tyagi and Sohal (1984) found that family size did not have any relationship with the adoption of dairy practices. But the findings of Haque (1989) and Sagar (1989) showed that family size had a significant contribution to adoption of fishery technology and farmer's produtivity, respectively.

The twenty three variables mentioned above exhibited different types of relationship with management factor or adoption behaviour. There was no study directly on the relationship between these factors and managerial efficiency of farmers. Hence, it was decided to include initially all these variables in the study.

## 2.7. MANAGERIAL CONSTRAINTS

Pandya and Trivedi (1988) defined constraints as those items of difficulties or problems faced by individuals in adoption of technology. Zinyama (1988) referred any problem or limitations as constraints.

Lanjewar and Kalantri (1985) had treated any problems faced by farmers in their farming activities of production, credit and marketing as managerial problems. Hence, problems in farming activities of farmers with regard to various crops were reviewed and are presented in this section.

Johnson and Haver (1953) stated five types of problems faced by farm managers: technical price, changes in technology, political and economic and social and personality problems. According to Castle *et al.* (1972) lack of accesibility to information, lack of knowledge on price trend, labour, machinery availability and difficulty in acquisition of resources are the problems of farm managers.

Greg and Omprakash (1974) felt that heavy investment needs, non-compatibility with consumer needs and complexity of modern technology are the most important barriers coming in the way of production technology. Pal (1975) reported that major constraints to paddy yield were related to difficulties in obtaining seeds, chemicals, fertilizer, credit, inadequate irrigation water and attack of pests and diseases. Ravi (1979) expressed that lack of industrial facilities, credit facilities and inadequate supply of fertilizers as the major problems of cassava farmers. Sivaramakrishnan (1981) reported poor quality of high yielding variety tubers, low market price and lack of adequate information were the constraints experienced by the farmers.

Lanjewar and Kalantri (1985) found that non-availability of high yielding seeds, lack of knowledge in loan procedure, labour scarcity, low price of produce and delayed payment for the produce were the managerial problems. Anantharaman et al. (1986) reported that non-availability of seed materials, lack of capital, lack of awareness and lack of knowledge as the major barriers to adoption of improved cultivation of cassava. Singh and Sharma (1986) reported high cost of inputs, non-availability of good seeds, lack of finance and irrigation as constraints.

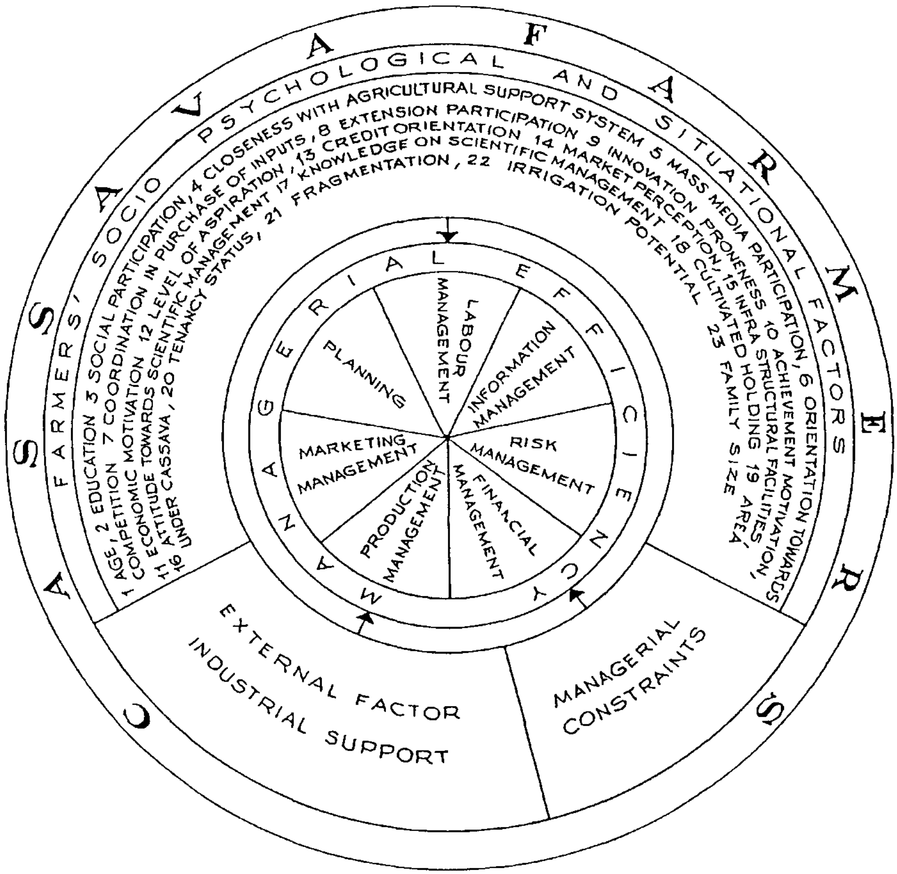
Ramanathan et al. (1987) found that lab to land programme farmers had indicated economic and marketing constraints comprising high cost of cultivation, lack of marketing system, less price of tubers of high yielding varieties of cassava as the most important ones while non-programme farmers pointed out infrastructural constraints consisting of non-availability of planting materials, lack of adequate knowledge and lack of special development programmes as important constraints in the adoption of improved cassava technology.

Prakash (1989) found that lack of cooperation among farmers, low adoption of high yielding varieties, lack of irrigation and fragmentation as the important constraints for rice production. Sagar (1989) revealed that lack of finance, non-availability of inputs, inadequate irrigation and high cost of inputs were the constraints hindering farmers' productivity. Sripal and Ramachandran (1990) found out that lack of knowledge was the most common and important constraint in the adoption of dry land technology for cotton by the farmers.

## 2.8. THEORETICAL MODEL OF THE STUDY

The theoretical model of the study, developed based on the objectives, theoretical orientation presented and assumptions of the study is diagrammatically represented in Fig. 1. The model consists of four concentric circles showing both independent and dependent variables. The innermost circle, partitioned into seven components subsumes the managerial efficiency components considered for the study based on theoretical orientation.The second circle represents the dependent variable 'managerial efficiency'. The third circle is partitioned into three segments representing the 23 independent variables encompassing the socio-psychological and situational factors of farmers,

FIG 1 THEORETICAL MODEL OF THE STUDY



managerial constraints and the external factors of industrial support enjoyed by the farmers. The three segments are connected to the managerial efficiency to indicate that managerial efficiency would be influenced by them. The outermost circle represents cassava farmers indicating that the various aspects shown in the inner circles are with reference to cassava farmers.

# METHODOLOGY

# 3. METHODOLOGY

The methodology followed in the study is presented under the following heads.

3.1. Locale of the study

3.2. Selection of the respondents

3.3. Selection of the variables for the study

3.4. Operationalisation and measurement of the variables

3.5. Procedure employed in data collection

3.6. Statistical tools used in the study

3.7. Hypotheses set for the study

## 3.1. LOCALE OF THE STUDY

### 3.1.1. Selection of the study area

The study was undertaken in four districts, two each from Kerala and Tamil Nadu which were selected purposively owing to the reason that these two states account for more than 90 per cent of the area and production of cassava in India (Subramanian, 1986; George, 1988). The selection procedure of districts in these states was based on area and level of productivity of cassava. Taking into account the area under cassava cultivation for the past two years, the districts were arranged in descending order separately for the two states. Fifty per cent of the districts having larger area under cassava were listed out. These districts were categorised as high and low productivity districts taking into consideration the average productivity of cassava for two years in each state. Productivity was considered for selection of the districts so as to give representation for various productivity levels and to analyse managerial efficiency in the background of productivity. From these two categories of high and low productivity districts in each state, one district was selected from each category at random.

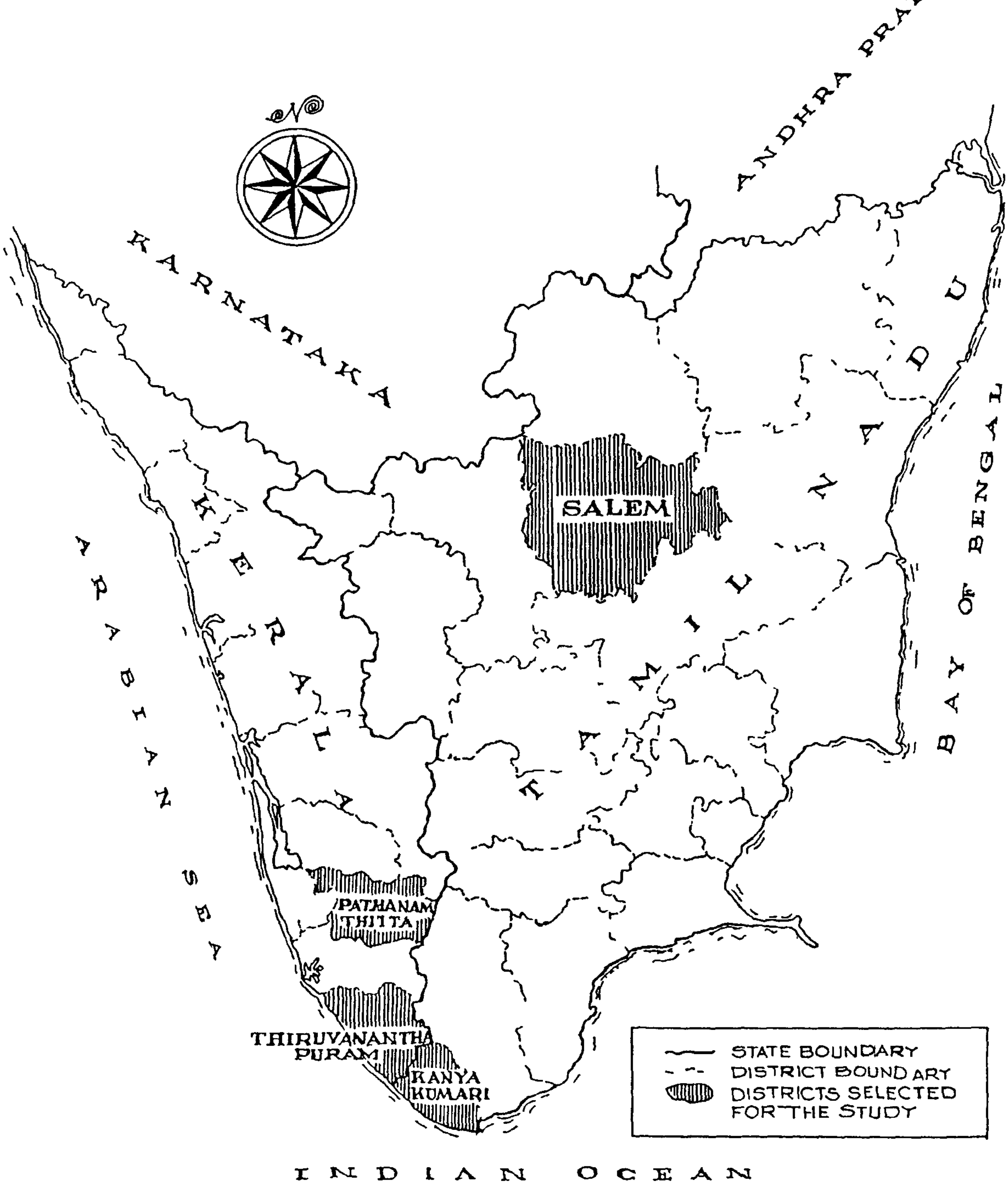
The selected districts were Thiruvananthapuram (low productivity) and Pathanamthitta (high productivity) in Kerala State and Kanyakumari (low productivity) and Salem (high productivity) in Tamil Nadu. Subramanian (1986) and George (1988) reported that while cassava is cultivated mainly as a food crop in Kerala and in Kanyakumari district of Tamil Nadu, it is grown to meet the industrial needs in Salem district. Moreover 70 percent of cassava-based industries in India are situated in Salem district whereas the entire Kerala state accounts only seven per cent (Central Food Technological Research Institute 1980). Hence, Salem district which was selected as high productivity district was also considered as an industrial district as the cassava production in the district is very well supported by a network of cassava-based industries. The other three districts were considered as non-industrial districts for the purpose of analysis.

### 3.1.2. Brief description about study area

#### 3.1.2.1. Thiruvananthapuram district

Cassava occupies an important position in this district which accounts for one-fourth of the area and production of cassava in Kerala state, with an average productivity of 17 tonnes per hectare. This is the southern most district in Kerala surrounded by Kollam district

FIG 2 MAP SHOWING THE DISTRICTS SELECTED FOR THE STUDY



in the north, Arabian sea in the west, Tirunelveli district of Tamil Nadu in the east and Kanyakumari district of Tamil Nadu in south. It has four taluks, 12 blocks and is divided into three agricultural sub-divisions. The average rainfall in the district is 2000 mm with seven per cent net sown area under irrigation. The district is traversed by the Neyyar, Karamana and Vamanapuram rivers. Forests occupy nearly 22 per cent of the total geographical area. The important soil types are forest loams, red loams, laterite and coastal alluvium.

The major crops grown in the district are paddy, coconut, rubber and cassava. The main planting season of cassava is April and is cultivated mostly in uplands. High yielding varieties of cassava occupy only five per cent of the area (Ramanathan et al., 1989). The fertilizer consumption is 43 kg per hectare. Eventhough few cassava-based factories were registered, only two are reported to be in operation.

### 3.1.2.2. Pathanamthitta district

It is one of the important districts as far as cassava cultivation is concerned in Kerala. The district has eight per cent of cassava area and constitutes ten per cent to the production in the state with an average productivity of 23 tonnes per hectare. It is bordered by Kollam district in the south, Alapuzha in the west, Idukki and Kottayam districts in the north and Tirunelveli district of Tamil Nadu in the east. It is divided into five taluks, with nine blocks and has two agricultural sub-divisions. It enjoys an annual rainfall of 3000 mm. The major rivers flowing through the district are Pamba, ... and Achencoil. Only three per cent of area is under irrigation and 57 per cent under forests. Like most other districts in Kerala, it consists of natural divisions of low, middle and high land with riverine, alluvium, laterite and forest soil as major types of soil.

The principal crops cultivated in the district are paddy, coconut, rubber and cassava. The main planting season of cassava is March and April and it is cultivated in uplands and low lands mainly as rainfed crops with supplementary pot irrigation. Nearly 29 per cent of cassava area is reported to be put under high yielding varieties of cassava viz., H. 226 (Ramanathan et al., 1989). The fertilizer consumption per unit of gross cropped area is 100 kg per hectare. The district is not much industrially developed and the district has no cassava-based industry.

### 3.1.2.3. Kanyakumari district

It is the southern most district in Tamil Nadu having the second largest area under cassava accounting for 18 per cent of area and 12 per cent of production in Tamil Nadu with average productivity of 18 tonnes per hectare. It is surrounded in the north and north-east by Tirunelveli district, north-west by the Thiruvananthapuram district of Kerala, west by the Arabian sea and in the south by the Indian ocean. It has four taluks, nine blocks and is divided into four agricultural divisions. The average rainfall is 1400 mm and 37 per cent of area under cultivation is irrigated. The important rivers flowing in the district are Tambaraparani, Kothayar and Palayar. Nearly 30 per cent of area is occupied by forests. The major soil types in the district are red loam, laterite and coastal alluvium.

Paddy, cassava, coconut and rubber are the principal crops grown in the district. Cassava is planted in April and 13 per cent of area is cornered by high yielding varieties of cassava namely, H.1687 and H.165 (Ramanathan et al., 1989). The fertilizer comsumption per unit area of gross cropped area is 43 kg per hectare. Nearly eight cassava-based factories are in operation in the district.

3.1.2.4. Salem district

This is the most important cassava producing district in Tamil Nadu accounting for about 45 per cent of area and 50 per cent of production with productivity more than 30 tonnes per hectare. It is bound by Dharmapuri district in the north, Trichirapalli district in the south, Periyar district in the west and South Arcot district in the east. It has nine taluks with 35 blocks and is divided into eight agricultural divisions. The rainfall in this district is comparatively lower than Kerala with an annual precipitation of 900 mm only. The major rivers in the district are Cauvery, Vashistanadhi and Sarabanganadhi. Nearly 19 per cent of area is covered by forests and 30 per cent of cropped area is irrigated. Red and black soils are the major soil types in the district.

The major crops are paddy, sorghum, sugarcane, groundnut, cotton, coconut and cassava. The main planting season of cassava is January and February. Cassava is cultivated under limited irrigation conditions. Nearly 70 per cent of cassava area is under cassava hybrids viz., H.226 and H.165 (Ramanathan et al., 1990). The fertilizer consumption is 90 kg per hectare. This district is benefitted by a fairly good network of agro-based industries and is enjoying a special status in the manufacture of processed cassava products namely, starch and sago. Nearly 700 small scale cassava-based industries are operating in this district accounting for 70 per cent of production of starch and sago in India.

## 3.2. SELECTION OF THE RESPONDENTS

The farmer-respondents from the study area were selected following stratified random sampling procedure. The selection procedure adopted for the study is as follows.

### 3.2.1. Selection of agricultural sub-division/agricultural divisions, blocks and villages

Two agricultural sub-divisions from each district were selected randomly (In Tamil Nadu agricultural division is equivalent to the agricultural sub-division in Kerala). Categorisation of agricultural sub-division into low and high productivity as in the case of district was not resorted to owing to the reason that not much difference in the productivity was observed among the divisions in a district.

From each agricultural sub-division two blocks were randomly selected so as to give wider representation in a sub-division area. In consultation with agricultural department officials at block level, a list of villages having large area under cassava as well as large number of farmers who sell cassava was prepared and one village was selected at random in each block.

Table 1. Selected locations and number of farmers selected

| State | District | Sub-division | Block | Village | No.of farmers | No.per district |
|---|---|---|---|---|---|---|
| 1. Kerala | 1. Thiruva-nanthapuram | 1. Neyyattinkara | 1. Nemom | Maranalloor | 15 | |
| | | | 2. Perunkadavila | Kollayil | 15 | |
| | | 2. Nedumangad | 1. Vamanapuram | Koliacode | 15 | |
| | | | 2. Vellanad | Kulathummal | 15 | 60 |
| | 2. Pathanam-thitta | 1. Adoor | 1. Paracode | Kadampanad | 15 | |
| | | | 2. Panthalam | Panthalam Thekkekara | 15 | |
| | | 2. Thiruvalla | 1. Koipuram | Koipuram | 15 | |
| | | | 2. Mallapalli | Kunnamthanam | 15 | 60 |
| 2. Tamil Nadu | 1. Kanyakumari | 1. Kuzhithurai | 1. Melpuram | Palukal | 15 | |
| | | | 2. Munchirai | Medugummal | 15 | |
| | | 2. Thuckalai | 1. Thiruvattar | Athur | 15 | |
| | | | 2. Thuckalai | Kappiara | 15 | 60 |
| | 2. Salem | 1. Salem | 1. Panamarathupatti | Gajjalnaickenpatti | 15 | |
| | | | 2. Ayodhyapatnam | Koothattupatti | 15 | |
| | | 2. Athur | 1. Athur | Selliampalayam | 15 | |
| | | | 2. Bethanaickenpalayam | Veeragoundanoor | 15 | 60 |

### 3.2.2. Selection of the farmer-respondents

The study was concerned with managerial efficiency of cassava farmers and hence the following criteria were used to define the population for the study.

a. Respondents should be the practising cassava farmers.

b. They should have cultivated cassava for atleast three consecutive years prior to data collection.

c. They should sell atleast half of the proportion of cassava tubers produced either as raw or in the processed form. This criteria has been fixed in view of the concept on managerial efficiency developed for the study and to make the farmer-respondents a homogenous group in terms of the objective of the crop enterprise.

d. They should have atleast 0.2 hectare of land apportioned under cassava in the past three years. The stipulation of minimum area 0.2 hectare was based on the study of Lakshmi (1984) which revealed that farmers cultivating cassava in atleast 0.2 hectare of land, were found to have a marketed surplus of over 50 per cent of their production.

Keeping these four criteria, list of farmers in each selected village was prepared in consultation with field level extension workers. Fifteen farmers were selected from each village randomly. Thus a total sample of 240 farmers were selected for the study at the rate of 120 farmers from each state and 60 from each district selected. The selected agricultural sub-division, blocks, villages and number of respondents are presented in Table 1.

## 3.3. SELECTION OF THE VARIABLES FOR THE STUDY

### 3.3.1. Criterion variable

It refers to the variable selected for the purpose of a) testing the validity of items included in the managerial efficiency scale, and b) finding out the relative importance of various components in the managerial efficiency scale. To meet the above purpose and keeping in view the managerial efficiency concept, profit accrued from the crop enterprise was selected as criterion variable.

### 3.3.2. Dependent variable

The objective of the study necessiated managerial efficiency of the farmers as the dependent variable for the study.

### 3.3.3. Independent variables

The independent variable in the study refers to the socio-psychological and situational factors of farmers. The independent variables for the present study were selected following the procedure outlined here under.

Based on the review of literature a list of 23 variables that could possibly establish a relationship with managerial efficiency as contemplated in the theoretical orientation chapter was prepared. The list of variables was sent to 50 judges comprising Professors, Associate Professors of Tamil Nadu and Kerala Agricultural Universities and Scientists of the Indian Council of Agricultural Research Institutes with social science background. The judges were asked to examine the list for its sufficiency of the variables for the study and to include additional variables, if they found necessary (Appendix I). They were requested to evaluate the variables critically and indicate the relevancy of each variable on a five-point continuum ranging from 'most relevant', 'more relevant', 'relevant'.'less relevant' and 'least relevant' with the weightages of 5,4,3,2 and 1, respectively. Out of the 50 judges, 30 responded.

The independent variables were selected based on two criteria namely, variable's mean relevancy score and coefficient of variation. Mean relevancy score was found by summing up the weightages obtained for a variable and dividing it by the number of judges responded. Likewise, coefficient of variation was arrived at by the standard formula of dividing standard deviation of a variable by its mean score and multiplying by 100. Then, the average mean score and average coefficient of variation were worked out by dividing with the number of variables included in the judges rating. The variables with their mean relevancy score and coefficient of variation are presented in Appendix II.

The variables having mean relevancy score more than average mean relevancy score and coefficient of variation less than the average coefficient of variation were selected for the study. The former one indicated variable's higher degree of relevancy and the latter revealed the higher degree of agreement among the judges on the relevancy of the variables. Finally, 15 independent variables:twelve socio-psychological namely, education, social participation, extension participation, mass media participation, closeness with agricultural support system, infrastructural facilities, market perception, achievement motivation, economic motivation, orientation towards competition, attitude towards scientific management in crop enterprise, knowledge on scientific management in crop enterprises and three situational factors namely, cultivated holding, area under cassava and irrigation potential were selected.

## 3.4. OPERATIONALISATION AND MEASUREMENT OF THE VARIABLES

### 3.4.1. Criterion variable

Criterion variable selected was the profit accrued by the farmers from the cultivation of a crop and was measured in terms of per hectare profit based on the lines of Kahlon and Singh (1980) with slight modification to meet the purpose of the study as shown below.

Profit = Gross income - Operational cost

where gross income was calculated by multiplying the total quantity of produce and bye produce with the respective prices at which farmers sold.

Operational cost was assessed by adding a) cost of input purchased b) values of owned input used c) hire charges of implements and labour d) imputed cost of family and implements used and e) interest on working capital.

The profit was calculated separately for two crops, cassava and paddy which were considered for selection of items for scale construction of managerial efficiency. Profit was assumed to be the outcome of managerial efficiency. But, apart from management factor, it is natural that external factors like climatic, edaphic and other infrastructural facilities prevailing in a locality may affect the profit. Since, the study was conducted in different localities, it became imperative to neutralise the effect of these external factors on profit. This was achieved by converting the profit per hectare of farmers in a district to normalised standard scores using the procedure suggested by Guilford and Fruchter (1978), considering each district as distinct locality.

### 3.4.2. Dependent variable - Managerial efficiency

It was measured with a help of a scale developed for the study. In this section, a review on various aspects of measurement of managerial efficiency is attempted so as to provide a justifiable footing to the measurement procedure of managerial efficiency adopted for this study.

Measurement of managerial efficiency could be referred to as the 'Achilles heel' of managerial development. It is probably a major key to managing itself. However, managerial efficiency does not lend itself easily to objective and appropriate measurement. Although, today, it is universally recognised that farmers' managerial abilities and the environment conditions under which they operate are important to the levels of production which is possible for them to achieve from the inputs they use, it is still not possible to measure satisfactorily these influences and incorporate them into farm management decision models and other planning devices (Bessell, 1970).

Harinath (1971) had pointed out that measurement of management input through an index has become a major problem to be solved. Singh and Singh (1975) stated that the management input, inspite of its importance and substantial contribution, has been over looked due to lack of scientific criterion for its quantitative measurement.

However, theorists and practitioners have arrived at various approaches to measure management input which are epitomised here under.

### 3.4.2.1. Approaches to measurement of managerial efficiency

The possible approaches for measuring managerial efficiency/ effectiveness proposed by various authors are presented here. Campbell *et al.*(1970) proposed a person - process-product model for measurement of managerial effectiveness in which they referred, person as the manager's characteristic traits and abilities, product as the results such as profit maximisation and productivity and process as manager's on-the-job behaviour and activities.

Banerjee (1981) has located three approaches that could be used for assessment of managers. They are: a) goal or objective approach, b) personal qualities or trait approach, and c) the managerial functional approach. Further, he recommended two other derived approaches namely, a) Trait -cum-goal approach and b) Goal - cum -functional approach. In the goal approach the appraisal process is simplified to a quantative comparison of the achievement to the goal or objectives set. The logic behind trait approach is the assumption that certain traits/qualities of manager are essential for success and a quantification of these would provide suitable measure of managerial success. The functional approach hinges on the thesis that a manager's success depends on the extent to which he performs the managerial functions.

Koontz et al. (1986) has also suggested trait, goal and functional approaches for measuring managerial success.

Bhattacharya (1983), while discussing the methods of measurement of managerial effectiveness, quoted: a) Greatman theory-same as that of trait approach, b) Reality theory - equivalent to functional approach c) Common core theory - measures the managerial peformance and is resource oriented d) Key factor operating methods namely, gross profit, current ratio etc. and e) Time study- performance in terms of time frame.

3.4.2.2. Measurement tools developed

Various types of quantifying techniques mostly on management input have been developed by various authors. Important ones as far as the study is concerned, are presented in the following pages.

3.4.2.2.1. Trait approach

Carlson (1967) measured farmers' management ability with various vocabulary, mechanical comprehension, numerical reasoning tests based on rating by experts using rating scale and checklist.

Hebbar (1975) developed an index to measure managerial ability of coffee cultivators. The index consisted of 28 characteristics of coffee growers essential in the effective maintenance of coffee plantations and these were identified as management factors. Farmers were graded into 10 points in each of the 28 characters and the management index was computed by dividing points obtained by the farmer by total obtainable points and multiplying by 100. Similarly, Shanmugappa (1978) and Thimmappa (1981) developed index for measuring managerial ability of arecanut and coconut farmers having 12 and 10 characteristics respectively as management factors with three-point rating scale. Samanta (1977) constructed a management orientation scale which would be used to measure farmers' orientation towards scientific farm management. The scale has three components namely, planning, production and marketing. Each component has six statements with four-point response categories from strongly agree to strongly disagree with scores of 4, 3, 2 and 1. The management orientation score was found out by summing up the scores for all statements.

### 3.4.2.2.2. Goal approach

Prasad and Neghandhi (1968) suggested net and gross profits and percentage increase in profits as measurements for managerial effectiveness. Radhakrishna (1969) measured farmers' efficiency using criteria such as yield per acre, cost of production, and ratio of value of output to cost.

Bessell (1970) developed an econometric model to measure managerial efficiency in agriculture as follows.

$$P_n = a_1 \; T_n + a_2 \; M_n + C_1 \; \ldots\ldots\ldots\ldots (1)$$

$$M_n = b_1 \; T_n + b_2 \; C_n + b_3 S_n + C_2 \; \ldots\ldots\ldots (2)$$

where $P$ = productivity defined as output per acre

$M$ = operating efficiency

$T$ = Intensity of farming

$C$ = Complexity of farming

$S$ = Potential operating efficiency

$n$ = refer to $n^{th}$ farm

The model was interpreted as an interdependent system in order to derive P in terms of T, C and S.

Johl and Kapur (1973), Singh (1977) and Kahlon and Singh (1980) have suggested ratio methods and aggregate measures for measuring efficiency. Ratio methods included net capital ratio, working capital ratio, net income per acre etc., while aggregate measures included gross income, cash income, net operating income etc. Rao and Acharya (1978) suggested profit and productivity as the two measures of managerial performance. Bhuiyan and Nandal (1987) suggested gross output, gross output over material cost, gross margin, cash cost basis net returns and benefit-cost ratio as measures of efficiency.

Sengupta (1986) suggested data envelopment analysis, originally developed by Charnes _et_ _al_. (1978), to measure managerial efficiency of decision making units (DMU) which could provide a relative comparison of DMU's in terms of ratio of wanted outputs to valued inputs. The model is given as

$$h_o = \sum_{i=1}^{n} U_i Y_{io} \Big| \sum_{s=1}^{m} V_s X_{so} \quad \text{subject to}$$

$$\sum_{i=1}^{n} U_i Y_{ik} \leq \sum_{s=1}^{m} V_s X_{sk} \;; \quad k=1,2 \ldots\ldots. K; \; U_i \geq 0; \; V_s \geq 0$$

$s = 1, 2, \ldots\ldots m; \; i = 1, 2, \ldots\ldots n.$

where $Y_{ik}$ = Outputs; $X_{ik}$ = inputs; m and n = number of inputs and outputs.

O = Common set of input and output

$U_i V_s$ = Weights obtained through linear functional fractional programme

$h_o$ = Scalar function

3.4.2.2.3. Functional approach

Kahlon and Acharya (1967) developed a management index comprising 10 management factors selected based on the farmers' decision which contributed to difference between low and high income groups of farmers. The identified factors were ranked based on research findings and converted to scores using Fisher and Yate's Table. The selected management factors represented mostly the recommended practices. The summed up scores were used as management index.

Harinath (1971) constructed a management index with nine major items namely, decision making, extension contact, supervision, preparatory cultivation, seeds and sowing, manures, plant protection and interculture, marketing and cooperative service. The index had altogether 79 sub-items under all items. The items and sub-items were ranked and weightages were given based on Fisher and Yate's

Table. Summing up of the combined weightage of each sub-item and item formed the management index.

Morse and Wagner (1978) developed a measuring device for managerial effectiveness as follows: Managers were rated on a nine-point rating scale against 106 statements pertaining to specific behaviour and activites of managers. Final scale consisted of 51 items selected based on correlation with total score and criterion score which was factor analysed into six groups namely, managing the resources, organising and coordinating, providing for growth and development, motivating and conflict handling and strategic problems.

Chari and Nandapurkar (1987) evolved a scale to measure managerial ability of farmers. Seven main components namely, planning, organising, human relationship, supervision, communication, coordination and control were selected and ranked based on relevancy rating by judges. Using normalised rank method, scale values for the seven items were calculated whereas 29 sub-items under items were given weightage based on their ranking. Managerial Ability Index (MAI) was calculated using the formula,

$$MAI = \frac{\Sigma \text{ Score obtained for components X Scale value of components}}{\Sigma \text{ Maximum score for components X Scale value of components}} \text{ X100}$$

Mathew (1989) constructed a managerial activity scale with 111 items grouped into 17 areas of management which formed the sub-scales. It was a self-rating scale with a four-point response categories namely, frequently, occasionally, rarely and never with scores of 4, 3, 2 and 1 respectively. Summing up of scores in each item constituted the total score.

Thus, almost all scales developed to measure management factor belonged to any one of the above approaches.

### 3.4.2.3. Development of Managerial efficiency scale

#### 3.4.2.3.1. Operationalisation

Managerial efficiency is operationalised in line with the concept on managerial efficiency derived for the study presented in the previous Chapter. It is operationalised as the consistency with which the farmers undertake mental as well as operational managerial activities with regard to a crop enterprise which contribute to profit maximisation of that crop enterprise.

Activities refer to the actions performed by the farmers. Mental and operational activities refer to the mental exercise a farmer does and action executed in the situation with regard to a crop enterprise.

#### 3.4.2.3.2. Scale development procedure

It may be pointed out here that the main aim behind the scale development was to construct a scale of general nature so as to enlarge the scope of application of the scale to measure managerial efficiency of farmers not only with reference to cassava crop but also in any other single crop enterprise of seasonal or annual in nature. The scale was developed following the functional approach because it carries more of objectiveness than trait approach and is independent of external factors unlike in goal approach. The methods and procedure followed to develop the scale on managerial efficiency are as follows.

#### 3.4.2.3.2.1. Item generation

The first step in the development of the scale was to identify all possible items reflecting managerial activities of farmers. The primary sources of activities and area of activities were literature, discussion with experts and through critical incident technique used in successful farm units. The collected items were screened by verifying its applicability for various crops of annual or seasonal nature. The item generation yielded 196 items which were initially grouped theoretically under seven components namely, 'planning', 'labour management', 'information management', 'financial management', 'risk management', 'production management' and 'marketing management' (Appendix III). The items were prepared in affirmative statements avoiding all technical jorgans. The items were pretested with a group of farmers for its appropriatness and feasibility.

#### 3.4.2.3.2.2. Initial screening of items by relevancy rating

In order to screen the 196 items generated based on the degree of relevancy, the statements were sent to 100 judges with proper instructions (Appendix IV). Experts in the fields of extension, economics, management and agronomy were selected as judges. The judges were asked to indicate the relevancy of items on a five-point continuum of most relevant to least relevant. Sixty judges responded. The mean relevancy score and coefficient of variation of each item was worked out as described in the selection of independent variables which are presented in Appendix III. The selection procedure of items using average mean relevancy score and average coefficient of variation was similar to that in the selection of independent variables. This exercise yielded 93 items.

3.4.2.3.2.3. Item analysis

Item analysis is a set of procedures that are applied to know indices of truthfulness of items (Singh, 1986). The indices used in the selection of items for the study were : a) discrimination index b) correlation of item with external criterion and c) Correlation of item with total score as suggested by Anastasi (1961) and Guilford (1971).

Item analysis was done on the responses of two groups of farmers, one belonging to paddy crop enterprise and the other cassava. Two crop enterprise farmers were used because the main objective was to develop a scale amenable for measuring managerial efficiency of farmers in any single crop. Cassava and paddy crops were considered for scale development because the study was concerned with the former group and latter one is a common and major croo.

The 93 items selected by relevancy rating were administered to 60 cassava growers and 60 paddy growers selected randomly from non-sample villages of two districts viz., Thiruvananthapuram in Kerala and Salem in Tamil Nadu. Farmers were asked to give their reponse to each of the managerial activity based on how often these activities were performed by them in the previous cropping seasons. The response categories used for the purpose were five-point frequency rating namely, always, frequently, occasionally, rarely and never, excepting for the items relating to fertilizer and farm yard manure application and cultivating high yielding varieties. Quantification was done based on the frequency with which the managerial activities were performed by the farmers because it was assumed in the study that managerially efficient farmers would exhibit consistency in the performance of these activities over various seasons.

The response of farmers were quantified by alloting scores of 5, 4, 3, 2 and 1 for the above mentioned response categories in that order as followed by Mathew (1989) while developing managerial activity scale.

The response categories used for the items fertilizer and farm yard manure application were in terms of average percentage of recommended fertilizers/farm yard manure applied by the farmers and for the item high yielding varieties it was in terms of percentage of land put under high yielding varieties in the previous two cropping seasons. Five response categories were adopted namely, $>$ 75%, 51-75%, 25-50%, $<$ 25% and Nil. Scores alloted for these categories were 5, 4, 3, 2, and 1 in that order. This sort of alloting scores to responses in percentage was followed by Muthiah (1971) also. In the case of fertilizer application, which involves three major nutrients, the percentage of fertilizer applied was arrived at using level of fertilizer index developed by Singh (1981) which was based on averaging the percentage of recommended Nitrogen, Phosphorus and Potash used by the farmers.

A different response pattern was adopted for these items in view of the following: a) It was found that farmers could not give their response in the categories adopted for other items b) the proportion of fertilizer/ farm yard manure and extent of use of high yielding varieties have direct bearing on the yield and consequently on profit and c) recommendations are mainly in quantitative terms.

For carrying out item analysis two types of scores were used. They were item score referring to the score of an individual on a particular item and total score referring to the summation of item scores of an individual. These scores were used to arrive at discrimination index, item-criterion correlation and item-total score correlation. These indices were developed for each item separately for cassava and paddy farmers.

3.4.2.3.2.3.1. <u>Discrimination index</u>

It refers to the power of an item to discriminate the low efficient from the high efficient category of farmers. The total score for each farmer was found. Following the suggestion of Kelley (1939) high and low level groups were formed by grouping the farmers whose total score fell within top and bottom 27 per cent, respectively. The values of critical ratio were used as discrimination index as suggested by Singh (1986). The critical ratio (t-value) of each item was calculated using the formula given by Edwards (1957). This formula was selected because the number of respondents in high and low group were equal. The formula used was -

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{\Sigma(X_H - \bar{X}_H)^2 + \Sigma(X_L - \bar{X}_L)^2}{n(n-1)}}}$$

where

$\bar{X}_H$ = the mean score of an item for the high group

$\bar{X}_L$ = the mean score of an item for the low group

n = number of subjects in a group

$$\Sigma(X_H - \bar{X}_H)^2 = \Sigma X_H^2 - \frac{(\Sigma X_H)^2}{n}$$

$$\Sigma(X_L - \bar{X}_L)^2 = \Sigma X_L^2 - \frac{(\Sigma X_L)^2}{n}$$

3.4.2.3.2.3.2. <u>Item-criterion correlation</u>

The external criterion used in this context was normalised standard scores of profit obtained for each farmer as explained elsewhere. Pearson's product-moment correlation was worked out between each item score and profit score.

### 3.4.2.3.2.3.3. Item-total score correlation

The correlation of each item score with total score yields a measure of internal consistency (Anastasi, 1961). Using Pearson's product-moment method, correlation was worked out for each item between item score and total score of individual.

### 3.4.2.3.2.3.4. Selection of items for final scale

The results of the item analysis of the 93 items performed on the basis of discrimination index, item-criterion correlation and item-total correlation with regard to the two groups of farmers (Cassava and Paddy) are presented in Appendix V. It could be seen from the Appendix V that 34 items in the case of cassava and 35 with respect to paddy had significant discrimination index (t-value) and item criterion correlation, item-total score correlation. Among these items, 30 were common for both the crops and hence, these 30 items were selected for inclusion in the final scale. The items under each theoretical component selected based on the item analysis are presented in Appendix VI.

### 3.4.2.3.2.4. Classification of selected items into components

After having selected 30 final items from an exhaustive number of items, it became necessary to group these selected items into reduced number of components empirically so as to analyse the efficiency of farmers on these managerial components.

### 3.4.2.3.2.4.1. Method of Classification

Grouping of items into components can be attempted based on theoretical lines or judgement method or following statistical models. For the study, the statistical method was resorted to as it was considered to have objectiveness when compared to the others.

The model followed in the study in grouping the scale items was factor analysis since:

a. Factor analysis enables to replace large number of indices which may have little theoretical meaning with a much smaller number of conceptual variables which make very good sense theoretically (Blalock, 1960).

b. Among various applications, factor analysis can be used for sorting or classification of abilities, tests, items etc. (Fruchter, 1954; Harman, 1960; Cronbach, 1970; Rummel, 1970)

c. Factor analysis enables to discover variables sharing similar characteristics (Bennett and Bowers, 1976)

d. Factor analysis can be used as an approach to test construction and finding out and defining sub-scales in the scale (Youngman,1979).

e. Factor analysis gives new variables called 'factors' which will, hopefully, give us a better understanding of the data (Chatfield and Collins, 1980).

f. Factor analysis techniques allow the researcher to group variables in factors which may be treated as new variables (Rangacharyulu, 1982; and Kothari, 1985).

g. Factor analysis was effectively used in the identification of components of the measurement instrument for managerial effectiveness by Morse and Wagner (1978) and for strategic orientation of business enterprises by Venkatraman (1989).

In view of the above supportive evidences, factors extracted through factor analysis were treated as components of the scale and items grouped under a factor were treated as items of the component.

3.4.2.3.2.4.2. Method of factor analysis

The most important aspect of factor analysis is the extraction of factor loadings. Several methods can be adopted for extraction of factor loadings. Among them are the centroid method, principal factor analysis, minimum residual method and maximum-likelihood method. The alternate methods that circumvent many of the problems of principal factor analysis have been suggested. One such method is maximum-likelihood factor analysis proposed by Lawley (1940) which provides maximum-likelihood estimates for factor loadings. The maximum - likelihood method was adhered to workout factor loadings in the study for the following reasons.

a. It is independent of the unit of measurement in the characters (Chatfield and Collins, 1980)

b. It is mathematically the most efficient method among factor analysis (Fruchter, 1954; Maxwell, 1977).

c. Maximum-likelihood method estimation leads to a statistic which can be used for test of significance for the number of common factors (Thomson, 1951; Harman, 1960; Morrison, 1976).

d. It is a consistent estimator as well as a minimum variance estimator (Mulaik, 1972).

e. It maximises the relationship between the sample data and the population from which the sample was drawn (Kothari, 1985).

3.4.2.3.2.4.3. Procedure and criteria adopted for arriving at number of components and grouping of items into a component

Factor analysis was done using the scores of 120 farmers (selected for item analysis) obtained on the 30 common items. The intercorrelations of the 30 items worked out was initially subjected to principal factor solution to arrive at the minimum number of factors to start with. The eigen values of the 30 factors obtained from principal factor analysis are presented in Appendix VII. The number of factors whose eigen values exceeding one could be considered sufficient in describing the dependence structure (Geer, 1971, Youngman, 1979). It could be observed from the Appendix VII that out of the 30 factors six factors had shown eigen value exceeding one.

Hence, maximum-likelihood method of factor analysis was applied to extract factor loadings of the items for the six factors initially and the factors were extracted by Lawley's iterative scheme following ± 0.005 convergence criterion.

After extraction, the matrix of factor loadings was subjected to varimax orthogonal rotation, the effect of which was to accentuate the larger loadings in each factor and suppress the minor loading coefficients and in this way improve the oppurtunity of achieving a meaningful interpretation of each factor (Denis and Adams, 1978). For the study, Kaiser (1958) varimax rotation was followed which yielded new loadings either relatively larger or smaller in magnitude compared to the original ones.

The rotated maximum-likelihood estimates of factor loadings of items with regard to six factors are presented in Appendix VIII.

The next step was to classify the items using the rotated factor loadings of the item. The procedure for classifying the items of the measurement instrument based on factor loadings of the items was also used by Morse and Wagner (1978). This was considered because factor loadings, in short, express the correlation between a variable and a factor (Bennett and Bowers, 1976; Kerlinger, 1973; Youngman, 1979; Srivastava et al., 1983; Kothari, 1985). If a variable (item) has no significnt correlation with a factor then that variable is not contributing significantly to the variance of factor (component) and hence, there is no meaning in grouping that item under that

Fruchter (1954) suggested a limit of 0.50 and variables having factor loadings from 0.50 to 0.70 could be considered to be significant. Khatker et al. (1987) had drawn inferences on factors on the basis of factor loading more than 0.40. Harris (1975) Maxwell (1977) and Youngman (1979) and Chatfield and Collins (1980) suggested a factor loading of 0.50, 0.25 and 0.50 and 0.25, respectively in absolute terms. Srivastava et al. (1983) considered for classifying the variables under each factor based on factor loadings more than or equal to 0.50. Kothari (1985) stated that it has become customary in factor analysis literature for a loading of 0.33 to be minimum absolute value for interpretation. Kunju (1989) considered 0.45 as the minimum limit of factor loading while identifying the linkage activities of technology transfer systems.

In this study the criteria fixed for classifying the items into various components were: a) Items should have a minimum of 0.45 factor loading in absolute value under a particular factor b) Overlapping of the items in various factors based on minimum factor loading considered for the study should be minimum. c) Item grouped under a factor should have the highest factor loading when compared to other factors as done by Bhaskaran (1988).

A perusal of the rotated factor loadings presented in Appendix VIII showed that the six factor-model did not permit to have a convenient classification of the items into six components without much overlapping of items in various factors, keeping in view the minimum factor loading of 0.45 considered significant for the study. For example, overlapping of the items 4, 5, 6, 7, 8 and 19 could be noted as these items had significant factor loadings in factor 1 as well as in 6. Further the item 23 did not show the significant loading in any of the factors.

A test of significance of $\chi^2$ model was also worked out as suggested by Thomson (1951), Harman (1960) and Morrison (1976) to find out the adequacy of the number of factors selected in explaining the variance. If the $\chi^2$ value is significant, maximum-likelihood need to be tried with extraction of additional factors (Thomson, 1951; Harman, 1960; Morrison, 1976).

The test of significance of six factor-model for the residual variance after removing 6 factors gave a $\chi^2$ value of 797.65. Since the degree of freedom for this $\chi^2$ was 270, the normal test criterion $\sqrt{2\chi^2} - \sqrt{2n-1}$ was applied to test for significance where 'n' is the degree of freedom, which indicated that $\chi^2$ value was significant. This is indicative that six factor-model was not sufficient to explain the dependence structure 'managerial efficiency'.

Considering the reasons of the difficulty involved in grouping of the items in the six factor and the significant $\chi^2$ value for the residual variance, the estimation of factor loadings was extended to seven factor-model.

The rotated maximum-likelihood estimates of seven factors solution is presented in Appendix IX. The goodness of fit of this model ( $\chi^2$ 246 = 641.89) showed that residual variance was significant and suggestive of extraction of additional factors to explain the dependence structure.

Eventhough the $\chi^2$ test gave the indication to have additional factors, the seven factor-model did permit the classification of the items in the seven factors without overlapping or omission of items. A perusal of factor loadings of thirty items (Appendix IX) showed clearly that items 1 to 8 had not only significant loading exceeding 0.45 but also highest loadings against factor 1. Similarly items 13 to 17 against factor 2, items 18-22 against factor 3, items 27 to 30 against factor 4, items 24-26 against factor 5, items 23 had shown significant loading in factor 5 as well as 7, but its loading in factor 7 was higher than in 5, hence it could be classified under factor 7.

Inspite of convenient grouping of all the items in seven components, maximum-likelihood method of factor analysis was continued with 8, 9 and 10 factor solution with the assumption that it would provide a better goodness of fit and also facilitate clear-cut classification of items. The estimated factor loadings of 8, 9 and 10 factor solution are presented in Appendix X, XI and XII respectively. The $\chi^2$ values were found to be 344.30 (degree of freedom 223), 288.74 (201) and 255.69 (198) for 8, 9 and 10 factors, respectively, which were significant indicating that even 10 factors were not sufficient to explain the variance.

Further, it could be observed from the factor loadings presented in the Appendix X, XI and XII that either some of the items had significant loadings in two or more factors or some of the factors did not have even an item with significant loading which posed hurdles in convenient classification of all the items in all the factors extracted.

Moreover, a critical analysis of the 9 and 10 factor-models clearly indicated that all the 30 items got grouped with significant loadings only under 7 factors and additional factors did not have any of the items with significant loadings. Owing to these reasons, estimation of factor loadings was not further extended with additional factors.

In view of the fact that the seven factor-model had very well facilitated a clear-cut classification and the additional factors neither helped in reducing the residual variance nor in classification, seven factor-model was considered apt for the study. This has been considered so, as the classification of items using factor analysis was the prime concern in the scale development procedure. Eventhough $\chi^2$ test indicated the insufficiency of seven factors, all the seven factors put together had explained a far satisfactory amount of more than 80 per cent of the variance of the dependence structure. The items which could be grouped under these seven factors were indicated earlier.

### 3.4.2.3.2.4.4. <u>Labelling the components</u>

After grouping the items into various components, it became essential to name the components so as to consider these as new variables for various types of analysis. According to Harris (1975), labelling of factors is a very persistent problem and is a difficult task in finding substantive interpretations of latent variables derived through factor analysis. However, he opined that by far the most common procedure for interpreting (naming) the factors is to single out for each factor those variables having the highest loadings in absolute value on that factor to define the factor.

Fruchter (1954) suggested that interpretation of factors is done by inferring what tests (items) with high loadings on a factor in common that is present to a lesser degree in tests with moderate loadings and absent from tests with zero or near zero loadings. According to Kothari (1985), it is the absolute value of factor loadings that is important in the interpretation of a factor and the factor name is chosen in such a way that it conveys what is that all variables that correlate with the factor have in common. Stevens (1986) stated that components are interpreted by using the factor loadings which are the largest in absolute magnitude and interpretation is done by determining what the variables have in common.

Following the suggestions put up by Fruchter (1954), Kothari (1985) and Stevans (1986), labelling the components was done by taking into consideration the common content of the items having significant loadings grouped into a component. The nature of the seven individual factors and labelling of the factors are furnished in the results chapter. The components identified through labelling are referred as to managerial components.

### 3.4.2.3.2.5. Final format of the scale and quantifying procedure

The final format of the scale contained the components and the items grouped under each component (Part II of Appendix XV). The response categories for the items and scores alloted for the response categories are the same as described in the item analysis part.

Computation of individual scores was done for each component (factor) derived by factor analysis and for managerial efficiency scale as a whole. According to Bennett and Bowers (1976), there are several ways of measuring the factor, from a simple method of using the score which an individual obtains on variables, which best represent the factor to sophisticated estimation methods based on factor loadings of all variables on that factor. Youngman (1979) suggested two forms of measuring factors which incorporate weighted variable combinations and scale which usually combine disjoint set of variables by simple addition. According to Kothari (1985), values for the factors are derived by summing up the values of original variables which have been grouped into a factor.

In the present study, component score was derived by simple addition of the scores obtained by individuals on the items grouped into a component since items having substantial factor loadings were only grouped under a component. This can be denoted as

$$\sum_{i=1}^{n} t_i = t_1 + t_2 + t_3 \ldots \ldots \ldots t_n$$

where $t_1$ . . . . . . . . $t_n$, refer to individual's score on items. Managerial efficiency score was computed by summing the scores obtained by individuals on components. This can be denoted as

$$\sum_{i=1}^{n} C_i = C_1 + C_2 \ldots\ldots\ldots C_n$$

where $C_1$ + . . . . . . $C_n$ refer to individual's score on components.

It may be pointed out here that differential weightages were not given to items because all the items selected in the final scale had statistically significant item validity indices and hence, it was assumed that their contributions to efficiency were on par. The management orientation scale of Samanta (1977) and managerial activity scale of Mathew (1989) also did not have differential weightage for items and total scores were computed by simple addition of item scores.

3.4.2.3.2.6. <u>Standardisation of the scale</u>

The standardisation of the scale was done by verifying the reliability and validity of the scale.

3.4.2.3.2.61. <u>Reliability of the scale</u>

The reliability of a test refers to the consistency of scores obtained by some individuals on different occasions or with different sets of equivalent forms (Anastasi, 1961). In this study, reliability was determined by test-retest method. The scale was administered to 30 cassava as well as 30 paddy farmers of non-sample village of Thiruvananthapuram and Salem districts, twice at 15 days interval.

Pearson's product-moment correlation was worked out between the two sets of managerial efficiency scores. The correlation coefficients were 0.81 and 0.84 for cassava and paddy farmers, respectivity, which were significant indicating the high reliability of the scale.

3.4.2.3.2.6.2. Validity of the scale

A scale is valid when it actually measures what it claims to measure (Goode and Hatt, 1952). The validity of the scale was found by using the following methods.

3.4.2.3.2.6.2.1. Content validity

It is concerned with whether or not the test covers a representative sample of behaviour domain to be measured (Anastasi, 1961). This was ensured during the preparation of the scale itself during which time, utmost care was taken to include all the items to represent the universe of contents.

3.4.2.3.2.6.2.2. Criterion related validity

It is studied by comparing scale scores with one or more external variables or criteria known to measure the attribute under study (Kerlinger, 1973). Since, all the items included in the scale were selected based on the relationship of items with the external criterion variable (profit) with regard to two crops viz., cassava and paddy, the scale was considered to have criterion validity.

3.4.2.3.2.6.2.3. Construct validity

The construct validity of a test is the extent to which the test may be said to measure the theoretical construct or trait and correlation between the new test and similar earlier test gives evidence that the new test measures the same area of behaviour as other tests designated by the same name (Anastasi, 1961). For the study, the construct validity was tested by working out correlation coefficient between managerial efficiency score of 30 each of cassava and paddy farmers of non-sample village form Thiruvananthapuram and Salem districts and their scores on the earlier developed scale of management orientation by Samanta (1977). The correlation coefficient computed for cassava and paddy farmers were 0.84 and 0.85, respectively. The values were highly significant revealing that the scale has construct validity also.

3.4.2.3.2.6.2.4. <u>Known group validity</u>

According to this method a scale is administered among persons who are known to hold a particular opinion or belonging to a particular category and the results are then compared with known facts (Bhatnagar, 1990). For testing the validity of the scale using this method, two groups of farmers (15 farmers in each group), one known to be efficient and another inefficient based on the opinion of field level extension workers with regard to the two crops viz., cassava and paddy were selected from non-sample villages of Thiruvananthapuram and Salem districts. The managerial efficiency scale was administered to the two groups of farmers. The mean scores of two groups were compared and tested for significance of difference viz., the critical ratio. The computed critical ratios were 5.54 and 9.38 for cassava and paddy farmers, respectively. The values were highly significant thus establishing the known group validity of the

### 3.4.3. Independent variables

### 3.4.3.1. Socio-psychological variables

### 3.4.3.1.1. Education

It refers to the extent of informal or formal learning possessed by the farmer-respondent. The different educational levels of tha respondents were scored as per the procedure followed in the socio-economic status scale of Trivedi (1963). The scoring procedure was as follows.

| Level of Education | Scores |
|---|---|
| Illiterate | 0 |
| Can read only | 1 |
| Can read and write | 2 |
| Primary school | 3 |
| Middle level | 4 |
| High school | 5 |
| College | 6 |
| Above College | 7 |

### 3.4.3.1.2. Social participation

Social participation in this study refers to the degree of involvement of the farmer-respondent in formal organisation as members or office-bearers including his frequency of attendance in meetings. The procedure developed by Lokhande (1974) was used for the purpose of measurement of social participation.

| Item | Score |
|---|---|
| No membership | 0 |
| Membership in one organisation | 1 |
| Membership in more than one organisation | 2 |
| Office-bearer in one organisation | 3 |
| Office-bearer in more than one organisation | 4 |
| Distinctive features (MLA, MP etc.) | 6 |

Scores of 3,2, and 1 were assigned for attending the meetings regularly, occasionally and never. To obtain the final score of a repondent, the scores secured as a member or office- bearer were multiplied with the scores secured for attendence and these scores were summed up for all the social organisations in which participation was reported.

3.4.3.1.3. Extension participation

It refers to the degree of participation in various extension activities conducted by development agencies in the farmer-respondents' locality. This was measured using the procedure suggested by Bhaskaran (1979) with slight modification. The respondent's participation in each of the activities was recorded on a three-point continuum and the scores given were: whenever conducted 2, Sometimes 1, Never 0. The extension activities included are as shown in Appendix XV. Summing up the scores obtained by the farmer in all the activities, the respondents's extension participation score was obtained.

### 3.4.3.1.4. Mass media participation

It refers to the degree to which mass media information sources were used by the farmer-respondent. The measurement procedure followed by Syamala (1988) was used to quantify this variable. The weightages with reference to frequency of usage are given below.

| Frequency | Score |
|---|---|
| Two or more times a week | 4 |
| Once a week | 3 |
| Once a fortnight | 2 |
| Once a month | 1 |
| Never | 0 |

The mass media participation score of each respondent was computed by adding the score secured in each of the mass media. The various mass media sources included are given in Appendix XV.

### 3.4.3.1.5. Closeness with agricultural support system

It refers to the extent to which the farmer makes contact with the personnel of various agencies and organisation related to agriculture. It was measured with the help of index of closeness with agricultural support system developed by Bora (1986) with slight modification to suit the locale of the study. Farmers were asked to indicate the extent of contact with each type of agencies on a four-point response categories namely, most often, often, sometimes and never with weightages 3, 2, 1 and 0 respectively. By adding the score secured in each item the total score of an individual respondent was obtained (Appendix XV).

### 3.4.3.1.6. Infrastructural facilities

It refers to the perception of farmers about the availability and adequacy of infrastructural facilities which provide support to crop cultivation. This was measured by the procedure developed by Kumari (1989) with slight modification. The quantification procedure had five facility items namely, seeds, fertilizers, plant protection chemicals, credit and labour. The factors considered for measuring infrastrutural facilities were timeliness and adequacy in availability as perceived by farmers. Positive answer for each of the factors of the facility items were given a score of '1' and negative answers '0'. The scores were then added up to get total score of individual's perception about infrastructural facilities. The infrastructural facilities included are given in Appendix XV.

### 3.4.3.1.7. Market perception

It refers to the farmer's perception of the existence of market for the cassava produce, the ease in marketing and his confidence in securing remunerative price. It was measured by adopting the procedure developed by Nair (1969). The method consisted of scoring the responses obtained to selective questions presented to the respondents to elicit their perception of market for the produce. The questions and scoring procedure adopted are as follows.

a. Do you think a farmer will be able to sell the produce if he increases the production by adopting the recommended practices?

Yes 1 No 0.

b. Do you think that produce of crop cultivated according to recommnded practices will fetch good prices compared to those raised under traditional practices?

Low price 0 Same price 1 High price 2

c. How difficult it will be to dispose of the produce of the crop cultivated following the recommended practices?

Very difficult 0 Difficult 1 Easy 2 Very easy 3

The scores obtained by the farmer in each of the item questions were added up to form his market perception score.

3.4.3.1.8. Achievement motivation

It refers to the striving of the farmer to do a good job of work with a standard of excellence which may be task related or self related or other related. It was measured with the help of the achievement motivation scale of Desai (1981). The scale consisted of five incomplete sentences, each having three choices for the respondents to choose the answers felt appropriate. One of the choices indicated high achievement motivation. Farmers who responded with the proper choice for each of the five sentences were given a score of 1 and for other choices '0' was given. Summing up the scores obtained on the five sentences the respondent's achievement motivation score was arrived at (Appendix XV).

3.4.3.1.9. Economic motivation

It refers to the relative value placed by the farmer on economic ends. This was measured with the help of the economic motivation scale developed by Moulik (1965). The scale consisted of three sets of statements, each set having three sentences with weights of 3, 2 and 1. Each farmer was asked to choose a sentence which described him most accurately and another which described him least accurately from each group of statements. After obtaining the respondents 'most-least' choice for each of three sets of statements, the scoring was done by summing up the ratios of weightages of the most - like sentence to least-like sentences (Appendix XV).

3.4.3.1.10. Orientation towards competition

It refers to the degree to which a farmer is oriented to place himself in a competitive situation in relation to other farmers for projecting his excellance in farming. This was measured by the orientation towards competition scale developed by Singh (1981). The scale consisted of six statements of which the third and the sixth statements indicated negative orientation. Each statement was provided with four-point response categories namely, strongly agree, agree, disagree and strongly disagree with weights of 4, 3, 2 and 1, respectively for positive statements and 1, 2, 3 and 4 for negative statements. The farmer's response to each statement was collected and the summation of the weightages gave the score for orientation towards competition of the farmer (Appendix XV).

### 3.4.3.1.11. Attitude towards scientific management in crop enterprise

This variable is operationally defined as the degree of farmer's positive or negative feeling towards scientific management in crop enterprise. Scientific management refers to the management principles of planning, budgeting, marketing etc. farmers need to follow with regard to a crop enterprise. This variable was measured with an attitude scale constructed for the study following Likert's summated rating method as described by Edwards (1957). The details of the steps followed in constructing the scale are as follows.

#### 3.4.3.1.11.1. Collection of items

The statements reflecting views for and against the topic under study were taken from review of literature on farm/crop management as well as by discussing with experts. Thus, a total of 60 statements were collected and after editing them based on the criteria suggested by Edwards (1957), 50 statements were retained which are furnished in Appendix XIII.

#### 3.4.3.1.11.2. Item analysis

For selection of statements to be included in the final scale, the edited statements were administered to 60 farmers (30 paddy farmers and 30 cassava farmers) randomly selected from non-sample areas in Thiruvananthapuram and Salem districts. The farmers were asked to respond to each statement in terms of their own agreement on a five-point rating method viz., strongly agree, agree, neutral, disagree and strongly disagree. For positive statements, weights of

5, 4, 3, 2 and 1 in that order were given and the scoring procedure was reversed in the case of negative statements.

The total score of each individual was found by summing up the score on all statements. The subjects were placed in descending order and 25 per cent of the respondents as per the procedure suggested by Edward and Kilpatrik (1948) with highest total score and another 25 per cent with lowest score were selected to form criterion groups to compute the critical ratio of each statement discriminating the two groups. The critical ratio (t-value) was calculated using the formula given by Edwards (1957) which is presented elsewhere. The critical ratios of the statements are shown in Appendix XIII. From the 50 statements 10 statements having high t-values were selected for the final scale of which 6 were positive and 4 were negative. The final format of the scale is presented in Appendix XV.

3.4.3.1.11.3. Scoring

Farmers were asked to give their response to each statement in a five-point continuum of strongly agree to strongly disagree. For positive items, scores alloted were 5, 4, 3, 2 and 1 in that order. The scoring pattern was reversed in the case of negative statements. The attitude score of the respondent was obtained by summing up the scores for all the 10 statements.

3.4.3.1.11.4. Reliability of the scale

Reliability of the scale was measured by using split-half and test-retest methods. In the split-half method, the 10 statements were divided into two equal halves of odd and even numbered items and administered to 30 farmers selected from a non-sample area in Thiruvananthapuram District. Two sets of scores were obtained on odd and even numbered items. The coefficient of reliability was calculated by Spearman - Brown prophecy formula as suggested by Garrett (1966). The coefficient of reliability obtained was 0.87.

The scale was subjected to test-retest method also by administering it to a set of 30 respondents from a non-sample area in Thiruvananthapuram district twice at an interval of 15 days and correlation coefficient between the two sets of scores were worked out which was found to be highly significant (0.81).

The results of the above two tests indicated that the scale was reliable.

3.4.3.1.11.5 <u>Validity of the scale</u>

The scale was examined for the content validity by determining how well the contents of the scale represented the subject-matter under study. As all the possible items covering the universe of content were selected from literature and discussion with experts, the scale satisfied the content validity. Further, the high critical ratios revealed that the attitude statements had high discriminatory values confirming validity of the scale.

3.4.3.1.12. <u>Knowledge on scientific management in crop enterprise</u>

It refers to the extent of information on management principles possessed by farmers which helps in making crop enterprise successful.

It was measured with a standard knowledge test developed for the study, the procedure of which is described as follows.

**3.4.3.1.12.1 Item collection**

Fifty two test items on management activities with regard to crop enterprise were collected from literature and in consultation with experts. From the pool of items, initial selection of items was done on the basis of the following criteria: a) It should promote thinking b) It should differentiate the well informed farmers from the poorly informed c) It should have some difficulty value. Based on these criteria, from the pool of items, 35 were initially selected for the knowledge test. The item content in the test was in terms of questions and answers. The questions were framed to test the what and how aspects of farmers in the managerial activities. Items were framed in the objective form to be answered as alternative choices or True/False (Appendix XIV).

**3.4.3.1.12.2. Item analysis**

Item analysis yields information like indices of item difficulty, item discrimination and item validity. The 35 items selected were administered to 60 farmers (30 paddy and 30 cassava farmers) randomly selected from villages other than the ones selected for the main study in Thiruvananthapuram and Salem districts. For correct answers, a score of '1' was given and for incorrect ones '0' was given.

After arriving the total score secured by the individual farmers, they were arranged in descending order of their scores from highest to lowest. Following the recommendations of Kelley (1939), Garrett (1966) and Guilford (1971), 27 per cent of the respondents with highest scores and lowest scores were considered for calculating item difficulty and item discrimination and these groups were referred as upper and lower groups.

3.4.3.1.12.2.1. **Difficulty index**

The difficulty value of an item refers to the proportion or percentage of individuals, who answer the item correctly (Garrett, 1966; Guilford, 1971). Various methods have been suggested to arrive at difficulty index of items. The formula used for this study is as recommended by Singh (1986) which takes into account the extreme groups only, thus saving labour and time. The formula used was:

$$p = \frac{RU + RL}{NU + NL}$$

where p = Index of difficulty

RU = Number of individuals answering correctly in the upper group.

RL = Number of indviduals answering correctly in the lower group

NU = Number of individuals in upper group

NL = Number of individuals in lower group

3.4.3.1.12.2.2 **Discrimination index**

Index of discrimination is that ability of the item on the basis of which the discrimination is made between superiors and inferiors (Blood and [illegible] 1972). Among various methods of determining of discrimination index, a simple and quick method called as'Net D index of discrimination' suggested by Marshall and Hales (1972) was followed. This is an unbiased index of absolute difference in number of discriminations made between upper and lower groups and it is proportional to the net discrimination made by the items between the two groups. The formula used was:

$$V = \frac{RU - RL}{NU}$$

where V = Net discrimination index

RU = Number of individuals giving correct answers in upper group

RL = Number of individuals giving correct answers in lower grop

NU = Number of individuals in a group

3.4.1.3.12.2.3. <u>Item validity</u>

The validity power of the item is the correlation of the item score with the whole test score, referred as internal-consistency item discrimination index (Lindquist, 1951). Since the items were scored simply as '0' and '1', point biserial correlation as recommended by Garrett (1966) was worked out to indicate the item validity of each item. The formula used was

$$r_{pbis} = \sqrt{\frac{M_p - M_q}{t}} \quad \sqrt{pq}$$

where

$r_{pbis}$ = point biserial correlation

$M_p$ = the mean of the total scores of the respondents who gave correct answer to the item.

$M_q$ = the mean of the total scores of respondents who gave incorrect answers to the item

t = standard deviation of the entire sample

p = proportion of farmers giving correct answer to the item.

q = proportion of farmers giving incorrect answer to the item

The calculated values of difficulty index, discrimination index and point biserial correlation for all the 35 items are given in Appendix XIV.

3.4.1.3.12.3. Final selection of items

Difficulty index, discrimination index and point biserial correlation were the criteria considered for selection of items for the scale. Anantharaman (1977) selected the items with difficulty index values ranging from 33 to 66 percentage, discrimination index above 0.20 with significant point biserial correlation. Pillai (1983) considered difficulty index of 65 to 76 percentage and discrimination index above 0.35. For this study, items with difficulty index of 0.40 to 0.60 proportion which signal the maximum variance, discrimination index above 0.40 which discriminates the upper and lower groups significantly as recommended by Singh (1986) and having significant point biserial correlation were selected. This procedure yielded 12 test items for the final scale which are listed in Appendix XV.

### 3.4.1.3.12.4. Method of scoring

Each respondent was given a score of '1' for correct answer and '0' for incorrect answer for each item. The total knowledge score of each respondent was calculated by adding the number of items answered correctly by him.

### 3.4.1.3.12.5. Reliability

Reliability of the test was found by the split-half as well as test-retest methods. In the split-half method, the selected 12 items were split into two equal halves of odd and even numbered items and administered to 30 farmers from non-sample areas in Thiruvananthapuram district. The Spearman-Brown-prophecy formula was used to calculate reliability coefficient which was found to be highly significant (0.83). The test-retest method used with 30 farmers at 15 days interval gave a correlation coefficient of 0.81 which was also found to be highly significant indicating the reliability of the scale.

### 3.4.1.3.12.6. Validity

Care was taken to include the items covering the universe of content with respect to the subject-matter and the respondents, thus, satisfying the content validity. Since the items were selected based on discrimination index and point biserial correlation which are the measures of validity, the scale was considered to have validity.

3.4.3.2. <u>Situational variables</u>

3.4.3.2.1. <u>Cultivated holding</u>

It refers to the size of the operational holding under all crops cultivated by the farmer-respondent. It was measured in hectares.

3.4.3.2.2. <u>Area under cassava</u>

It refers to the area put under cassava by the farmer and was measured in hectares.

3.4.3.2.3. <u>Irrigation potential</u>

It refers to the area under various sources of irrigation and was measured in terms of proportion of cultivated holding under irrigation.

3.4.4. <u>Managerial constraints</u>

It refers to the reasons perceived by the farmers for not practising the managerial activities included in the scale. Farmers, who gave responses in the categories except 'always' for each item in the scale were asked to give reasons for not following the activities. The reasons were then pooled under each component in the scale and expressed in terms of percentage. The top five reasons under each component were considered as important ones for the study.

to overall managerial efficiency and the components. Mean scores arrived at for the sub-samples namely, state and various district categories such as low productivity, high productivity, industrial and non-industrial districts etc.,were used to make comparisons.

### 3.6.2. Simple percentage

After grouping the farmers who have secured equal or more than mean score as high efficiency group and lower than mean score as low efficiency groups, simple percentage was worked out to find out percentage distribution of the farmers under high and low efficiency groups in managerial efficiency and the components with respect to total sample as well as for the sub-samples of states and district categories.

### 3.6.3. Analysis of variance

It was used to test the significant difference between the farmers of two states and between various district categories in the overall managerial efficiency and the components. Analysis of variance was done to compare the two states with the districts categorised based on low and high productivity and also the industrial and non-industrial districts.

### 3.6.4. Mean score percentage

This was arrived at by dividing the mean score obtained for the components by the farmers of each state and district category by the product of maximum score attainable for an item and number of items in a component. The mean score percentage is used to compare

## 3.5. PROCEDURE EMPLOYED IN THE DATA COLLECTION

The data collection was done using a structured interview schedule prepared for the purpose of the study (Appendix XV). The interview schedule consisted of three parts. Part I was used to collect information on various independent variables. Part II was used to gather the farmer's response on the managerial efficiency scale and managerial constraints. Part III was meant to collect data on cost of cultivation and profit accrued from cassava cultivation for the previous two seasons.

The data collection was done during July to November 1990.

## 3.6. STATISTICAL TOOLS USED FOR THE STUDY

The data collected from the respondents were scored, tabulated and analysed using suitable statistical methods. Described below are the statistical methods used apart from the ones included and explained under scale development procedure. Assuming that the data were normally distributed, more of parametric tests were preferred as per the suggestions of Bonean (1960) and McNemar (1962). The factor analysis as well as the other statistical methods used in the study were performed using VERSA IWS computer at the College of Agriculture, Vellayani.

### 3.6.1. Mean

The mean of the managerial efficiency score and the managerial components score for the total sample was used as a cut-off point to group the farmers into low and high efficiency groups with respect and rank the components. This type of analysis was suggested by Mathew (1989).

### 3.6.5. Spearman rank correlation

Spearman rank correlation was computed to know whether the rankings obtained on various components with regard to two states and two district categories had a significant agreement.

### 3.6.6. Kendall's coefficient of concordance

Kendall's coefficient of concordance 'w' was computed to know whether the rankings obtained on various components with regard to three non-industrial districts had a significant agreement.

### 3.6.7. Pearson's product-moment correlation

It was done to find out the nature of relationship between the managerial components and the criterion variable profit.

### 3.6.8. Step-wise regression analysis

Step-wise regression analysis procedure developed by Draper and Smith (1966) was applied to find out the relative importance of various components included in the scale in contributing towards the variations in the profit. This was done by establishing a linear relationship between a particular response 'Y' and 'K' independent variables $X_1$.............$X_k$. A variable which may have been the best single variable to enter at an early stage may, at a later stage be superfluous because of the relationship between it and the other variables in regression. This is checked by 'F' test for each variable at each stage of calculation. This provides a judgement on the contribution made by each variable as though it had been the most recent variable entered irrespective of its actual point of entry into the model. This procedure was repeated until a number of variables were admitted and no more were rejected.

### 3.6.9. Multiple regression analysis

This was done to find out the contribution of socio-psychological and situational factors of farmers in the variation in managerial efficiency of farmers.

### 3.6.10. Multivariate path coefficient analysis

Path analysis originally developed by Wright (1921) and followed by Li (1955) was used to analyse the direct and indirect effects of a set of independent variables on dependent variable.

## 3.7. HYPOTHESES SET FOR THE STUDY

In the light of postulated relationship of variables as per the theoretical orientation and based on the objectives and the assumptions, relevant hypotheses were formulated as given below.

(1) There would be no significant difference in the managerial efficiency between cassava farmers of the two states and between the farmers of various district categories.

(2) There would be no significant difference in the managerial components between the cassava farmers of the two states and between the farmers of various district categories.

(3) There would be no significant difference in the importance among the managerial components in terms of their contribution towards profit from cassava crop.

(4) The variation in the managerial efficiency of cassava farmers would not be explained by the socio-psychological and situational factors included in the study.

(5) There would be no significant contribution of each socio-psychological and situational factor towards managerial efficiency of cassava farmers.

# RESULTS

# 4. RESULTS

Keeping the objectives of the study in view, the results are presented under the following heads.

4.1. Components of the managerial efficiency scale

4.2. Managerial efficiency of the cassava farmers

4.3. Important components of managerial efficiency of the cassava farmers

4.4. Relationship between socio-psychological and situational factors of the cassava farmers and their managerial efficiency

4.5. Managerial constraints as perceived by the cassava farmers

## 4.1. COMPONENTS OF THE MANAGERIAL EFFICIENCY SCALE

The seven factor-model was considered apt for the classification of items (Appendix IX). The classification of the 30 items under the seven factors was described in the previous Chapter. The extracted factors formed the components of the scale and are referred as managerial components. The components were identified based on the labelling of the factor as mentioned under 'methodology' in the previous chapter. The managerial components identified are presented below.

### 4.1.1. Factor 1. Planning

The items grouped under this factor with their factor loadings and the percentage variance accounted are presented in Table 2. This factor had the highest contribution of 18.65 per cent to

Table 2. Factor 1 Planning

| Sl. No. | Item No. | Items | Factor loading | Percentage variance |
|---|---|---|---|---|
| 1 | 1 | Setting an objective of profit target from the crop | 0.7068 | |
| 2 | 2 | Preparing calendar of various operations of crop cultivation well in advance | 0.7082 | |
| 3 | 3 | Working out operation-wise expenditure before the cultivation starts | 0.7300 | 18.65 |
| 4 | 4 | Estimating the labour requirements for the crop cultivation | 0.7642 | |
| 5 | 5 | Estimating the financial requirements for the crop cultivation | 0.8516 | |
| 6 | 6 | Calculating the finance in possession and to be raised before the crop cultivation | 0.8774 | |
| 7 | 7 | Calculating the inputs in possession and to be acquired before the crop cultivation | 0.8170 | |
| 8 | 8 | Planning for alternate means of marketing | 0.7317 | |

the total variability. Eight items were found to have significant loadings well above the limit of 0.45 (the cut off value fixed for the study). The items which represented this component were 'setting an objective of profit target from the crop', 'preparing calender of various operations of crop cultivation well in advance', 'working out operation-wise expenditure before the cultivation starts' 'estimating the labour requirements for the crop cultivation', 'estimating the financial requirement for the crop cultivaiton', 'calculating the finance in possession and to be raised before the crop cultivation', 'calculating the inputs in possession and to be acquired before the crop cultivation', and 'planning for alternate means of marketing'. All the eight items had very high factor loadings and none of the remaining 22 items had crossed the loading of 0.32 (Appendix IX). All these items are related to the mental exercise done by the farmers before an action is executed, and therefore, this component was named as 'planning'. It may be noted that these items have been theoretically categorised under 'planning' before the employment of factor analysis.

#### 4.1.2. Factor 2. Information management

The items of this factor with factor loadings are given in Table 3. The percentage contribution of 13.62 (second highest) to the total variability was due to this factor. The results of rotated factor structure indicated that five items were significantly loaded with factor 2. They were 'getting information on practices and solutions to problems from various information sources', discussing the information on practices with extension agents', 'collecting information on prices of various inputs from different sources',

Table 3. Factor 2 Information management

| Sl. No. | Item No. | Items | Factor loading | Percentage variance |
|---|---|---|---|---|
| 1 | 13 | Getting information on practices and solutions to problems from various information sources | 0.8202 | |
| 2 | 14 | Discussing the information on practices with extension agents | 0.8294 | |
| | | | | 13.26 |
| 3 | 15 | Collecting information on prices of various input from different sources. | 0.9004 | |
| 4 | 16 | Collecting information on price of produce from different sources | 0.8268 | |
| 5 | 17 | Recording the technical information received | 0.7331 | |

'collecting information on price of produce from different sources' and 'recording the technical information received'. All these five items are related to gathering information on various aspects with respect to cultivation of crops.Grouping of these items under the label 'information management' is in agreement with the theoretical categorisation as attempted earlier.

### 4.1.3. Factor 3. Financial management

The items grouped under this factor with their factor loadings and the percentage variance accounted are presented in Table 4. This factor had contributed to the tune of 12.84 per cent of total variability which was the third highest among the factors. Five items were found to influence this factor, all showing factor loadings exceeding 0.75. These included 'recording the expenditure incurred in various operations', 'recording the income obtained from sales of produce', 'calculating the profit or loss in the cultivation', 'fixing wages for labourers based on quantum of work turned out' and 'keeping reserve capital to meet unexpected and important practices'. Barring these five items, the other items had very weak loading much below 0.22 affirming that these five items were main contributors to this factor. The common content of these five items was money matters which is nothing but handling the finance possessed by the farmers. Hence, the factor could be named as 'financial management' with reasonable conviction.

### 4.1.4. Factor 4. Marketing management

The items grouped under this factor with their factor loadings and the percentage variance accounted are presented in Table

Table 4. Factor 3 Financial management

| Sl. No. | Item No. | I t e m s | Factor loading | Percentage variance |
|---|---|---|---|---|
| 1 | 18 | Recording the expenditure incurred in various operations | 0.8636 | |
| 2 | 19 | Recording the income obtained from sales of produce | 0.8344 | |
| 3 | 20 | Calculating the profit or loss in the cultivation | 0.8545 | 12.84 |
| 4 | 21 | Fixing wages for labourers based on quantum of work turned out | 0.8278 | |
| 5 | 22 | Keeping reserve capital to meet unexpected and important practices | 0.7555 | |

5. The percentage contribution of this factor to the total variability was 12.83 which was fourth in the order of contribution. Four items were found to have significant loadings well above the limit of 0.45. They were: 'postponing the sales when the current price is less and there is a possibility of price hike', 'making sales whole or part based on overall profit considerations', 'seeing that the price offered does not come lower than prevailing market price' and 'negotiating with the buyers for increase in the price of produce'. All these four items under this factor had very high factor loadings and none of the remaining 26 items had crossed the loading of 0.32 indicating that the factor is mainly associated to these four items. A mere look at the content of these items would reveal that they reflected the marketing activities performed by the farmers. It may be noted that these items have been theoretically categorised under 'marketing management' before the employment of factor analysis. Factor analysis also confirmed the grouping of these items under marketing. Hence, this factor was labelled as 'marketing management'.

### 4.1.5. Factor 5. Production management (practices)

The items which formed this component are given in Table 6. The contribution made by this factor to the total variability was 10.42 per cent. This factor comprised three items viz., 'proportion of the recommended fertilizer applied', 'following plant protection measures' and 'providing water during critical periods during acute shortage of soil moisture'. The items reflected the

Table 5. Factor 4 Marketing management

| Sl. No. | Item No. | Items | Factor loading | Percentage variance |
|---|---|---|---|---|
| 1 | 27 | Postponing the sales when the current price is less and there is a possibility of price hike | 0.6948 | |
| 2 | 28 | Making the sales in terms of part or whole based on overall profit considerations | 0.8176 | |
| | | | | 12.83 |
| 3 | 29 | Seeing that the price offered does not come lower than prevailing market price | 0.9149 | |
| 4 | 30 | Negotiating with the buyers for increase in price of produce | 0.8855 | |

Table 6. Factor 5 Production management (Practices)

| Sl. No. | Item No. | Items | Factor loading | Percentage variance |
|---|---|---|---|---|
| 1 | 24 | Proportion of the recommended fertilizers applied | 0.9249 | |
| 2 | 25 | Following the plant protection measures | 0.8299 | 10.42 |
| 3 | 26 | Providing water during critical periods of acute shortage of soil moisture | 0.6035 | |

cultivation practices followed by the farmers which would increase the production. The clear-cut similarity in the functional content of the grouped items facilitated the naming of the component as 'production management (practices)'.

### 4.1.6. Factor 6. Labour management

This factor had a contribution of 10.25 per cent to the total variability and was dominated by four items, all having loadings above 0.79 (Table 7). The items which formed this component were 'evaluating the labour efficiency by assessing the amount of work accomplished per unit time', 'using available family labour at appropriate time and operation', 'fixing labourers well in advance to overcome the constraint of labour unavailablity for the operations planned' and 'providing necessary amenities in the field itself for the labourers to reduce the wastage of time by labourers'. All these four items are related to managing labourers engaged in the cultivation and hence, the label 'labour management' was given to this factor.

### 4.1.7. Factor 7. Production management (variety)

This factor had only one item: 'proportion of land put under high yielding varieties' with significant factor loading and the factor had a percentage variance of 2.31 to the total variability. This item reflected the content 'variety' and as adoption of high yielding varieties by the farmers contribute more to the production, this single item component was given the labelling 'production management (variety)' (Table 8).

Table 7. Factor 6 Labour management

| Sl. No. | Item No. | Items | Factor loading | Percentage variance |
|---|---|---|---|---|
| 1 | 9 | Evaluating the labour efficiency by assessing the amount of work accomplished per unit time | 0.7970 | |
| 2 | 10 | Using available family labour at appropriate time and operation | 0.8303 | |
| | | | | 10.25 |
| 3 | 11 | Fixing labourers well in advance to overcome the constraint of labour unavailability for the operations planned | 0.8784 | |
| 4 | 12 | Providing necessary amenities in the field itself for the labourers to reduce wastage of time by labourers | 0.8251 | |

Table 8. Factor 7 Production management (Variety)

| Sl. No. | Item No. | Item | Factor loading | Percentage variance |
|---|---|---|---|---|
| 1 | 23 | Proportion of land put under high yielding varieties | 0.4686 | 2.31 |

The seven components arrived with the items grouped are represented in a schematic way in Fig.2. The order of the components identified have been rearranged as 'planning', 'labour management', 'information management', 'financial management', 'production management (variety)', 'production management (practices)' and 'marketing management' in order to have meaningful sequence of the components in terms of crop cultivation when presented to the farmers as well as for further analysis.

## 4.2. MANAGERIAL EFFICIENCY OF THE CASSAVA FARMERS

### 4.2.1. Distribution of the cassava farmers under low and high efficiency group

The percentage distribution of the farmers under low and high efficiency group, with respect to managerial efficiency and the managerial components for the total sample, states and district categories are furnished in the pages that follow.

#### 4.2.1.1. Distribution of the cassava farmers (total sample) based on their managerial efficiency and the managerial components

The percentage of the farmers under low and high efficiency group for managerial efficiency and the managerial components with the respective mean scores are presented in Table 9. It could be observed from the table that little more than half of the farmers (51.25 per cent) belonged to high group of managerial efficiency and the rest belonged to low efficiency group. Viewing the components of managerial efficiency individually, it could be observed that

FIG 3 SCHEMATIC REPRESENTATION OF SEVEN FACTOR MAXIMUM LIKELIHOOD SOLUTION OF ITEMS OF MANAGERIAL EFFICIENCY

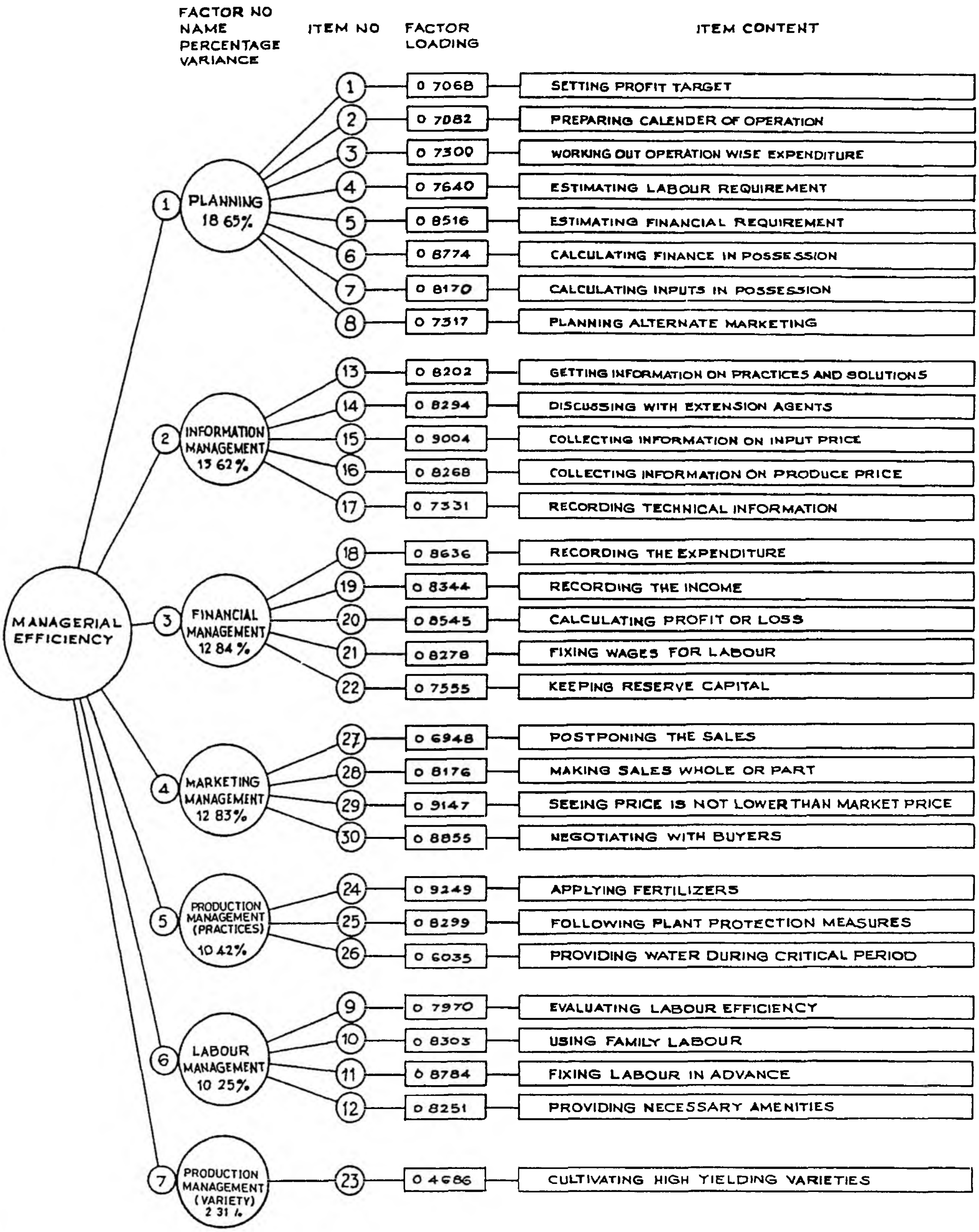


Table 9. Distribution of the farmers based on managerial efficiency and managerial components

| Managerial efficiency and components | | Mean score | Efficiency groups n = 240 | |
|---|---|---|---|---|
| | | | Low (%) | High (%) |
| I. | Managerial efficiency | [illegible] | 48.75 | 51.25 |
| II. | <u>Components</u> | | | |
| 1. | Planning | 2.39 | 48.75 | 51.25 |
| 2. | Labour management | 2.51 | 45.83 | 54.17 |
| 3. | Information management | 2.75 | 55.84 | 44.16 |
| 4. | Financial management | 3.74 | 45.83 | 54.17 |
| 5. | Production management (variety) | 2.49 | 52.08 | 47.92 |
| 6. | Production management (practices) | [illegible] | 62.50 | 37.50 |
| 7. | Marketing management | [illegible] | 45.83 | 54.17 |

Table 9. Distribution of the farmers based on managerial efficiency and managerial components

| | Managerial efficiency and components | Mean score | Efficiency groups n = 240 | |
|---|---|---|---|---|
| | | | Low (%) | High (%) |
| I. | Managerial efficiency | 83.85 | 48.75 | 51.25 |
| II. | <u>Components</u> | | | |
| | 1. Planning | 22.39 | 48.75 | 51.25 |
| | 2. Labour management | 12.51 | 45.83 | 54.17 |
| | 3. Information management | 12.75 | 55.84 | 44.16 |
| | 4. Financial management | 13.74 | 45.83 | 54.17 |
| | 5. Production management (variety) | 2.49 | 52.08 | 47.92 |
| | 6. Production management (practices) | 8.08 | 62.50 | 37.50 |
| | 7. Marketing management | 11.89 | 45.83 | 54.17 |

while similar distribution pattern as that of managerial efficiency existed for the component 'planning', the components namely, 'labour management', 'financial management' and 'marketing management' had identical distribution pattern of farmers with 54.17 per cent under high efficiency group. A reverse pattern of distribution with majority of the farmers under low efficiency group was found in the case of 'information management' (55.84 per cent), 'production management (variety)' (52.08 per cent) and 'production management (practices)' (62.50 per cent).

#### 4.2.1.2. <u>Distribution and comparison of the farmers of the states and district categories based on their managerial efficiency</u>

The distribution of the farmers of the two states and district categories in high and low group of managerial efficiency with respective mean scores are presented in Table 10. With regard to states, the distribution pattern revealed that while majority (55 per cent) of the farmers in Kerala belonged to low group, Tamil Nadu had majority (57.50 per cent) under high efficiency group. The significance of difference in managerial efficiency was tested by analysis of variance and the F-value is presented in Table 10. The mean score obtained by Tamil Nadu farmers was 88.80, which was higher than their counterpart in Kerala (78.90). The managerial efficiency of the farmers of Tamil Nadu was significantly higher than that of Kerala farmers. Hence, the hypothesis that there would be no significant difference in the managerial efficiency between the cassava farmers of Kerala and Tamil Nadu was rejected.

Table 10. Distribution and comparison of the farmers of the two states and district categories based on managerial efficiency

| State/District categories | Efficiency group Low (%) | High (%) | Mean score | Test of significance |
|---|---|---|---|---|
| | | | | ($F_{1,236}$) |
| I. <u>States</u> | | | | |
| 1. Kerala (n = 120) | 55.00 | 45.00 | 78.90 | 8.53** |
| 2. Tamil Nadu (n = 120) | 42.50 | 57.50 | 88.80 | |
| II. <u>Kerala State</u> | | | | |
| 1. Low productivity district (n = 60) | 65.00 | 35.00 | 76.81 | 0.75^NS |
| 2. High productivity district (n = 60) | 45.00 | 55.00 | 80.98 | |
| III. <u>Tamil Nadu State</u> | | | | |
| 1. Low productivity district (n = 60) | 61.67 | 38.33 | 77.75 | 21.24** |
| 2. High productivity district (n = 60) | 23.33 | 76.67 | 99.87 | |
| | | | | ($F_{1,238}$) |
| IV. 1. Non-industrial district (n = 180) | 57.22 | 42.77 | 78.51 | 29.68** |
| 2. Industrial district (n = 60) | 23.33 | 76.67 | 99.87 | |

** Significant at 1 per cent level

NS Not significant

The distribution of the farmers in the case of high and low productivity districts within Kerala and Tamil Nadu showed that while low productivity districts in both the states had more or less same proportion of farmers viz., 65.67 and 61.67 per cent under low group of managerial efficiency, the high productivity districts of Kerala and Tamil Nadu had majority of the farmers (55.00 and 76.67 per cent) under high group. The high productivity district of Tamil Nadu had however relatively larger proportion of the farmers in high group. The managerial efficiency mean scores of low productivity districts of Kerala and Tamil Nadu were 76.81 and 75.85, respectively, while high productivity districts of respective states had high mean scores (80.98 and 99.87). Eventhough, the mean score of high productivity district of Kerala was higher than low productivity district, the analysis of variance revealed that the difference was not significant. But a significant difference between high and low productivity districts of Tamil Nadu was found. Hence, the hypothesis that there would be no significant difference in the managerial efficiency between high and low productivity district categories was accepted in the case of Kerala state and rejected in the case of Tamil Nadu. .

The distribution pattern of the farmers in terms of non-industrial and industrial district revealed that high proportion of the farmers of non-industrial district were in low managerial efficiency group and only less than one-fourth of the farmers in the industrial district came under low group. The mean scores of these district categories also revealed the same trend with industrial district having higher mean score. The F-value computed indicated that the managerial efficiency of the farmers in the industrial district was significantly higher than those in the non-industrial district which led to the rejection of the hypothesis that there would be no significant difference in managerial efficiency between the farmers of industrial and non-industrial districts.

#### 4.2.1.3. Distribution and comparison of the farmers of the two states and district categories based on planning

The group-wise distribution of the farmers of the two states and district categories based on planning with the mean scores and the results of the analysis of variance between states and district categories are presented in Table 11. It could be observed that the percentage distribution of farmers, state and district category-wise was more or less a replica of managerial efficiency described previously. A perusal of the mean score revealed that the mean score of the farmers of Tamil Nadu was higher than that of Kerala. Similarly the farmers of the high productivity district of Kerala had slightly more mean score than that of the low productivity district. The mean score of the high productivity district of Tamil Nadu was much higher than that of the low productivity district and that of the farmers in the industrial district was very much higher than non-industrial district. Analysis of variance computed revealed similar results obtained in the case of managerial efficiency. The F-value computed indicated that the

Table 11. Distribution and comparison of the farmers of the two states and district categories based on planning

| State/District categories | Efficiency group | | Mean score | Test of significance |
|---|---|---|---|---|
| | Low (%) | High (%) | | |
| | | | | ($F_{1,236}$) |
| I. States | | | | |
| 1. Kerala | 55.00 | 45.00 | 20.71 | 12.27** |
| 2. Tamil Nadu | 41.67 | 58.38 | 24.07 | |
| II. Kerala State | | | | |
| 1. Low productivity district | 63.33 | 36.67 | 19.83 | 1.67NS |
| 2. High productivity district | 46.67 | 53.33 | 21.58 | |
| III. Tamil Nadu State | | | | |
| 1. Low productivity district | 60.00 | 40.00 | 20.68 | 24.91** |
| 2. High productivity district | 23.33 | 76.67 | 27.45 | |
| | | | | ($F_{1,238}$) |
| IV. 1. Non-industrial district | 61.67 | 38.33 | 20.07 | 37.18** |
| 2. Industrial district | 23.33 | 76.67 | 27.45 | |

** Significant at 1 per cent level

NS Not significant

farmers of Tamil Nadu were significantly different with respect of 'planning' when compared to those in Kerala. This led to the rejection of the hypothesis that there would be no significant difference between farmers of Kerala and Tamil Nadu with reference to the component 'planning'. While there was no significant difference in 'planning' between the farmers of low productivity and high productivity districts of Kerala, there was significant difference between these district categories in the case of Tamil Nadu. Similarly the farmers of industrial district were significantly better in 'planning' than those in the non-industrial district. Hence, the hypothesis that there would be no significant difference between the farmers of the low and high productivity district categories of Kerala in the 'planning' component was accepted. The same hypothesis in the case of low and high productivity district categories of Tamil Nadu state and industrial and non-industrial district categories, was rejected.

#### 4.2.1.4. Distribution and comparison of the two states and district categories based on labour management

The percentage distribution of the farmers based on the component 'labour management' and results of analysis of variance are given in Table 12. The distribution pattern revealed that majority of the farmers of both the states, 52.50 per cent in Kerala and 55.83 per cent in Tamil Nadu were in high efficiency group of 'labour management'. The district category-wise distribution pattern also showed that all district categories had majority of the farmers in

Table 12. Distribution and comparison of the farmers of the two states and district categories based on labour management

| State/District categories | Efficiency group | | Mean score | Test of significance |
|---|---|---|---|---|
| | Low (%) | High (%) | | |
| | | | | ($F_{1,236}$) |
| I. States | | | | |
| 1. Kerala | 47.50 | 52.50 | 12.16 | $0.99^{NS}$ |
| 2. Tamil Nadu | 44.17 | 55.83 | 12.86 | |
| II. Kerala State | | | | |
| 1. Low productivity district | 48.33 | 51.67 | 11.73 | $0.71^{NS}$ |
| 2. High productivity district | 46.66 | 53.33 | 12.58 | |
| III. Tamil Nadu State | | | | |
| 1. Low productivity district | 48.33 | 51.67 | 12.18 | $1.87^{NS}$ |
| 2. High productivity district | 40.00 | 60.00 | 13.55 | |
| | | | | ($F_{1,238}$) |
| IV. 1. Non-industrial district | 47.77 | 52.23 | 12.17 | $2.83^{NS}$ |
| 2. Industrial district | 40.00 | 60.00 | 13.55 | |

NS Not significant

high category of 'labour management'. It is clear from the mean scores furnished in Table 12 that there was not much difference in the mean scores of states and district categories. The results of analysis of variance also indicated that none of the groups compared exhibited significant difference in this component. Hence, the hypothesis that there would be no significant difference in the 'labour management' component between the states and between various district categories was accepted.

#### 4.2.1.5. Distribution and comparison of the farmers of the two states and district categories based on information management

The grouping of farmers based on 'information management' presented in Table 13 revealed altogether a different picture of distribution pattern when compared to the components mentioned earlier. Majority of the farmers from both Kerala (60 per cent) and Tamil Nadu (51.67 per cent) belonged to low efficiency group of information management. Similar was the distribution pattern with regard to district categories with majority of the farmers congregating in the low group excepting those in the high productivity district of Tamil Nadu and in the industrial district which had majority of the farmers under high group. The results of analysis of variance revealed that the Tamil Nadu farmers were significantly better in 'information management' than those in Kerala. This led to the rejection of the hypothesis that there would be no significant difference in 'information management' between the

Table 13. Distribution and comparison of the farmers of the two states and district categories based on information management

| State/District categories | Efficiency group | | Mean score | Test of significance |
|---|---|---|---|---|
| | Low (%) | High (%) | | |
| | | | | $(F_{1,236})$ |
| I. <u>States</u> | | | | |
| 1. Kerala | 60.00 | 40.00 | 11.97 | $5.25^{*}$ |
| 2. Tamil Nadu | 51.67 | 48.33 | 13.53 | |
| II. <u>Kerala State</u> | | | | |
| 1. Low productivity district | 60.00 | 40.00 | 12.13 | $0.12^{NS}$ |
| 2. High productivity district | 60.00 | 40.00 | 11.80 | |
| III. <u>Tamil Nadu</u> | | | | |
| 1. Low productivity district | 68.33 | 31.67 | 11.28 | $21.43^{**}$ |
| 2. High productivity district | 35.00 | 65.00 | 15.78 | |
| | | | | $(F_{1,238})$ |
| IV. 1. Non-industrial district | 62.78 | 37.22 | 11.74 | $26.18^{**}$ |
| 2. Industrial district | 35.00 | 65.00 | 15.78 | |

** Significant at 1 per cent level

* Significant at 5 per cent level

NS Not significant

Table 14. Distribution and comparison of the farmers of the two states and district categories based on financial management

| State/District categories | Efficiency group Low (%) | High (%) | Mean score | Test of significance |
|---|---|---|---|---|
| | | | | ($F_{1,236}$) |
| I. States | | | | |
| 1. Kerala | 48.33 | 51.67 | 13.28 | $1.43^{NS}$ |
| 2. Tamil Nadu | 43.33 | 56.67 | 14.19 | |
| II. Kerala State | | | | |
| 1. Low productivity district | 48.33 | 51.67 | 13.20 | $0.02^{NS}$ |
| 2. High productivity district | 48.33 | 51.67 | 13.37 | |
| III. Tamil Nadu State | | | | |
| 1. Low productivity district | 51.67 | 48.33 | 12.91 | $5.68^{*}$ |
| 2. High productivity district | 35.00 | 65.00 | 15.47 | |
| | | | | ($F_{1,238}$) |
| IV. 1. Non-industrial district | 49.44 | 50.56 | 13.16 | $6.96^{**}$ |
| 2. Industrial district | 35.00 | 65.00 | 15.47 | |

** Significant at 1 per cent level

* Significant at 5 per cent level

NS Not significant

productivity districts of Tamil Nadu and between industrial and non-industrial districts. Based on these findings, the hypothesis that there would be no significant difference in 'financial management' between the farmers of Kerala and Tamil Nadu and between low productivity and high productivity districts of Kerala state was accepted and the same hypothesis was rejected in the case of low and high productivity districts of Tamil Nadu and between industrial and non-industrial district.

4.2.1.7. Distribution and comparison of the farmers of the two states and district categories based on production management (variety)

The distribution of the farmers in high and low efficiency group of 'production management (variety)' is presented in Table 15. It could be observed from the table that a criss-cross pattern of distribution emerged with nearly two-thirds of Tamil Nadu farmers in the high group while more than two-thirds of the Kerala farmers were found in the low group. The results also succintly point out to the discriminating nature of this component with specific reference to Kerala farmers. It is interesting to note that only in the case of this component, there is a substantial difference in the distribution of the farmers of the low productivity district (20 per cent in high group) and high productivity district (45 per cent in high group) of Kerala in low and high efficiency groups. In Tamil Nadu the inequality was still more distinct with nearly cent per cent of farmers of high productivity district in high group and only

Table 15. Distribution and comparison of the farmers of the two states and district categories based on production management (variety)

| State/District categories | Efficiency group Low (%) | High (%) | Mean score | Test of significance |
|---|---|---|---|---|
| | | | | ($F_{1,236}$) |
| I. <u>States</u> | | | | |
| 1. Kerala | 67.50 | 32.50 | 1.93 | 44.04** |
| 2. Tamil Nadu | 36.67 | 63.33 | 3.06 | |
| II. <u>Kerala State</u> | | | | |
| 1. Low productivity district | 80.00 | 20.00 | 1.58 | 8.01** |
| 2. High productivity district | 55.00 | 45.00 | 2.26 | |
| III. <u>Tamil Nadu</u> | | | | |
| 1. Low productivity district | 71.67 | 28.33 | 2.02 | 74.41** |
| 2. High productivity district | 1.67 | 98.33 | 4.10 | |
| | | | | ($F_{1,238}$) |
| IV. 1. Non-industrial district | 68.89 | 31.11 | 1.95 | 118.25** |
| 2. Industrial district | 1.67 | 98.33 | 4.10 | |

** Significant at 1 per cent level

28 per cent of farmers of low productivity district were in high group. Similar result was obtained in the categorisation based on industrialisation wherein the industrial district had cent per cent of the farmers in the high group. The analysis of variance revealed a result of different nature in which it could be seen that significant differences existed in all the comparisons made. This led to the rejection of the hypothesis that there would be no significant difference in 'production management (variety)' between the farmers of the two states and between various district categories.

4.2.1.8. <u>Distribution and comparison of the farmers of the two states and district categories based on production management (practices)</u>

The results presented in Table 16 revealed that nearly one-fourth of the Kerala farmers and half of the Tamil Nadu farmers were in the high efficiency group of this component. The distribution pattern of the low and high productivity districts of Kerala state was identical. In the case of Tamil Nadu, the low productivity district had two-thirds of the farmers under the low group and the high productivity district had the same proportion under the high group. A result of similar kind was observed in the case of non-industrial and industrial districts also. It is sagacious from the F-values that barring the comparison between low and high productivity districts of Kerala, the other comparisons in terms of state and district categories displayed a significant difference. Hence, the hypothesis that there would be no significant difference

Table 16. Distribution and comparison of the farmers of the two states and district categories based on production management (practices)

| State/District categories | Efficiency group | | Mean score | Test of significance |
|---|---|---|---|---|
| | Low (%) | High (%) | | |
| | | | | $(F_{1,236})$ |
| I. <u>States</u> | | | | |
| 1. Kerala | 75.83 | 24.17 | 7.13 | $28.52^{**}$ |
| 2. Tamil Nadu | 49.17 | 50.83 | 9.04 | |
| II. <u>Kerala State</u> | | | | |
| 1. Low productivity district | 76.67 | 23.33 | 6.85 | $1.18^{NS}$ |
| 2. High productivity district | 75.00 | 25.00 | 7.40 | |
| III. <u>Tamil Nadu State</u> | | | | |
| 1. Low productivity district | 66.67 | 33.33 | 7.28 | $47.96^{**}$ |
| 2. High productivity district | 31.67 | 68.33 | 10.29 | |
| | | | | $(F_{1,238})$ |
| IV. 1. Non-industrial district | 72.78 | 27.22 | 7.18 | $76.71^{**}$ |
| 2. Industrial district | 31.67 | 68.33 | 10.79 | |

** Significant at 1 per cent level

NS Not significant

in 'production management (practices)' between the low and high productivity districts of Kerala was accepted and the same hypothesis was rejected in the case of Kerala and Tamil Nadu, the high and low productivity districts of Tamil Nadu and the industrial and non-industrial districts.

#### 4.2.1.9. Distribution and comparison of the farmers of the two states and district categories based on marketing management

The categorisation of farmers of the two states and district categories based on 'marketing management' is presented in Table 17. A glance at the table indicated that the proportion of the farmers in the low and high efficiency groups was repetition of the one observed with respect to 'labour management'. All the district categories and the two states had majority of the farmers in the high efficiency group of 'marketing management'. None of the groups compared produced a significant difference as revealed by the analysis of variance. Hence, the hypothesis that there would be no significant difference in marketing management' between states and between various district categories was accepted.

### 4.2.2. Component-wise relative performance of the cassava farmers

The mean score percentage for each component was worked out to rank the components from the best to least performed ones by the farmers. The component wise relative performance of the farmers for the overall sample, the two states and the district categories are given below.

Table 17. Distribution and comparison of the farmers of the two states and district categorisation based on marketing management

| State/District categories | Efficiency group | | Mean score | Test of significance |
|---|---|---|---|---|
| | Low (%) | High (%) | | |
| | | | | $(F_{1,236})$ |
| I. States | | | | |
| 1. Kerala | 46.66 | 53.34 | 11.73 | $0.27^{NS}$ |
| 2. Tamil Nadu | 45.00 | 55.00 | 12.06 | |
| II. Kerala State | | | | |
| 1. Low productivity district | 48.33 | 51.67 | 11.48 | $0.32^{NS}$ |
| 2. High productivity district | 45.00 | 55.00 | 11.98 | |
| III. Tamil Nadu State | | | | |
| 1. Low productivity district | 48.33 | 51.67 | 11.38 | $2.36^{NS}$ |
| 2. High productivity district | 41.67 | 58.33 | 12.73 | |
| | | | | $(F_{1,238})$ |
| IV. 1. Non-industrial district | 47.22 | 52.78 | 11.62 | $2.43^{NS}$ |
| 2. Industrial district | 41.67 | 58.33 | 12.73 | |

NS Not significant

### 4.2.2.1. Component-wise relative performance of the farmers

The mean score percentage of the components (overall sample) is presented in Table 18. From the table, it could be observed that the relative performance of farmers was in the order of 'labour management', 'marketing management', 'planning', 'financial management', 'production management (practices)', 'information management and 'production management (variety)'.

### 4.2.2.2. Component-wise relative performance of the farmers of the states and district categories

The data on the component wise relative performance of the farmers belonging to the Kerala and Tamil Nadu states are given in Table 19. It could be seen from the table that the components were performed in the order of 'labour management', 'marketing management', 'financial management', 'planning', 'information management', 'production management (practices)' and 'production management (variety)', by the Kerala farmers and that of Tamil Nadu were 'labour management', 'production management (variety)', 'marketing management', 'production management (practices)', 'planning', 'financial management' and 'information management'.

A certain degree of non-agreement could be seen in the rank orders of the managerial components for Kerala and Tamil Nadu. Rank correlation was worked out to find out the degree of agreement in the component-wise performance. The rank correlation between the orders of component-wise performance of Kerala and Tamil Nadu

Table 18. Component-wise relative performance of the farmers (Total sample)

| | Components | Mean score percentage | Rank |
|---|---|---|---|
| 1. | Planning | 55.98 | 3 |
| 2. | Labour management | 62.55 | 1 |
| 3. | Information management | 51.00 | 6 |
| 4. | Financial management | 54.96 | 4 |
| 5. | Production management (variety) | 49.80 | 7 |
| 6. | Production management (practices) | 53.87 | 5 |
| 7. | Marketing management | 59.45 | 2 |

Table 19. Component-wise relative performance of the farmers of Kerala and Tamil Nadu states

| Components | Kerala | | Tamil Nadu | |
|---|---|---|---|---|
| | Mean score percentage | Rank | Mean score percentage | Rank |
| 1. Planning | 51.78 | 4 | 60.18 | 5 |
| 2. Labour management | 60.80 | 1 | 64.30 | 1 |
| 3. Information management | 47.88 | 5 | 54.12 | 7 |
| 4. Financial management | 53.12 | 3 | 56.76 | 6 |
| 5. Production management (variety) | 38.60 | 7 | 61.20 | 2 |
| 6. Production management (practices) | 47.53 | 6 | 60.26 | 4 |
| 7. Marketing management | 58.65 | 2 | 60.30 | 3 |

Rank correlation coefficient $0.21^{NS}$

NS Not significant

farmers was not significant (0.21) revealing that there was no agreement in the order of component-wise performance between Kerala and Tamil Nadu farmers.

The data on component-wise relative performance of the farmers of low and high productivity districts of Kerala and Tamil Nadu are presented in Tables 20 and 21 respectively. For the low productivity district of Kerala, it was in the order of 'labour management', 'marketing management', 'financial management', 'planning', 'information management', 'production management (practices), and 'production management (variety)'. In the case of the high productivity district of Kerala, the order was more or less the same except for 'planning' and 'financial management' which had taken third and fourth place and 'production management (practices)' and 'information management' taking fifth and sixth places respectively (Table 20). The similarity in the rank orders of components of these two districts was confirmed by significant rank correlation coefficient (0.93).

In the Table 21, it could be noticed that the farmers of the low productivity district of Tamil Nadu performed their best in 'labour management' followed by 'marketing management', 'planning', 'financial management', 'production management (practices)', 'information management' and 'production management (variety)'. A totally different picture emerged in the case of the high productivity district with 'production management (variety)' as the first one followed by 'production management (practices)', 'planning', 'labour management', 'marketing management', 'information

Table 20. Component-wise relative performance of the farmers of low and high productivity district categories of Kerala state

| | Components | Low productivity | | High productivity | |
|---|---|---|---|---|---|
| | | Mean score Percentage | Rank | Mean score Percentage | Rank |
| 1. | Planning | 49.58 | 4 | 53.95 | 3 |
| 2. | Labour management | 58.65 | 1 | 62.90 | 1 |
| 3. | Information management | 47.20 | 5 | 48.52 | 6 |
| 4. | Financial management | 52.80 | 3 | 53.48 | 4 |
| 5. | Production management (variety) | 31.60 | 7 | 45.20 | 7 |
| 6. | Production management (practices) | 45.67 | 6 | 49.33 | 5 |
| 7. | Marketing management | 57.40 | 2 | 59.90 | 2 |

Rank correlation coefficient $0.93^{**}$

** Significant at 1 per cent level

Table 21. Component-wise relative performance of the farmers of low and high productivity district categories of Tamil Nadu State

| | Components | Low productivity | | High productivity | |
|---|---|---|---|---|---|
| | | Mean score percentage | Rank | Mean score Percentage | Rank |
| 1. | Planning | 51.70 | 3 | 68.63 | 3 |
| 2. | Labour management | 60.90 | 1 | 67.75 | 4 |
| 3. | Information management | 45.12 | 6 | 63.12 | 6 |
| 4. | Financial management | 51.64 | 4 | 61.84 | 7 |
| 5. | Production management (variety) | 41.40 | 7 | 82.00 | 1 |
| 6. | Production management (practices) | 48.53 | 5 | 71.86 | 2 |
| 7. | Marketing management | 56.90 | 2 | 63.65 | 5 |

Rank correlation coefficient - $0.29^{NS}$

NS Not significant

management' and 'financial management'. The rank correlation coefficient was not significant, (-0.29) indicating lack of agreement between the orders of component-wise performance of farmers of these two categories of district.

The relative performance of the components by the farmers in the non-industrial and industrial districts is presented in Table 22. The order of components for the non-industrial district was same as that of the low productivity district of Tamil Nadu and the high productivity district of Kerala with exception of 'planning' and 'financial management' interchanging the adjacent rank positions. In the case of industrial district, the order of performance was same as that of the high productivity district of Tamil Nadu, since these were represented by same district (Salem). The rank correlation coefficient worked out between the industrial and non-industrial district was not significant (-0.43), revealing that there was no agreement between the order of component-wise performance of farmers of non-industrial and industrial districts.

From the rank correlation worked out for the two states and various pairs of district categories, it was found that there was agreement only between the low and high productivity districts of Kerala which were otherwise considered as non-industrial districts also. Further rank correlation coefficient showed no agreement between the non-industrial and the industrial district. Hence, it was assumed that there would be concordance in the relative performance in the

Table 22. Component-wise relative performance of the farmers of non-industrial and industrial districts

| | Components | Non-industrial | | Industrial | |
|---|---|---|---|---|---|
| | | Mean score percentage | Rank | Mean score percentage | Rank |
| 1. | Planning | 51.75 | 4 | 68.63 | 3 |
| 2. | Labour management | 60.85 | 1 | 67.75 | 4 |
| 3. | Information management | 46.96 | 6 | 63.12 | 6 |
| 4. | Financial management | 52.64 | 3 | 61.88 | 7 |
| 5. | Production management (variety) | 39.00 | 7 | 82.00 | 1 |
| 6. | Production management (practices) | 47.87 | 5 | 71.83 | 2 |
| 7. | Marketing management | 58.10 | 2 | 63.65 | 5 |

Rank correlation coefficient - $0.43^{NS}$

NS Not significant

components by the farmers of the three non-industrial districts. Kendall's coefficient of concordance was worked out with the rank orders of the components of the three non-industrial districts. It showed that there was a significant concordance (w = 0.551, s = 246.86*) among the orders of performance in the components by the farmers of non-industrial districts.

## 4.3. IMPORTANT COMPONENTS OF THE MANAGERIAL EFFICIENCY OF CASSAVA FARMERS

### 4.3.1. Managerial components in relation to profit in cassava crop enterprise

Simple correlation was worked out between managerial components score of the farmers and the profit accrued in the crop enterprise and the results are presented in Table 23. It is clear from the table that all the seven managerial components included in the scale were positively and significantly related with the profit, thus establishing that better the farmers' performance in these components higher will be the profit accrued.

### 4.3.2. Relative importance of the managerial components

The technique of step-wise regression was employed to obtain information about the variation in profit as explained by the variation in each of the important components. Further, step-wise regression selects the best sub-set of the components in predicting the profit.

Table 23. Correlation of the managerial components with the profit

| Sl.No. | Managerial components | 'r' value |
| --- | --- | --- |
| 1. | Planning $X_1$ | $0.7310^{**}$ |
| 2. | Labour management $X_2$ | $0.6389^{**}$ |
| 3. | Information management $X_3$ | $0.7060^{**}$ |
| 4. | Financial management $X_4$ | $0.7183^{**}$ |
| 5. | Production management (variety) $X_5$ | $0.4718^{**}$ |
| 6. | Production management (practices) $X_6$ | $0.6163^{**}$ |
| 7. | Marketing management $X_7$ | $0.6248^{**}$ |

** Significant 1 per cent level

The results of the step-wise regression are presented in Table 24. It could be observed from the table that among the seven components, 'planning' stood out as the most important component as it explained variation in the profit to the tune of 53.44 per cent. The predictive power increased with the inclusion of the other components in successive steps.

Step number two included one more component 'financial management' which along with 'planning' explained 62.97 per cent variation. The step which gave the highest $R^2$ value was taken as the last step in which all the components included were significant. The last step comprised 'information management', along with the above two. All these together explained 68.01 per cent variation in the profit which was the maximum in the step-wise regression model with a significant F-value.

The partial regression coeffecients of all the three components screened as relatively important ones by the step-wise analysis were significant as evident from t-value presented in Table 25.

The best regression equation derived from the analysis was significant in predicting the profit. The regression equation obtained was:

$$Y = 24.9024 + 0.6364\ x_3^{**} + 0.6472\ x_4^{**} + 0.4461\ x_1^{**}$$

From the equation, it could be said that a unit change in the components of 'information management', 'financial management' and

Table 24. Step-wise regression analysis of the managerial components

| Step No | Managerial components included in regression analysis | F ratio | % Variation explained |
|---|---|---|---|
| 1. | Planning $X_1$ | 273.1148 | 53.44 |
| 2. | Planning $X_1$<br>Financial management $X_4$ | 201.5842 | 62.97 |
| 3. | Planning $X_1$<br>Financial management $X_4$<br>Information management $X_3$ | 167.272 | 68.01 |

Table 25. Partial regression coefficients of the managerial components

| Managerial component NO. | Managerial component | Regression co-efficient | SE of (b) | 't' value |
|---|---|---|---|---|
| $X_3$ | Information management | 0.6364 | 0.1048 | 6.0734** |
| $X_4$ | Financial management | 0.6472 | 0.1017 | 6.3638** |
| $X_1$ | Planning | 0.4461 | 0.0793 | 5.6254** |

** Significant at 1 per cent level

'planning' would result in an increase of 0.6364, 0.6472 and 0.4461 units in the profit respectively.

The step-wise regression analysis proved that among the seven components, three of them, namely, 'information management', 'financial management' and 'planning' were distinctly contributing to the profit increase and hence, these three components were regarded as relatively more important than other four components of managerial efficiency.

Based on this, the hypothesis that there would be no significant difference in the importance among the managerial components in terms of their contribution to profit was rejected.

## 4.4. RELATIONSHIP BETWEEN THE SOCIO-PSYCHOLOGICAL AND SITUATIONAL FACTORS OF CASSAVA FARMERS WITH THEIR MANAGERIAL EFFICIENCY

The relationship of the socio-psychological and situational variables with the managerial efficiency of farmers is established in this study from the findings of multiple regression analysis as it gives the contribution of each* variable to managerial efficiency when other factors are kept constant and by path analysis which reveals the direct and indirect effects of the variables on managerial efficiency.

### 4.4.1. Contribution of the socio-psychological and situational factors to managerial efficiency

The results of multiple regression analysis done with the 15 independent variables against managerial efficiency are presented in Table 26. The F-value obtained from the analysis was significant indicating that the variables put together contributed significantly to the variation in the managerial efficiency of farmers. The coefficient of determination worked out was 0.9325 which revealed that over 93 per cent of the variation in managerial efficiency was explained by all the variables selected for the study. Hence, the hypothesis that the variation in the managerial efficiency of the farmers would not be explained by the socio-psychological and situational factors included in the study was rejected.

The partial regression coefficients computed showed that out of the 12 socio-psychological variables, six factors namely, closeness with agricultural support system, market perception, achievement motivation, economic motivation, attitude towards scientific management in crop enterprise, knowledge on scientific management in crop enterprise and all the three situational factors viz., cultivated holding, area under cassava and irrigation potential were significant in contributing to the managerial efficiency of the farmers. Hence, the hypothesis that there would be no significant contribution of each of socio-psychological and situational factors towards managerial efficiency was rejected in the case of the nine factors mentioned above. The variables which did not exhibit significant regression coefficient were education, social participation, extension participation, mass media participation, infrastructural facilities and orientation towards competition. Therefore, the hypothesis that

Table 26. Multiple regression analysis of the socio-psychological and situational factors with managerial efficiency of the farmers

| Variable No. | Variable name | Regression coefficient 'b' | 't' value | $R^2$ | 'F' value |
|---|---|---|---|---|---|
| $X_1$ | Education | $-1.1829^{NS}$ | 1.5784 | | |
| $X_2$ | Social participation | $0.1963^{NS}$ | 0.7564 | | |
| $X_3$ | Extension participation | $0.4604^{NS}$ | 0.5693 | | |
| $X_4$ | Mass media participation | $-0.2580^{NS}$ | 0.3229 | | |
| $X_5$ | Closeness with agricultural support system | $2.7289^{**}$ | 3.8740 | | |
| $X_6$ | Infrastructural facilities | $-0.7986^{NS}$ | 1.2373 | | |
| $X_7$ | Market perception | $4.5318^{**}$ | 3.7204 | | |
| $X_8$ | Achievement motivation | $1.9293^{*}$ | 2.2274 | | |
| $X_9$ | Economic motivation | $2.3606^{**}$ | 4.2748 | 0.9325 | $206.2772^{**}$ |
| $X_{10}$ | Orientation towards competition | $0.2835^{NS}$ | 0.9146 | | |
| $X_{11}$ | Attitude towards scientific management in crop enterprise | $1.5870^{**}$ | 4.1878 | | |
| $X_{12}$ | Knowledge on scientific management in crop enterprise | $1.0531^{**}$ | 4.7154 | | |
| $X_{13}$ | Cultivated holding | $-5.1092^{**}$ | 3.2098 | | |
| $X_{14}$ | Area under cassava | $8.3516^{**}$ | 2.7572 | | |
| $X_{15}$ | Irrigation potential | $0.1752^{**}$ | 2.7201 | | |

** Significant at 1 per cent level

* Significant at 5 per cent level

there would be no significant contribution to managerial efficiency by each of these six variables was accepted. The multiple regression equation predicting the managerial efficiency was as follows.

$$
\begin{aligned}
Y \quad = {} & 16.7310 - 1.1829\ X_1^{NS} + 0.1963\ X_2^{NS} + 0.4604\ X_3^{NS} \\
& - 0.2580\ X_4^{NS} + 2.7289\ X_5^{**} - 0.7986\ X_6^{NS} + \\
& 4.5318\ X_7^{**} + 1.9293\ X_8^{*} + 2.3606\ X_9^{**} + \\
& 0.2835\ X_{10}^{NS} + 1.5870\ X_{11}^{**} + 1.0531\ X_{12}^{**} \\
& - 5.1092\ X_{13}^{**} + 8.3516\ X_{14}^{**} + 0.1752\ X_{15}^{**}
\end{aligned}
$$

From the prediction equation it could be said that an increase in the closeness with agricultural support system would lead to an increase in managerial efficiency by 2.7289 units, other factors being kept constant. Similarly, a unit increase in market perception, achievement motivation, economic motivation, attitude towards scientific management in crop enterprise, knowledge on scientific management is crop enterprise, area under cassava and irrigation potential would lead to an increase in the managerial efficiency by 4.5318, 1.9293, 2.3606, 1.5870, 1.0531, 8.3516 and 0.1732 units, respectively. While positive changes in the above variables would lead to increase in managerial efficiency, the lone variable 'cultivated holding' showed that an increase by one unit would lead to a decrease in managerial efficiency by 5.1092 units.

### 4.4.2. Direct and indirect effects of the socio-psychological and situational variables of the farmers on their managerial efficiency

In order to gain insight into the path through which the independent variables exert influence on managerial efficiency both directly and indirectly, path analysis was carried out with all the independent variables (Appendix XVI).

The results of path analysis are presented in Table 27 and illustrated in Fig.4. From the Table 27, it is evident that the variable closeness with agricultural support system had the highest positive and direct effect (0.2463) on managerial efficiency. There were positive and direct effects of knowledge on scientific management (0.2419), market perception (0.1984), economic motivation (0.1429), attitude towards scientific management (0.1425), area under cassava (0.1286), irrigation potential (0.0893) and achievement motivation (0.0621) in that order of importance in terms of their direct effect on the managerial efficiency of the farmers.

Cultivated holding had a substantial but a negative direct effect (-0.1423) and infrastructural facilities also showed a negative direct effect (-0.060). The direct effects of orientation towards competition, mass media participation, education, extension participation and social participation were 0.0334, -0.0312, 0.0293, 0.0231 and 0.0139 respectively which were having relatively less direct effects.

Further it could be seen from Table 27 that out of the 45 substantial indirect effects, the variables knowledge on scientific management, closeness with agricultural support system and market perception had substantial indirect effects of as many as fourteen, thirteen and eleven variables channelled through these variables.

FIG 4 PATH DIAGRAM OF THE SOCIO PSYCHOLOGICAL AND SITUATIONAL FACTORS

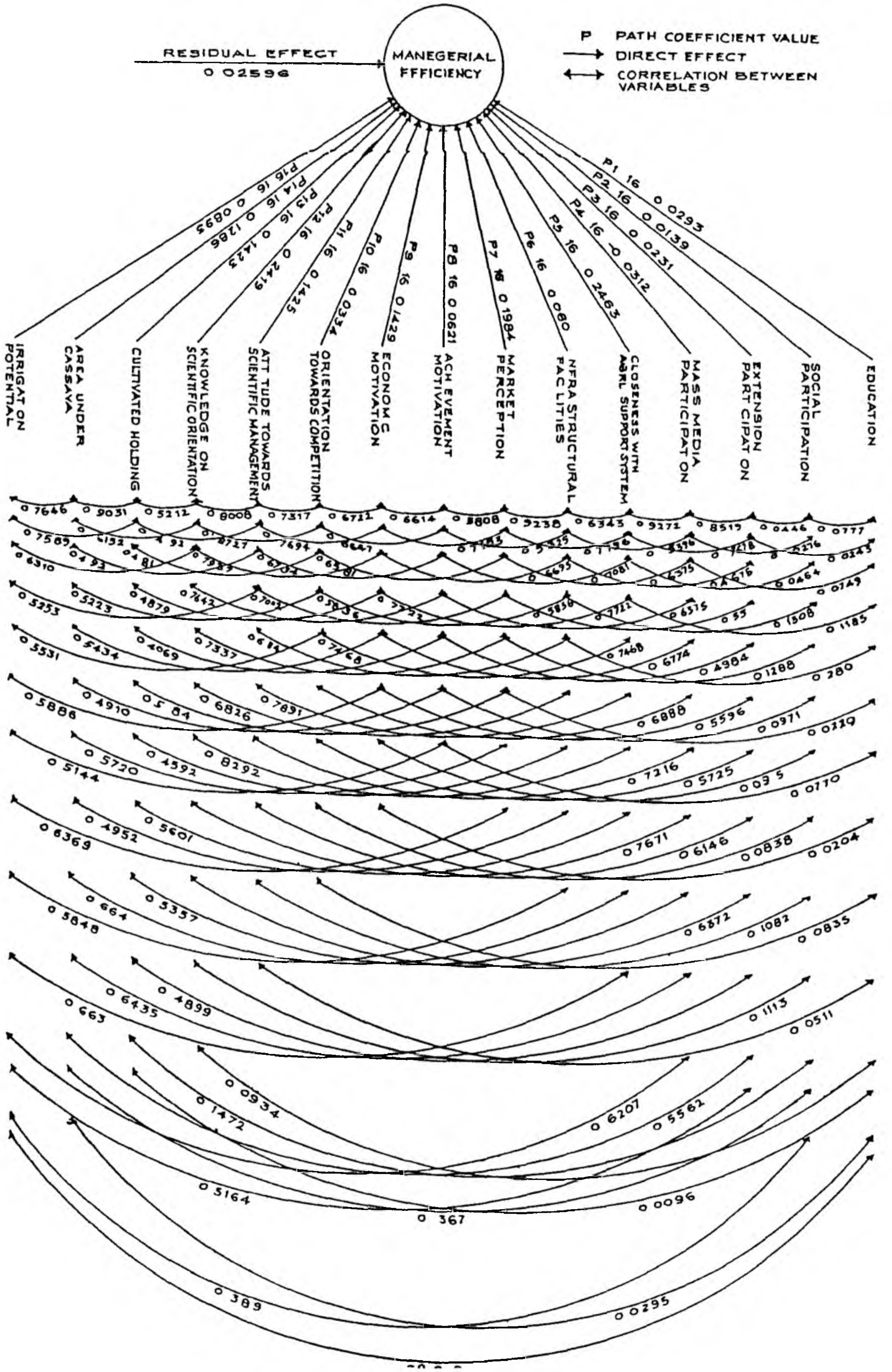


Table 27. Direct and indirect effects of the socio-psychological and situational factors on managerial efficiency

| Variable No. | Variable name | Direct effect | Total Indirect effect | Substantial indirect effect channelled through I | II | III |
|---|---|---|---|---|---|---|
| $X_1$ | Education | 0.0293 | 0.0042 | 0.0292 ($X_5$) | 0.0226 ($X_{12}$) | 0.0048 ($X_8$) |
| $X_2$ | Social participation | 0.0139 | 0.0845 | 0.2693 ($X_{12}$) | 0.0255 ($X_7$) | - 0.0209 ($X_{13}$) |
| $X_3$ | Extension participation | 0.0231 | 0.6633 | 0.1891 ($X_5$) | 0.1541 ($X_{12}$) | 0.1091 ($X_7$) |
| $X_4$ | Mass media participation | - 0.0312 | 0.4916 | 0.2284 ($X_5$) | 0.1856 ($X_{12}$) | 0.1265 ($X_7$) |
| $X_5$ | Closeness with agrl. support system | 0.2463 | 0.6483 | 0.2006 ($X_{12}$) | 0.1428 ($X_7$) | 0.1125 ($X_{11}$) |
| $X_6$ | Infrastructural facilities | - 0.0600 | 0.7882 | 0.1833 ($X_7$) | 0.1651 ($X_{12}$) | 0.1562 ($X_5$) |
| $X_7$ | Market perception | 0.1984 | 0.6111 | 0.1772 ($X_5$) | 0.1775 ($X_{12}$) | 0.1020 ($X_9$) |
| $X_8$ | Achievement motivation | 0.0621 | 0.6973 | 0.1849 ($X_{12}$) | 0.1744 ($X_5$) | 0.1152 ($X_7$) |
| $X_9$ | Economic motivation | 0.1429 | 0.7035 | 0.1920 ($X_{12}$) | 0.1902 ($X_5$) | 0.1419 ($X_7$) |
| $X_{10}$ | Orientation towards competition | 0.0334 | 0.7797 | 0.2111 ($X_{12}$) | 0.1839 ($X_5$) | 0.1306 ($X_7$) |
| $X_{11}$ | Attitude towards scientific management | 0.1425 | 0.7634 | 0.1944 ($X_5$) | 0.1937 ($X_{12}$) | 0.1389 ($X_7$) |
| $X_{12}$ | Knowledge on scientific management | 0.2419 | 0.6117 | 0.2042 ($X_5$) | 0.1456 ($X_7$) | 0.1140 ($X_{11}$) |
| $X_{13}$ | Cultivated holding | - 0.1423 | 0 6889 | 0.1379 ($X_5$) | 0.1261 ($X_{12}$) | 0.1161 ($X_{14}$) |
| $X_{14}$ | Area under cassava | 0.1286 | 0.5288 | 0.1635 ($X_5$) | 0.1488 ($X_{12}$) | - 0.1285 ($X_{13}$) |
| $X_{15}$ | Irrigation potential | 0.0893 | 0.6013 | 0.1641 ($X_5$) | 0.1526 ($X_{12}$) | 0.1264 ($X_7$) |

Out of 45 substantial indirect effects, 14 effects routed through $X_{12}$, 13 through $X_5$, 11 through $X_7$, 2 each through $X_{13}$ and $X_{11}$, 1 each through $X_8$ and $X_{14}$.

Moreover, the variables cultivated holding and attitude towards scientific management had indirect effects of two variables channelled through each of the variables. The indirect effect of one variable was channelled through the variables economic motivation, area under cassava and achievement motivation.

It could be observed from the multiple regression analysis and path analysis that the variables which had significant partial regression coefficients also showed relatively higher direct effects as compared to the ones which did not show significant partial regression coefficients. From this, it could be concluded that the nine variables namely, closeness with agricultural support system, market perception, achievement motivation, economic motivation, attitude towards scientific management, knowledge on scientific management, cultivated holding, area under cassava and irrigation potential had significant relationship with managerial efficiency.

## 4.5. MANAGERIAL CONSTRAINTS AS PERCEIVED BY THE CASSAVA FARMERS

The component-wise constraints perceived as important by the cassava farmers are presented in Tables 28-34. It is sagacious from Table 21 that 'uncertainty in resource mobilisation, production and marketing' stood out as a major constraint to 'planning' component as expressed by 45 per cent of the farmers followed by 'limited resources' (40 per cent), 'not essential as it is a routine work' (35 per cent) 'lack of awareness' (22 per cent) and 'lack of conviction' (20 per cent) as the reasons for not following planning activities.

The constraints to labour management expressed by the farmers are listed in Table 29. It could be seen from the table that 39 per cent of farmers attributed 'shortage of labour' as the reason for not carrying out labour management activities. The reason 'does not help much when cultivation is done in limited area' was reported by 37 per cent followed by 'lack of conviction in the labour management activities' (26 per cent), 'lack of skilled family labourers (23 per cent) and 'lack of awareness' (21 per cent) were expressed for not executing labour management activities.

'Lack of timely and accurate information' was the major reason ascribed by 36 per cent of the farmers for not attempting 'information management' activities (Table 30). More than one third of the farmers felt that 'there is no new information about cassava cultivation practices'. 'Lack of conviction' about information management activities was felt by one-fifth of the farmers and the same proportion of the farmers viewed that 'information does not help much when cultivation is carried in a limited area'. Fifteen per cent of the farmers reported 'lack of knowledge on information sources' as a constraint.

As far as 'financial management' was concerned (Table 31), a little more than one-third of the farmers attributed the reason 'does not help much when cultivation is done in limited area' and 'not done when expenditure incurred and income accrued are meagre' for not carrying out financial management activities. One-fourth of the farmers felt that they could not decide the wage according to

Table 28. Managerial constraints to planning

| Sl.No. | Constraints | Percentage |
|---|---|---|
| 1. | Uncertainty in resource mobilisation, production and marketing | 45.20 |
| 2. | Does not help much for limited resources | 40.10 |
| 3. | Not essential as cultivation is a routine work | 35.42 |
| 4. | Lack of awareness | 22.18 |
| 5. | Lack of conviction | 20.17 |

Table 29. Managerial constraints to labour management

| Sl.No. | Constraints | Percentage |
|---|---|---|
| 1. | Shortage of labour during peak periods | 39.18 |
| 2. | Does not help much when the cultivation is done in limited area | 37.03 |
| 3. | Lack of conviction | 26.45 |
| 4. | Lack of family labour | 23.81 |
| 5. | Lack of awareness | 21.16 |

Table 30. Managerial constraints to information management

| Sl.No. | Constraints | Percentage |
|---|---|---|
| 1. | Lack of timely and accurate information | 36.71 |
| 2. | Lack of new information on practices | 32.25 |
| 3. | Lack of conviction | 22.32 |
| 4. | Does not help much when cultivation is done in limited area | 19.10 |
| 5. | Lack of knowledge on information sources | 15.18 |

Table 31. Managerial constraints to financial management

| Sl.No. | Constraints | Percentage |
|---|---|---|
| 1. | Does not help much when cultivation is done in limited area | 35.26 |
| 2. | Not done when expenditure incurred and income accrued are meagre | 33.16 |
| 3. | Lack of awareness | 28.71 |
| 4. | Wages are fixed | 25.47 |
| 5. | Lack of conviction | 20.17 |

the work turned out as wages are fixed. 'Lack of awareness' and 'lack of conviction' were the reason expressed by 28 and 20 per cent of the farmers respectively, for not carrying out activities of 'financial management'.

Regarding the component 'production management (variety)' nearly half of the proportion of farmers attributed 'lack of hybrid planting materials' as the reason for not covering the entire area under cassava and 35 per cent expressed 'non-availability of hybrid planting materials' for the non-adoption of high yielding varieties (Table 32). 'Price of tuber is less' 'market demand is less' and 'not suitable to the locality' were the reasons stated by 30, 23 and 22 per cent of farmers respectively.

Among the constraints attributed to 'production management (practices)' in Table 33, 'high cost of fertilizers' was the major constraint expressed by 85 per cent of the farmers for not following recommended fertilizer dose. 'Lack of sufficient water' was expressed by 70 per cent of the farmers as the reason for not providing water during critical period and 60 per cent felt 'plant protection measures are not effective' for overcoming pest and disease problems of cassava. 'Unavailability of required fertilizers' was reported by 48 per cent while 32 per cent held the view that they lacked knowledge on the practices.

With regard to 'marketing management' nearly half of the farmers felt that 'lack of marketing choices' as the major constraint

Table 32. Managerial constraints to production management (variety)

| Sl.No. | Constraints | Percentage |
|---|---|---|
| 1. | Lack of sufficient high yielding planting materials to cover entire area | 47.27 |
| 2. | Unavailability of planting materials | 35.18 |
| 3. | Price of high yielding variety tuber is less | 30.15 |
| 4. | Market demand of high yielding variety tuber is less | 23.23 |
| 5. | Not suitable for the locality | 22.16 |

Table 33. Managerial constraints to production management (practices)

| Sl.No. | Constraints | Percentage |
|---|---|---|
| 1. | High cost of fertilizers | 85.19 |
| 2. | Lack of sufficient water | 70.17 |
| 3. | Plant protection measures not effective | 60.70 |
| 4. | Unavailability of required fertilizers | 48.15 |
| 5. | Lack of knowledge | 32.08 |

Table 34. Managerial constraints to marketing management

| Sl.No. | Constraints | Percentage |
|---|---|---|
| 1. | Lack of marketing choices | 52.13 |
| 2. | Dictation of price by merchants | 45.18 |
| 3. | Immediate need for money | 43.15 |
| 4. | Difficulty in predicting price | 40.71 |
| 5. | Lack of knowledge on prevailing price | 35.27 |

for profitable marketing (Table 34). More than one-third felt 'dictation of price by merchants' 'difficultuy in prediction of prices' 'immediate need for money' and 'lack of knowledge on prevailing prices' as the constraints for effective marketing management.

# DISCUSSION

# 5. DISCUSSION

The results of the study presented in the previous Chapter are discussed under the following heads.

5.1. Components of the managerial efficiency scale

5.2. Managerial efficiency of the cassava farmers

5.3. Important components of managerial efficiency of the cassava farmers

5.4. Relationship between the socio-psychological and situational factors of the cassava farmers and their managerial efficiency

5.5. Managerial constraints as perceived by the cassava farmers

5.6. Managerial efficiency of the cassava farmers - A Bird's eye view

## 5.1. COMPONENTS OF THE MANAGERIAL EFFICIENCY SCALE

The factor analysis done with 30 items of the scale projected seven components namely, 'planning', 'labour management', 'information management', 'financial management', 'production management (variety)', 'production management (practices)' and 'marketing management' which had explained the variance of the dependence structure 'managerial efficiency' of the farmers to the tune of more than 80 per cent.

The emergence of these seven components as the important ones in explaining the managerial efficiency of a farmer is not beyond reasoning. For every farmer, irrespective of crop enterprise or size of holding, planning of proper use and allocation of inputs, proper financing and marketing would be of immense help in reducing risk involved and in ensuring profit maximisaiton. Likewise, labour, which forms the important factor of production requires efficient management in labour selection, relationship with labourers and utilisation. In making an enterprise successful, proper accounting and control of finance are indispensable. Farming enterprise cannot escape the modern era of information, which is a sine qua non for any firm's success. Obviously farmers' ability of gathering and handling the information on improved practices, inputs and marketing has significant role in rational decision making, which is a pre-requisite for enhancing profitability of the business. Profit will not be forthcoming sans production. Optimum production warrants use of high yielding varieties and management of cultivation practices needed for crop production. In the present day agriculture where commercial considerations have a considerable clout, efficiency in market oriented activities dictate very much the success in crop enterprise. Thus, the components emerging significant in the factor analysis have a telltale reflection in the present day agriculture.

The aforesaid explanation justifies amply the emergence of the seven components in describing the managerial efficiency of farmers. Further, the components identified were more or less in line with the six* groups of activities common to all types of management viz., technical, commercial, financial, security, accounting and managerial isolated by operational management theory propounded by Fayol (1949). It also derived support form the operational approach of management described by Koontz el al. (1986) which signified management of comprising planning, production, finance and marketing.

It could be observed that the seven components of managerial efficiency objectively arrived represented fairly the major functional areas of management as derived in the theoretical orientation part. The components of the scale had the representation of important functions of farm managers viz., technical, trading, financial and personnel management as stated by Hardaker et al. (1970). The components emerged were also in line with the view of Castle et al. (1972) who suggested that for successful management, farmers should perform better in management of information, capital, land and crop.

The areas of management considered by Wills (1973) namely, financing, operating and marketing; by Wortman (1976) namely, planning, financing and marketing; by Samanta (1977) viz., planning, production and marketing; by Buckett (1981) viz., planning, production, marketing, financial and staffing were reflected in the components identified in the scale.

Further, a comparison of classification of items under the components arrived objectively through factor analysis as mentioned above and grouped theoretically under seven components as shown in the Appendix VI, would reveal only slight variation in the classification of the items and the components identified. While the classification of items made theoretically under 'planning', 'labour management', 'information management' and 'marketing management' remained unchanged in factor analysis also, items under 'financial management' and 'production management' did show slight variation.

The only item 'keeping reserve capital to meet unexpected and important practices' which was considered theoretically under 'risk management' got clubbed along with the other four items of 'financial management' in the factor analysis results. Eventhough the above item reflected risk management, the content of item covered financial element also. This may be the reason why the item had come under 'financial management'.

The items regarding fertilizer application, plant protection measures, providing water and high yielding varieties which were theoretically grouped under 'production management', got split in factor analysis, with the former three under one component and the last one forming a single item component. Inspite of the fact that all these four items were related to production management, the item high yielding variety became a separate entity. The decision of farmers on the use of high yielding variety was very much influenced by their perception of market demand, price, suitability to locality, cost factor, ability to take risk etc., unlike the other three items of production which would be common irrespective of the variety grown. This may be the reason for the item high yielding variety emerged as a separate component.

Barring these slight variations mentioned above, the grouping of items and the components identified were alike in the theoretical as well as factor analysis. From the above discussion, it could be pointed out that the grouping of items and components identified for the scale had sound justificaiton.

## 5.2. MANAGERIAL EFFICIENCY OF THE CASSAVA FARMERS

The results obtained with regard to the distribution of the cassava farmers in high and low group of managerial efficiency and the managerial components, comparison made based on state-wise and district category-wise analysis and the relative performance of the managerial components are discussed in this part.

From the distribution of farmers in high efficiency group presented in the Table 9, it may be inferred that cassava farmers in general were somewhat better in their overall managerial efficiency as well as in the components of 'planning', 'labour management', 'financial management' and 'marketing management'. The state-wise analysis (Tables 10-17) had indicated that the farmers of Tamil Nadu were good in overall managerial efficiency and in all the managerial components except 'information management'. The Kerala farmers had not been that good in managerial efficiency as well as in the components of 'planning', 'information management', 'production management (variety)' and 'production management (practices)'. This has been evidently proved by the analysis of variance (Table 10-17) worked out between Kerala and Tamil Nadu farmers.

The district category-wise analysis (Table 10-17) had showed that while the farmers of high productivity district of Tamil Nadu and industrial district were excellent in their overall managerial efficiency as well as in all the components, the farmers of high producitivity district of Kerala resembled more or less the performance of the total sample. The farmers representing the low productivity districts as well as non-industrial districts did not perform well with respect to managerial efficiency, but they were good in the managerial components, 'labour management' and 'marketing management' and in 'financial management' in which farmers of low productivity district of Tamil Nadu were not that efficient.

The analysis of variance worked out between the various district categories indicated that the farmers of the high productivity district of Kerala did not differ significantly in their managerial efficiency as well as in the components with the exception of 'production management (variety)'.

The farmers of the high productivity district of Tamil Nadu (which is also the industrial district) were significantly superior in managerial efficiency and in the components barring labour and marketing management than their counterparts.

It may be observed from the Tables 10-17 that the mean scores as well as the proportion of the farmers in the high group of managerial efficiency and the managerial components (excepting labour and marketing management) were remarkably high in the case of the high productivity district of Tamil Nadu and the industrial district as compared to any other category of the farmers considered for the study. As emphasised elsewhere, Salem represented both the industrial as well as the high productivity district of Tamil Nadu. It is also interesting to note that the Kanyakumari district, a constitutent of Tamil Nadu state had the distribution pattern and the mean scores with regard to managerial efficiency and most of the managerial components more or less in line with the Pathanamthitta and Thiruvananthapuram districts of Kerala. From this, it could be argued that the high mean score and significant difference shown by Tamil Nadu farmers in managerial efficiency and concerned components over Kerala were due to the better performance of the farmers of Salem district.

The striking feature which could segregate Salem district from the other three districts with respect to cassava crop enterprise is the blessing of a strong network of more than 700 cassava based industries. Hence, the significant superiority demonstrated by the farmers of Salem district could be largely attributed to the presence of myriad cassava-based industries. This draws support from Ghosh and Nair (1986), who observed that a steady demand for starch and sago (cassava processed products) acted as s stimulus for the cultivation of cassava crop in Salem. Subramanian (1986) also opined that the existence of cassava-based factories in Salem district was mainly responsible for the increase in the cassava productivity in the district.

Any crop enterprise acquires a status of business when crop production is backed adequately by industrial utilisiation. Cassava crop cannot be an exception to this. Of the four districts included in the study, it is only in Salem the entire production is locally utilised by the network of cassava-based starch and sago manufacturing industries. This assured marketing would certainly build interest, security and confidence in the crop among the farmers, ultimately resulting in intensified efforts in the various spheres of management of crop enterprise. Hence, it is quite natural that the cassava farmers, in order to supply maximum cassava tubers and to reap more profit would meticulously plan various production and marketing operations, collect and process information regarding improved practices, inputs and marketing, maintain accounts and control the finance, follow production management practices in terms of growing high yielding varieties and improved cultivation practices. All these efforts would ultimately lead to better managerial efficiency of the farmers.

The significant differences observed in the components 'planning'. 'information management,' 'financial management', 'production management (variety)' and 'production management (practices)' between the farmers of the industrial and non-industrial districts were not reflected in the case of 'labour and marketing management'. Moreover, there was no significant difference observed in these two components in any of the comparisons made.

From the mean score as well as the distribution of farmers, it is clear that the farmers of various districts were found to be uniformly efficient in labour management. This is quite understandable in view of the following reasons.

'Labour management' is a traditional area of management as far as farmers are concerned, and as a result farmers were quite experienced with this aspect of management. Cultivation of cassava over the years might have been tuned in such a way as to match the labour availability. Most of the cultivation practices do not demand much of skilled labourers, thus enabling the utilization of family labour also. The high labour wages in Kerala might have made the cultivators more cautious and careful in extracting the required work. Although the labour wages are low in Tamil Nadu, the organic bondage existing between the labourers and the cultivators might have enabled the farmers in getting the work done.

The similarity observed in 'marketing management' among the farmers of various district categories may be attributed to the reasons stated as follows.

Farmers included in the study were those who had marketing of cassava tubers as the prime objective. Hence, there may be uniformity in the distribution of the farmers of various district categories in the performance of marketing activities such as watching market price, negotiating with buyers, postponement of sales and selling partly or wholly on profit considerations. While the farmers of Salem who grow cassava on commercial lines, can ill-afford to ignore the market, the farmers from Kerala and Kanyakumari district who are already hurdled with the problem of lack of marketing facilities would obviously be extracautious about 'marketing management'. Such situations of growing cassava on commercial lines as well as the narrow market avenues might have encouraged or forced the farmers to carry out the market oriented activities and hence, the similarity inspite of diversity.

It is sagacious that farmers of the industrial district performed well in the managerial efficiency and the components mentioned above. However, the fact that the farmers of the high productivity district of Kerala had exhibited relatively a better performance in managerial efficiency and the components especially in 'production management (variety)' cannot be overlooked. It could be noted from the Table 15 that 'production management (variety)' of the farmers of high productivity district of Kerala was significantly higher than that in the low productivity district. This indicates that the farmers of the high productivity district had adopted high yielding varieties of cassava relatively better than those in the low productivity district. The finding of Ramanathan et al. (1989) also showed that nearly 28 per cent of cassava area in Pathanamthitta district was covered by high yielding varieties of cassava whereas, the coverage was only five per cent in Thiruvananthapuram district. The high productivity of Pathanamthitta district could also be attributed to this phenomenon.

Cassava is marketed as fresh tubers for consumption purpose in Thiruvananthapuram district. This demands good cooking quality of the tubers, which as per the farmers' conviction is mainly fulfilled by the local varieties. This may be the reason why the performance of farmers of Thiruvananthapuram district in the production management in terms of high yielding varieties was poor. In Pathanamthitta district (high productivity district in Kerala) also a major portion of cassava tubers is marketed locally for consumption purpose. Yet it enjoys relatively a better position than Thiruvananthapuram district in terms of indirect linkage with cassava-based industries in Salem through a network of contract merchants. The moderate demand from the industries might have prompted farmers of certain localities in the Pathanamthitta district to go in for high yielding varieties of cassava. Probably, this might be the reason which could be attributed to the better performance of the Pathanamthitta farmers than their counterparts in the low productivity districts in the component 'production management (variety)'.

The rank order worked out to find out the component-wise relative performance of the cassava farmers (Table 18) was in the order of 'labour management', 'marketing management', 'planning', 'financial management', 'production management (practices)', 'information management' and 'production management (variety)'. The rank correlation computed between the states and district categories resulted in the emergence of two patterns of component-wise relative performance, one for industrial and another for non-industrial district. The order of performance of components for industrial district was 'production management (variety)', 'production management (practices)', 'planning,' 'labour management', 'marketing management', 'information management' and 'financial management'. In the case of non-industrial district, it was in the order of 'labour management,' 'marketing management,' 'financial management', 'planning', 'production management (practices)', 'information management' and 'production management (variety)'.

The above order of performance indicated that while industrial district farmers gave prime importance to production oriented managerial activities viz., 'production management (variety)' 'production management (practices)' and 'planning', the farmers from non-industrial district concentrated on the components namely, 'labour management', 'financial management' and 'marketing management' which could be considered as the functions enabling the farmers in controlling the cost of cultivation and disposal of the produce.

Marketing of cassava is assured in the industrial district. Hence, the farmers would aim to produce as much as possible so as to increase the level of profit. In the non-industrial districts where uncertainty rules the roost in marketing the produce, farmers would be interested in controlling the cost incurred in the cultivaiton which could be achieved by attending to labour and financial management activities. Since marketing avenues are not that open as compared to the industrial district, farmers bestow extra care on the mechanism of disposal of the produce. These may be the reasons for the above mentioned differential order of performance of managerial components by the farmers in the industrial and non-industrial districts.

## 5.3. IMPORTANT COMPONENTS OF MANAGERIAL EFFICIENCY OF THE CASSAVA FARMERS

The positive and significant correlation between the seven managerial components and the profit accrued (Table 23) revealed that the farmers performance in these components guaranteed profit-making in cassava crop enterprise. The explanation given for the results obtained with regard to the components included in the scale holds good here also.

The step-wise regression (Table 24) computed indicated that among the seven components, three components viz., 'planning', 'information management' and 'financial management' were relatively more important than the other components in terms of their contribution to the profit accrued from the cassava crop enterprise.

Planning forms the crux of management. It is the beginning of all other process of management and it flows through all the functions of management as their life-blood. This has been rightly pointed out by Chatterjee (1980) who observed that planning has a unique contribution towards efficacy of other managerial processes. For the farmers to achieve the objective of maximizing the returns from the crop, they need to give considerable thought well in advance to activities related to procurement and allocation of resources, timing the operations and the market choice. All these activities help the farmers to choose the least-cost but effective operations and input utilisation with least risk coupled with a control exercised on other management areas related to labour, finance, production and marketing.

This draws support from the statement of Chatterjee (1980) that planning reduces cost of performance and of Davar et al. (1982) that planning reduces mistakes, makes control easier and increases the effectiveness of manager. This could be further explained by Coughenour's theory of instrumental activity as described by Prasad (1983). The theory posits that the most important decisions which the farmer makes relate to future committments and that planned committments are crucial to future profits. Probably these may be the reasons for this component to have significant contribution towards profit.

Capital to many is the crusader of all development. It is the dominating resource which links the different sections of the society. In farming capital is the key resource to accelerate the production in order to achieve enhanced farm income. Financial management is intimately interwoven into the fabric of management itself and it pervades its influence over the whole business and encompasses every facet of the enterprise. Not only is this because the results of management's action are expressed in financial terms but principally because the central role of financial management is concerned with the same objective of management itself. Martin et al. (1979) stated that the goal of profit maximisation does stress the efficient use of capital resources. Symonds (1981) opined that financial management is mostly concerned with the practice of accounting. Hence, cassava farmers maintaining accounts of expenditure and profit would come to know of the trends in relation to time of expenditure and profit accrued over the seasons. All these would guide the farmers to check the wasteful and unwanted expenditure which would certainly increase their profit margin.

Information is power and it is sine qua non in planning and control of an enterprise. Logical decisions in farming require an understanding of the technology, inputs, price trends and marketing alternatives which become possible only with proper information gathering and processing. Hicks and Gullett (1981) stated that the more pertinent and timely the information better would be the resulting decisions. Farmers need to plan based on facts and not on hunch or intitution. Gathering information on technology, price of inputs and marketing trends help the farmers to make a comparative analysis which would lead to rational decisions on cost effective inputs and profitable marketing. These may be the reasons why information management had contributed more to profit in cassava enterprise.

## 5.4. RELATIONSHIP BETWEEN SOCIO-PSYCHOLOGICAL AND SITUATIONAL FACTORS OF CASSAVA FARMERS AND THEIR MANAGERIAL EFFICIENCY

The multiple regression analysis carried out between the socio-psychological and situational factors of the cassava farmers with their managerial efficiency (Table 26) clearly indicated that the variables included in the study could explain 93 per cent of variation in the managerial efficiency and it was found to be significant.

of various managerial activities. This may be the reason for this variable to emerge as the most influential in determining the managerial efficiency of the farmers. This finding is in accordance with that of Bora (1989) who found that closeness with agricultural system was positively related to returns to management.

### 5.4.2. Market perception

This variable also showed a positive direct effect on the managerial efficiency of the farmers. According to Ensminger (1989), profitability of enterprise is viewed in the background of its marketing scope. Marketing is the ultimate deciding factor for the farmers to realise attractive returns. Market perception of the farmers greatly relies on their awareness and possession of knowledge on marketing channels, comparative prices, demands etc., of the produce. Farmers with these qualities would be able to market the produce with ease and confidence for remunerative prices which in turn would ensure favourable market perception in them. This may be the reason for the positive influence of market perception on managerial efficiency. Similar finding in the case of adoption behaviour of cassava farmers was reported by Ravi (1979) and Sivaramakrishnan (1981).

### 5.4.3. Achievement motivation

The theorists of achievement motivation contend that highly achievement oriented individuals display some distinctive behavioural patterns (Prasad, 1983). McClelland (1961) argued that highly achievement motivated individuals go to make successful leaders in business and industry. Farming is also a business where the intrinsic factor of achievement motivation plays a pivotal role in doing a good job with a standard of excellence in the managerial performance of the farmers. A farmer with high achievement motivation would definitely exhibit the quest for perfection in every field of his activity. 'Management' as a concept, emphasises on this systematic nature and therefore, it is only in this logical reasoning that a farmer with high achievement motivation would have a corresponding degree of excellence in his managerial efficiency also. The findings of Badachickar (1985) and Chari and Nandapurkar (1987) also reported that management orientation and managerial ability, respectively had positive relationship with achievement motivation in their studies.

### 5.4.4. Economic motivation

Profitability is the major outcome aimed upon in managing the farm. Economic motivation is the intrinsic value of farmers responsible for the fulfilment of the basic motive of profitability. It is this intrinsic value which drives the farmers towards action on various managerial activities to maximise the profit. On a closer perusal of the components of managerial efficiency of the farmers, it would become clear that most of these components have the basic fibre of efficiency in aspects related to finance. In other words, the tenet of managerial efficiency revolves round sound economic decisions and therefore, it could be surmised that the managerial efficiency of a farmer would be a product of this economic motivation also. This in accordance with the finding of Badachickar (1985) that economic motivation was positively related to management orientation of farmers.

### 5.4.5. Attitude towards scientific management in crop enterprise

The result of the study that attitude of the farmers towards scientific management in crop enterprise had positive and significant contribution to their managerial efficiency is well within the domain of the classic theories of human behaviour. The results of the preponderant 'KAP' (Knowledge, Attitude and Practice) studies on diffusion of agricultural innovations (Rogers, 1983) and the myriad experiments on cognitive, affective and connative components in explaining man's behaviour could be drawn to establish the cause-effect relationship between attitude and behaviour. The results of this study do corroborate the already available evidence on this nature of relationship.

### 5.4.6. Knowledge on scientific management in crop enterprise

This variable had positive and significant contribution to the managerial efficiency of the farmers. As explained earlier knowledge is one of the important components of farmers' bevaviour and as such it has an important say in covert and overt managerial behaviour of farmers. It is an inevitable pre-requisite input for productive management of any crop enterprise. Farmers having sufficient knowledge back up on scientific management will be in a favourable niche to take right managerial decisions as well as execution of action in various management functional areas of labour, information, finance, production and marketing. Hence, there cannot be any difference of opinion of the knowledge variable influencing managerial efficiency. This finding also derives support from several studies viz., Abraham (1980), Sethy et al. (1984), Chari and Nandapurkar (1987) and Bora (1989).

### 5.4.7. Cultivated holding

In contrast to the variables mentioned above, this variable had shown negative and significant partial regression coefficient and negative direct effect, revealing that the farmers having more cultivated holding tend to exhibit less of managerial efficiency in cassava crop enterprise. Farmers with large cultivated holding, normally go in for diversified crop enterprises. As a result, dependence as well as concentration on cassava crop may be less and diluted. It is also pertinent to point out here that in the present study the farmer-respondents, except those in Salem district, were found to bestow relatively little care to the cassava crop for reasons explained earlier. This observation bears significance in the light of the fact that three-fourth of the farmers in the study belonged to this category. These farmers, on the other hand had shown keen interest in other commercial crops of their areas such as coconut, rubber etc. Mere possession of large cultivated holdings of these farmers, therefore cannot be expected to reflect their managerial efficiency with reference to cassava crop. This odd finding could possibly be construed as a pointer to the growing tendency among the farmers to care only for those enterprises that pay back. Probably, this might be the reasons why large cultivated holding had negative effect on managerial efficiency of the farmers in cassava crop. This finding could be supported by the study of Walker et al. (1983) in which negative association was found between farm size and returns to management.

### 5.4.8. Area under cassava

Farmers who had more area under cassava had exhibited high managerial efficiency. Cultivating cassava in larger area indicates the farmer's confidence in acruing better profit from this crop as well as their dependence on this crop to support the family. Confidence and dependence would naturally make the farmers to plan and execute various managerial functions meticulously to reap maximum profit. It could also be reasoned out that farmers who put their major area under cassava are in a way forced to do so since other attractive alternatives are either not available or not feasible. In such compelling situations, cassava crop becomes their sustenance and therefore, they have to plan and execute various managerial functions to ensure better returns from the crop. These could possibly be the reasons for the positive and significant contribution of this variable to the managerial efficiency of the farmers as observed in the study. The finding of Sivaramakrishnan (1981) also indicated the same trend of relationship between adoption and area under cassava.

### 5.4.9. Irrigation potential

Irrigation is one of the important inputs of production. Eventhough a crop like cassava can be successfully cultivated under rainfed conditions, studies have indicated that with supplementary irrigation, especially at critical periods, production can be enormously increased (Muthukrishnan *et al.*, 1973; Nayar *et al.*, 1985). Irrigation facilities help the farmers in the manipulation of planting time so as to have the harvest when the tubers fetch better price. Availability of water during critical period increases the confidence in planning and the farmers could execute the production oriented activities as schedule without falling prey to unpredictable climatic conditions. It may also be pointed out that the performance of the present day agriculture is weighed more in terms of unit of produce per unit of irrigation water than anything else (Antholt, 1990). This highlights the growing significance of irrigation and farmers are already cognisant of this fact. Naturally, irrigation potentiality of a farmer would be a significant parameter of his managerial efficiency also. The finding of this study is in confirmity with Bora (1989) abnd Sagar (1989).

### 5.4.10. Education

It is quite surprising in this study that education was found to have non-significant contribution to the managerial efficiency of farmers. Efficient management of crop enterprise depends to a great extent on the acquisition of certain basic skills of decision making and speculation of marketing situation. In the formal education system which was used as the basis for categorising the farmers in the continuum of education, these skills are never taught. Instead, the farmers acquire these skills through experience and practice in field situation. This could be the reason for the finding of the study that education did not have any significant influence on managerial efficiency of farmers. This draws support from the study of Kalirajan and Shand (1985) who found that education was not a significant factor in determining the performance of farmers.

### 5.4.11. Social participation

The variable was not related to the managerial efficiency of the farmers. Various social organisations with which the farmers associate themselves might not have acted as a suitable platform for the exchange of ideas on management of crop enterprise. Rather, they serve the purpose of discussing social problems. Probably this might be the reason for the non-significant influence of this variable on the managerial efficiency of the farmers. The finding of the study is in confirmity with that of Raju (1984), Lalitha (1986) and Kumari (1989) who found that the adoption behaviour of farmers was not related with their social participation.

### 5.4.12. Extension participation

The variable showed neither a significant contribution nor direct effect on the managerial efficiency of the farmers. An analysis on the current content of various extension programmes would reveal that they mainly concentrate on dissemination of information regarding production technologies and there is a dearth of management content in the extension programme at present. This may probably be the reason for the non-significant influence of this variable on managerial efficiency. The findings of Baadgoenkar (1983), and Reddy and Reddy (1988) lend support in this direction.

### 5.4.13. Mass media participation

Mass media participation of the farmers was found to have no significant influence on the managerial efficiency of the fármers. The explanation given in respect of extension participation holds here also. Ravi (1979) also found that there was no relationship between mass media participation and adoption behaviour of cassava farmers.

### 5.4.14. Infrastructural facilities

This variable did not have significant predictive power as well as direct effect on managerial efficiency of the farmers. The states of Kerala and Tamil Nadu are, of course, benefitted by a strong network of infrastructural facilities in terms of agencies for the supply of seeds, fertilizer, plant protection chemicals and credit. Obviously, the farmers in these states would perceive the availability of infrastructure as adequate. That is, however, no guarantee to the use of these infrastructural facilities by them for these infrastructural facilities have little relevance to the marginal cassava growers. Considering the two differential variables examined in the study viz., the infrastructural facilities (perceptual) and the managerial efficiency (functional) of the cassava farmers, the lack of any significant influnence between these two variables could be attributed to their independent structures. Pillai (1978) also found that there was no relationship between credit facilities and adoption behaviour of farmers.

### 5.4.15. Orientation towards competition

The variable did not have any significant contribution to the managerial efficiency of the farmers. Farmers with high competition orientation normally desire extrinsic concomitants, not much for their material value, but for their symbolic value namely, prestige, power and self-esteem for demonstrating their success. On the contrary, a material value of making profit is the yardstick for efficient farmers which may not always satisfy symbolic values. Hence, farmers who really aim at making better profit may not fall into the trap of mere attainment of symbolic values. Probably, this could be the reason for lack of significant influence of this variable on managerial efficiency of the cassava farmers.

## 5.5. MANAGERIAL CONSTRAINTS AS PERCEIVED BY THE CASSAVA FARMERS

The results presented in Tables 28-34 revealed that 'lack of awareness' and 'lack of conviction' were the common constraints in relation to the components 'planning' 'labour management' and 'financial management' while 'lack of knowledge' had emerged as a common constraint in 'information management', 'production management (practices)' and 'marketing management'. In the current extension efforts, information dissemination regarding various aspects of planning, labour management, and financial management are probably neglected areas unlike production and marketing information. Similarly 'lack of conviction' is the consequential offshoot of 'lack of awareness'. Lack of knowledge and lack of awareness had also been reported by Castle et al. (1972), Anantharaman et al. (1986), Ramanathan et al. (1987) and Sripal and Ramachandran (1990).

The next dominant and common constraint for not following the management components was attributed to the 'limited area/

resources'. The reasons 'lack of conviction' and 'limited resources' may be complementary to each other. In the absence of importance felt for various managerial components, the farmers were not convinced and confident in carrying out these managerial activities when crop cultivation was done in limited area.

The remaining reasons expressed under various components were specific to the respective components. The important one was 'uncertainty in resource mobilisation' acting as a hurdle in planning which draws support from Castle _et al._ (1972). 'Shortage of labourers' was considered as the major constraint for 'labour management' which was also reported by Lanjewar and Kalantri (1985). 'Lack of timely and accurate information' was the major constraint reported in the case of 'information management' which is in line with the findings of Sivaramakrishnan (1981).

The major constraint to 'financial management' was expressed as 'does not help much when cultivation is done in limited area'. 'Lack of seed materials' was the major constraint in 'production management (variety)' which had also been reported by Pal (1975), Lanjewar and Kalantri (1985) and Ramanathan _et al._ (1987). In the views of farmers, 'production management (practices)' was hindered very much by 'high cost of fertilizers' which got the supportive evidence from the findings of Greg and Omprakash (1974) and Ramanathan _et al._ (1987). 'Lack of marketing choice' was felt as a constraint to 'marketing management' which derives support from the findings of Ravi (1979) and Ramanathan _et al._ (1987).

## 5.6. MANAGERIAL EFFICIENCY OF CASSAVA FARMERS - A BIRD'S EYE VIEW

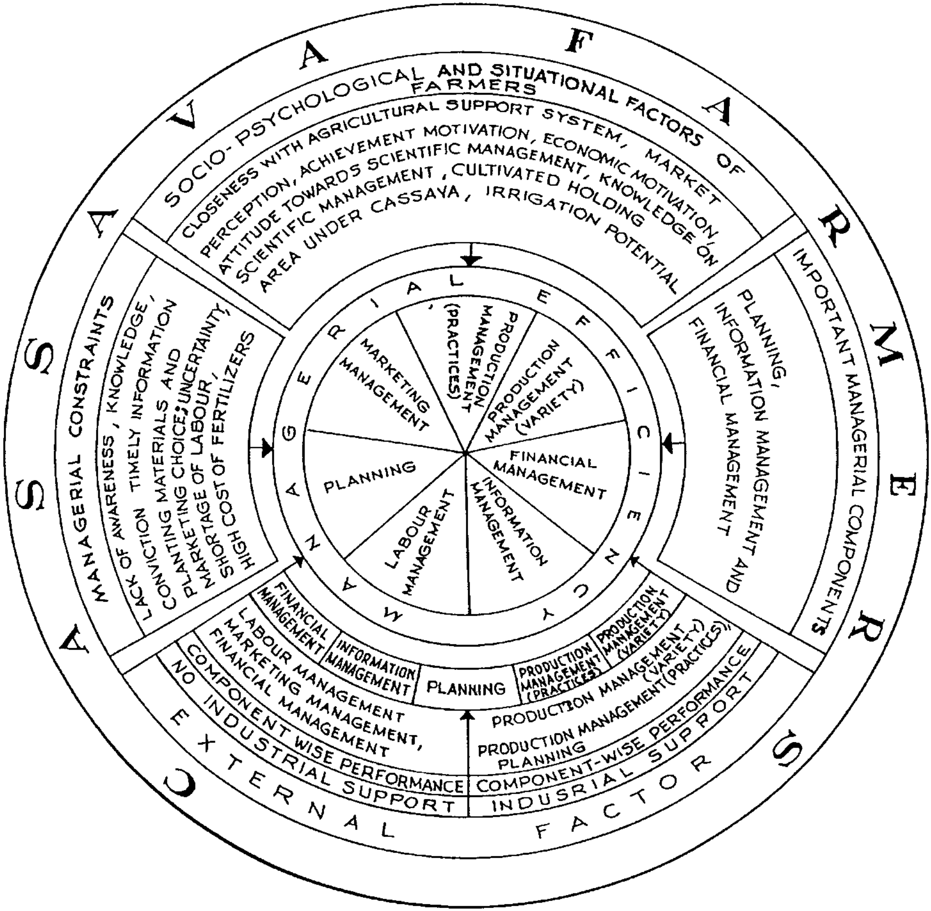
The cream of the results on managerial efficiency of cassava farmers is represented in a nutshell in the empirical model diagrammatically (Fig.5).

The model depicted in Fig.5 has four concentric circles. The innermost circle represents the components of managerial efficiency derived empirically. The components identified were 'planning' 'labour management', 'information management', 'financial management', 'production management (variety)', 'production management (practices)' and 'marketing management'. The dependent variable is represented in the second circle which is surrounded by the third circle and partitioned into four segments. The segments shown are the important managerial components, the external factor of industrial support or no support, socio-psychological and situational factors of the farmers and the managerial constraints. The arrows connecting these segments with managerial efficiency indicate that these variables influence managerial efficiency.

The important managerial components identified in the study in terms of their contribution to profit were 'planning', 'information management' and 'financial management'.

The segment external factor is divided into two parts as farmers having industrial support and those not having industrial support with arrows connected to the five managerial components

FIG 5 EMPIRICAL MODEL OF THE STUDY



indicating that the industrial support received by the farmers favourably influence the performance of farmers in these five components. The five managerial components in which industrial area farmers perform better were 'production management (variety)', 'production management (practices)', 'planning', 'information management' and 'financial management'.

The segment external factor also depicts the component-wise order of performance (top three) of farmers having industrial support as well as no industrial support. The component-wise performance of farmers with industrial support was in the order of 'production management (variety)', 'production management (practices)', and 'planning' while for the farmers having no support it was in the order of 'labour management', 'marketing management' and 'financial management'.

The socio-psychological and situational factors which influence managerial efficiency are closeness with agricultural support system, achievement motivation, economic motivation, market perception, attitude towards scientific management, knowledge on scientific management, cultivated holding, cassava area and irrigation potential.

The important managerial constraints faced by the farmers are lack of awareness, knowledge, conviction, timely information, planting materials and marketing choice;uncertainty shortage of labour and high cost of fertilizers.

### 5.6.1. Towards substantiation of theories in behavioural sciences

The telltale results of the present study are epitomised to substantiate the established theories in behavioural sciences as follows.

The finding of the study that farmers of industrial area exhibited significantly higher managerial efficiency than their counterparts of non-industrial areas again brings to the surface the omnipotent environmental influences on farmer's behaviour. The 'systems theory' as enunciated by Koontz et al. (1986) and Ghosh et al. (1988 c) encompasses this pervasive aspect. According to them, an enterprise does not exist in vacuum but is dependent on its environment; it is a part of larger systems. Difussion researches conducted elsewhere also proved that when the systems norms are more permissive, farmers venture to be innovative and risk-prone. It is expected that the farmers of the industrial area in the study are more likely to experience the environment of open systems and this positive environmental influence perpetuates in them higher managerial efficiency in crop enterprise also. Similarly, the 'expectancy theory of motivation' propounded by Vroom (1964) could also be cited in this context. This theory states that the people's motivation toward doing anything will be determined by the value they place on the outcome of their effort (negative or positive) multiplied by the confidence they have that their efforts will materially aid in achieving the goal. The farmers of the industrial area in the study enjoy the benefit of assured market for their cassava produce because of the prevalence of starch and sago factories in their vicinity. They have the confidence that their efforts will pay back rich dividends and hence, they tended to exhibit high managerial efficiency giving credence to the expectancy theory of motivation.

Yet another crystal clear result of the study that farmers of the industrial area included in the study exhibited relatively better performance in production-oriented managerial components and that the farmers of the non-industrial areas performed better in cost controlling components of managerial efficiency augers well the 'contingency theory' and the 'decision theory'. Luthans (1976), while enunciating the 'contingency theory' explained the functional relationship between environmental variables and management concepts and techniques. In line with the above theory, farmers whose situation is assured of marketing take action to increase the production in order to profit more. On the other hand, farmers constrained by market would prefer to concentrate more on cost saving activities. Similarly, this result is also explained by the 'decision theory' (Radford, 1978) which stated that decisions are normally encountered by conditions of either certainty or uncertainty. Certainty situations, as experienced by the farmers of the industrial area in the study, foster greatest degree of achievement of the objectives and therefore these farmers go in for production and profit maximising activities in that crop enterprise. On the contrary, the farmers of the non-industrial areas of the study, where the uncertainty situation rules the roost, are guided by the minimax (minimising the maximum cost) and maximin (maximising the minimum profit) postulates and therefore, they indulge in cost saving activities in their crop enterprise.

# SUMMARY

# 6. SUMMARY

Agriculture plays a vital role in the economic development of the country. Eventhough the dream of self-sufficiency in food production has come true as a result of scientific break-through in agriculture, the ever increasing population demands a spectacular augmentation in the current growth rate of agricultural production. This is hurdled by the problem of the technological gap existing among the farmers and the rising average cost of production in the crop enterprises. Management input of the farmers plays a crucial role in bridging the technological gap and reaping maximum profit through effective control of the cost of cultivation. This applies to all types of crop enterprises and cassava crop is not exception to it.

Cassava is an important food crop especially for the poor farmers. It also forms the main source of raw materials for starch and sago industries, thus occupying a prominent position in the agricultural economy of Kerala and Tamil Nadu states. The area under this crop has drastically come down during the last decade owing to the replacement of traditional cassava areas by commercial crops. Cassava crop needs to be made monetarily a competative one to prevent further decline in the area so as to meet the anticipated food and industrial requirements. The possible way out to realise higher income from this crop depends heavily on improving the managerial efficiency of cassava farmers. This warrants an information package at the hands of the extension agency on various aspects of managerial efficiency of farmers. Past studies conducted in the area of management factor of farmers neither came out with a measuring device for managerial efficiency on sound scientific procedures nor with comprehensive information on managerial efficiency of cassava farmers and related factors of it. Considering the above facts, the present study was taken up with the following objectives.

## 6.1. OBJECTIVES

(1) To develop and standardise a scale to measure managerial efficiency of farmers.

(2) To measure the managerial efficiency of cassava farmers in Kerala and Tamil Nadu with the developed scale.

(3) To delineate the important components of managerial efficiency of cassava farmers.

(4) To study the relationship of socio-psychological and situational factors with the managerial efficiency of cassava farmers.

(5) To identify the managerial constraints as perceived by the cassava farmers.

## 6.2. METHODOLOGY

The study was undertaken in four districts, two each from the states of Kerala and Tamil Nadu, selected based on the criteria of area and productivity of cassava. The selected districts were Thiruvananthapuram (low productivity district), and Pathanamthitta (high productivity district) in Kerala, and Kanyakumari (low productivity district) and Salem (high productivity district) in Tamil Nadu. Salem district was also considered as industrial district and the other three districts as non-industrial districts for the purpose of analysis. A total 240 cassava farmers who were selling minimum of half the proportion of cassava tubers produced by them were selected for the study at the rate of 60 from each of the four districts following stratified random sampling procedure.

The dependent variable of the study was managerial efficiency of farmers and the same was measured with the help of a scale developed for the study. Based on the review of literature and discussion with experts, 196 items reflecting managerial activities of farmers applicable for various crop enterprises were generated. From this exhaustive list of items, 93 items were selected based on judges relevancy rating method. These 93 items were subjected to item analysis based on the responses from 60 each of cassava and paddy farmers to each of the 93 items, on a five-point frequency rating with scores of 5, 4, 3, 2 and 1. Thirty items which had shown significant discrimination index, item-criterion correlation and item-total score correlation for both the crops were selected for inclusion in the final scale. The scale was standardised by subjecting to various tests of validity and reliability. The components of the scale were identified empirically through maximum-likelihood method of factor analysis. Fifteen independent variables (socio-psychological and situational factors of cassava farmers) viz., education, social participation, extension participation, mass media participation, closeness with agricultural support system, infrastructural facilities, market perception, achievement motivation, economic motivation, orientation towards competition, attitude towards scientific management in crop enterprise, knowledge on scientific management in crop enterprise, cultivated holding, area under cassava and irrigation potential were selected based on judges relevancy rating to find out the influence of these variables on managerial efficiency of farmers. New scales were constructed to measure the attitude towards scientific management in crop enterprise and knowledge on scientific management in crop enterprise. The other independent variables were measured with the help of available scales.

The data were collected using a pre-tested and structured interview schedule during July to November 1990. The statistical tools used were mean, percentage, mean score percentage, analysis of variance, correlation, step-wise regression, multiple regression and multivariate path coefficient analysis.

The salient findings of the study are summarised as follows.

## 6.3. FINDINGS

6.3.1. Factor analysis done with 30 items included in the scale revealed that seven components (factors) were involved in explaining the dependent structure 'managerial efficiency' of farmers to the tune of more than 80 per cent.

6.3.2. The components of the scale identified based on labelling of factors were 'planning', 'labour management', 'information management', 'financial management', 'production management (variety)', production management

6.3.3. The analysis of overall managerial efficiency of the cassava farmers indicated that little more than half of the farmers (51.25 per cent) had high managerial efficiency.

6.3.4. The component-wise analysis with respect to the cassava farmers on the whole revealed that while little above half the proportion of farmers were highly efficient in the components viz., 'planning', 'labour management', 'financial management' and 'marketing management', majority of the farmers were in low efficiency group with reference to 'information management', 'production management (variety)' and 'production management (practices)'.

6.3.5. Majority of the cassava farmers in Tamil Nadu had high efficiency in overall managerial efficiency as well as in all the managerial components excepting 'information management'. In the case of Kerala state, majority were found to have low efficiency in overall management and in the components barring 'labour management', 'financial management' and 'marketing management'.

6.3.6. The district category-wise analysis indicated that while a large majority (more than 60 per cent) of the farmers of the high productivity district (Tamil Nadu)/industrial district in Tamil Nadu belonged to the high efficiency group in the overall managerial efficiency as well as in all the managerial components, the distribution of the farmers of the high productivity district of Kerala indicated little more than half of the farmers had high efficiency in over-all managerial efficiency and in the components of 'planning', 'labour management', 'financial management' and 'marketing management'. In the case of low productivity districts/non-industrial districts of both the states majority were found to have low efficiency in overall management and in the components of 'planning', 'information management', 'production management (variety)' and 'production management (practices)'.

6.3.7. There was significant difference between the farmers of Tamil Nadu and Kerala with respect to their overall managerial efficiency and in the components barring 'labour management', 'financial management', and 'marketing management'.

6.3.8. There was significant difference between farmers of the high productivity and low productivity districts of Tamil Nadu and the farmers of the industrial and non-industrial districts in the overall managerial efficiency and the components excepting labour and marketing management.

6.3.9. In the case of the low and high productivity districts of Kerala, significant difference was found only in the component 'production management (variety)'.

6.3.10. It was found that the high proportion of the farmers of Tamil Nadu in the high efficiency group as well as the high mean score in overall managerial efficiency and in the components was mainly due to the excellent performance of the farmers belonging to Salem district which is strongly backed by cassava-based industries.

6.3.11. The component-wise performance of the cassava farmers as a whole was in the order of 'labour management', 'marketing management', 'planning', 'financial management', 'production management (practices)', 'information management' and 'production management (variety)'.

6.3.12. The rank correlation analysis showed that the component-wise relative performance of the farmers of the industrial district differed from that of the non-industrial district.

6.3.13. The component-wise relative performance of the farmers of the industrial district was in the order of 'production management (variety)', 'production, management (practices)', 'planning', 'labour management', 'marketing management', 'information management' and 'financial management' while for the farmers of non-industrial district, it was in the order of 'labour management', 'marketing management', 'financial management', 'planning', 'produciton management (practices)', 'information management' and 'production management (variety)'.

6.3.14. There was significant relationship between the performance of the cassava farmers in the managerial components and the profit obtained by them in cultivation.

6.3.15. The step-wise regression analysis indicated that the components 'planning', 'information management' and 'financial management' were relatively more important than the other components and these three components explained 68 per cent of the variation in the profit accrued.

6.3.16. The multiple regression analysis revealed that the 15 independent variables put together contributed significantly to the managerial efficiency of the cassava farmers and explained 93 per cent of the variation in managerial efficiency.

6.3.17. The variables namely, closeness with agricultural support system, market perception, achievement motivation, economic motivation, attitude towards scientific management, knowledge on scientific management, cultivated holding, area under cassava and irrigation potential were found to have significant contribution and direct effect on managerial efficiency and were considered to be related to the managerial efficiency of the farmers. The variables education, social participation, extension participation, mass media participation, infrastructural facilities and orientation towards competition were found to be not significantly related to managerial efficiency of the farmers.

6.3.18. The major constraints faced by the cassava farmers in carrying out the activities under various managerial components were 'lack of awareness', 'lack of knowledge', 'lack of conviction', 'limited resources', 'uncertainty', 'shortage of labourers', 'lack of timely information', 'lack of planting materials', 'high cost of fertilizers' and 'lack of marketing choice'.

## 6.4. IMPLICATION OF THE STUDY

6.4.1. The managerial efficiency scale developed in this study can be used to assess the managerial efficiency of farmers in any single crop enterprise of annual or seasonal nature as the items of the scale were so chosen to suit various crop enterprises. The scale has been deliberately made simple so that persons interested in using the scale could do so with ease in recording the response of the farmers as well as in computing the managerial efficiency score.

6.4.2. The empirical identification of the components involved in the scale brought out in clear terms the major areas of management of any crop enterprise. The areas of management delineated in the study can be used as the basis for the formulation of management development programmes of farmers. The items under each component may be taken as guidelines in the preparation of specific extension education content in such management development programmes.

6.4.3. Lack of awareness, knowledge and conviction were the widely reported constraints by cassava farmers for not following managerial functions which is suggestive of the imminent need for organising management development programmes for this group of farmers for enriching their knowledge on efficient management of crop enterprises.

6.4.4. The study has brought to focus the positive influence of assured marketing (due to industrial base) on the managerial efficiency of cassava farmers. This calls for suitable policy decisions on the part of the Government to ensure better marketing facilities for cassava either by establishing a network of cassava-based industries or functional marketing organisations in the public/private/cooperative sector.

6.4.5. The managerial efficiency of farmers of low productivity districts was in general poor suggesting the need for intensive efforts by the extension agencies in organising management development programmes for cassava farmers in these districts to bring about an awareness about the importance of management in crop cultivation and imparting basic knowledge on managerial skills. In areas such as the district supported with cassava-based industries and high productivity districts where cassava farmers were better managers, extension agency can formulate management development programme of advanced nature covering economic principles underlying management and decision making methods in order to enable the farmers to be practising managers.

6.4.6. Among the components of managerial efficiency, three components namely, 'planning', 'financial management' and 'information management' had emerged as more important ones in determining the profit accrued. Hence, these management areas are to be given prime importance and wider scope in the management development programmes of cassava farmers.

6.4.7. The farmers' factors such as closeness with agricultural support system, market perception, achievement motivation, economic motivation, attitude towards scientific management, knowledge on scientific management, area under cassave and irrigation potential were found to influence managerial efficiency. Hence, it is suggested that these factors may be borne in mind while selecting farmers for the management development programmes.

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## 6.5. SUGGESTED LINES OF FUTURE WORK

6.5.1. The present study has been undertaken only with regard to cassava farmers. Hence, it is suggested that similar studies may be taken up in future to assess the managerial efficiency of the farmers cultivating cereals, pulses, oils seeds and plantation crop etc.

6.5.2. The scope of the present investigation was restricted to a single crop enterprise. However, considering the gaining importance of cropping systems/farming systems approach of late, there is a need to develop appropriate scales to measure the managerial efficiency of farmers in various cropping/farming systems.

6.5.3. Action research studies may be initiated to standardise the course content of various managerial components that can form a base material for imparting suitable training for the farmers and also to analyse the impact of such trainings in actual field condition.

6.5.4. It is also necessary to develop suitable measuring devices exclusively for the individual managerial components such as planning, marketing etc. to gain an in-depth knowledge on these components.

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* Original not seen

# APPENDICES

## APPENDIX I

## KERALA AGRICULTURAL UNIVERSITY

Dr.G.T.Nair,
Professor & Head

Department of Agricultural Extension,
College of Agriculture,
Vellayani - 695 522

Dear Sir/Madam,

Mr. M.Anantharaman, Ph.D. Scholar in this Department has taken up a research study on "MANAGERIAL EFFICIENCY OF CASSAVA FARMERS" under my guidance. One of the objectives of the study is to find out the relationship between managerial efficiency of cassava farmers and socio-psychological and situational factors.

For this purpose, twenty three socio-psychological and situational variables have been identified based on review of literature and discussion with experts which are listed in the Appendix.

In view of your expert knowledge and experience, I request you to offer your valuable rating of the relevancy of these variables in the five point continuum of "Most relevant" to "Least relevant". Please put a tick mark (✓) against each of the variables to indicate your judgement on the degree of relevancy of the variables.

Further, you are welcome to add additional variables, if any, relevant to the study. Kindly rate all the variables and return the proforma in the stamped envelop enclosed to the researcher at the earliest.

Yours Sincerely,

Sd/-
G.T.NAIR

## APPENDIX II.

**Independent variables with their mean relevancy score and coefficient of variation**

| Sl. No. | Variables | Mean relevancy score | Coefficient of variation |
|---|---|---|---|
| | Socio-psychological | | |
| 1. | Age | 3.33 | 32.73 |
| *2. | Education | 4.20 | 19.05 |
| *3. | Social participation | 3.77 | 21.49 |
| *4. | Extension participation | 4.30 | 18.37 |
| *5. | Mass media participation | 4.20 | 19.29 |
| *6. | Closeness with agricultural support system | 4.23 | 17.26 |
| 7. | Coordination in purchase of inputs | 3.40 | 22.56 |
| *8. | Infrastructural facilities | 3.86 | 18.91 |
| 9. | Innovation - proneness | 3.30 | 24.45 |
| *10. | Market perception | 4.40 | 15.23 |
| *11. | Achievement motivation | 4.00 | 13.79 |
| *12. | Economic motivation | 4.17 | 12.72 |
| 13. | Level of aspiration | 3.00 | 55.67 |
| 14. | Credit orientation | 2.77 | 55.02 |
| *15. | Orientation towards competition | 3.80 | 24.21 |
| *16. | Attitude towards scientific management in crop enterprise | 4.13 | 17.68 |
| *17. | Knowledge on scientific management in crop enterprise | 4.57 | 13.79 |
| | Situational | | |
| *1. | Cultivated holding | 4.10 | 20.60 |
| *2. | Area under cassava | 3.83 | 22.83 |
| 3. | Tenancy status | 3.37 | 32.64 |
| 4. | Fragmentation | 3.33 | 34.53 |
| *5. | Irrigation potential | 3.93 | 23.15 |
| 6. | Family size | 2.80 | 37.86 |
| | Average | 3.77 | 24.95 |

* Variable selected for the study

## APPENDIX III

Components and items generated with mean score and coefficient of variation based on judges relevancy rating

| Sl.No. | Components and items | Mean score | Coefficient of variation |
|---|---|---|---|
| | I. <u>Planning</u> | | |
| (1) 1.* | Setting an objective of production from the crop | 4.23 | 19 46 |
| (2) 2 * | Setting an objective of profit target from the crop | 4 38 | 17.22 |
| (3) 3.* | Setting an objective of expenditure limit for crop cultivation | 3 83 | 23 19 |
| (4) 4.* | Preparing calender of various operations of crop cultivation well in advance | 4 33 | 20 93 |
| 5. | Considering family consumption requirements while planning crop cultivation | 3 45 | 32 37 |
| (5) 6.* | Considering climatic conditions while planning various operations | 4 22 | 17.37 |
| (6) 7.* | Making decisions on cultivation practices based on evidence | 3 78 | 25 12 |
| (7) 8.* | Taking into account the relationship of quantum used and produce outcome while allocating resources like seed, fertilizer, etc. | 3 67 | 26 19 |
| (8) 9.* | Taking into account the least-cost combination of inputs for producing given quantity of output | 3 93 | 26 20 |
| (9) 10.* | Working out operation-wise expenditure before the cultivation starts | 3 80 | 22 94 |
| 11. | Preparing produce/bye produce returns budget | 3 28 | 34 77 |
| 12. | Preparing alternate budget to select best ones | 3 53 | 31 63 |
| (10) 13.* | Considering the experience of previous crop in planning | 3 82 | 24.62 |
| (11) 14 * | Deciding the planting time so as to get maximum price during harvest time | 4 10 | 20 74 |
| (12) 15 * | Planning based on the available resources and resources to be acquired | 4 05 | 21.35 |
| 16. | Breaking up the planning into production plan, market plan, labour plan, etc. | 3 37 | 31 14 |
| 17 | Anticipating policy change by the Government | 2.75 | 41.79 |
| 18. | Taking decisions based on family consensus | 3 02 | 37 55 |
| 19 | Planning the division of operations among family members | 3 32 | 32 33 |
| 20. | Allocating the available land to the crop proportional to the predicted demand of the crop | 3.60 | 29 22 |
| (13) 21.* | Planning various operations keeping in view the labour availability | 3 87 | 25.19 |
| 22. | Planning various operations keeping in mind the time availability | 3.78 | 32.41 |
| 23 | Planning various operations so as to fully utilize the available family labour | 3 53 | 30 77 |
| 24 | Planning ways and means to increase the efficiency of labours employed | 3 80 | 27 93 |
| (14) 25 * | Estimating the labour requirements for the crop cultivation | 3 81 | 21 65 |
| 26. | Working out labour available at disposal and to be hired | 3.50 | 22 44 |
| (15) 27.* | Estimating the financial requirements for the crop cultivation | 4 18 | 25.26 |
| (16) 28.* | Calculating the finance in possession and to be raised before the cultivation starts | 4 02 | 22 95 |
| (17) 29.* | Planning ways to get the additional financial requirements | 3 73 | 24.87 |

| Sl.No. | Components and items | Mean score | Coefficient of variation |
|---|---|---|---|
| 30 | Planning ways to utilize the profit accrued | 3 20 | 35 99 |
| (18) 31.* | Calculating the inputs in possession and to be acquired before the cultivation starts | 3 80 | 20 83 |
| 32. | Planning ways to get additional input required | 3 45 | 30.63 |
| (19) 33.* | Taking into account the price advantage of various inputs (like fertilizers) to be used in cultivation | 3 77 | 24.89 |
| 35. | Preparing operation wise requirement of inputs | 3 53 | 27 08 |
| (20) 36.* | Planning for alternate means of marketing | 3 76 | 27 12 |
| 37. | Analysing the consequence of alternate means of marketing based on merits and demerits | 3 40 | 29 99 |
| (21) 38 * | Allocating the land suitable for the crop | 4 18 | 21 15 |
| 39. | Planning alternate means of production | 3 42 | 30 83 |
| 40. | Analysing the consequences of alternate means of production based on merit and demerits | 3 32 | 33 25 |
| (22) 41.* | Planning the ways to increase soil fertility | 3.67 | 25 23 |
| (23) 42 * | Planning the producition of own seed materials | 3 83 | 20 30 |
| 43. | Planning the ways of soil conservation | 3 33 | 30 82 |
| (24) 44 * | Planning for providing water at critical periods | 3 97 | 22.53 |
| (25) 45 * | Planning the moisture conservation methods | 3 68 | 25 99 |
| 46 | Planning the ways of draining excess water | 3 50 | 26 85 |
| 47 | Planning the storage of seed materials | 3 55 | 28 83 |
| 48. | Planning the storage of produce | 3 60 | 26 45 |
| 49. | Deciding the crop variety based on its suitability to the field | 3 53 | 26 27 |
| (26) 50 * | Deciding the crop variety based on its quality demand in market | 4 67 | 25 34 |
| 51 | Deciding the crop variety based on its short duration | 3 46 | 20 10 |
| (27) 52.* | Deciding the crop variety based on its tolerance to pests and diseases | 3 83 | 20 85 |
| (28) 53.* | Planning for additional crop (intercrop or border crop) along with main crop for more income from the field | 3 82 | 24 62 |
| | II. <u>Labour management</u> | | |
| 1. | Building rapport with the labourers engaged in field work | 3 22 | 34 10 |
| 2 | Persuading the labourers to put in quality work | 3 50 | 22 44 |
| 3 | Demonstrating the cultivation operations to the labourers | 3 17 | 35 15 |
| (29) 4.* | Evaluating the labour efficiency by assessing the amount of work accomplished per unit time | 3 78 | 19 36 |
| 5. | Assessing the overall efficiency of labourers engaged by relating to total crop output | 3 08 | 32 59 |

| Sl.No. | | Components and items | Mean score | Coefficient of variation |
|---|---|---|---|---|
| | 6. | Assessing the effective labour utilisation by comparing the labour utilised against standard requirement of work engaged in | 3.18 | 32 69 |
| | 7. | Considering criteria like ability, common sense, neatness of work etc. while selecting the labourers | 3.06 | 30.28 |
| | 8. | Evaluating the labour efficiency by assessing the quality of work output | 3 43 | 29.30 |
| | 9. | Supervising personally the labourers at work | 3.75 | 29.06 |
| (30) | 10.* | Using available family labour at appropriate time and operation | 3.88 | 24.92 |
| | 11. | Providing incentives for the best workers | 3.37 | 29 69 |
| (31) | 12.* | Adjusting the time of various labour requiring activities to overcome the labour scarcity period | 3 68 | 23.51 |
| (32) | 13.* | Fixing labourers in advance to overcome the constraint of labour unavailability for the operations planned | 3.88 | 18.86 |
| (33) | 14.* | Giving clear instrctions to the labourers when they are asked to perform a job | 3.90 | 23.27 |
| | 15. | Telling the labourer the aim of the operation they perform | 3.10 | 33.68 |
| | 16. | Discussing the technology with the labourers | 3.05 | 38.06 |
| (34) | 17.* | Providing necessary amenities in the field for the labourers to reduce wastage of time by labourers | 3.77 | 27 12 |
| (35) | 18.* | Payment of wages promptly | 4.08 | 20 63 |
| | 19 | Accepting the suggestions of labourers | 3.50 | 28.33 |
| | III. | Information management | | |
| (36) | 1.* | Getting information on practices and solution to problems from various information sources | 4.40 | 16.70 |
| (37) | 2.* | Discussing the information on practices with extension agents | 4.25 | 19 03 |
| (38) | 3.* | Discussing the information on practices with experienced and progressive farmers | 4.22 | 24.91 |
| (39) | 4.* | Evaluating the recommended practices based on the experience in cultivation | 4.05 | 21.82 |
| (40) | 5.* | Assessing the practices recommended based on their suitability to loclal conditions | 4.17 | 20.16 |
| (41) | 6.* | Collecting information on prices of inputs from different sources | 3.80 | 22.94 |
| (42) | 7.* | Collecting information on price of produce from different sources | 3.80 | 24.87 |
| (43) | 8.* | Recording the technical information received | 3.73 | 24.39 |
| | 9. | Recording the input information received | 3.45 | 28.21 |
| (44) | 10.* | Recording the market price information | 3.70 | 17.99 |
| | 11. | Collecting information on loan provided by various sources | 3.20 | 27 83 |

| Sl.No. | Component and items | Mean score | Coefficient of variation |
|---|---|---|---|
| 12. | Collecting information on crop cultivation subsidy schemes | 3.18 | 31 15 |
| 13. | Collecting information on persons a farmers has to deal with | 2.77 | 35 15 |
| 14. | Collecting information on policy changes regarding the crop cultivated | 3.01 | 32.87 |
| 15. | Analysis the information received from various sources on same subject | 3.28 | 28.40 |
| 16. | Collection of information on labour availability | 3.15 | 30.57 |
| 17. | Giving clear cut information to family members regarding various operations to be handled by them | 3.47 | 27.09 |
| IV. | Financial management | | |
| (45) 1.* | Maintenance of farm records to note down information on crop yield | 4.05 | 22.28 |
| (46) 2.* | Recording expenditure incurred in various operations | 3 88 | 24.02 |
| (47) 3 * | Recording income obtained from sales of produces | 4 02 | 22.95 |
| (48) 4.* | Recording the income obtained from sales of bye produce | 3 95 | 23 31 |
| (49) 5.* | Recording the expenditure on various inputs purchased | 4.05 | 21.35 |
| (50) 6.* | Using the farm records to compare the performance of crop enterprise over years | 4 02 | 22.95 |
| 7 | Comparing the performance of crop with other farmers' crop | 3.72 | 27.39 |
| (51) 8.* | Comparing the production obtained and target set | 3 78 | 24.65 |
| 9. | Comparing the expenditure limit set and expenditure incurred | 3 68 | 31.15 |
| (52) 10.* | Comparing the profit obtained and profit target set | 3 90 | 24.64 |
| (53) 11 * | Calculating the profit or loss in the cultivation | 3 70 | 26.71 |
| 12. | Preparing the cost of cultivation of the crops | 4 07 | 29.39 |
| 13 | Maintaining receipts and vouchers for the purchase made | 3 47 | 30.92 |
| 14. | Utilising the farm records to develop norms and standards in respect of labour input requirement etc | 3 33 | 31.78 |
| 15. | Analysing the change in price of produce | 3.25 | 31.09 |
| 16 | Analysing the change in price of inputs | 3.33 | 30.33 |
| 17. | Recording number of labourers employed for various operations | 3.55 | 28.83 |
| 18 | Maintaining cash flow chart showing cash inflow and outflow | 3.08 | 37 12 |
| (54) 19 * | Working out cost of production per unit of produce | 3 85 | 24.06 |
| 20 | Analysing the cost of production so as to evaluate the cost incurred due to various factors like inputs, labourers etc. | 3.73 | 29.29 |
| 21. | Comparing the cost of cultivation over years | 3.58 | 28.50 |
| 22. | Availing credit facilities extended by institutional sources | 3.47 | 28.59 |
| 23 | Analysing the differential benefit of credit from various sources | 3.30 | 27 70 |

| Sl No. | | Component and items | Mean score | Coefficient of variation |
|---|---|---|---|---|
| (55) | 24 * | Fixing wages for labourers based on quantum of work turned out | 3 68 | 19 51 |
| | 25 | Taking into consideration the quality of work put in while fixing wages | 3 07 | 37 11 |
| | 26 | Wage payment made in terms of cash or kind on the basis of the price considerations of the produce | 2 82 | 35 20 |
| | 27 | Working out cash needed for various operations | 3 43 | 31 62 |
| | 28 | Checking up cash balance on cash inflows and outflows | 3 22 | 31 14 |
| | 29 | Ascertaining cash availability during peak period of expenditure | 3 55 | 28 05 |
| | 30 | Arranging outside finance without pressure at more favourable terms | 3 32 | 28 33 |
| (56) | 31 * | Making loan repayment timely | 3 93 | 25 37 |
| | 32 | Investing surplus cash to keep the idle fund fully employed | 3 58 | 31 11 |
| | 33 | Considering the estimate of cost and returns while availing loan | 3 88 | 27 45 |
| (57) | 34 * | Working out strategies in such a way that loan is obtained in right time | 3 72 | 23 09 |
| | 35 | Managing the finance required for cultivation without external source | 3 70 | 32 09 |
| (58) | 36 * | Timing the borrowing and returning the loan to minimise the interest | 3 87 | 26 06 |
| | 37. | Predicting the price of produce based on the analysis of price trend over years | 3 42 | 28 42 |
| | 38 | Predicting the change in price of various inputs | 3 13 | 34 7 |
| | 39 | Deciding the priority of operations in allocating cash | 3 72 | 27 83 |
| | 40 | Utilising the subsidy facilities extended by various agencies | 3 62 | 31 56 |
| | 41. | Adhering to the budget prepared in meeting the expenditure of various operations | 3 43 | 26 25 |
| | V. | <u>Risk management</u> | | |
| (59) | 1 * | Keeping track of problems faced in cropping | 3 72 | 23 61 |
| (60) | 2 * | Analysing the reasons for the problems | 3 87 | 25 19 |
| (61) | 3 * | Working out solutions to overcome the problems | 3 97 | 22 53 |
| (62) | 4 * | Selecting the variety that are not prone to crop failure | 4 10 | 25 46 |
| (63) | 5 * | Adopting timely measures like plant protection and other practices which reduce the crop failure | 4 32 | 21 35 |
| | 6 | Insuring the crop | 3 73 | 27 61 |
| | 7 | Making advance contracts for the sale of produce which avoids situation of not being able to sell the produce in future | 3 32 | 36 72 |
| | 8 | Ensuring the degree of success of crop based on past trends | 3 28 | 30 50 |
| | 9 | Cultivating different crop varieties to avoid total crop failure | 3 57 | 29 12 |
| | 10 | Cultivating various varieties to overcome the problem of unpredictable nature of marketing demand for a particular variety | 3 22 | 34 10 |

| Sl No. | | Component and items | Mean score | Coefficient of variation |
|---|---|---|---|---|
| | 11 | Making arrangements for substitute inputs when originally planned inputs are not available | 3 58 | 27 93 |
| (64) | 12 * | Cultivating additional crops (mixed crop, intercrop, border crops) to avoid total crop loss in the field | 3 82 | 26 84 |
| | 13 | Estimating the costs and returns considering the safety margin | 3 63 | 27 51 |
| (65) | 14 * | Keeping reserve capital to meet unexpected and important practices | 3 77 | 26 66 |
| | 15. | Investing capital more or less in lines of previous year | 2 70 | 37 83 |
| (66) | 16 * | Evaluating new technology by trying it in small area before adopting in large area | 3 90 | 25 08 |
| | 17. | Staggering the harvest to avoid post-harvest glut | 3 28 | 31 99 |
| | | VI. Production management | | |
| | 1 | Performing various operations according to calender of operations | 3 55 | 24 35 |
| (67) | 2 * | Performing various operations in tune with the climatic donditions | 3 73 | 26 27 |
| (68) | 3 * | Cultivating high yielding varieties(proportion of land put under H Y.V.) | 3 90 | 26 36 |
| | 4 | Delegating the responsibility to family members for various operations | 3 33 | 36 19 |
| (69) | 5 * | Adopting correct seed rate/planting material size | 3 97 | 25 61 |
| (70) | 6 * | Following the methods prescribed for seed material selection | 3 87 | 26 06 |
| | 7. | Adopting seed treatmment before planting | 3 83 | 30 19 |
| | 8. | Following the correct method of planting | 4 00 | 28 50 |
| (71) | 9 * | Following the correct spacing of planting | 4.15 | 24 03 |
| (72) | 10. * | Applying required dose of farm yard manure | 3 98 | 26 53 |
| (73) | 11 * | Following recommended dose of fertilizers (proportion of recommended dose of fertilizers used | 4 17 | 23 66 |
| (74) | 12 * | Following the correct method of fertilizer application | 4 07 | 25 34 |
| (75) | 13 * | Applying fertilizers based on soil testing | 4 13 | 23 57 |
| (76) | 14 * | Applying the top dressing in correct time | 4 07 | 24 12 |
| (77) | 15 * | Adopting moisture conservation methods | 4 05 | 22 73 |
| (78) | 16. * | Planting in such a time to reap maximum moisture available | 3 87 | 26 49 |
| (79) | 17 * | Observing the field for pests and diseases | 4 18 | 20 70 |
| (80) | 18 * | Following the plant protection measures | 4 18 | 24 88 |
| (81) | 19. * | Adopting drainage measures at the time of excess moisture | 3 88 | 24 92 |
| (82) | 20 * | Observing critical period of water requirement | 4 22 | 22 95 |
| (83) | 21. * | Providing water during critical period during acute shortage of soil moisture | 4 35 | 23 30 |
| (84) | 22 * | Adopting soil fertility enriching measures like green manuring/growing legumes | 3 95 | 23 31 |
| | 23 | Changing the field year after year for particular crop | 3 47 | 30 47 |

| Sl.No. | | Component and items | Mean score | Coefficient of variation |
|---|---|---|---|---|
| | 24. | Observing the general stand of the crop | 3 40 | 27 32 |
| | 25 | Observing others field and comparing the stand of the crop | 3 37 | 25.99 |
| | 26 | Adopting the gap filling measures | 3 48 | 32 09 |
| | 27 | Adopting the after cultivation methods correctly | 3 80 | 27 93 |
| (85) | 28 * | Producing necessary seed materials for the next crop | 3 87 | 23.53 |
| | 29 | Giving sufficient storage/preservation facilities for the seed material produce | 3 75 | 29 06 |
| | 30 | Proper storage of the produce | 3 60 | 25.94 |
| | | VII. Marketing management | | |
| | 1. | Selling the produce on weight basis rather than on volume or area basis | 3 63 | 28 41 |
| | 2 | Analysing the price of produce in various forms of sales (whole, retail etc ) | 3 53 | 28 99 |
| (86) | 3.* | Postponing the sales when the current price is felt less and there is a possibility of price hike | 3 83 | 27 01 |
| (87) | 4.* | Processing the produce to various forms to get more profit | 3 92 | 22 50 |
| | 5 | Processing the produce to overcome the quality deterioration of produce | 3 63 | 29.71 |
| | 6 | Selling the produce through contract merchants | 2 63 | 46 49 |
| (88) | 7.* | Making the sales in terms of whole or part based on profit considerations | 3 72 | 25.09 |
| (89) | 8.* | Selling the produce through regulated market | 3 87 | 24 75 |
| | 9 | Selling the produce directly in the local market | 3 08 | 38 96 |
| | 10 | Selling the produce directly to mill or industries | 3 13 | 34 70 |
| | 11. | Enlisting the contract mmerchants who purchase the produce | 2 95 | 34 69 |
| | 12 | Getting information on prices offered by different contract merchants | 3 30 | 29.94 |
| (90) | 13 * | Ensuring the price offered is not less than cost of production | 3 78 | 23.69 |
| (91) | 14 * | Seeing that the price offered for the produce does not come lower than prevailing market price | 3 85 | 25.01 |
| | 15. | Selling the produce at lot when the price is very favourable without regard for family consumptions | 3 33 | 33 61 |
| (92) | 16 * | Negotiating with the buyers for increase in price of produce | 3 77 | 22.92 |
| (93) | 17 * | Selling or using the bye produce derived from cultivation | 3 73 | 20 67 |
| | 18 | Evaluating various modes of transportation of produce to buyers | 3 27 | 35.73 |
| | 19 | Getting cash as and when the produce is sold | 3 17 | 35 62 |
| | | Average | 3 65 | 27 32 |

* Items selected for item analysis

Number in paranthesis indicates the serial number of selected items

# APPENDIX IV

## KERALA AGRICULTURAL UNIVERSITY

Dr.G.T.Nair
Professor

Department of Agricultural Extension,
College of Agriculture,
Vellayani - 695 522

Dear Sir/Madam,

Mr.M.Anantharaman, Ph.D. Scholar in Agrl.Extension, working under my guidance is developing a scale to measure "Managerial efficiency of farmers" as a part of his doctoral research programme.

In view of your high academic qualifications and vast experience in the field of Agrl. Extension/Management, we are pleased to choose you as a judge for the preliminary selection of items for the scale.

Managerial efficiency of farmers refers to the extent of ability of the farmer in undertaking mental and operational activities which contribute to profit maximisation in a crop enterprise.

Items presumably related to managerial efficiency of farmers selected using a variety of procedures including critical incident technique, review of related literature and discussion with experts are provided in the appendix.

You are requested to kindly spare a few minutes of your valuable time and express your frank opinion about the items presented. On the right hand side of each item, there are five columns representing 'Most relevant', 'More relevant', 'Relevant', 'Less relevant' and 'Least relevant'. Please put a tick mark ( ✓ ) against each item to indicate your judgement on the degree of relevancy of items to managerial efficiency of farmers.

Care has been taken to make the list exhaustive. Still there may be scope for addition of items. Please do that if you think it necessary.

Please send the appendix duly filled up to Mr.M.Anantharaman, Ph.D. Scholar, Department of Agrl. Extension, College of Agriculture, Vellayani-695522 in the self addressed stamped envelop enclosed.

Thanking you in anticipation

Yours sincerely

Sd/-
(G.T.NAIR)

## APPENDIX V

### Item analysis Discrimination index, Criterion correlation and Total score correlation of items

| Sl No | Cassava | | | Paddy | | |
|---|---|---|---|---|---|---|
| | Discrimination Index | Criterion 'r' | Total score 'r' | Discrimination Index | Criterion 'r' | Total score 'r' |
| **I. Planning** | | | | | | |
| 1 | 1 7622$^{NS}$ | 0 2164$^{NS}$ | 0.2383$^{NS}$ | 1.5217$^{NS}$ | 0.2543$^{NS}$ | 0 4418$^{NS}$ |
| ***2 | 6 9781$^{**}$ | 0 7669$^{**}$ | 0.7293$^{**}$ | 7 4052$^{**}$ | 0 7316$^{**}$ | 0 6892$^{**}$ |
| 3 | 1 5321$^{NS}$ | 0 2683$^{*}$ | 0 0927$^{NS}$ | 1.8352$^{NS}$ | 0.1496$^{NS}$ | 0 2838$^{*}$ |
| ***4 | 6 4091$^{**}$ | 0 6591$^{**}$ | 0 7948$^{**}$ | 7 0403$^{**}$ | 0 6795$^{**}$ | 0 7300$^{**}$ |
| 5 | 2 6978$^{*}$ | 0 4333$^{**}$ | 0 5471$^{**}$ | 1 1941$^{NS}$ | 0.2990$^{*}$ | 0 2953$^{*}$ |
| 6 | 1 0471$^{NS}$ | 0 4490$^{**}$ | 0 2448$^{NS}$ | 1 8517$^{NS}$ | 0.3568$^{**}$ | 0 2311$^{NS}$ |
| 7 | 0 9259$^{NS}$ | 0 3915$^{**}$ | 0 2638$^{**}$ | 1 6430$^{NS}$ | 0 2868$^{*}$ | 0 2164$^{NS}$ |
| 8 | 1 6476$^{**}$ | 0 4321$^{**}$ | 0 3037$^{*}$ | 1 6430$^{NS}$ | 0 3180$^{*}$ | 0 3078$^{*}$ |
| ***9 | 5 0116$^{**}$ | 0 5923$^{**}$ | 0 6431$^{**}$ | 6 7284$^{**}$ | 0 6318$^{**}$ | 0 7102$^{**}$ |
| 10 | 0 7712$^{NS}$ | 0 0309$^{NS}$ | 0 3032$^{*}$ | 2 5905$^{*}$ | 0 3682$^{**}$ | 0 6005$^{**}$ |
| 11 | 2 5354$^{*}$ | 0 7207$^{**}$ | 0 5054$^{**}$ | 1.2755$^{NS}$ | 0 1983$^{NS}$ | 0 1038$^{NS}$ |
| 12 | 0 6066$^{NS}$ | 0 0314$^{NS}$ | 0 2304$^{NS}$ | 4 4116$^{**}$ | 0 4116$^{**}$ | 0 6474$^{**}$ |
| 13 | 1 7750$^{NS}$ | 0 2396$^{NS}$ | 0 2767$^{*}$ | 1 0050$^{NS}$ | 0 1867$^{NS}$ | 0 1162$^{NS}$ |
| ***14 | 6 3580$^{**}$ | 0 5983$^{**}$ | 0 7457$^{**}$ | 5 3697$^{**}$ | 0 4961$^{**}$ | 0 6463$^{**}$ |
| ***15 | 8 4554$^{**}$ | 0 6522$^{**}$ | 0 8306$^{**}$ | 5 4533$^{**}$ | 0.4823$^{**}$ | 0 5855$^{**}$ |
| ***16 | 6 5809$^{**}$ | 0 6035$^{**}$ | 0 7651$^{**}$ | 4 3174$^{**}$ | 0.3258$^{*}$ | 0 5336$^{**}$ |
| 17 | 0 7760$^{NS}$ | 0 1556$^{NS}$ | 0 3141$^{*}$ | 2.0900$^{*}$ | 0 3240$^{*}$ | 0 5154$^{**}$ |
| ***18 | 7 3698$^{**}$ | 0 6157$^{**}$ | 0 7672$^{**}$ | 4.5033$^{**}$ | 0 4298$^{**}$ | 0 5493$^{**}$ |
| 19 | 0 8000$^{NS}$ | 0.2895$^{*}$ | 0 1567$^{NS}$ | 1.8733$^{NS}$ | 0 3864$^{NS}$ | 0 3288$^{NS}$ |
| ***20 | 7 2770$^{**}$ | 0 5926$^{**}$ | 0 7248$^{**}$ | 4.9690$^{**}$ | 0 4254$^{**}$ | 0 5533$^{**}$ |
| 21 | 1 3383$^{NS}$ | 0 1984$^{NS}$ | 0 3249$^{*}$ | 0.5907$^{NS}$ | 0 1086$^{NS}$ | 0 3574$^{**}$ |
| 22 | 0 9418$^{NS}$ | 0 0234$^{NS}$ | 0 1766$^{NS}$ | 2.5905$^{*}$ | 0 3600$^{**}$ | 0 6369$^{**}$ |
| 23 | 1 8605$^{NS}$ | 0 2597$^{**}$ | 0 4416$^{**}$ | 1.2147$^{NS}$ | 0 0820$^{NS}$ | 0 1914$^{NS}$ |
| 24 | 1 2686$^{NS}$ | 0 3401$^{*}$ | 0 2914$^{*}$ | 0.9907$^{NS}$ | 0 2953$^{*}$ | 0 2614$^{*}$ |
| 25 | 0 8322$^{NS}$ | 0.3764$^{**}$ | 0 2474$^{NS}$ | 0.5042$^{NS}$ | 0 2458$^{NS}$ | 0 1512$^{NS}$ |
| 26 | 2 4319$^{*}$ | 0 3026$^{*}$ | 0 6271$^{**}$ | 0.4473$^{NS}$ | 0 1170$^{NS}$ | 0 0371$^{NS}$ |
| 27 | 0 4733$^{NS}$ | 0 0337$^{NS}$ | 0 0322$^{NS}$ | 0.5425$^{NS}$ | 0 4305$^{**}$ | 0 2987$^{*}$ |
| 28 | 2 0760$^{*}$ | 0 1620$^{NS}$ | 0 2771$^{*}$ | 1 2322$^{NS}$ | 0 3878$^{**}$ | 0 2979$^{**}$ |
| **II. Labour management** | | | | | | |
| ***29 | 5 4626$^{**}$ | 0 4219$^{**}$ | 0 6919$^{**}$ | 4.0140$^{**}$ | 0.4328$^{**}$ | 0.5121$^{**}$ |
| ***30 | 5 0898$^{**}$ | 0 3903$^{**}$ | 0 6239$^{**}$ | 3.2686$^{**}$ | 0.3763$^{**}$ | 0.4972$^{**}$ |
| 31 | 1.4315$^{NS}$ | 0.3582$^{**}$ | 0 2149$^{NS}$ | 1.5903$^{NS}$ | 0.2958$^{*}$ | 0.2679$^{*}$ |

| Sl.No | Cassava | | | Paddy | | |
|---|---|---|---|---|---|---|
| | Discrimination Index | Criterion 'r' | Total score 'r' | Discrimination Index | Criterion r' | Total score 'r' |
| ***32 | 4 7717$^{**}$ | 0.3435$^{**}$ | 0.6216$^{**}$ | 2.9360$^{**}$ | 0 3214$^{*}$ | 0.4332$^{**}$ |
| 33 | 1 4654$^{NS}$ | 0.0374$^{NS}$ | 0.1784$^{NS}$ | 2 2062$^{*}$ | 0 1839$^{NS}$ | 0 5177$^{**}$ |
| ***34 | 4 8742$^{**}$ | 0.3312$^{**}$ | 0.6153$^{**}$ | 3.6656$^{*}$ | 0 3858$^{**}$ | 0 5363$^{**}$ |
| 35 | 1.784$^{NS}$ | 0.3027$^{*}$ | 0.5291$^{**}$ | 1.2101$^{NS}$ | 0 1717$^{NS}$ | 0 1916$^{NS}$ |
| **III. Information management** | | | | | | |
| ***36 | 6 3993$^{**}$ | 0.4680$^{**}$ | 0.5727$^{**}$ | 4.3925$^{**}$ | 0 4150$^{**}$ | 0.5436$^{**}$ |
| ***37 | 8 4175$^{**}$ | 0 4008$^{**}$ | 0 6217$^{**}$ | 3.0030$^{**}$ | 0 3185$^{*}$ | 0 4053$^{**}$ |
| 38 | 1 9464$^{NS}$ | 0.3262$^{*}$ | 0.5927$^{**}$ | 0.1676$^{NS}$ | 0 0474$^{NS}$ | 0.0497$^{NS}$ |
| 39 | 2 6069$^{*}$ | 0.2723$^{*}$ | 0.6669$^{**}$ | 0.5907$^{NS}$ | 0 1674$^{NS}$ | 0 0149$^{NS}$ |
| 40 | 2 9076$^{**}$ | 0 2448$^{NS}$ | 0.6167$^{**}$ | 1.2882$^{NS}$ | 0 1688$^{NS}$ | 0 3847$^{**}$ |
| ***41 | 4 7269$^{**}$ | 0 2791$^{*}$ | 0 5203$^{**}$ | 5.1975$^{**}$ | 0 3846$^{**}$ | 0 5604$^{**}$ |
| ***42 | 4 5731$^{**}$ | 0 3852$^{**}$ | 0.3875$^{**}$ | 3.7478$^{**}$ | 0 2782$^{*}$ | 0 4807$^{**}$ |
| ***43 | 3 3528$^{**}$ | 0.4218$^{**}$ | 0.5759$^{**}$ | 2.3771$^{*}$ | 0 2758$^{*}$ | 0 3581$^{**}$ |
| 44 | 1.3086$^{NS}$ | 0 3147$^{*}$ | 0.2223$^{NS}$ | 1.4638$^{NS}$ | 0 1018$^{NS}$ | 0 1747$^{NS}$ |
| **IV. Financial management** | | | | | | |
| 45 | 0 88[illegible]0$^{NS}$ | 0 1301$^{NS}$ | 0 12[illegible]3$^{NS}$ | 2.3443$^{*}$ | 0 0251$^{NS}$ | 0 1476$^{NS}$ |
| ***46 | 4 5054$^{**}$ | 0 5283$^{**}$ | 0.6408$^{**}$ | 4.9618$^{**}$ | 0 5390$^{**}$ | 0 5590$^{**}$ |
| ***47 | 5 3226$^{**}$ | 0 5311$^{**}$ | 0.7153$^{**}$ | 4.3720$^{**}$ | 0 5270$^{**}$ | 0 5196$^{**}$ |
| 48 | 1 8750$^{NS}$ | 0.3528$^{**}$ | 0 1858$^{NS}$ | 1.0548$^{NS}$ | 0 1947$^{NS}$ | 0 3473$^{**}$ |
| 49 | 0 2388$^{NS}$ | 0 2751$^{*}$ | 0 137[illegible]$^{NS}$ | 1.2548$^{NS}$ | 0 1010$^{NS}$ | 0 2893$^{*}$ |
| 50 | 1 8750$^{NS}$ | 0 5990$^{**}$ | 0.336[illegible]$^{**}$ | 0.8518$^{NS}$ | 0 0593$^{NS}$ | 0 0117$^{NS}$ |
| 51 | 1 8169$^{NS}$ | 0 1731$^{NS}$ | 0 1817$^{NS}$ | 2.9069$^{**}$ | 0 2977$^{*}$ | 0 4954$^{**}$ |
| 52 | 2.2745$^{*}$ | 0.2605$^{*}$ | 0 2563$^{*}$ | 0.5741$^{NS}$ | 0 1114$^{NS}$ | 0 1191$^{NS}$ |
| 53 | 3.5319$^{**}$ | 0 4481$^{**}$ | 0.6410$^{**}$ | 3.9742$^{**}$ | 0 3351$^{**}$ | 0 4494$^{**}$ |
| 54 | 0 5671$^{NS}$ | 0.2245$^{NS}$ | 0.0213$^{NS}$ | 1.8518$^{NS}$ | 0 1351$^{NS}$ | 0.2613$^{**}$ |
| ***55 | 2 9504$^{**}$ | 0 2553$^{*}$ | 0 5052$^{**}$ | 8.7057$^{**}$ | 0 3669$^{**}$ | 0 4450$^{**}$ |
| 56 | 0.4152$^{NS}$ | 0.0221$^{NS}$ | 0.1017$^{NS}$ | 0.4616$^{NS}$ | 0 0187$^{NS}$ | 0 0106$^{NS}$ |
| 57 | 0.3126$^{NS}$ | 0.0318$^{NS}$ | 0 0661$^{NS}$ | 0.2326$^{NS}$ | 0 0187$^{NS}$ | 0 0117$^{NS}$ |
| **V. Risk management** | | | | | | |
| 58 | 1.8619$^{NS}$ | 0 3588$^{**}$ | 0 1781$^{NS}$ | 0.5907$^{NS}$ | 0 1028$^{NS}$ | 0 0429$^{NS}$ |
| 59 | 1 0548$^{NS}$ | 0 2187$^{NS}$ | 0 0931$^{NS}$ | 0.4917$^{NS}$ | 0 1273$^{NS}$ | 0 0994$^{NS}$ |
| 60 | 1 0016$^{NS}$ | 0 8420$^{NS}$ | 0 0607$^{NS}$ | 0.3112$^{NS}$ | 0 1735$^{NS}$ | 0.0612$^{NS}$ |
| 61 | 0.3217$^{NS}$ | 0 0457$^{NS}$ | 0 0215$^{NS}$ | 0.3517$^{NS}$ | 0 1273$^{NS}$ | 0 0580$^{NS}$ |

| Sl.No | Cassava | | | Paddy | | |
|---|---|---|---|---|---|---|
| | Discrimination Index | Criterion 'r' | Total score 'r' | Discrimination Index | Criterion 'r' | Total score 'r' |
| 62 | 1.4770$^{NS}$ | 0.2474$^{NS}$ | 0.3733$^{**}$ | 1.2755$^{NS}$ | 0.1117$^{NS}$ | 0.1629$^{NS}$ |
| 63 | 0.3314$^{NS}$ | 0.0912$^{NS}$ | 0.1211$^{NS}$ | 0.2231$^{NS}$ | 0.0802$^{NS}$ | 0.0203$^{NS}$ |
| 64 | 0.6902$^{NS}$ | 0.1834$^{NS}$ | 0.0931$^{NS}$ | 1.0090$^{NS}$ | 0.1883$^{NS}$ | 0.1572$^{NS}$ |
| ***65 | 4.3320$^{**}$ | 0.3688$^{**}$ | 0.6024$^{**}$ | 6.1334$^{**}$ | 0.3651$^{**}$ | 0.4951$^{**}$ |
| 66 | 0.5699$^{NS}$ | 0.4833$^{**}$ | 0.3005$^{*}$ | 0.4730$^{NS}$ | 0.2007$^{NS}$ | 0.6620$^{NS}$ |
| **VI. Production management** | | | | | | |
| 67 | 2.2062$^{*}$ | 0.4002$^{**}$ | 0.2046$^{NS}$ | 0.31[illegible]$^{NS}$ | 0.0940$^{NS}$ | 0.0910$^{NS}$ |
| ***68 | 5.0725$^{**}$ | 0.5173$^{**}$ | 0.5734$^{**}$ | 3.5467$^{**}$ | 0.4762$^{**}$ | 0.3595$^{**}$ |
| 69 | 0.2312$^{NS}$ | 0.1219$^{NS}$ | 0.1017$^{NS}$ | 0.4731$^{NS}$ | 0.0151$^{NS}$ | 0.0232$^{NS}$ |
| 70 | 1.2421$^{NS}$ | 0.3380$^{**}$ | 0.3606$^{**}$ | 0.3512$^{NS}$ | 0.0738$^{NS}$ | 0.0772$^{NS}$ |
| 71 | 1.2421$^{NS}$ | 0.3121$^{*}$ | 0.3208$^{*}$ | 1.0016$^{NS}$ | 0.0510$^{NS}$ | 0.1191$^{NS}$ |
| 72 | 2.0983$^{*}$ | 0.2030$^{NS}$ | 0.5416$^{**}$ | 0.1598$^{NS}$ | 0.0920$^{NS}$ | 0.0430$^{NS}$ |
| ***73 | 8.6365$^{**}$ | 0.7891$^{**}$ | 0.8173$^{**}$ | 4.2633$^{**}$ | 0.2794$^{**}$ | 0.4373$^{**}$ |
| 74 | 0.1755$^{NS}$ | 0.1084$^{NS}$ | 0.0731$^{NS}$ | 1.009$^{NS}$ | 0.1664$^{NS}$ | 0.0830$^{NS}$ |
| 75 | 0.7219$^{NS}$ | 0.5279$^{**}$ | 0.4231$^{**}$ | 1.3619$^{NS}$ | 0.2269$^{NS}$ | 0.2748$^{NS}$ |
| 76 | 1.2933$^{NS}$ | 0.1927$^{NS}$ | 0.1928$^{NS}$ | 7.8240$^{**}$ | 0.7344$^{**}$ | 0.8761$^{**}$ |
| 77 | 1.0023$^{NS}$ | 0.1971$^{NS}$ | 0.1329$^{NS}$ | 3.0329$^{**}$ | 0.1993$^{NS}$ | 0.3973$^{**}$ |
| 78 | 1.6190$^{NS}$ | 0.1883$^{NS}$ | 0.1704$^{NS}$ | 1.8518$^{NS}$ | 0.1458$^{NS}$ | 0.4224$^{NS}$ |
| 79 | 1.9222$^{NS}$ | 0.2976$^{*}$ | 0.4449$^{**}$ | 1.5485$^{NS}$ | 0.1020$^{NS}$ | 0.1963$^{NS}$ |
| ***80 | 5.3697$^{**}$ | 0.6457$^{**}$ | 0.8291$^{**}$ | 4.803$^{**}$ | 0.2679$^{*}$ | 0.4385$^{**}$ |
| 81 | 1.0548$^{NS}$ | 0.3595$^{**}$ | 0.1639$^{NS}$ | 1.0545$^{NS}$ | 0.2142$^{NS}$ | 0.1133$^{NS}$ |
| 82 | 2.1335$^{*}$ | 0.[illegible] | 0.6044$^{**}$ | 1.4165$^{NS}$ | 0.1525$^{NS}$ | 0.3446$^{**}$ |
| 83 | 11.1111$^{**}$ | 0.7186$^{**}$ | 0.731[illegible]$^{**}$ | 4.6758$^{**}$ | 0.5903$^{**}$ | 0.5679$^{**}$ |
| 84 | 1.3317$^{NS}$ | 0.2690$^{*}$ | 0.5048$^{**}$ | 1.3614[illegible] | 0.3723$^{**}$ | 0.3615$^{**}$ |
| 85 | 0.7747$^{NS}$ | 0.2028$^{NS}$ | [illegible]1108$^{**}$ | 0.4731$^{NS}$ | 0.0354$^{NS}$ | 0.0598$^{NS}$ |
| **VII. Marketing management** | | | | | | |
| ***86 | 5.65[illegible]2$^{**}$ | 0.68[illegible]7[illegible] | 0.6735$^{**}$ | [illegible].5[illegible]93$^{**}$ | 0.6718$^{**}$ | 0.7[illegible]$^{**}$ |
| 87 | 1.4645$^{NS}$ | 0.3373$^{**}$ | 0.[illegible]392$^{NS}$ | 0.2581$^{NS}$ | 0.2677$^{**}$ | 0.2331$^{NS}$ |
| ***88 | [illegible].0369 | 0.6905$^{**}$ | 0.7305$^{**}$ | 6.2106$^{**}$ | 0.5751$^{**}$ | 0.6586$^{**}$ |
| 89 | 0.3733$^{NS}$ | 0.0336$^{NS}$ | 0.0225$^{NS}$ | 0.1821$^{NS}$ | 0.0226$^{NS}$ | 0.0172$^{NS}$ |
| 90 | 1.7111$^{NS}$ | 0.3770$^{**}$ | 0.3157$^{*}$ | 1.0548$^{NS}$ | 0.1930$^{NS}$ | 0.2196$^{NS}$ |
| ***91 | 6.4729$^{**}$ | 0.7043$^{**}$ | 0.7521$^{**}$ | 6.5298$^{**}$ | 0.5887$^{**}$ | 0.6293$^{**}$ |
| ***92 | 6.3064$^{**}$ | 0.6634$^{**}$ | 0.7712$^{**}$ | 4.8620$^{**}$ | 0.4702$^{**}$ | 0.5230$^{**}$ |
| 93 | 0.2533$^{NS}$ | 0.0326$^{NS}$ | 0.0211$^{NS}$ | 0.1717$^{NS}$ | 0.0221$^{NS}$ | 0.0167$^{NS}$ |

NS Not significant     * Significant at 5 per cent level

| Sl.No | | Components and items |
|---|---|---|
| **VI. Production management** | | |
| 23 | 1. | Proportion of land put under high yielding varieties |
| 24 | 2. | Proportion of recommended fertilizer used |
| 25 | 3. | Following the plant protection measures |
| 26 | 4. | Providing water during critical periods during acute shortage of soil moisture |
| **VII. Marketing management** | | |
| 27 | 1 | Postponing the produce sales when the current price is less and there is a possibility of price hike |
| 28 | 2 | Making the produce sales in terms of whole or part based on overall profit consideration |
| 29 | 3 | Seeing that the price offered for the produce does not come lower than prevailing market price |
| 30 | 4 | Negotiating with the buyers for increase in price of produce |

## APPENDIX VII

### Eigen values of the thirty factors

| Factor No. | Eigen Value |
|---|---|
| 1. | 12.6408 |
| 2. | 3.1474 |
| 3. | 2.8804 |
| 4. | 2.5961 |
| 5. | 1.9926 |
| 6. | 1.5074 |
| 7. | 0.8821 |
| 8. | 0.7714 |
| 9. | 0.4477 |
| 10. | 0.3730 |
| 11. | 0.3453 |
| 12. | 0.2836 |
| 13. | 0.2772 |
| 14. | 0.2212 |
| 15. | 0.1973 |
| 16. | 0.1697 |
| 17. | 0.1548 |
| 18. | 0.1515 |
| 19. | 0.1237 |
| 20. | 0.1205 |
| 21. | 0.1129 |
| 22. | 0.1079 |
| 23. | 0.0957 |
| 24. | 0.0831 |
| 25. | 0.0688 |
| 26. | 0.0661 |
| 27. | 0.0576 |
| 28. | 0.0507 |
| 29. | 0.0448 |
| 30. | 0.0273 |

## APPENDIX VI

Items selected by item analysis with the theoretical components

| Sl No | | Components and items |
|---|---|---|
| **I. Planning** | | |
| 1 | 1 | Setting an objective of profit target from the crop |
| 2 | 2 | Preparing calendar of various operations of crop cultivation well in advance |
| 3 | 3 | Working out operation-wise expenditure before the cultivation starts |
| 4 | 4 | Estimating the labour requirements for the crop cultivation |
| 5 | 5 | Estimating the financial requirements for the crop cultivation |
| 6 | 6 | Calculating the finance in possession and to be raised before the cultivation starts |
| 7 | 7 | Calculating the inputs in possession and to be acquired before the cultivation starts |
| 8 | 8 | Planning for alternate means of marketing |
| **II. Labour management** | | |
| 9 | 1 | Evaluating the labour efficiency by assessing the amount of work accomplished per unit time |
| 10 | 2 | Using available family labour at appropriate time and operation |
| 11 | 3 | Fixing labourers well in advance to overcome the constraint of labour unavailability for the operation planned |
| 12 | 4 | Providing necessary amenities in the field itself for the labourer to reduce the wastage of time by the labourers |
| **III. Information management** | | |
| 13 | 1 | Getting information on practices and solutions to problems from various information sources |
| 14 | 2 | Discussing the information on practices with extension agents |
| 15 | 3 | Collecting information on prices of various inputs from different sources |
| 16 | 4 | Collecting information on price of produce from different sources |
| 17 | 5 | Recording the technical information received |
| **IV. Financial management** | | |
| 18 | 1 | Recording the expenditure incurred in various operations |
| 19 | 2 | Recording the income obtained from sales of produce |
| 20 | 3. | Calculating the profit or loss in the cultivation |
| 21 | 4 | Fixing wages for labourers based on quantum of work turned out |
| **V. Risk management** | | |
| 22 | 1 | Keeping reserve capital to meet unexpected and important practices |

## APPENDIX VIII

Rotated maximum-likelihood estimate of factor loadings (6 factor model)

| Item | Factor loadings | | | | | |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. | 0.4827 | 0.4033 | −0.1537 | −0.0766 | 0.3161 | 0.3789 |
| 2. | 0.5250 | 0.3611 | −0.2034 | −0.1074 | 0.3186 | 0.3628 |
| 3. | 0.5979 | 0.3252 | −0.1684 | 0.0208 | 0.2708 | 0.3418 |
| 4. | 0.5191 | 0.3719 | −0.2036 | −0.0606 | 0.1943 | 0.4673 |
| 5. | 0.6559 | 0.3316 | −0.2097 | −0.1204 | 0.2122 | 0.4928 |
| 6. | 0.6624 | 0.2516 | −0.1529 | −0.1177 | 0.2022 | 0.5491 |
| 7. | 0.6025 | 0.3069 | −0.1559 | −0.1395 | 0.2070 | 0.5078 |
| 8. | 0.5085 | 0.2954 | −0.2139 | −0.2313 | 0.1766 | 0.4706 |
| 9. | 0.1987 | 0.2349 | −0.1052 | 0.7975 | 0.1935 | -0.0710 |
| 10. | 0.0911 | 0.3203 | −0.1577 | 0.8355 | 0.1381 | 0.0090 |
| 11. | 0.0895 | 0.1969 | −0.2634 | 0.8782 | 0.1302 | 0.0404 |
| 12. | 0.0940 | 0.2918 | −0.2309 | 0.8227 | 0.1659 | 0.0408 |
| 13. | 0.1188 | 0.3247 | 0.8276 | −0.0940 | 0.1516 | −0.0306 |
| 14. | 0.1971 | 0.1878 | 0.8324 | −0.0083 | 0.1179 | −0.0419 |
| 15. | 0.0905 | 0.3168 | 0.8961 | −0.0225 | 0.0925 | −0.0422 |
| 16. | 0.0149 | 0.3381 | 0.8282 | −0.0436 | 0.1338 | 0.0034 |
| 17. | 0.1748 | 0.1216 | 0.7388 | −0.0350 | 0.1821 | −0.0421 |
| 18. | 0.7750 | 0.1940 | −0.0632 | −0.0781 | 0.1557 | −0.4451 |
| 19. | 0.7382 | 0.2122 | −0.1115 | −0.0742 | 0.1934 | −0.4581 |
| 20. | 0.7820 | 0.0963 | −0.1169 | −0.1127 | 0.1098 | −0.4072 |
| 21. | 0.7195 | 0.0864 | −0.0836 | −0.0674 | 0.1152 | −0.4448 |
| 22. | 0.7358 | 0.2249 | −0.1257 | −0.0727 | 0.0658 | −0.2810 |
| 23. | 0.2102 | 0.2008 | −0.2137 | −0.1433 | 0.4171 | −0.1645 |
| 24. | 0.1301 | 0.2078 | 0.0334 | 0.1002 | 0.9168 | −0.0359 |
| 25. | 0.1508 | 0.2276 | 0.0601 | 0.1404 | 0.8393 | −0.0312 |
| 26. | 0.1942 | 0.3307 | −0.2489 | −0.1950 | 0.5870 | −0.0291 |
| 27. | 0.2052 | 0.7455 | −0.1991 | −0.1042 | 0.2412 | 0.0236 |
| 28. | 0.1279 | 0.8622 | −0.1617 | −0.0554 | 0.2569 | 0.0547 |
| 29. | 0.1332 | 0.9567 | −0.0622 | −0.0578 | 0.2193 | −0.0089 |
| 30. | 0.0906 | 0.9131 | −0.0509 | −0.0898 | 0.1637 | 0.0098 |

## APPENDIX IX

Rotated maximum-likelihood estimate of factor loadings (7 factor model)

| Item No. | Factor Loadings | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1. | 0.7068 | -0.1554 | 0.1131 | 0.2659 | 0.2679 | -0.0976 | 0.2467 |
| 2. | 0.7082 | -0.2064 | 0.1574 | 0.2216 | 0.2745 | -0.1244 | 0.1526 |
| 3. | 0.7300 | -0.1765 | 0.2207 | 0.1791 | 0.2284 | 0.0080 | 0.0611 |
| 4. | 0.7642 | -0.2140 | 0.1029 | 0.2247 | 0.1352 | -0.0851 | -0.1409 |
| 5. | 0.8516 | -0.2214 | 0.1970 | 0.1621 | 0.1551 | -0.1431 | -0.0596 |
| 6. | 0.8774 | -0.1642 | 0.1698 | 0.0777 | 0.1327 | -0.1461 | -0.0682 |
| 7. | 0.8170 | -0.1660 | 0.1530 | 0.1438 | 0.1453 | -0.1665 | -0.0491 |
| 8. | 0.7217 | -0.2226 | 0.1089 | 0.1502 | 0.1191 | -0.2579 | 0.1177 |
| 9. | 0.2058 | -0.1036 | 0.1632 | 0.1935 | 0.1825 | 0.7970 | 0.1076 |
| 10. | 0.0984 | -0.1571 | 0.1292 | 0.3029 | 0.1389 | 0.8303 | -0.0732 |
| 11. | 0.0936 | -0.2616 | 0.1065 | 0.1775 | 0.1325 | 0.8784 | 0.0625 |
| 12. | 0.1174 | -0.2274 | 0.1050 | 0.2730 | 0.1651 | 0.8251 | -0.1090 |
| 13. | 0.1238 | 0.8202 | 0.0630 | 0.2969 | 0.2048 | -0.0962 | 0.0653 |
| 14. | 0.1242 | 0.8294 | 0.1390 | 0.1540 | 0.1747 | -0.0147 | 0.0819 |
| 15. | 0.0826 | 0.9004 | 0.0610 | 0.2963 | 0.1474 | -0.0281 | 0.0602 |
| 16. | 0.0785 | 0.8268 | -0.0228 | 0.3236 | 0.1736 | -0.0460 | -0.1200 |
| 17. | 0.1030 | 0.7331 | 0.1204 | 0.0930 | 0.2321 | -0.0303 | 0.0972 |
| 18. | 0.1891 | [illegible] | 0.8636 | 0.1306 | 0.2466 | -0.0084 | 0.0295 |
| 19. | 0.1652 | -0.1310 | 0.8344 | 0.1554 | 0.2828 | -0.0065 | 0.0289 |
| 20. | 0.1905 | -0.1412 | 0.8545 | 0.0296 | 0.1976 | -0.0458 | -0.0269 |
| 21. | 0.1251 | [illegible] | 0.8278 | 0.0313 | 0.2085 | 0.0001 | 0.0120 |
| 22. | 0.2779 | [illegible] | 0.7555 | 0.1484 | 0.1391 | -0.0157 | -0.2345 |
| 23. | [illegible] | [illegible] | 0.2283 | 0.1755 | 0.4612 | -0.1302 | 0.4686 |
| 24. | [illegible] | [illegible] | 0.0292 | 0.1795 | 0.9249 | 0.1095 | -0.0601 |
| 25. | 0.1962 | [illegible] | 0.0586 | 0.1984 | 0.8299 | 0.1485 | -0.1077 |
| 26. | 0.2096 | [illegible] | 0.1223 | 0.2921 | 0.6035 | -0.1970 | 0.1943 |
| 27. | [illegible] | [illegible] | 0.1435 | 0.6948 | 0.2458 | -0.1019 | 0.3325 |
| 28. | [illegible] | [illegible] | 0.0652 | 0.8176 | 0.2490 | -0.0989 | 0.1117 |
| 29. | [illegible] | [illegible] | 0.1201 | 0.9149 | 0.2169 | -0.0550 | 0.0079 |
| 30. | [illegible] | [illegible] | 0.0842 | 0.8855 | 0.1560 | -0.0890 | -0.1869 |

Proportional
variance by

## APPENDIX X

Rotated maximum-likelihood estimate of factor loadings (8 factor model)

| Item No. | Factor loadings 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. | 0.7775 | -0.1726 | -0.1617 | -0.0391 | 0.1153 | 0.0450 | 0.4840 | -0.1462 |
| 2. | 0.7302 | -0.2177 | -0.1998 | -0.0943 | 0.1229 | 0.0917 | 0.4537 | -0.0121 |
| 3. | 0.7250 | -0.3044 | -0.0681 | -0.0685 | 0.0760 | 0.1043 | 0.4589 | 0.0898 |
| 4. | 0.7405 | -0.1722 | -0.1648 | -0.1419 | 0.0172 | 0.2187 | 0.2040 | 0.2319 |
| 5. | 0.7457 | -0.2694 | -0.2392 | -0.1427 | 0.0347 | 0.3923 | 0.0976 | 0.1012 |
| 6. | 0.7199 | -0.2463 | -0.2247 | -0.0833 | 0.0291 | 0.5287 | 0.0161 | 0.0886 |
| 7. | 0.7070 | -0.2213 | -0.2576 | -0.1110 | 0.0532 | 0.5050 | -0.1013 | 0.0020 |
| 8. | 0.6582 | -0.1404 | -0.3212 | -0.1254 | 0.0076 | 0.3492 | 0.1534 | -0.1120 |
| 9. | 0.2143 | -0.0500 | 0.8438 | -0.0236 | 0.0951 | 0.0132 | 0.1407 | -0.0881 |
| 10. | 0.1765 | 0.0030 | 0.8950 | -0.1161 | 0.0635 | -0.0971 | 0.0335 | 0.0851 |
| 11. | 0.1073 | 0.0364 | 0.9185 | -0.1827 | 0.0565 | 0.0131 | 0.1296 | -0.7734 |
| 12. | 0.1778 | 0.0170 | 0.8859 | -0.1877 | 0.0958 | -0.0307 | 0.0060 | 0.0746 |
| 13. | 0.2933 | -0.1123 | -0.0273 | 0.8353 | 0.1162 | -0.0512 | 0.1152 | -0.0933 |
| 14. | 0.1876 | -0.1743 | -0.1003 | 0.8264 | 0.0931 | 0.1083 | 0.0772 | -0.1384 |
| 15. | 0.2452 | -0.0889 | -0.0956 | 0.9136 | 0.0622 | -0.0636 | 0.1166 | 0.0287 |
| 16. | 0.2691 | 0.0036 | -0.1523 | 0.8437 | 0.0981 | -0.1051 | 0.1254 | 0.1038 |
| 17. | 0.1373 | -0.1533 | -0.1292 | 0.7392 | 0.1640 | 0.1399 | 0.0669 | -0.1434 |
| 18. | 0.1702 | 0.8817 | -0.1972 | -0.0669 | 0.0994 | -0.0599 | 0.0943 | -0.0324 |
| 19. | 0.1712 | 0.8571 | -0.1979 | -0.1176 | 0.1364 | -0.0920 | 0.1044 | -0.0173 |
| 20. | 0.0924 | 0.8667 | -0.2247 | -0.1189 | 0.0679 | 0.0791 | 0.0179 | 0.0026 |
| 21. | 0.0518 | 0.8418 | -0.1715 | -0.0953 | 0.0887 | 0.0348 | 0.0050 | -0.0448 |
| 22. | 0.2315 | 0.7736 | -0.1984 | -0.1491 | 0.0068 | 0.0352 | -0.0243 | 0.2010 |
| 23. | 0.1876 | -0.2545 | -0.2264 | -0.1964 | 0.3927 | -0.0104 | 0.0463 | -0.5650 |
| 24. | 0.3265 | -0.1380 | 0.1938 | 0.0198 | 0.8736 | -0.0414 | 0.0512 | 0.0451 |
| 25. | 0.3238 | -0.1515 | 0.2388 | 0.0572 | 0.7823 | -0.0303 | 0.0129 | 0.1097 |
| 26. | 0.3612 | -0.1727 | -0.3113 | -0.2460 | 0.5362 | 0.0047 | -0.0342 | -0.2816 |
| 27. | 0.6519 | -0.1685 | -0.2583 | -0.2513 | 0.1386 | -0.2785 | -0.1027 | -0.3248 |
| 28. | 0.7268 | -0.1022 | -0.3239 | -0.2502 | 0.1551 | -0.3721 | -0.1915 | -0.1274 |
| 29. | 0.7504 | -0.1487 | -0.2364 | -0.1787 | 0.1215 | -0.4806 | -0.2575 | -0.0519 |
| 30. | 0.6951 | -0.1008 | -0.2564 | -0.1711 | 0.0762 | -0.4743 | -0.2817 | 0.1249 |
| Proportional | | | | [illegible] | 0.0683 | 0.0545 | 0.0348 | 0.0265 |

## APPENDIX XI

Rotated maximum-likelihood estimate of factor loadings (9 factor model)

| Item No. | Factor loadings | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 1. | 0.4246 | 0.7465 | -0.1007 | -0.0656 | -0.1154 | 0.1275 | -0.0848 | 0.3819 | -0.0090 |
| 2. | 0.3845 | 0.7383 | -0.1521 | -0.1186 | -0.1534 | 0.1369 | 0.0490 | 0.2922 | -0.0584 |
| 3. | 0.3374 | 0.7568 | -0.0258 | -0.1038 | -0.0123 | 0.1336 | 0.1336 | 0.2770 | -0.0261 |
| 4. | 0.3682 | 0.7436 | -0.1061 | -0.1101 | -0.0893 | 0.0227 | 0.1955 | -0.0171 | 0.1708 |
| 5. | 0.3294 | 0.8107 | -0.2117 | -0.1266 | -0.1599 | -0.0279 | 0.0523 | -0.1591 | -0.0012 |
| 6. | 0.2452 | 0.8456 | 0.1963 | 0.0687 | -0.1551 | -0.0512 | 0.0006 | -0.2819 | -0.0069 |
| 7. | 0.3033 | 0.7722 | -0.1757 | -0.0795 | -0.1786 | -0.0712 | -0.1074 | -0.3517 | 0.0218 |
| 8. | 0.2897 | 0.7253 | 0.1004 | 0.1189 | -0.2660 | -0.0801 | -0.1232 | -0.0341 | -0.0197 |
| 9. | 0.2733 | 0.1994 | -0.1160 | -0.0226 | 0.8154 | -0.0596 | -0.0105 | 0.0900 | -0.2135 |
| 10. | 0.3541 | 0.0709 | -0.0674 | -0.0674 | 0.8367 | -0.0855 | 0.1362 | 0.0084 | 0.0065 |
| 11. | 0.2283 | 0.1119 | -0.0358 | -0.1543 | 0.9043 | -0.0988 | -0.0339 | 0.0723 | 0.0846 |
| 12. | 0.3293 | 0.1030 | -0.0475 | -0.1401 | 0.8387 | -0.0681 | 0.1030 | 0.0607 | -0.0013 |
| 13. | 0.3288 | 0.1875 | 0.0159 | 0.8366 | -0.0052 | 0.0588 | -0.0265 | 0.0404 | -0.0670 |
| 14. | 0.1845 | 0.1985 | -0.0968 | 0.8740 | -0.0900 | -0.0004 | -0.0825 | -0.0621 | -0.2531 |
| 15. | 0.3127 | 0.1509 | -0.0021 | 0.8812 | -0.0726 | 0.0217 | 0.0849 | 0.0212 | 0.0993 |
| 16. | 0.3451 | 0.1386 | 0.0829 | 0.8014 | -0.1351 | 0.0698 | 0.1459 | 0.0300 | 0.2283 |
| 17. | 0.1416 | 0.1785 | -0.0899 | 0.7376 | -0.1431 | 0.0915 | -0.1559 | -0.0723 | 0.1449 |
| 18. | 0.2289 | 0.1686 | 0.8656 | -0.1293 | -0.0861 | 0.0870 | -0.0253 | 0.0976 | 0.0292 |
| 19. | 0.2550 | 0.1500 | 0.8351 | -0.1767 | -0.0928 | 0.1237 | 0.0086 | 0.1051 | -0.0183 |
| 20. | 0.1217 | 0.1703 | 0.8624 | -0.1805 | -0.1250 | 0.0326 | 0.0035 | -0.0417 | -0.0543 |
| 21. | 0.1158 | 0.1066 | 0.8379 | -0.1588 | -0.0803 | 0.0592 | -0.0568 | -0.0171 | 0.0129 |
| 22. | 0.2352 | 0.2301 | 0.7588 | -0.1570 | -0.0740 | -0.0028 | 0.1587 | -0.0943 | 0.1856 |
| 23. | 0.2797 | 0.1098 | -0.2339 | -0.2387 | -0.2357 | 0.2536 | -0.5976 | 0.0970 | -0.0307 |
| 24. | 0.3937 | 0.2018 | 0.1175 | -0.0227 | 0.2564 | 0.7930 | -0.0781 | -0.1124 | -0.0671 |
| 25. | 0.3963 | 0.1979 | 0.1344 | -0.0464 | 0.2834 | 0.7031 | 0.0027 | 0.1547 | -0.0711 |
| 26. | 0.4405 | 0.2125 | -0.1453 | -0.2354 | 0.3127 | 0.3887 | -0.3840 | -0.0826 | 0.0871 |
| 27. | 0.7696 | 0.2297 | -0.1110 | 0.1932 | -0.1257 | -0.0101 | -0.2681 | 0.0811 | -0.0204 |
| 28. | 0.8884 | 0.1976 | -0.0378 | -0.1523 | -0.0692 | 0.0202 | -0.0943 | 0.0016 | 0.0557 |
| 29. | 0.9772 | 0.1335 | -0.0901 | 0.0710 | -0.0472 | -0.0159 | -0.0077 | -0.0078 | -0.0096 |
| 30. | 0.9277 | 0.0970 | 0.0532 | -0.0531 | -0.0680 | -0.0434 | 0.1592 | -0.0686 | -0.0070 |
| Proportional variance by each factor | 0.1882 | 0.1280 | 0.1289 | 0.1289 | 0.1169 | 0.0493 | 0.0277 | 0.0221 | 0.0099 |

# APPENDIX XII

**Rotated maximum-likelihood estimate of factor loadings (10 factor model)**

| Item No. | Factor loadings 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 0.7330 | 0.3293 | −0.1617 | −0.1153 | 0.1357 | 0.2287 | −0.1196 | 0.4089 | −0.0005 | 0.0158 |
| 2. | 0.7195 | 0.2984 | −0.1953 | −0.1764 | 0.1756 | 0.2374 | 0.0211 | 0.3119 | −0.0352 | −0.0246 |
| 3. | 0.7280 | 0.2844 | −0.0465 | −0.2508 | 0.1718 | 0.2280 | 0.1236 | 0.3064 | −0.0458 | 0.0780 |
| 4. | 0.7046 | 0.3595 | −0.1311 | −0.1346 | 0.1524 | 0.1166 | 0.1982 | 0.0570 | 0.2169 | 0.0309 |
| 5. | 0.7734 | 0.3554 | −0.1922 | −0.2493 | 0.1674 | 0.0605 | 0.0598 | −0.1193 | 0.0774 | 0.0119 |
| 6. | 0.8135 | 0.3032 | −0.1682 | −0.2376 | 0.1182 | 0.0175 | 0.0287 | −0.2614 | 0.0603 | 0.0833 |
| 7. | 0.7380 | 0.3676 | −0.2049 | −0.2099 | 0.1065 | 0.0050 | −0.0932 | −0.3163 | 0.1472 | −0.0166 |
| 8. | 0.7090 | 0.2813 | −0.2938 | −0.1361 | 0.1589 | −0.0061 | −0.1206 | −0.0184 | 0.0485 | −0.0078 |
| 9. | 0.2404 | 0.1359 | 0.3405 | −0.1178 | −0.0122 | −0.0050 | −0.0166 | 0.0752 | −0.2106 | −0.0495 |
| 10. | −0.0960 | 0.2174 | 0.8842 | −0.0643 | 0.0036 | −0.0254 | 0.1349 | 0.0514 | 0.0088 | −0.0403 |
| 11. | 0.1300 | 0.0793 | 0.9363 | −0.0550 | 0.0926 | −0.0711 | −0.0339 | 0.0913 | 0.0832 | 0.0138 |
| 12. | 0.1188 | 0.2008 | 0.8863 | −0.0567 | 0.0824 | −0.0155 | 0.1135 | −0.0258 | 0.0033 | −0.0049 |
| 13. | 0.0972 | 0.2919 | −0.1151 | −0.0893 | 0.8387 | 0.1208 | −0.0424 | 0.0567 | 0.0184 | −0.1284 |
| 14. | 0.1173 | 0.1747 | −0.1756 | −0.1860 | 0.8650 | 0.0417 | −0.0850 | −0.0943 | −0.1452 | −0.1526 |
| 15. | 0.0510 | 0.2696 | −0.1832 | −0.0811 | 0.8663 | 0.0832 | 0.0867 | 0.0678 | 0.1889 | −0.1354 |
| 16. | 0.0397 | 0.2759 | −0.2462 | 0.0127 | 0.8012 | 0.1220 | 0.1670 | 0.0937 | 0.2355 | 0.0748 |
| 17. | 0.0660 | 0.1179 | −0.2148 | −0.1733 | 0.7727 | 0.0780 | −0.1258 | −0.0787 | 0.0838 | 0.4327 |
| 18. | 0.1100 | 0.2395 | −0.1187 | 0.8628 | 0.0472 | 0.1383 | −0.0374 | 0.1433 | 0.0153 | 0.0144 |
| 19. | 0.0902 | 0.2512 | −0.1337 | 0.8336 | 0.1016 | 0.1818 | 0.0012 | 0.1437 | −0.0476 | 0.0163 |
| 20. | 0.1123 | 0.1618 | −0.1428 | 0.8756 | 0.0950 | 0.0696 | 0.0043 | −0.0201 | −0.0432 | −0.0204 |
| 21. | 0.0450 | 0.1531 | −0.0980 | 0.8455 | 0.0658 | 0.0873 | −0.0579 | 0.0126 | 0.0207 | 0.0116 |
| 22. | 0.0589 | 0.2844 | −0.1094 | 0.7699 | 0.0691 | 0.0561 | 0.1563 | −0.0041 | 0.2413 | 0.0367 |
| 23. | 0.0702 | 0.1953 | −0.2883 | −0.2428 | 0.2127 | 0.2852 | −0.6011 | 0.0826 | −0.0071 | 0.0185 |
| 24. | 0.1664 | 0.2272 | 0.3019 | 0.1069 | 0.0169 | 0.8459 | −0.1018 | −0.0992 | −0.0115 | 0.0374 |
| 25. | 0.1629 | 0.2465 | 0.3322 | 0.1253 | 0.0377 | 0.7702 | 0.0019 | −0.1384 | −0.0398 | 0.0467 |
| 26. | 0.1598 | 0.3339 | 0.3865 | −0.1534 | 0.2075 | 0.4496 | −0.3904 | −0.0470 | 0.1502 | 0.0193 |
| 27. | 0.1931 | 0.7189 | −0.2600 | −0.0866 | 0.2148 | 0.1235 | −0.2549 | 0.1666 | −0.0549 | 0.0750 |
| 28. | 0.1579 | 0.8393 | −0.2228 | 0.0002 | 0.1693 | 0.1801 | −0.0814 | 0.1322 | 0.0425 | 0.0336 |
| 29. | 0.1036 | 0.9376 | −0.2120 | −0.0316 | 0.0798 | 0.1655 | −0.0044 | 0.1413 | −0.0147 | −0.0073 |
| 30. | 0.0734 | 0.8940 | −0.2243 | 0.0032 | 0.0548 | 0.1322 | 0.0597 | 0.0877 | 0.0022 | −0.0313 |
| Proportional variances by each factor | 0.1580 | 0.1548 | 0.1444 | 0.1347 | 0.1280 | 0.0660 | 0.0280 | 0.0248 | 0.0115 | 0.0095 |

## APPENDIX XIII

Statement on attitude of farmers towards scientific management in crop enterprise with critical ratio (t-Value)

| Sl.No. | Statements | t-Value |
|---|---|---|
| 1. | Scientific management in crop enterprise ensures more profit | 2.97 |
| 2. | The food problem of our country can be solved by scientific management in crop enterprise | 2.72 |
| 3. | All farmers should adhere to scientific management in crop enterprise | 1.54 |
| 4. | Scientific management is useless, since it is not applicable to all types of crop enterprises | 1.03 |
| 5. | Scientific management is not a must for a crop enterprise | 1.92 |
| 6. | Scientific management does not help farmers to solve problems in crop enterprise | 1.10 |
| 7 | [illegible] spent on scientific management is not worth the profit obtained | 5.83 |
| *8 | To be an efficient farmer, one must adopt scientific management in a crop enterprise | 13.21 |
| 9 | The traditional way of management of crop enterprise is still the best way | 3.32 |
| 10 | Scientific management helps the farmers to minimise unnecessary expenditure incurred in a crop enterprise | 2.03 |
| 11. | Scientific management does not guarantee the farmers to make profit from the crop enterprise | 5.58 |
| 12. | In order to utilise the available resources effectively in a crop enterprise a farmer must follow scientific management | 3.95 |
| 13. | In view of dynamic nature of agricultural technology, a farmer must use scientific management in a crop enterprise | 0.92 |
| 14. | Scientific management avoids failure in crop enterprise | 1.86 |
| 15. | Following scientific management in crop enterprise is the way to prosperity | 3.64 |
| 16. | Farmers following scientific management will be better off than other farmers | 1.75 |
| 17 | There is nothing new in scientific management in a crop enterprise than the age-old traditions | 1.75 |
| 18. | Scientific management in crop enterprise is the only hope for feeding growing population | 2.55 |
| 19. | Top priority should be given by the agricultural department in developing scientific management skills among farmers | 0 69 |
| *20 | Scientific management is the only resort for profit making from the limited resources | 6.72 |
| 21 | A farmer should feel proud of managing the crop enterprise scientifically | 5.79 |
| *22. | Popularising scientific management in crop enterprise is the way for country's prosperity | 7.25 |
| *23. | Scientific management in crop enterprise leads to overall development of farm family | 7 85 |
| 24. | Scientific management is not the solution to reduce the poverty of farmers | 1.05 |
| *25. | Farmers must follow traditional ways of managing a crop enterprise as it is very simple | 6.73 |
| *26 | Without scientific management in crop enterprise our forefathers were able to make huge profit | 6.53 |
| *27 | Scientific management is the only way to raise the standard of living of farmers in our country | 5.93 |
| 28. | Scientific management has made agriculture to attain the status of business | 2.35 |
| *29 | Scientific management matters little in crop enterprise | 10.09 |
| 30. | It is too difficult to understand scientific management principles by the farmers | 3.40 |
| 31. | Farmers can't be sure about the success by adopting scientific management in crop enterprise | 2.70 |
| 32. | Scientific management is not a pragmatic concept, agricultural specialists expect farmers to practice | 1.18 |

| Sl.No. | Statements | t-Value |
|---|---|---|
| 33. | Emphasis on scientific management is a correct measure for better farming | 2.16 |
| 34. | Scientific management of a crop enterprise leads to depletion of natural resources | 2.45 |
| *35. | Farmers feel confident in their crop enterprise if they follow scientific management | 6.32 |
| 36. | The risk involved in present day crop enterprise can be overcome by scientific management | 1.97 |
| 37. | Scientific management methods avoids exploitation of farmers by middleman | 2.45 |
| *38. | Scientific management techniques does not help farmers in facing adverse situation | 7.01 |
| 39. | Scientific management alone can improve the farmers' competance in crop enterprise | 3.79 |
| 40. | Scientific management guides the farmers in achieving the objectives set | 1.62 |
| 41. | Farmers should develop their talents in scientific management in crop enterprise | 3.97 |
| 42. | Scientific management is a good tool for taking right type of decisions in various operations of crop enterprise | 3.15 |
| 43. | Farmers are not scientists and hence scientific management is beyond their reach | 3.79 |
| 44. | Scientific management is a panacea for all the problems in crop enterprise | 1.11 |
| 45. | Scientific management in crop enterprise is a must for a sustainable production | 0.93 |
| 46. | Scientific management in crop enterprise is a wasteful exercise since crop production is pre-determined by God | 1.66 |
| 47. | Farmers who have no other business alone go in for scientific managment in crop enterprise | 1 94 |
| 48. | A farmer following scientific management in crop enterprise will be accorded higher status in his community | 2.16 |
| 49. | Scientific management is the concept extension workers use to fool the farmers | 2.46 |
| 50 | Scientific management is suited only for the resource rich farmers | 0 63 |

* Statment selected for the scale

## APPENDIX XIV

**Difficulty index, discrimination index and point biserial correlation values of items of knowledge test on scientific management in crop enterprise**

| Sl.No. | Items | Difficulty index | Discrimination index | Point biserial correlation |
|---|---|---|---|---|
| 1. | An efficient farmer will be always concerned about<br>a Simply cultivating the crop<br>b. Maximising the profit from the crop | 0 84 | 0 31 | 0 3138* |
| 2. | Success of any crop enterprise depends on<br>a. Decision making ability of farmers<br>b Borrowing loan for cultivation | 0 75 | 0 38 | 0 4097* |
| 3. | What should be the market price of the product to run the enterprise profitable?<br>a Price equals the cost of production<br>b. Price exceeds the cost of production | 0.81 | 0 38 | 0 3839** |
| 4 | What should a farmer do when the market price predicted for the produce is vary high?<br>a. Maximise the productivity<br>b. Maximise the use of available resources | 0 81 | 0.10 | 0.0958NS |
| ***5. | Which of the following criteria is good for fixing optimum level of input?<br>a Level at which maximum yield is obtained<br>b Level at which input price is less than its corresponding produce price | 0 46 | 0.69 | 0.5936** |
| ***6. | Planning for a crop enterprise is done<br>a. To determine the course of action<br>b. To supervise the labourers | 0 46 | 0.81 | 0.5712** |
| 7. | What is a budget?<br>a. Statement of expenditure<br>b. Statement of expenditure and profit | 0.81 | 0.25 | 0.2392NS |
| ***8. | Which of the following criteria need to be considered in planning to maximise the returns from the crop?<br>a Considering resources only<br>b. Considering technology and resources | 43.75 | 0.88 | 0.7085** |
| ***9. | An efficient farmer will calculate input-output relationship in terms of<br>a. Production maximisation<br>b. Profit maximisation | 0.46 | 0.81 | 0.6719** |

| Sl.No. | Items | Difficulty index | Discrimination index | Point biserial correlation |
|---|---|---|---|---|
| ***10. | Gross income of a crop enterprise is calculated by considering | 0.46 | 0 81 | 0 6526** |
| | a. Yield and price of produce | | | |
| | b. Cost of cultivation | | | |
| 11. | The main purpose of accounting is | 0.87 | 0.01 | -0 030NS |
| | a. Fixing wages to labourer | | | |
| | b. Analysing cost and returns of the crop | | | |
| ***12. | What is the best basis for allocating the resources? | 0.50 | 0 88 | 0.7385** |
| | a. Least-cost combination of inputs | | | |
| | b. Available inputs | | | |
| 13. | To get more profit from crop, the time of planting of crop should be oriented towards | 0.84 | 0 15 | 0.1256NS |
| | a. When family labourers are free | | | |
| | b. Harvesting falls during the period of maximum price and demand | | | |
| ***14. | The method of assessing the labourers should be based on | 0.46 | 0 94 | 0.7077** |
| | a. Quantity of work done as instructed | | | |
| | b. Quantity of work done | | | |
| 15. | Selection of labourers should be based on | 0.62 | 0 69 | 0 5116** |
| | a. Labourers available close by | | | |
| | b. Labourers who knows the work | | | |
| 16. | The best way of supervising the labourers at work is by | 0.78 | 0 19 | 0.0575NS |
| | a. Watching the labourer at work | | | |
| | b. Encouraging the labourers to put quality work | | | |
| 17 | Which is the best source of availing loan? | 0.84 | 0 25 | 0.3752** |
| | a. Sources easily available | | | |
| | b. Sources offering at least interest | | | |
| 18. | The best basis for allocation of capital is by | 0.62 | 0 75 | 0.6494** |
| | a. Equal allocation to various operations | | | |
| | b. On the basis of financial requirement of operations | | | |
| 19. | What are the information a farmer needs for profitable cultivation? | 0.56 | 0 38 | 0.2781* |
| | a. Information on cultivation practices | | | |
| | b. Information on cultivation practices and market price of produce | | | |

| Sl,No. | Items | Difficulty index | Discrimination index | Point biserial correlation |
|---|---|---|---|---|
| ***20. | The best method of fertilizer application is based on<br>a. Soil testing<br>b. Experience | 0 50 | 1 00 | 0 7590** |
| 21. | The recommendations on crop cultivation practices by the department is to be evaluated based on<br>a. Its ability to provide income<br>b. Prestige in adopting it | 0 63 | 0 88 | 0 7861** |
| ***22. | An efficient farmer adopts recommended practices in large area without trying it in a small way. True/False | 0 53 | 0 94 | 0 7617** |
| 23. | An efficient farmer only aims at higher yield at any cost. True/False | 0 21 | 0 44 | 0 5347** |
| 24. | Net income derived from a crop enterprise is calculated based on yield and price of produce only. True/False | 0.36 | 0 81 | 0.6797** |
| ***25. | Farmers should have alternate plans for cultivaiton. True/False | 0.44 | 0 63 | 0 5075** |
| ***26. | Fellow farmer is the only source for getting information on price of the produce | 0.50 | 1 00 | 0 8114** |
| 27. | Calender of operations indicates the timing of various activities regarding crop enterprises True/False | 0.87 | 0 01 | 0.0026NS |
| 28 | A comparative analysis of price of varius inputs help in minimising the expenditure. True/False | 0.84 | 0 63 | 0 0105NS |
| 29. | It is better to verify the market price from various sources before fixing price for the produce. True/False. | 0.64 | 0.31 | 0.4505** |
| 30. | A farmer should sell the produce to merchant who approach him first True/False | 0.81 | 0.25 | 0 2903** |
| 31. | Whether required or not, a farmer must avail all loan facilities. True/False | 0.69 | 0 56 | 0.5483** |
| 32. | Whether required or not, an efficient farmer always retains one labour everyday. True/False | 0.68 | 0 81 | 0.6936** |
| 33. | An efficient farmer engages labourers after fixing terms and conditions. True/False | 0.63 | 0 81 | 0 5951** |
| 34. | To ensure better labour efficiency, an efficient farmer provides basic facilities for the farmers at the work place True/False | 0 62 | 0 56 | 0 5432*** |
| ***35. | A farmer is said to be good at managing, if he adopts improved varieties without verifying its market demand. Ture/False | 0.50 | 0 88 | 0 7678** |

APPENDIX XV

KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF AGRICULTURAL EXTENSION, COLLEGE OF AGRICULTURE, VELLAYANI - 695 522

**Managerial efficiency of cassava farmers**
**Interview Schedule**

| | |
|---|---|
| State | District |
| Sub-division | Block |
| Krishi Bhavan | Village |
| Name of the farmer | Address |

Part I

1) **Education** Illiterate/Can read only/Can read and write/Primary/Middle/High/College/Above
2) **Cultivated holding**

| Particulars | Area in hectares | | |
|---|---|---|---|
| | Owned | Leased in | Leased out |
| a) Unirrigated | | | |
| b) Well irrigated | | | |
| c) Canal irrigated | | | |

3) **Area under cassava**

| Particular | Hectares |
|---|---|
| a Rainfed | |
| b Irrigated | |
| c Low land | |
| Total | |

4) **Social participation**

| Institutions | Memberships | | Attendance | | |
|---|---|---|---|---|---|
| | Member | Office bearer | Regularly | Occasionally | Never |
| a Panchayat | | | | | |
| b. Co-operative | | | | | |
| c. Youth Club | | | | | |
| d Farmers forum | | | | | |
| e. MLA/MP | | | | | |
| f. Any other | | | | | |

5) **Extension participation**

Please indicate frequency of **participations** in extension activities in your locality

| | Activities | Whenever conducted | Sometimes | Never |
|---|---|---|---|---|
| a | Meetings | | | |
| b | Seminar | | | |
| c | Exhibition | | | |
| d | Film shows | | | |
| e | Farmers days | | | |
| f | Demonstration | | | |
| g | Field days | | | |
| h | Any other | | | |

6) **Mass media participation**

Please indicate the frequency of utilisation of mass media

| | | Two or more times a week | Once a week | Once a fortnight | Once a month | Never |
|---|---|---|---|---|---|---|
| a | Reads news paper | | | | | |
| b | Listens to radio | | | | | |
| c | Listens to Rural Radio program | | | | | |
| d | Views T V | | | | | |
| e | Reads farm magazines and other literature on agriculture | | | | | |

7) **Closeness with Agricultural support system**

Please indicate the extent to which you are in contact with the following personnel

| | Personnel | Most often | Often | Sometimes | Never |
|---|---|---|---|---|---|
| a | Agrl. Officer | | | | |
| b | Agrl Asst | | | | |
| | Agrl. University | | | | |
| d | Veterinary Asst Surgeon | | | | |
| e | Irrigation department | | | | |
| f | Panchayat | | | | |
| g | Co-operative society | | | | |
| h | Field officer of Bank | | | | |
| i | Input dealers | | | | |

8) **Infrastructural facilities**

Please give your response based on your perception with regard to following facilities

| Facilities | Available Timely | | Available in adequate quantity | |
|---|---|---|---|---|
| | Yes | No | Yes | No |
| 1. Seeds | | | | |
| 2 Fertilizer | | | | |
| 3. Plant protection chemicals | | | | |
| 4. Credit | | | | |
| 5 Labour | | | | |

9) **Market perception**

Please record your response based on your perception with regard to marketing your cassava produce

a. Do you think a farmer will be able to sell his produce if he increases the production by adopting the recommended practices? Yes/No

b. Do you think that produce of the crop cultivated according to recommended practices will fetch good price compared to those raised under traditional practices? Low/Same/High

c How difficult will it be to dispose off the produce of the crop cultivated following their recommended practice? Very difficult/Difficult/Easy/Very Easy

10) **Achievement motivation**

Please complete the sentences by choosing the appropriate answers

a In whatever work I under take on my farm
i I like to make advance plan ii I like to do my best iii. I do not assume full responsibility for it

b I am always keen
i To maintain the social status ii To remove social evils iii To develop my qualifications

c I feel happy when
i Tell others of my personnel experience ii I assigned a difficult job iii I am required to give advice to others

d My secret ambition in life is
i To deal a happy married life ii To establish a glorious record of achievement iii To own a large farm unit

e I like to venture something which
i. Others can hardly do ii Will make one wealthy iii Others regard as a quality of leadership

11) **Economic motivation**

Given below are three sets of statements. In each of the set, please indicate which one of the three statements describes you 'Most like' and 'Least like'

| | | Statements | Most like | Least like |
|---|---|---|---|---|
| A | i | All I want from my farm is to make just reasonable living for the family (1) | | |
| | ii. | In addition to making resonable profit, the enjoyments in farming life is also inprotant for me (2) | | |
| | iii. | I would invest in farming to the maximum to gain large profit (3) | | |

| | | Statements | Most like | Least like |
|---|---|---|---|---|
| B. | i. | I would not hestitate to borrow any amount of money in order to run the farm properly (3) | | |
| | ii. | Instead of growing new cash crops which cost more money I follow the routine farming practice (1) | | |
| | iii. | It is not only monetary benefit but also the enjoyment of work done, which gives me satisfaction for my hard work on farming (2) | | |
| C. | i. | I hate to borrow money on principles even when it is necessary for properly running the farm (1) | | |
| | ii. | My main aim is maximising monetary profit in farming by growing cash crops in comparison to growing of crops which are simply consumed by my family (3) | | |
| | iii. | I avoid excessive borrowing of money for farm investigation (2) | | |

12) **Orientation toward competition**

What is your degree of agreement for the following statements?

| | Statements | Strongly agree | Agree | Disagree | Strongly disagree |
|---|---|---|---|---|---|
| 1. | The key points of success in farming should not be divulged to other farmers | | | | |
| 2. | A better yield in comparison to the neighbours brings more prestige | | | | |
| *3. | It is of no use to keep information or what other farmers are doing | | | | |
| 4. | Crop competition should be organised for all important crops | | | | |
| 5. | Better farming provides opportunity for recognition by the extension officers | | | | |
| *6. | It is not good for a farmer to become too ambitious in life | | | | |

* Negative itmes

13) **Attitude of farmers towards scientific management in crop enterprise**

Please state the degree of agreement or disagreement with each of the following statement

| Sl. No. | Statements | Strongly agree | Agree | Neutral | Disagree | Strongly disagree |
|---|---|---|---|---|---|---|
| 1. | To be an efficient farmer, one must adopt scientific management in a crop enterprise | | | | | |
| 2. | Scientific management is the only resort for profit making from the limited resources | | | | | |
| *3. | Without scientific management in crop enterprise our forefathers were able to make huge profit | | | | | |
| 4. | Scientific management in a crop enterprise leads to overall development of farm family | | | | | |
| *5. | Farmers must follow traditional ways of managing a crop enterprise as it is very simple | | | | | |

| Sl.No. | Activities | Always | Frequently | Sometimes | Rarely | Never | Reasons |
|---|---|---|---|---|---|---|---|
| **I.** | **Planning** | | | | | | |
| 1. | Setting an objective of profit target from the crop | | | | | | |
| 2. | Preparing calender of various operations of crop cultivaiton well in advance | | | | | | |
| 3. | Working out operation-wise expenditure before the cultivalton starts | | | | | | |
| 4. | Estimating the labour requirements for the crop cultivation | | | | | | |
| 5. | Estimating the financial requirement for the crop cultivation | | | | | | |
| 6. | Calculating the finance in possession and to be raised before the cultivalton starts | | | | | | |
| 7 | Calculating the finance in possession and to be acquired before the cultivation starts | | | | | | |
| 8 | Planning for alternate means of marketing | | | | | | |
| II. | Labour management | | | | | | |
| 9. | Evaluating the labour efficiency by assessing the amount of work accomplished per unit time | | | | | | |
| 10. | Using available family labour at appropriate time and operation | | | | | | |
| 11 | Fixing labourers well in advance to overcome the constraint of labour unavailability for the operations planned | | | | | | |
| 12. | Providing necessary amenities in the field itself for the labourers to reduce wastage of time by labourers | | | | | | |
| **III.** | **Information management** | | | | | | |
| 13. | Getting information on practices and solutions to problems from various information sources | | | | | | |
| 14. | Discussing the information on practices with extension agents | | | | | | |
| 15. | Collecting information on prices of various inputs from different sources | | | | | | |
| 16. | Collecting information on price of produce from different sources | | | | | | |
| 17. | Recording the technical information received | | | | | | |
| **IV.** | **Financial management** | | | | | | |
| 18. | Recording the expenditure incurred on various operations | | | | | | |
| 19. | Recording the income obtained from sales of produce | | | | | | |
| 20. | Calculating the profit or loss in the cultivation | | | | | | |
| 21. | Fixing wages for labourers based on quantum of work turned out | | | | | | |
| 22. | Keeping reserve capital to meet unexpected and important practices | | | | | | |
| **V.** | **Production management** (variety) | | | | | | |
| 23. | Proportion of land put under high yielding varieties<br>a. Previous season b Season before last | | | | | | |

| Sl. No. | Statements | Strongly agree | Agree | Neutral | Disagree | Strongly disagree |
|---|---|---|---|---|---|---|
| 6. | Popularising scientific management of crop enterprise is the way for country's prosperity | | | | | |
| *7. | Scientific management matters little in crop enterprise | | | | | |
| 8. | Farmers feel confident in their crop enterprise if they follow scientific management | | | | | |
| 9. | Scientific management is the only way to raise the standard of living of farmers in the country | | | | | |
| *10. | Scientific management techniques does not help farmers in facing adverse situation | | | | | |

* Negative items

14) **Knowledge on scientific management in crop enterprise**

I. Please choose the correct answer for each statment/question

1 Which of the following criteria is good for fixing optimum level of input?
   a. Level at which maximum yield is obtained
   b. Level at which input price is less than its corresponding produce price

2 Planning for a crop enterprise is done
   a. To determine the course of action  b To supervise the labourers

3. Which of the following criteria need to be considered in planning to maximise the returns from the crop
   a. Considering resources only  b. Considering technology and resources

4. An efficient farmer will calculate input - output relationship in terms of
   a. Production maximisation  b. Profit maximisation

5. Gross income of a crop enterprise is calculated by considering
   a. Yield and price of produce  b. Cost of cultivation

6. What is the best basis for allocating the resources?
   a. Least-cost combination of inputs  b Available inputs

7. The method of assessing the labourers should be based on
   a. Quantity of work done as instructed  b Quantity of work done

8. The best method of fertilizer application is based on
   a. Soil testing  b. Experience

II. Please check whether true or false under each statement

9. An efficient farmer just adopts recommended practices in large area without trying it in a small way True/False

10 Farmers should have alternate plans for cultivation True/False

11. Fellow farmer is the only source for getting information on price of the produce True/False

12. A farmer is said to be good at managing, if he adopts improved varieties without varifying its market demand True/False

Part II

**Managerial efficiency**

You have been cultivating cassava for some years in various seasons. Given below are some activities which help in improving the profit. Please indicate how often these activities were practicsed by you in the previous cropping seasons. If you have not practised an activity always, please give reasons for it.

| Sl.No. | Activities | Always | Frequently | Sometimes | Rarely | Never | Reasons |
|---|---|---|---|---|---|---|---|
| V. | **Production management (practices)** | | | | | | |
| 24 | Proportion of recommended fertilizers applied<br>a. Previous season<br>b. Season before last | | | | | | |
| 25. | Following the plant protection measures | | | | | | |
| 26. | Providing water during critical periods of acute shortage of soil moisture | | | | | | |
| VII. | **Marketing management** | | | | | | |
| 27. | Postponing the sales when the current price is less and there is a possibility of price hike | | | | | | |
| 28. | Making the produce sales in terms of whole or part based on overall profit considerations | | | | | | |
| 29. | Seeing that the price offered does not come lower than prevailing market price | | | | | | |
| 30. | Negotiating with the buyers for increase in price of produce | | | | | | |

## Part III

## PROFIT FROM CASSAVA

I. Area

| Variety | Previous year | | | Year before last | | |
|---|---|---|---|---|---|---|
| | Area | Planting month | Harvesting month | Area | Planting month | Harvesting month |
| a | | | | | | |
| b. | | | | | | |
| c | | | | | | |

II. Cost of inputs

| | Previous year | | | | Year before last | | | |
|---|---|---|---|---|---|---|---|---|
| | High yielding variety | | Local | | High yielding varieties | | Local | |
| | Quantity | Cost | Quantity | Cost | Quantity | Cost | Quantity | Cost |
| 1. Stems | | | | | | | | |
| 2 FYM | | | | | | | | |
| 3 Fertilizers | | | | | | | | |
| a. | | | | | | | | |
| b | | | | | | | | |
| c | | | | | | | | |
| 4. Plant protection | | | | | | | | |
| a. | | | | | | | | |
| b | | | | | | | | |
| 5. Irrigation charges | | | | | | | | |
| 6. Any other | | | | | | | | |

III. Labour cost

| l.No | Operation | Previous year | | | | Year before last | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | High yielding varieties | | Local | | High yielding varieties | | Local | |
| | | Quantity | Cost | Quantity | Cost | Quantity | Cost | Quantity | Cost |
| | Land preparation | | | | | | | | |
| | a. Ploughing | | | | | | | | |
| | b. Mounds | | | | | | | | |
| | Planting | | | | | | | | |
| | a. Sett preparation | | | | | | | | |
| | b. Planting | | | | | | | | |
| | Manuring | | | | | | | | |
| | a. Transporting | | | | | | | | |
| | b Spreading | | | | | | | | |
| | c. Basal dressing | | | | | | | | |
| | d. Top dressing | | | | | | | | |
| | Irrigation | | | | | | | | |
| | Intercultivation | | | | | | | | |
| | a. Gap filling | | | | | | | | |
| | b Nipping | | | | | | | | |
| | c. Weeding and earthing up | | | | | | | | |
| | Harvesting | | | | | | | | |
| | a. Pulling | | | | | | | | |
| | b. Bundling stems | | | | | | | | |
| | d. Storing | | | | | | | | |

Income

| | Previous year | | Year before last | |
|---|---|---|---|---|
| | High yeilding varieties | Local | High yeilding varieties | Local |
| Yield | | | | |
| Proportion sold | | | | |
| Price | | | | |
| Mode of sales | | | | |
| Bye-produce sold/value | | | | |
| Transportation charges | | | | |
| Any other | | | | |

APPENDIX XVI

Path analysis with 15 independent variables on Managerial efficiency

| Variable No. | X1 Education | X2 Social participation | X3 Extension participation | X4 Mass media participation | X5 Closeness with agrl.support system | X6 Infrastructural facilities | X7 Market perception | X8 Achievement motivation | X9 Economic motivation | X10 Orientation towards competition | X11 Attitude towards scientific management | X12 Knowledge on scientific management | X13 Cultivated holding | X14 Area under cassava | X15 Irrigation potential |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| X1 | -0.0293 | 0.0011 | 0.0006 | -0.0023 | 0.0292 | 0.0017 | -0.0026 | 0.0048 | -0.002 | 0.0028 | 0.0073 | 0.0226 | 0.0013 | 0.0038 | -0.0045 |
| X2 | -0.0029 | 0.0139 | 0.001 | -0.0009 | 0.0114 | -0.0079 | 0.0256 | 0.006 | 0.043 | 0.0028 | 0.0154 | 0.0269 | -0.0209 | 0.0176 | -0.0035 |
| X3 | -0.0007 | 0.0006 | 0.0231 | -0.0266 | 0.1842 | -0.0281 | 0.1092 | 0.0309 | 0.079 | 0.0191 | 0.0876 | 0.1541 | -0.0697 | 0.0715 | 0.0461 |
| X4 | 0.0022 | 0.0004 | 0.0197 | -0.0312 | 0.2284 | -0.0324 | 0.1265 | 0.0393 | 0.096 | 0.0229 | 0.1039 | 0.1856 | -0.0762 | 0.0827 | [illegible] |
| X5 | -0.0035 | 0.0007 | 0.0178 | -0.0289 | 0.2464 | -0.0381 | 0.1428 | 0.0439 | 0.111 | 0.0249 | 0.1125 | 0.2007 | -0.0797 | 0.0854 | [illegible] |
| X6 | 0.0008 | 0.0018 | 0.0108 | -0.0169 | 0.1563 | -0.0601 | 0.1834 | 0.033 | 0.095 | 0.0195 | 0.0882 | 0.1652 | -0.0654 | 0.0635 | 0.0522 |
| X7 | 0.0004 | 0.0018 | 0.0127 | -0.0199 | 0.1773 | -0.0554 | 0.1984 | 0.036 | 0.102 | 0.0219 | 0.0998 | 0.1775 | -0.0738 | 0.0735 | 0.0569 |
| X8 | -0.0023 | 0.0014 | 0.0115 | -0.0198 | 0.1744 | -0.0319 | 0.1153 | 0.0621 | 0.094 | 0.0222 | 0.0960 | 0.1849 | -0.0579 | 0.0631 | 0.0459 |
| X9 | 0.0006 | 0.0013 | 0.0129 | -0.0212 | 0.1902 | -0.0402 | 0.1419 | 0.041 | 0.1429 | 0.0224 | 0.1097 | 0.1921 | -0.0694 | 0.0699 | 0.0526 |
| X10 | -0.0025 | 0.0012 | 0.0132 | -0.0215 | 0.1839 | -0.032 | 0.1306 | 0.0413 | 0.096 | 0.0334 | 0.1043 | 0.2112 | -0.0595 | 0.0672 | 0.0494 |
| X11 | -0.0015 | 0.0015 | 0.0142 | -0.0227 | 0.1944 | -0.0371 | 0.1389 | 0.0418 | 0.1091 | 0.0244 | 0.1425 | 0.1938 | -0.0597 | 0.0661 | 0.0469 |
| X12 | -0.0027 | 0.0016 | 0.0147 | -0.0239 | 0.2043 | -0.041 | 0.1456 | 0.0474 | 0.113 | 0.0291 | 0.1142 | 0.2419 | -0.0742 | 0.079 | 0.0564 |
| X13 | 0.0003 | 0.0021 | 0.0113 | -0.0167 | 0.1379 | -0.0276 | 0.1029 | 0.0253 | 0.069 | 0.014 | 0.0598 | 0.1261 | -0.1423 | 0.1161 | 0.0678 |
| X14 | -0.0009 | 0.0019 | 0.0129 | -0.0201 | 0.1636 | -0.0297 | 0.1135 | 0.0304 | 0.077 | 0.0174 | 0.0733 | -0.1489 | -0.1285 | 0.1286 | 0.0683 |
| X15 | 0.0015 | -0.0005 | 0.0119 | -0.0194 | 0.1641 | -0.0351 | 0.1264 | 0.0319 | 0.084 | 0.0185 | 0.0749 | 0.1527 | -0.1080 | 0.0983 | 0.0893 |

All diagonal values are direct effects of the variables.

Other values in the row are indirect effect of that particular variable.

# MANAGERIAL EFFICIENCY OF CASSAVA FARMERS

BY

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ABSTRACT OF THE THESIS

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# ABSTRACT

The study aimed at analysing the managerial efficiency of cassava farmers. The study was conducted in four districts namely, Thiruvananthapuram (low productivity), and Pathanamthitta (high productivity) in Kerala State and Kanyakumari (low productivity) and Salem (high productivity) in Tamil Nadu state. The first three districts were considered as non-industrial district and ~~the~~ Salem district was considered as industrial district also. A total of 240 cassava farmers were selected, 60 from each district following stratified random sampling.

The managerial efficiency was measured with the help of a scale consisting of 30 items developed for the study. The data on the managerial efficiency of farmers and on the fifteen socio - psychological and situational factors of the farmers were collected using an interview schedule.

The components of managerial efficiency identified empirically were 'planning', 'labour management', 'information management', 'financial management' 'production management (variety)', 'production management (practices)' and 'marketing management'.

The managerial efficiency of cassava farmers as the whole was somewhat better as little more than half of the farmers had high managerial efficiency. While the farmers exhibited high efficiency in the managerial components namely, 'planning', 'labour management', financial management' and marketing management', they were not

efficient in the components of 'information management', 'production management (variety)' and 'production management (practices)'.

The farmers of industrial district were found to have significantly higher efficiency in the overall managerial efficiency as well as in the managerial components viz., 'planning', 'information management', 'financial management'. 'production management (variety)', and 'production management (practices)' when compared to farmers of non-industrial district.

The component-wise performance of farmers on the whole was in the order of 'labour management', marketing management', 'planning' 'financial management', 'production management (practices)', 'information management', and 'production management (variety)'. While farmers of industrial district relatively performed well in 'production management (variety)', 'production management (practices)' and 'planning' when compared to other components, non-industrial district farmers performance was good at 'labour management', 'marketing management' and 'financial management'.

The managerial components namely, 'planning', 'information management' and 'financial management' were found to be relatively more important than other components with regard to their contribution towards the profit from cassava cultivation.

The socio-psychological and situational factors namely, closeness with agricultural support system, market perception, achievement motivation, economic motivation, attitude towards scientific management in crop enterprise, knowledge on scientific management in crop enterpise, cultivated holding, cassava area and irrigation potential were found to be significantly contributing to the managerial efficiency.

The major managerial constraints faced by the farmers were lack of awareness, knowledge, conviction, timely information and planting materials; limited resources, uncertainty and shortage of labourers.