RESOURCE USE MANAGEMENT AMONG COCONUT GROWERS OF KERALA

By

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THESIS

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requirement for the degree of

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(AGRICULTURAL EXTENSION)

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DECLARATION

I hereby declare that this thesis entitled "**Resource Use Management among Coconut Growers of Kerala**" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis of the award to me of any degree, diploma, associateship, fellowship or other similar title of any other University or Society.

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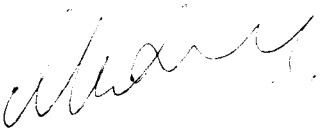
Certified that this thesis entitled "**Resource Use Management among Coconut Growers of Kerala**" is a record of research work done independently by **Mr.Haridasan, V.**, under my guidance and supervision and that it has not previously formed the basis for the award of any degree, fellowship or associateship to him.



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CHAPTER-I

INTRODUCTION

The coconut palm (*Cocos nucifera* Linn.), the 'Kalpa Vriksha' or the 'Tree of Heaven' is the most important plantation crop in Kerala. The origin of coconut cultivation in Kerala can be traced back to centuries and coconut is inextricably interwoven with the culture and people of Kerala besides being a major income source for a good majority of farmers.

Coconut is grown in more than 90 countries in the world with India occupying the third position with an area of 1.52 million hectares (1/8th of total world area) and a production of 10,043 million nuts during 1991-'92. Kerala ranks first in both area and production of coconut among the coconut growing states of India. But Kerala's share to the total production of coconut in the country has slipped down from 57.8 per cent in 1950-'51 to 47.1 per cent in 1989-'90 (Thampan, 1989). The productivity has also shown a steady decline over the years. While West Cost Tall (WCT) the major coconut cultivar yielding 60-75 nuts/palm/year, the observed average yield in the state is only 32 nuts/palm/year (KAU, 1989).

Kerala with its limited land resources does not offer much scope for expansion of area under coconut cultivation. Therefore, any attempt at increasing productivity and income has to heavily depend on efficient management of available resources.

The successful management of a farm calls for the best use of the resources available so that it can survive and prosper. In achieving this, the aims and

objectives of management should be specific. But in Kerala's agriculture production units have got many disadvantages. They are often small in size, labourers scarce during peak season, frequently short of capital and often at the mercy of markets they do not control. The individual farmer is often isolated and hence weak in commanding remunerative prices for his produce. For getting the best results from the farm, farmer has to weigh up the benefits and disadvantages of his enterprise and the resources available to him and he has to plan for the efficient management of these available resources.

Often the vital component of management is overlooked by farmers due to varied reasons and requires strategic corrective measures. Philip (1994) reported that there are often marked differences in the economic performance of individual farms in the same area; some do better than others even with broadly the same level of resources and advantages or problems. Such differences exist in all countries, as local extension workers will testify, but they are more easily demonstrated where more detailed management data is available.

Against this background the present study was conceived to assess the resource use management among coconut growers of Kerala by analyzing the application of scientific management principles and procedures in running their farms, with the following objectives.

1. To study the resource use management among the coconut growers of Kerala.
2. To study the influence of personal, socio-psychological and situational variables on resource use management.
3. To study the influence of resource use management on income.

4. To identify the factors adversely affecting resource use management and to elicit suggestion for the improvement of resource use management.

Scope of the study

The present investigation, intended to measure the resource use management among coconut growers of Kerala is a pioneering work of its kind. It highlights the various components of resource use management and their respective contributions to income from coconut cultivation. Further, the study also attempts to find out the relationship between selected independent variables and its contribution and effect on resource use management. Such a careful analysis is expected to help coconut farmers to restructure their existing pattern of resource allocation in a scientific manner to get maximum returns by the judicious and effective exploitation of available resources.

Limitations of the study

The present endevour is based on research by a single student at Masters Degree level, covering a vast area of three districts. Hence time, money and other resources at the disposal of the investigator were limited. Naturally the study had to be conducted with a restricted sample size. For the same reason, the generalization of the results to the entire state may not hold good. However, every care was taken to gather as much accurate information as possible through out the course of the research, so that the results of the study could find application to those situations similar to the conditions under which the study was conducted. Since the study was based on the expressed opinions of the respondents, it may or may not be free from

their individual biases and prejudices. There could be some distortion in the interpretation of the responses of the farmer, though utmost care was taken as to avoid this. Notwithstanding the above limitations, it is hoped that the findings of this study will be of immense value for further investigations on resource use management in agriculture.

Presentation of the report

The presentation of the remaining chapters of this report and the contents of each chapter are as follows:

The chapter II covers the review of literature, definition of concepts, assumptions and derivation of hypotheses. Chapter III deals with the methodology in which details regarding sampling, data collection, empirical measures used etc. are given.

In chapter IV, the results and discussion of the study in relation to the objectives are presented.

Chapter V, presents a summary of the entire study emphasizing salient findings.

Review of Literature

CHAPTER-II

REVIEW OF LITERATURE

The prime focus of this chapter is to cull out theoretical and empirical information concerning the present study. As there were not many studies on resource use management of coconut growers, allied studies have been reviewed. The literature available is presented under the heads mentioned hereunder.

2.1 Concept and definition of management in relation to resource use

2.2 Components of resource use management

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2.1 Concept and definition of management in relation to resource use

Fayol (1949) stated management as the conduct of business through a continuous process of improvement and optimisation of resources through the essential management functions.

Forster (1953) defined farm management as the ways and means of organising land, labour, capital and application of technical knowledge and skill in order that the farm may be made to yield the maximum net returns. Forster also identified farmer as a manager who should apply farm business principles to the organization and management of farm, if he expects to utilise his available resources to the best advantage.

Tandon (1958) opined that farm management is concerned with the application of business principles in farming and he also argued that it should be on the basis of individual farms.

Kahlon and Acharya (1967) stated that management is the process of decision making and implementation of these decisions.

Webster (1967) in the third international dictionary defined management as judicious use of means to accomplish ends.

According to Burger and Groenewald (1971) management ability is the recognition of the importance of science and technology changes for continuous development of the enterprise incorporating inherent skills and rationality to apply with discretion and integrating successfully those practices which will increase the level of agricultural productivity on a permanent and scientific basis.

Castle *et al.* (1972) suggested that for successful management, farm should efficiently utilise farm management information, capital, land, crop, livestock and machinery.

Dunn *et al.* (1973) suggested that those who fully explore the resources and who apply its principles and practices in dealing with the practical problems and incidents will be much better prepared to assess their managerial abilities and make considered career decisions.

Johl and Kapur (1973) opined that a farm manager should concentrate on the efficient use of resources like, land, capital, labour, farm machinery, fertilizer and pesticide. Further he mentioned that the management of risk and uncertainity also had the same importance.

Mali (1978) opined management efficiency as related to resource utilisation.

Osburn and Schneeberger (1978) opined that deciding what resources to use and how to use them is one major responsibility of management. Such decisions are not made once and forgotten, they must be made again and again as technical and economic conditions change. The beginning operator or one who is very limited in one or more of the basic resources may find decisions about resource use relatively frequent and very difficult. An established operator with a profitable farming operation, on the otherhand, may only make decisions about resource reallocation, when there are major shifts in commodity prices or when he buys a new tract of land. Nevertheless, all managers are faced with resource allocation decisions when they strive to attain their respective goals.

Hicks and Gullett (1981) defined management efficiency as doing things accurately and with minimum use of time and resources and effectiveness as doing those things necessary to accomplish the objective.

Kay (1981) mentioned that farmers need to concentrate on the management of land, labour, capital, credit, mechines, risk and uncertainity.

Terry and Franklin (1984) opined that management is a distinct process consisting of activities like planning, organising, actuating and controlling performed to determine and accomplish stated objectives with the use of human beings and other resources.

Chandan (1986) defined management as the field of human behaviour in which managers plan, organise, staff, direct and control human physiological and financial resources in any organised group effort in order to achieve desired individual and group objectives with optimum efficiency and effectiveness.

The above definitions and reports by various researchers make it is clear that the most important criterion for management is the efficient use of resources.

2.2 Components of resource use management

2.2.1 Land management

Johl and Kapur (1973) stated that land has its characteristic importance in production process and has some unique problems. Many of these problems however, are technological in nature and can be dealt with by an efficient farm manager.

Kahlon and Singh (1980) opined that management of land is very critical in farming since the limitation on increasing the operational farm size is a constraint in developing countries with high land-man ratio.

FAO (1984) observed that owners of small coconut holdings do not find full employment on their own farms and have insufficient income to sustain their family. Therefore, they seek other employment outside their own farms. In order to counter this situation an efficient farmer should utilize every inch of his land properly.

According to Bavappa (1990), in the management of coconut garden prime importance should be given to the management of soil. Further he emphasised on planting density, component crops, fertilizer use, employment generation potential of the system, labour utilization and marketing infrastructure.

Singh (1991) reported that land and its resources are becoming increasingly scarce day by day with the ever increasing population. The problem is being compounded further due to misutilisation of the available land and the consequent severe degradation in the land all over the country. It is therefore essential that all the available land is utilized fully because agricultural operation depend not only on the quantity and quality of land but also on the way land is used.

2.2.2 Water management

Bhaskaran and Leela (1977) conducted studies on summer irrigation in coconut at Coconut Research Station, Nileswar and recorded increase in yield to the tune of 214.9 per cent, 130.1 per cent, 57.4 per cent and 33.8 per cent in the yield group of below 20 nuts, 20-40 nuts, 40-60 nuts and 60-80 nuts per palm per annum respectively.

Kahlon and Singh (1980) stated that efficient use of available water resources is a major task of farm manager in production activities.

Aravindhakshan (1988) conducted a study on thrust areas in coconut management. The results of this study indicated that for increasing and sustaining the productivity of coconut, three basic requirements have to be satisfied, irrigation, fertilizer application and regular system of replanting and underplanting.

Muralidharan (1988) observed that irrigation alone in the coconut garden could increase the yield by 200 per cent within 2-3 years. At the same time in irrigated gardens interruption of irrigation would lead to serious set back in yield and general conditions of palms. Hence once started, irrigation should be continued regularly and systematically.

Santha *et al.* (1993) found that only 13.74 per cent of the sample coconut growers in Trivandrum district of Kerala state were utilizing their water resources for summer irrigation.

Sivanappan (1994) opined that high priority should be given for managing and increasing efficiency of water use in the field.

2.2.3 Management of inputs such as manures, fertilizers and pesticides

Sample survey conducted by Directorate of Coconut Development (1976) revealed that less than 25 per cent of the coconut growers were adopting fertilizer application and average dose was less than 1.5 kg per palm.

Singh and Ray (1985) observed that knowledge about soil fertility and fertilizer management contribute positively and significantly to the level of fertilizer use of farmer.

Sulaiman (1989) reported that soil test based fertilizer application is not properly perceived by the farmers which results in uneconomic use of fertilizer.

Sah and Shah (1992) in their study on efficiency of fertilizer use in Gujarat found that 'proper' adoption of soil test based recommendations was limited to 22 per cent of farmers whereas 'over' use was prevalent among one-third of the sample farmers.

According to Sankaran (1992) management can play a fruitful role and asserted that revival and wider adoption of organic manures merit attention and a blend of traditional manures with artificial fertilizers is not a compromise but a compulsion. Further he pointed out that currently, unutilized organic manure potential through green manures and compost alone is six million tonnes of NPK (3 + 1.5 + 1.5). The organic manure promote soil fertility in physical and biological terms for added inorganics to act with higher use efficiency.

Santha *et al.* (1993) found that coconut growers were not efficient in fertilizer and plant protection chemicals utilization. Further she stated that the importance of balanced use of fertilizers need emphasis while motivating farmers for adopting fertilizer recommendations for better production.

2.2.4 Labour management

Barnard and Nix (1973) pointed out that man management is the most important aspect in running farm business. He defined man management as the skill of controlling and energising an employee in the execution of his tasks so that employee efforts, sense of responsibility and the attention to detail are improved to provide the best possible circumstances.

Johl and Kapur (1973) found 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 labour efficiency were,

1. Enlarging the size of farm business
2. Labour distribution planning
3. Combination of enterprises
4. Field lay out and farm improvement programmes
5. Giving incentives to the labourers
6. Imparting training for increasing efficiency and
7. Simplification of farm operations

Kahlon and Singh (1980) pointed out to the importance of efficient use of labour in farm management. According to them labour resource constitute farmer himself, his family, and the permanent and hired labourers. Labour management involves estimation of labour requirement, adjustment in cropping pattern, increasing the working time and incentives.

Harsh *et al.* (1981) stated that labour management predominently come across with labour needs of individual enterprises. scheduling of available labour supply and allocation of work to labourers.

Padmanabhan (1981) conducted a study on the influence of labourer efficiency on the adoption of improved agricultural practices by farmers and factors related with it. The result of this study indicated that quantity of work output per day, quality of work done, interest and skill in doing work were the important criteria for evaluating agricultural labour efficiency.

According to Anantharaman (1991) important points to be considered while measuring labour management efficiency were

1. Amount of work accomplished per unit time
2. Availability of family labour
3. Advance fixing of labourers to ensure the availability of hired labour
4. Reduction in wastage of time by providing necessary amenities in the field of labourers

2.2.5 Information management

According to Johnson and Lard (1961) important types of farm information include, price, production, new developments, human, institutional and home technology.

Thomas and Knight (1961) observed that majority of farmers sought information on price and considerable proportion of farmers sought information on production and human element.

Harsh *et al.* (1981) found that farmers need information about type of farm, location and resources available to the operator.

According to Chatterjee (1983) a good manager should have three important qualities viz., power of appropriate decision making, up to date knowledge and efficiency in resource utilization.

Olsson (1988) pointed out that the farm manager seeks, receives, classifies and adjusts his operations on the basis of various informations on market signals, knowledge on production techniques and developments in environment.

2.2.6 Capital management

Johnson (1971) opined that functions of capital management are planning, managing assets, raising funds and meeting special problems.

Sharma and Sidhu (1972) observed that adoption of improved technology needs increased demand for cash funds added with rational financial management of available funds.

Johl and Kapur (1973) mentioned that capital management deals with acquisition and use of capital and judicious management of financial business of a farm enterprise which is very important for increasing the outcome of the farm.

Singh and Singh (1975) found that managerial ability of the farmer is significant in the field of credit planning and farmers' credit management ability is a prerequisite for minimising risks.

Kahlon and Singh (1980) indicated that management of capital resources along with its efficient organization with other farm resources was very important for the farmers.

Charles (1980) in a study among coconut growers of Papua New Guinea showed that social status and social responsibilities often hamper more efficient use of available financial resources. Monetary income beyond subsistance needs was a form

of surplus and its normal use was for cementing social relationships and for spending on luxuries, not for purchase of essentials.

Buckett (1981) opined while discussing about farm organization and management that farmers should examine all sources of capital, decide how much capital is required, when it is wanted and which source to be used during each stage of the farm business.

According to Massie (1987) capital management is an operational activity of a farm business that is responsible for obtaining and effectively utilizing the funds.

It could be generalised from the review of literature that, resource management mainly concerns with the efficient utilization of land, water, manures, fertilizer, pesticide, labour, information and capital. It also involves proper planning and decision making by the farmer at all stages of resource use.

2.3 Measurement of resource use management

Tonbary (1957) conducted a study to measure the resource management abilities of different farmers in London. He considered three criteria to distinguish between poor management group and good management group. Those were, comparing the production levels to the group average, production per unit and economic performance.

Kahlon and Acharya (1967) devised a management index based on the decision which contributed to the differences in the two levels of farm income. Managerial decisions taken by different farmers pertaining to ten selected factors were ranked based on the research findings related to them. The ranks obtained were

converted into scores. The weighted sum of these scores was used as management index.

Harinath (1971) developed a management index with nine major components namely, decision making, supervision, preparatory cultivation, seeds and sowing, manures, plant protection and interculture, extension contact, marketing and co-operative service. The index had altogether 79 sub-components under the nine major components. The components and sub components were ranked and weightages given on Fisher and Yates table. Sum of the combined weightage of each sub-component and major component formed the managerial index.

Hebbar (1975) formulated an index of management ability of coffee farmers. He identified twenty eight factors which contributed to the efficient maintenance of coffee estate with consistently high productivity. Each factor was given a maximum score of 10 and farmer was graded on all 28 items by the researcher himself and management ability score was calculated as follows.

$$\text{Management ability index} = \frac{\text{Total score obtained by the farmer}}{\text{Maximum possible score (280)}} \times 100$$

Samanta (1977) developed management orientation scale which constituted three major components namely, planning orientation, production orientation and marketing orientation. Each component had six statements, three were of negative orientation and three were of positive orientation. Each statement was provided with four response categories. The positive statements were given scores 4, 3, 2 and 1 respectively for strongly agree, agree, disagree and strongly disagree. In the case of negative statements scorings were reversed. The sum of scores of all statements constituted the management orientation score of an individual.

Banarjee (1981) pointed out five approaches to measure management efficiency. They were

1) Goal approach: In the goal approach, quantitative comparison of the achievement to the goal or objective set is done properly.
2) Trait approach: Trait approach is rooted on the assumption that certain qualities of manager are essential for success and a quantification of these would provide suitable measure of managerial ability.
3) Functional approach: It was developed on the assumption that a managers' success depends on the extent to which he performs the managerial functions.
4) Trait-cum-goal approach: This is a combination of the first and second approaches.
5) Goal-cum-functional approach: This possess the qualities of goal approach and functional approach.

Bhattacharya (1983) mentioned about common core theory which helps to measure the performance on resource management.

Mathew (1989) devised a managerial scale with 17 areas of management and 111 items. Each item was provided with four response catagories frequently, occassionally, rarely and never with scores of 4, 3, 2 and 1 respectively. Sum of scores on each item constituted the total score.

Anantharaman (1991) constructed a managerial efficiency scale with seven main components namely, planning, labour management, information management, financial management, production management (variety), production management (practices) and marketing management. These components were constituted of

30 items. The responses of farmers on each item were marked on five point frequency rating namely, always, frequently, occassionally, rarely and never with scores of 5, 4, 3, 2 and 1 respectively and sum of scores on each item constituted the total score.

2.4 Relationship of personal, socio-psychological and situational factors with resource use management

Studies related to resource use management and personal socio-psychological and situational variables were relatively scanty. However, in this section an attempt has been made to review some related studies.

2.4.1 Personal factors

2.4.1.1 Age

Age has a direct influence on farmers' experience in resource use management and thus help them in taking appropriate decisions at the correct time. This in turn helps a coconut grower to utilize his available resources in a better manner.

Saraf (1983) studied adoption behaviour, management orientation and economic performance of farmers in Karnataka and the results showed no association between age and management orientation.

Walker *et al.* (1983) observed a positive relationship between age and returns to management. Badachickar (1985) found a positive relationship between age and farmers' management orientation. A similar observation was made by Sreekumar (1985) in a comparative analysis of adoption behaviour, economic performance and management orientation of borrowers and non-borrowers of bank credit in Kerala.

2.4.1.2 Education

Formal education helps in rational decision making, efficient exeuction and utilization of various resources.

Reddy (1983) observed that education was positively related with management orientation.

Walker *et al.* (1983) in a study on management as a factor of production in the semi-arid tropics, revealed that education was positively related to better managers.

Jamison and Moock (1984) reported the existance of a positive relationship between education and efficiency of farmers.

Sreekumar (1985) concluded that education was negatively associated with management orientation.

Reddy and Reddy (1985) found that education had significant relationship with small scale entrepreneurs' success.

Bora (1989) observed that education was positively associated with returns to management.

2.4.1.3 Farm size

Size of the farm owned by the farmer may influence resource use pattern, productivity and efficiency in resource use. Some related studies are explored here. Randhawa (1960) observed an inverse relationship between farm size and productivity. The reasons for the inverse relationship were better soil fertility and irrigation facility of small farms.

Saini (1969) after analysing the resource use efficiency in agriculture reported that farmers are quite rational in terms of their response to economic opportunities and made adjustments in resource use. This rationality however does not imply that farmers always succeed in utilizing their resources at optimum levels.

Prabhakaran and Venugopalan (1971) revealed that the gross output per acre was found to be decreasing as the size of the farm increased.

Singh (1973) made an exhaustive study on resource use, farm size and returns to scale of the farms of Eastern Uttar Pradesh. This study indicated that educational level of farmers as well as size of holding were positively correlated with efficiency in resource use.

2.4.1.4 Experience

Experience in farming helps to sharpen skills and it also provides a clear cut idea about things to be done. Therefore it is logical to assume that an experienced person will make use of his available resources efficiently. There are not many studies available to establish the direct relationship of experience and resource use management.

Balasubramanian and Kaul (1982) observed that no significant relation existed between farming experience and utilization of improved technologies.

Jayakrishnan (1984) reported a positive and significant association between farming experience and extent of utilization of low cost technology by the farmers.

2.4.1.5 Knowledge on scientific management

Present day agriculture is very competitive and involves various types of risks. Knowledge on scientific management is therefore an important factor determining the success of an enterprise.

Abraham (1980) found that technical knowledge was positively and significantly correlated with the efficiency of managers.

Kamarudheen (1981) indicated that management orientation was positively associated with knowledge of farmers.

Chari and Nandapurkar (1987) also observed a positive association between knowledge and management orientation.

Bora (1989) stated that farmers' knowledge on cultivation was positively related to returns to management.

Anantharaman (1991) indicated that knowledge on scientific management had significant contribution and direct effect on managerial efficiency of farmers.

2.4.2. Socio-psychological factors

2.4.2.1 Scientific orientation

It is supposed that the farmers with high degree of scientific orientation will have a greater affinity to utilize his resources efficiently. Some related studies are given below to show the relationship between resource use management and scientific orientation.

Manivannan (1980) reported positive and significant correlation between scientific orientation and extent of utilization of agricultural technology.

Kamarudheen (1981) conducted a study on the impact of National Demonstration programme on paddy cultivation. The result indicated the existence of a significant positive correlation between scientific orientation and extent of utilization of agricultural technology.

Jayapalan (1985) studied constraints involved in rice seed production. The results of this study also established positive and significant correlation between scientific orientation and extent of utilization of agricultural technology. The same trend was observed by Syamala (1988) in an analysis of the effectiveness of National demonstration programme conducted by the Kerala Agricultural University.

2.4.2.2 Innovativeness

In the absence of studies directly related to resource use management and innovativeness some related works are given below.

Bidari (1982) found significant association between innovativeness and fertilizer use behaviour of farmers in Karnataka.

Badachickar (1985) observed that innovativeness was positively and significantly related to economic performance of farmers.

Velumani (1988) reported that innovativeness was significantly and positively related to information source utilization and institutional source utilization of cotton growers.

Ajayakumar (1989) found a significant positive association between innovativeness and adoption behaviour while Anithakumari (1989) observed a nonsignificant association between these variables.

Ravi (1989) noticed a positive correlation between innovativeness and information source utilization of tapioca growers in Tamil Nadu.

Bharathan (1991) reported the existence of a positive relationship between innovativeness and utilization of farm magazine as an information source.

2.4.2.3 Extension guidance

Extension guidance can help a farmer to use a technology in an appropriate manner and at the correct time. It is assumed that extension guidance received from various development agencies can influence resource use efficiency of a farmer. Studies establishing a direct relationship between the two variables were scanty. however some related studies are reviewed here based on the assumption that extension guidance can influence economic performance and adoption behaviour of a farmer which inturn reflect on the resource use.

Desai (1981) conducted a critical analysis of the contribution of education and extension guidance on economic performance of cotton farmers of Karnataka. The result showed that economic performance of farmers was positively related to extension guidance received from various development agencies.

Gondi *et al.* (1983) observed the existance of positive correlation between extension guidance and adoption behaviour of farmers in his study on "Monitoring and Evaluation of Agricultural Extension Projects"

Prakashkumar (1986) reported that labour utilization and adoption of improved sericulture practices were positively correlated with extension guidance received by the farmers.

Ajayakumar (1989) also observed significant positive correlation between extension guidance and adoption behaviour of grape growers of Andra Pradesh.

2.4.2.4 Achievement motivation

Managerial efficiency and motivation are interrelated. A farmer who possesses high degree of achievement motivation is likely to be efficient in resource management.

Badachickar (1985) found a positive association between achievement motivation and management orientation.

Chari and Nandapurkar (1987) observed a similar trend in their attempt to construct a scale to measure managerial ability of farmers.

Mathew (1989) reported a positive and significant correlation between achievement motivation and managerial leadership.

Anantharaman (1991) also found a significant contribution and direct effect of achievement motivation on managerial efficiency of cassava farmers in Kerala and Tamil Nadu.

2.4.2.5 Extension participation

Today large numbers of Governmental and Non Governmental agencies

are involved in agricultural extension activities. Participation in these programmes is certainly an indicator of innovativeness and therefore could result in better resource use efficiency.

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

Anantharaman (1991) found that extension participation was not significantly related with managerial efficiency of farmers.

2.4.2.6 Economic motivation

Farmers having higher economic motivation undertake economically more viable projects and activities. They would be more conscious about cost benefit interactions.

Study conducted by Badachickar (1985) found that economic motivation was positively related to management orientation.

Anantharaman (1991) observed that economic motivation was significantly and positively correlated with management efficiency of farmers.

2.4.2.7 Perceived availability of resources

Studies establishing relationship between perceived availability of resources and resource use management were few. However, subject experts believe that this psychological variable could influence resource use of farmers and hence has been included in the study.

2.4.2.8 Risk orientation

A farmer who is willing to take risks may be an early adopter of a new practice. In the case of resource use management he may be an early acceptor of new management principles. Some related studies are reviewed here.

Sachidananda (1972) found negative correlation between risk bearing ability and utilization of various inputs in farming.

Earnest (1973) revealed that risk orientation and communication utilization behaviour were positively related based on a study of communication utilization behaviour of small and big farmers.

Pillai (1983) after an analytical study of the integrated soil conservation practices in Kerala revealed that risk orientation and adoption behaviour were associated positively.

Viju (1985) concluded that risk orientation and adoption behaviour of tribal farmers of Kerala were positively correlated.

Palani (1987) also noticed a positive correlation between risk orientation and adoption behaviour of farmers in Tamil Nadu. The result of the study showed a significant positive correlation between risk orientation and utilization of various inputs.

Rameshbabu (1987) found that economic performance of grape growers and risk orientation were correlated positively.

2.4.2.9 Market perception

Perceptions about various markets assume great significance in buying of inputs and marketing of produce. An awareness about demand and preferences in local and distant markets will definitely help to fetch higher price and accordingly farmer can make arrangements for marketing.

Anantharaman (1991) concluded that market perception had significant influence on the management efficiency of farmers.

2.4.3 Situational factor

2.4.3.1 Accessibility to infrastructural facility

Accessibility to infrastructural facility will motivate a farmer to utilise its services which inturn will increase the ability of farmers to utilize available resources at its optimum level.

Studies directly related to this variable were scanty, however some related studies are reviewed below.

Bora (1989) found the existence of a positive relationship between closeness with agricultural support system and returns to management.

Khan *et al.* (1989) conducted a study on socio-economic and personal traits of farmers associated with cattle management. The results of the study revealed that closeness with extension agency had significant effect on dairy management of farmers.

Anantharaman (1991) stated that closeness with agricultural support system was not related with the managerial efficiency of farmers.

2.5 Relationship between resource use management and income

Heady (1946) observed that farmers with higher management efficiency gained significantly higher net income from their farms.

Tandon (1958) pointed out that the main objective of farm management is to secure maximum continuous income by the efficient use of available resources.

Williamson (1964) suggested that an efficient manager should be able to maximise utility of any activity. He further added that a variety of goals including power, control, prestige and desire for a quiet life may be included in his utility function.

Kahlon and Acharaya (1967) found strong correlation between management input and farm income. The coefficient of correlation was found to be 0.88.

Chowdhary (1968), Singh (1977) and Suresh (1983) opined that farmers should apply basic business principles to maximise profit from the farm.

Rannorey (1979) observed that in Karnataka farmers having higher management orientation adopted more number of practices and higher adoption led to higher income from farm business.

Harsh *et al.* (1981) opined that the definition of management recognises that farmers may have multiple or varying goals. Profit maximization is usually

assumed as one goal. However, farmers can have other goals such as business survival, growth, leisure, social acceptance or maintenance of one's health.

A critical study on Farmers Training Programme by Renukaradhya (1983) revealed that management orientation was positively correlated with economic performance of farmers.

Badachickar (1985) observed no significant relationship between management orientation and economic performance of farmers.

Kandker (1988) expressed that goal of good management is to maximise income from the farm business.

Olsson (1988) stated that an able farmer should combine fulfilment of his own goals with the fulfilment of basic economic goals.

Anantharaman (1991) studied the managerial efficiency of cassava farmers of Kerala and Tamil Nadu. The results of the study showed that there was significant relationship between the performance of farmers on the managerial components and the profit obtained by them in cultivation.

2.6 Factors affecting resource use management

Resource use management is likely to be hindered by many factors. An attempt has been made to glean various factors from previous researches.

Johnson and Haver (1953) observed five types of problems faced by farm managers. They were changes in technology, political, economical, social and personality problems.

Singh *et al.* (1979) identified inadequate availability of capital as a major cause for low productivity and slow adoption of technology among a majority of Indian farmers.

Castle *et al.* (1972) opined in their book 'Farm business management' that farm managers were suffering from lack of accessibility to information, lack of knowledge on price trend, labour, machinery availability and difficulty in acquisition of resources.

Lanjewar and Kalantri (1985) identified non-availability of high yielding seeds, lack of knowledge in loan procedure, labour scarcity, low price of produce and delayed payment for the produce as major factors affecting farm management.

According to Singh and Sharma (1986) constraints perceived by the farmers were high cost of inputs, non-availability of good seeds, lack of finance and irrigation.

Bastine *et al.* (1988) studied the adoption rate and constraints of adoption of newer technologies by coconut farmers. The results of the study revealed non awareness of recommended technology, lack of conviction of recommendations and lack of sufficient capital as major constraints.

Prakash (1989) indicated that lack of co-operation among farmers, low adoption of high yielding varieties, lack of irrigation and fragmentation as important constraints in rice production.

Santha *et al.* (1993) identified lack of water for irrigation, lack of capital and nonawareness of recommendations as major constraints perceived by coconut growers of Trivandrum district of Kerala.

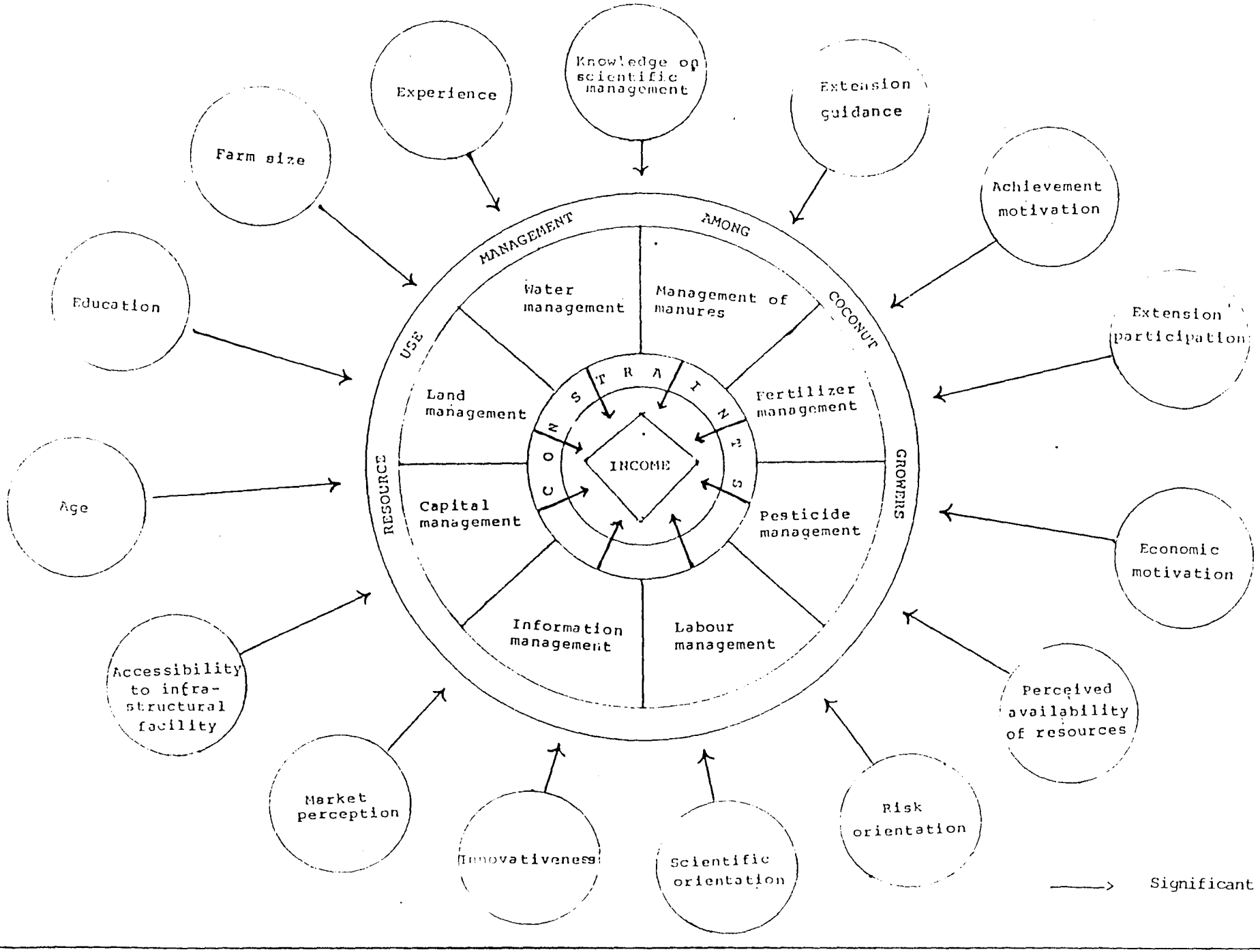
2.7 Conceptual framework of the study

Resource use management has been defined in the present study as "the degree to which a farmer uses his available resources by applying efficient management practices or techniques to reach higher levels of performance". Past researchers viewed resource management as a composite factor involving several components. However, there seems to be no unanimity about the number and kind of components. In the present study eight components selected and included were assumed to constitute resource use management of coconut growers.

Resource use management of coconut growers has been conceptualized in the present study to be the direct and indirect consequences of different personal, socio-psychological and situational factors. Personal factors include age, education, farm size, experience and knowledge on scientific management. Some of the influential socio-psychological factors are scientific orientation, innovativeness, extension guidance, achievement motivation, extension participation, economic motivation, perceived availability of resources, risk orientation and market perception. Factors like accessibility to infrastructural facility and managerial constraints are also supposed to have a marked influence over resource use management of farmers.

The conceptional model for the study is presented in Figure 1.

Fig. 1. CONCEPTUAL FRAMEWORK OF THE STUDY



2.8 Assumptions of the study

The present research study was undertaken with the following assumptions.

1. Resource use management of coconut growers can be measured empirically
2. Resource use management of coconut growers will be influenced by their personal, socio-psychological and situational variables/factors
3. The efficiency of resource use management of farmers will have direct effect on their income
4. The coconut growers will differ in their level of management in resource use.

2.9 Hypotheses for the study

Keeping in view the objectives of the study, review of literature and the above assumptions, the following null hypotheses were formulated for testing.

1 There will be no significant difference in the performance of resource use management components between the farmers of the three geographical zones.

2 There will be no significant relationship between farmers personal, socio-psychological and situational factors and their resource use management.

3 The personal, socio-psychological and situational factors do not cause variation in resource use management.

4 The efficiency of resource use management do not have any influence on income from coconut cultivation.

5 There will be no significant difference in the importance among the components of resource use management interms of their contribution to income.

Methodology

CHAPTER III

METHODOLOGY

The methodology adopted for the present study is given below under the following heads.

3.1 Locale of the study

3.1.1 Selection of the study area

The study was undertaken in the three geographical regions/zones of Kerala viz., Northern, Central and Southern zones to draw a representative sample of coconut growers. One district each was selected from these three zones purposively based on highest area under coconut cultivation. The districts selected were Kozhikode from Northern zone, Thrissur from Central zone and Thiruvananthapuram from Southern zone. The selected three districts together add up to 33.59 per cent of area and 39.17 per cent of production of coconut in the state.

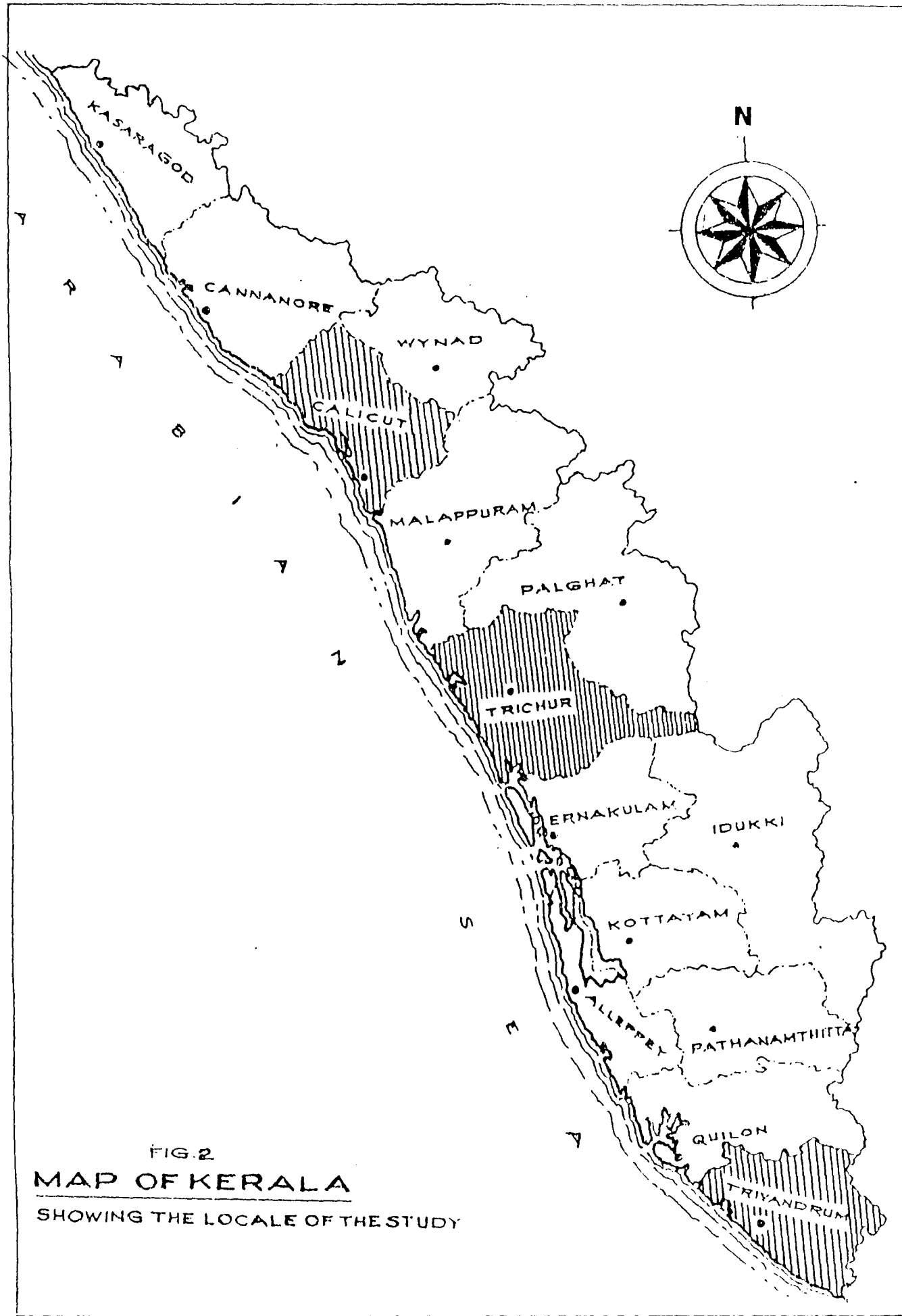


FIG.2

MAP OF KERALA

SHOWING THE LOCALE OF THE STUDY

3.1.2 Brief description of the study area

3.1.2.1 Kozhikode district (Northern zone)

Kozhikode district with an area of 2,435 sq.km. including 336 sq.km. under forest cover (3% of total forest area in Kerala) occupies largest area under coconut in the state. Coconut is the major plantation crop in the district and covers an area of 122193 hectares (14.16% of total coconut area in the state) with a production of 751 million nuts (1991-92). The district is divided into 12 blocks.

The annual rainfall during 1991-92 was 3614.4 mm with an irrigated coconut area of 1106 hectare (1.07% of total irrigated area under coconut). The major crops grown in the district are paddy, coconut, pepper and rubber. The major soil types include laterite, sandy loam and forest loams.

3.1.2.2 Thrissur district (Central zone)

The area of the district is 3,032 sq.km. including a forest cover of 1015 sq.km. (9% of total forest area in Kerala). Descending from the heights of the western ghats in the east, the land slopes towards west, forming the district three natural divisions - the high lands, the plains (mid lands) and the coastal lands. Major cultivable area is the mid lands and it is extensively grown over with paddy, coconut, rubber, arecanut and fruit crops. Coconut occupies an area of 84789 hectares (9.82% of total coconut area in the state) with a production of 546 million nuts (1991-92).

The annual rainfall during 1991-92 was 3836.5 mm and irrigated coconut area 29015 hectares (27.96% of total irrigated area under coconut). Coconut is cultivated predominently in the laterite soils of the district.

3.1.2.3 Thiruvananthapuram district (Southern zone)

Thiruvananthapuram is the southern most district of Kerala. Total geographical area of the district is 2,192 sq.km. with a forest cover of 593 sq.km. (5.3% of total forest area in Kerala). Most important plantation crop in this district is coconut and it covers an area of 82907 hectares (9.61% of the total coconut area in the state) with a production of 521 million nuts (1991-92).

The major soil types of the district include laterite, red loam, forest loam and coastal alluvium. Major crops grown in the district are paddy, coconut, rubber and cassava. The annual rainfall received during 1991-92 was 2407.3 mm.

3.2 Selection of respondents

Random sampling procedure as given below was adopted to select the farmer-respondents for the present study.

3.2.1 Selection of blocks, Panchayats/Krishi Bhavans and farmer-respondents

One block each from selected districts was identified at random. From the selected blocks three Panchayats/Krishi Bhavans each were selected again at random. From each Panchayat/Krishi Bhavan area, 25 small coconut growers were selected randomly to constitute the sample for the study. A total of 225 farmer-respondents were thus selected.

Table 1. Brief description of study area and number of respondents

Zone	District	Block	Panchayat	Area under coconut (ha)			No. of respondents
				Irrigated	Non irrigated	Total	
North	Kozhikode	Meladi	1. Tikkoti	500 (24.39)	1550 (75.61)	2050 (100.00)	25
			2. Keezhariyoor	180 (20.45)	700 (79.55)	880 (100.00)	25
			3. Meppayoor	352 (15.06)	1986 (84.94)	1338 (100.00)	25
			Total	1032 (19.59)	4236 (80.41)	5268 (100.00)	75
Central	Thrissur	Ollukkara	1. Nadathara	78 (25.00)	234 (75.00)	312 (100.00)	25
			2. Ollukkara	130 (72.22)	50 (27.78)	180 (100.00)	25
			3. Madakkathara	110 (74.32)	38 (25.68)	148 (100.00)	25
			Total	318 (49.69)	322 (50.31)	640 (100.00)	75
South	Thiruvan-anthapuram	Nemom	1. Kalliyoor	298 (28.17)	760 (71.83)	1058 (100.00)	25
			2. Nemom	30 (4.23)	680 (95.77)	710 (100.00)	25
			3. Balarama-puram	66 (15.35	364 (84.65)	430 (100.00)	25
			Total	394 (17.93)	1804 (82.07)	2198 (100.00)	75

Figures in parenthesis indicate percentage
Source: Department of Agriculture, Kerala

3.2.2 Criteria for the selection of farmer-respondents

The following criteria were adopted to select the sample for the study.

1. Respondents should be practising coconut farmers

2. They should have atleast five years experience in coconut cultivation

3. The farmer-respondents should have atleast 40 bearing palms. This was fixed in consultation with experts in Kerala Agricultural University

4. A respondent should possess a minimum of 50 cents of garden land

Based on these criteria a list of coconut growers was prepared in consultation with the Agricultural Officers and field level extension workers of the selected Krishi Bhavans. From this list farmer-respondents were selected randomly for the study using Toppett's Table of Random numbers.

3.3 Selection of variables

3.3.1 Dependent variable

The project mainly aims at studying the resource use management among coconut growers of Kerala which was taken as the dependent variable for the study.

3.3.2 Independent variables

The project also intends to study the influence of personal, socio-psychological and situational variables on resource use management. These variables to be included in the study were selected based on the following procedure.

A list of 52 variables that could have relationship with resource use management was prepared and sent to 45 judges comprising experts in Kerala Agricultural University, Tamil Nadu Agricultural University, University of Agricultural Sciences, Bangalore and Indian Agricultural Research Institute, New Delhi. They were requested to evaluate the variables and indicate their relevency to the proposed study on a five point continuum ranging from most relevant to least relevant weighted as follows.

Most relevant - 5

More relevant - 4

Relevant - 3

Less relevant - 2

Least relevant - 1

Ratings were received back from 30 judges.

The mean relevancy score for each variable was worked out by summing up the weightages obtained for a variable by the judges and dividing it by the number of judges. The average of the mean relevancy scores of all the variables was calculated. The variable which have a mean relevancy score above the average mean relevancy score were selected for inclusion in the study.

Accordingly the variables selected were, age, education, land size, experience infarming, scientific orientation, achievement motivation, market perception, innovativeness extension guidance, knowledge on scientific management, extension participation, accessability to infrastructural facility, economic motivation, perceived availability of resources and risk orientation.

3.3.3 Criterion variable

Income obtained by the farmer from coconut cultivation was selected as a criterion variable for the study. This was used to test the validity of items included in the resource use management scale and also for assessing the relative importance of the various resources included in the study.

3.4 Operationalisation and measurement of the variables

3.4.1 Dependent variable - Resource use management

Resource use management was operationalised for the purpose of the study as the degree to which a farmer utilizes available resources by applying efficient management practices or techniques to reach higher levels of performance.

Dependent variable was measured using the scale developed for the purpose.

3.4.1.1 Procedure for the development of the scale

One of the important objectives of the study was to construct a scale for measuring resource use management for perennial crops in general and coconut in particular. Procedure followed for the construction of the scale is given below.

3.4.1.1.1 Item generation

The first step in the development of resource use management scale was to collect all possible items related to use of various resources by coconut growers. Preliminary details of various resource management activities were collected from

literature, subject experts of the Kerala Agricultural University and the State Department of Agriculture and also from successful coconut growers from different parts of the state. Thus 133 items were collected which were grouped under eight identified components of resource use namely, land management, water management, management of manures, fertilizer management, pesticide management, labour management, information management and capital management. These eight components had been identified in discussion with subject experts in the Kerala Agricultural University. The items were prepared in affirmative statements under the selected components taking care to avoid technical jargon. The items were then pretested with a non sample group of coconut growers for its appropriateness and feasibility.

3.4.1.1.2 Relevancy rating

For initial screening all the collected 133 items were sent to 80 judges comprising of experts in the field of agricultural extension management, economics, agronomy, plant protection and soil chemistry, with proper directions. The judges were requested to rate the relevancy of these items on a five point continuum, ranging from most relevant to least relevant. Forty five judges sent back the list after indicating their responses. Based on the ratings, mean relevancy and coefficient of variation was worked out for each item. Finally, 67 items having scores above mean relevancy and high 't' value were selected to be subjected to item analysis.

3.4.1.1.3 Item analysis

Item analysis was done to know the truthfulness of the items. Items selected after relevancy rating were administrated to a randomly selected non sample group of 35 coconut growers of Trichur district. They were then asked to indicate

their responses on a five point continuum ranging from always to never for each of the selected managerial items. This was to be done based on how often these activities were carried out by them during the previous year.

The scoring pattern was as follows.

Sl.No.	Response category	Score
1	Always	5
2	Frequently	4
3	Sometimes	3
4	Rarely	2
5	Never	1

Mathew (1989) and Anantharaman (1991) also followed the same scoring pattern in their studies. Equal weightage had been given to the items under the eight components selected based on discussions with subject experts of the Kerala Agricultural University. But in the case of application of fertilizers, farm yard manure/compost, green leaf manure and lime the method of quantification was slightly different. Here the quantification was made on the basis of per cent of recommended quantity of material used for application. The percentage of fertilizer applied was calculated using level of fertilizer index developed by Singh (1981) which was based on an averaging of the percentage of recommended N, P_2O_5 and K_2O. For these items, scoring procedure adopted by Muthiah (1971) and Anantharaman (1991) was used for categorisation. Five response categories were adopted namely, > 75%, 51-75%, 25-50%, < 25% and Nil adoption with scores of 5, 4, 3, 2 and 1 respectively.

Item analysis was carried out using total score and item score. Total score for an individual referred to the summation of the scores over all the items and item score was the score of an individual on a particular item.

3.4.1.1.3.1 Discrimination index

Discrimination index refers to the power of an item to discriminate low efficiency group of farmers from high efficiency group in their resource use.

The total resource use management score of each farmer respondent was worked out. Based on this total score, respondents were arranged in decending order. Farmers falling within the top and bottom 27 per cent were seperated and grouped following the procedure by Kelley (1939). It was assumed that these two groups would provide criterion groups in terms of which one can evaluate an individual statement.

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

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

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

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

't' value is a measure of the extent to which a given statement differentiates between the high and the low groups. As an appropriate rule of thumb, items

with 't' values equal to or greater than 1.75 only was considered. Interestingly only one item got eliminated leaving 66 items for the final scale.

3.4.1.1.4 Final format and quantifying procedure of the scale

The final scale constituted 66 statements/items under 8 components. Each statement was provided with five response categories namely always, frequently, sometimes, rarely and never with scores of 5, 4, 3, 2 and 1 respectively. The resource use management index of each individuals was computed using the following formula

$$\text{Resource use management index (RUMI)} = \frac{\text{Total score obtained by the farmer}}{\text{Maximum score possible}} \times 100$$

The component scores were derived by simple addition of the scores obtained by individuals on the items grouped under a component and its management index was computed using the same formula as given above. Shanmugappa (1978) also used similar procedure for the measurement of managerial ability of arecanut growers in Karnataka. In the present study differential weightages were not given to items because all the items selected and included in the final scale had statistically significant item validity and expert opinion also was heavily in favour of uniform weightage.

The management orientation scale of Samanta (1977) and managerial efficiency scale of Anantharaman (1991) also did not have differential weightage for items.

3.4.1.1.5 Standardisation of the scale

It was done by assessing the reliability and validity of the scale.

3.4.1.1.5.1 Reliability of the scale

A test score is said to be reliable when we have reason to believe the score to be stable and trustworthy. Guilford (1954) has defined reliability as the proportion of variance in the obtained test scores. Hence a scale can be considered reliable only when it consistently produces the same or similar results when applied to the same or similar sample at any time. Usually reliability can be measured using three methods namely pre-test method, multiple form method and split half method. In the present study split-half method was used to find out the reliability of the constructed scale as given below.

The statements selected after item analysis (66 statements) were divided into two equal halves based on odd-even numbers. These two halves of statements were then administered to a group of 30 nonsample coconut growers. Two sets of scores were thus derived for the same group of respondents and the scores were correlated. The correlation coefficient (r) worked out (0.81) was highly significant indicating very high reliability for the scale.

3.4.1.1.5.2 Validity of the scale

According to Goode and Hatt (1952), a scale is said to be valid when it actually measures what it claims to measure. The validity of a scale is usually determined using the following methods namely content validity, criterion-related validity and known group validity.

3.4.1.1.5.2.1 Content validity

The important basis for content validity is, how well the contents of the scale represent the subject matter under study. This was ensured during the preparation of the scale itself taking utmost care to include all the relevant items to represent the universe of content.

3.4.1.1.5.2.2 Criterion validity

According to Kerlinger (1973) criterion validity is ascertained by comparing scale scores with one or more criteria known to measure the attribute understudy. All the components/items included in the scale were found to have significant correlation with the external criterion variable, income. Therefore it was safely concluded that the scale had criterion validity.

3.4.1.1.5.2.3 Known group validity

Known group validity is measured by administering a test among persons who are known to have a particular opinion or belonging to a particular category and the results are then compared with known facts (Bhatnagar, 1990). For this two groups of farmers (15 farmers in each group), one known to be efficient and the other inefficient in their resource use were selected based on the opinion of field level extension workers and Agricultural Officers from the non sample area. The constructed scale was then administered to these two groups of coconut growers. The mean score of these two groups were compared and tested for significance of difference. The result yielded a significant 't' value showing that the mean scores of the two groups were significantly different indicating high known group validity for the scale.

3.4.2 Operationalisation and measurement of independent variables

3.4.2.1 Personal variables

3.4.2.1.1 Age

Age was operationalised as the number of years the farmer respondent had completed at the time of the investigation since his birth.

3.4.2.1.2 Education

Education was operationalised as the extent of informal or formal learning acquired by the coconut grower. The level of education was measured based on the socio-economic status scale of Trivedi (1963). The procedure was as shown below.

Sl. No.	Different levels of education	Score
1	Illiterate	0
2	Can read only	1
3	Can read and write	2
4	Primary school	3
5	Middle school	4
6	High school	5
7	College	6
8	Above College	7

3.4.2.1.3 Farm size

In the present study farm size was refered to as the number of hectares of land owned and cultivated by a farmer, which included both garden land and wet land. Wet land having cultivation more than once was multiplied by 2 so as to get a standardized estimate. The farmers who possessed atleast 40 bearing coconut palms were selected for the study.

3.4.2.1.4 Experience

Chambers' Dictionary (1983) explains experience as practical acquaintance with any matter derived from the change and trials of life.

Experience in farming was operationally defined as the number of years the farmer respondent had actually engaged in coconut cultivation.

3.4.2.1.5 Knowledge on scientific management

It was operationalised for the purpose of this study as the extent of knowledge on management principles possessed by the coconut grower which helps in the better utilisation of available resources.

It was measured using the knowledge test developed by Anantharaman (1991). This consisted of 12 items, which were framed in objective form to be answered as alternative choices or as True/False. For the correct answer for each item, a score of '1' was given and for incorrect ones '0' was given. The total knowledge score of each respondent was calculated by adding up the number of items answered correctly.

3.4.2.2 Socio-psychological variables

3.4.2.2.1 Scientific orientation

It refers to the degree of orientation of coconut growers towards scientific methods in coconut cultivation.

The scientific orientation scale developed by Supe (1969) was used for the present study. It consisted of 6 statements of which 5 were positive and one negative. The responses were rated on a five point continum with response catagories as follows: strongly agree, agree, undecided, disagree and strongly disagree. Corresponding scores were 7, 5, 4, 3 and 1. In the case of the negative statement (statement No.2) the scoring pattern was in the reverse order.

3.4.2.2.2 Innovativeness

Innovativeness was operationalised as the degree to which a coconut grower is relatively earlier in adopting new ideas in resource use management.

The procedure developed by Singh (1977) and adopted by Rajendran (1992) was used in the present study to measure the innovativeness of coconut growers.

The question "When would you prefer to adopt an improved practice in farming" was posed to respondents and the reaction rated as follows:

Sl.No.	Response	Score
1	As soon as it is brought to my knowledge	3
2	After I have seen some other farmers using it successfully	2
3	Prefer to wait and take my own time	1

The score obtained by the respondent was taken as his innovativeness score.

3.4.2.2.3 Extension guidance

Extension guidance was operationalised as the degree of guidance actually received by the farmer-respondent directly from various extension personnel or institutions in relation to resource use management.

The procedure employed by Desai (1981) and adopted by Rajendran (1992) was used in the present study also. According to this, extension guidance received and its usefulness during the year prior to the investigation was measured on a three point continuum The scoring procedure was as follows.

Sl.No.	Statement	Scoring pattern
1	Technical guidance received during the last one year was	Very adequate (3) Adequate (2) Not adequate (1)
2	Technical guidance received was	Very much useful (3) Much useful (2) Least useful (1)

Total score on extension guidance of the respondents was calculated by summing up the scores on the statements.

3.4.2.2.4 Achievement motivation

McClelland (1964) defined achievement motivation as the spontaneously expressed desire to do something well for its own sake rather than to gain power or love, recognition or profit.

In the present study it refers to the striving of a coconut grower to do a good job with a standard of excellence which may be task related or self related or other related.

Achievement motivation was measured in the present study using the scale constructed by Desai (1981). It comprised of five incomplete sentences, each having three choices. The respondents were free to select anyone of the choices which he felt appropriate. The choice indicating high achievement motivation was given a score of '1' and the other choices '0'. Summing up the scores over all the five sentences gave the respondent's total achievement motivation score.

3.4.2.2.5 Extension participation

Extension participation was operationally defined as the extent of participation by a coconut grower in various extension programmes conducted by development agencies in the area. This was measured using the procedure suggested by Bhaskaran (1979) with slight modification.

The participation of farmer-respondents in various programmes such as group meetings, seminar, exhibitions, film shows, demonstrations, campaigns, farmers' days, field days etc. were included to measure the extent of participation during the previous year.

Sl.No.	Frequency	Score
1	Always attending an activity/programme whenever conducted	2
2	Sometimes attending an acitivity/programme whenever conducted	1
3	Never	0

The summation of the scores for the different extension programmes/ activities for a farmer-respondent constituted his total score on extension participation.

3.4.2.2.6 Economic motivation

Economic motivation refers to the drive for occupational excellence in terms of profit making and relative value placed on economic ends by a coconut farmer.

In any farming system, economic motivation may be regarded as an indication of the degree of willingness for investment of available potential resources in adopting farm innovations. The farmer who views himself to be economically motivated may seek more monetary gains than a farmer with values such as freedom from debt and self-sufficiency.

In the present study, economic motivation of coconut growers was measured with the help of the self-rating economic motivation scale developed by Moulik (1965). The scale consisted of three sets of statements, each set having three shorter statements with weights 3, 2 and 1 respectively indicating high, medium and low degree of economc motivation.

Forced choice method was followed to overcome the familiar problems of personal bias and lack of objectivity in self evaluation. This method forced the respondent to choose from a group of three short statements describing a particular personality characteristic, the one which most accurately described the respondent himself and also the one which least accurately portrayed himself. After obtaining the respondent's 'most-least' choices for each of the three sets of statements the scoring was done by summing up the ratios of the weight of the 'most-like' statement to the weight of the 'least-like' statement. As there were three sets of statements for the

economic motivation scale, the sum of the ratios for the three sets was the respondent's selfrating score for economic motivation.

3.4.2.2.7 Perceived availability of resources

It refers to the perception of a coconut grower about the availability of various resources including technical guidance required for the proper functioning of a profitable agricultural enterprise.

The variable was measured using a schedule developed for the study by the researcher. Nine important resources including technical guidance were identified in consultation with experts and the respondents rated the availability of each of these resources on a 3 point continnum. 'More', 'Optimum' and 'Less'. Weights of 3, 2 and 1 respectively were assigned to these points and a total score obtained for each individual by summating the weights of all the components.

3.4.2.2.8 Risk orientation

It refers to the extent to which the coconut grower is prepared to face risks and uncertainity in farming.

In this study, the risk orientation scale developed by Supe (1969) was employed. The scale consisted of six items rated against a 5 point continuum ranging from 'strongly agree' to 'strongly disagree'. There were four positive and two negative statements.

The scoring procedure adopted was as follows.

Sl.No.	Responses	Score for positive items	Score for negative items
1	Strongly agree	7	1
2	Agree	5	3
3	Undecided	4	4
4	Disagree	3	5
5	Strongly Disagree	1	7

Summation of scores over the six items gave the respondent's risk orientation score.

3.4.2.2.9 Market perception

Market perception was measured as the perception of coconut growers about their marketing facilities to get a remunerative price for his produce. It was measured by adopting the procedure developed by Nair (1969) with suitable modifications. The method consisted of assessing the responses obtained to selected questions presented to the respondents to elicit their perceptions regarding market for their produce. There were four items, each having two choice Yes or No with respective scores of 1 and 0. The respondents were asked to indicate any one of the choices which he felt appropriate for each of the items. Summing up the scores over all the four items gave the respondent's total market perception score.

3.4.2.3 Situational variable

3.4.2.3.1 Accessibility to infrastructural facility

This variable was operationally defined as the perception of farmers about their accessibility to infrastructural facilities which provide support to coconut cultivation.

Accessibility to infrastructural facility in relation to coconut cultivation was measured using a schedule developed for the study. Nine major items were identified for this purpose in discussion with experts and respondents rated these items on a 3 point continuum: 'Easily accessible', 'accessible without much difficulty' and 'accessible with much difficulty'. Weightages of 3, 2 and 1 respectively were given to these points. The summation of scores of all items gave the total score for this variable.

3.4.3 Criterion variable

Criterion variable selected for the study was annual income from coconut cultivation on per hectare basis. It was evident from the review of literature that resource use management can influence the economic performance of a farmer.

For the present study annual net income derived from coconut cultivation was taken into consideration. It was obtained by deducting operational costs from the annual gross income of the farmer.

Annual gross income was calculated by multiplying the total quantity of produce and byproducts with respective prices at which the farmer sold them.

Operational costs considered in the study are shown below.

1) Input costs including both purchased and owned inputs
2) Labour charges including hired labour and family labour
3) Hire charges of implements
4) Interest on working capital

5) Transportation charges of inputs, produce and byproducts

6) Irrigation charges

3.4.4 Factors affecting resource use management

An attempt has been made to identify various factors adversely affecting resource use management by asking direct related questions to the farmer-respondents. The factors were ranked under each component based on the percentage of respondents who identified that as a constraint. The suggestions for the improvement of these adversely affecting factors or constraints were also elicited from the respondents.

3.5 Procedure employed in data collection

An interview schedule consisting of structural questions was prepared in English and translated into Malayalam. The researcher personally interviewed the selected respondents with the help of the schedule which had three parts. First part was intended to collect general information and information about independent variables. Part two was meant to collect farmers' responses on resource use management and part three was used to derive information on cost of cultivation and income.

The data collection was done during September to December 1993.

3.6 Statistical tools used

The data collected were scored, tabulated and anlaysed using appropriate statistical tools. Apart from mean, standard error, simple percentages, and analysis of

variance, simple correlation, multiple regression analysis, step-wise regression analysis, angular transformation and $\sqrt{x}$ transformation for the conversion of raw score into standard scores and multivariate path coefficient analysis were employed in this study.

3.6.1 Mean

The mean score of the personal, socio-psychological and situational factors and resource use management components were used to compare different zones.

3.6.2 Standard error

Standard error was used as a measure of check to classify the respondents into various categories.

3.6.3 Simple percentage

After grouping farmer-respondents in to various categories based on the scores of each character, simple percentage was worked out to find out percentage distribution.

3.6.4 Analysis of variance

This was used to test the significant difference between the farmers of selected zones for their personal, socio-psychological and situational variables and components of resource use management.

3.6.5 Simple correlation

The simple correlation analysis was done to study the relationship between dependent and independent variables.

3.6.6 Multiple regression analysis

This was done to find out the contribution of personal, socio-psychological and situational variables of farmers in the variation in dependent variable resource use management and the contribution of resource use management components on income from coconut cultivation.

3.6.7 Step-wise regression analysis

It was done to know the relative effect of the independent variables in predicting variation in resource use management and also for predicting variation by resource use management components in income from coconut cultivation. The best fitting regression equation was estimated by step-wise regression as suggested by Draper and Smith (1966).

3.6.8 Angular transformation

This was used to convert percentage into standard scores for further statistical procedures.

3.6.9 $\sqrt{x}$ transformation

It was used to convert obtained raw scores into standard scores for further statistical procedures.

3.6.10 Multivariate path analysis

Multivariate path analysis was carried out to make an assessment of the relative influence of independent variable (antecedent variable) on dependent variable (consequent variable). In this analysis the correlation coefficient between two variables was decomposed into a series of parts, indicating the path of influence leading through intermediate variables. In the present study the path analysis was done to find out the direct effect and routes of indirect effect of independent variables on the dependent variable.

Results and Discussion

CHAPTER-IV

RESULTS AND DISCUSSION

Keeping the objectives of the study in view the results and discussions of the present study are presented in this chapter under the following main heads.

4.1 Resource use management of the coconut growers

4.2 Relationship between personal, socio-psychological and situational variables and resource use management

4.3 Resource use management and income

4.4 Factors/constraints affecting resource use management

4.5 Empirical model of the study

4.1 Resource use management of the coconut growers

4.1.1 Distribution of coconut growers based on resource use management and its components

The percentage distribution of respondents based on resource use management and its components for the total sample is presented here under.

The results given in Table 2 indicate that majority of respondents belong to the medium category in their resource use management (69.33%). While 12 per cent of the farmers had only low resource use management ability, 18.67 per cent recorded high resource use management. The potential range of scores was 20 to 100 and the observed range 30 to 96.67.

Table 2. Distribution of respondents based on resource use management and its components (n = 225)

Sl. No.	Variable/component	Category	Range	Frequency	Per cent
I	Resource use management	Low	30.00 to 37.85	27	12.00
		Medium	37.86 to 58.98	156	69.33
		High	58.99 to 96.67	42	18.67
		Low	30.00 to 49.29	27	12.00
a.	Land management	Medium	49.30 to 72.64	157	69.78
		High	72.65 to 93.33	41	18.22
		Low	25.00 to 26.75	6	2.67
b.	Water management	Medium	26.76 to 66.36	171	76.00
		High	66.37 to 95.00	48	21.33
		Low	20.00 to 38.17	24	10.67
c.	Management of manures	Medium	38.18 to 63.96	167	74.22
		High	63.97 to 93.33	34	15.11
		Low	20.00 to 21.64	57	25.33
d.	Fertilizer management	Medium	21.65 to 57.93	133	59.11
		High	57.94 to 90.00	35	15.56
		Low	20.00 to 23.03	12	5.33
e.	Pesticide management	Medium	23.04 to 55.07	176	78.23
		High	55.08 to 92.73	37	16.44
		Low	20.00 to 51.85	25	11.11
f.	Labour management	Medium	51.86 to 67.89	167	74.22
		High	67.90 to 86.67	33	14.67
		Low	34.00 to 41.01	36	16.00
g.	Information management	Medium	41.02 to 60.39	157	69.78
		High	60.40 to 86.00	32	14.22
		Low	22.50 to 31.27	28	12.44
k.	Capital management	Medium	31.28 to 56.55	167	74.22
		High	56.56 to 87.50	30	13.33

Potential range 20.00 to 100.00

Fig. 3. Pie Diagram showing the distribution of respondents based on resource use management

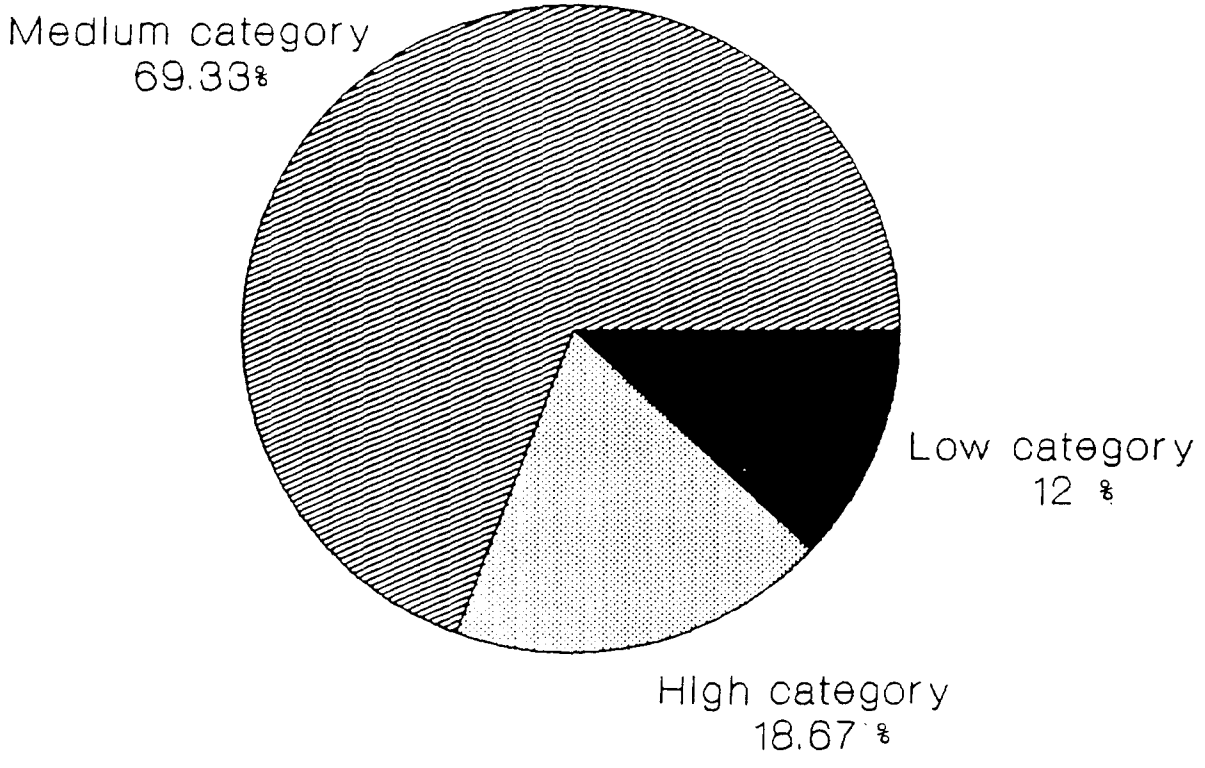
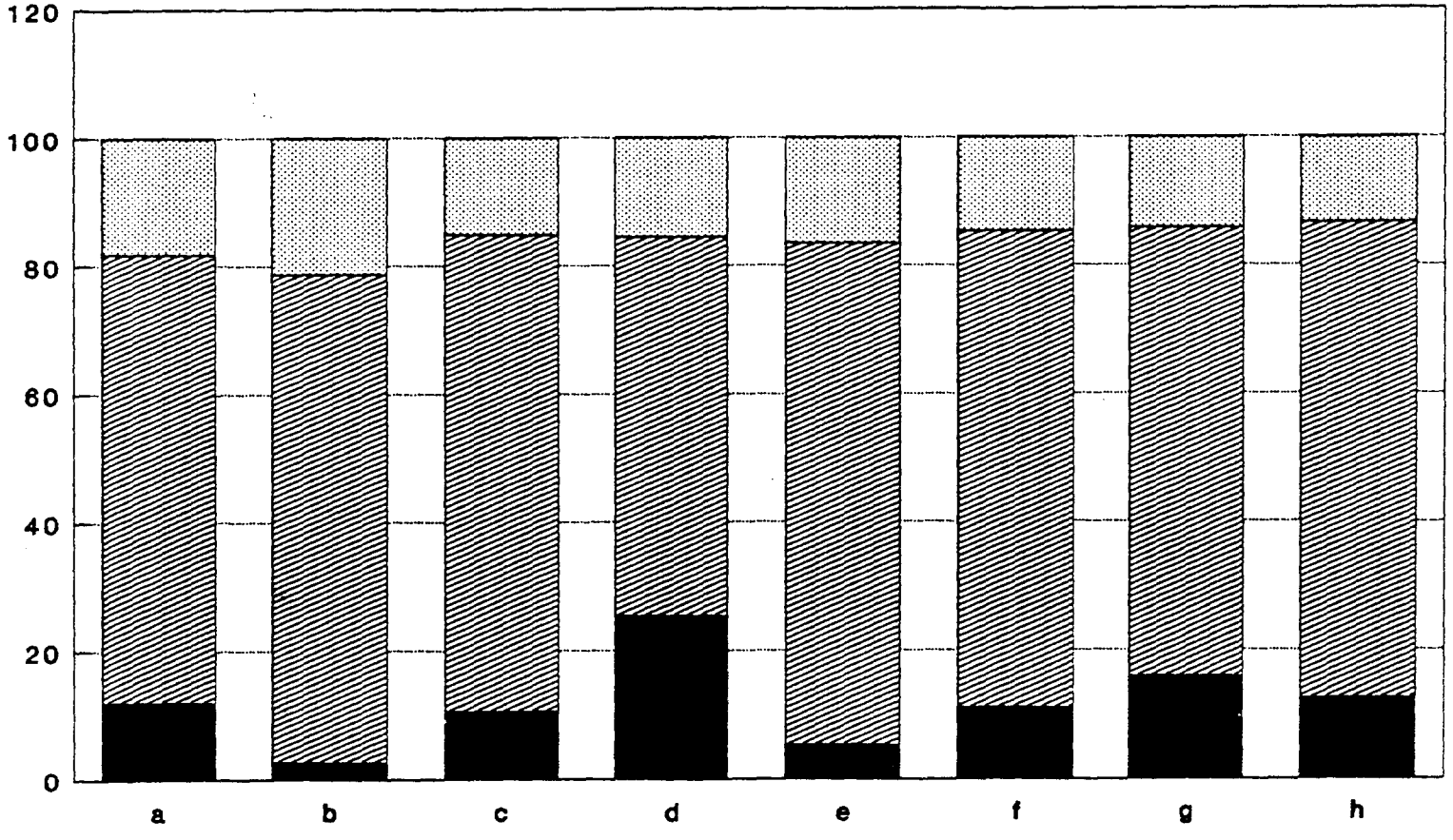


Fig.4. Distribution of respondents based on the components of resource use management



a. Land management

b. Water management

c. Management of manures

d. Fertilizer management

e. Pesticide management

f. Labour management

g. Information management

h. Capital management

Among the various components of resource use management, more than 70 per cent of the farmer respondents were in medium category with respect to water management (76%), management of manures (74.22%), pesticide management (78.23%), labour management (74.22%) and capital management (74.22%). In the case of land management and information management also majority of the respondents were in the medium group (69.78% for both the components). It may also be noted from the table that 25.33 per cent of total respondents were in the low group regarding fertilizer management, meanwhile number of respondents in the low category for water management was negligible (2.67%).

Maximum number of farmer respondents in high resource use management category was observed for the component water management (21.33%), followed by land management (18.22%), pesticide management (16.44%), fertilizer management (15.56%), management of manures (15.11%), labour management (14.22%) and information management (14.22%) while capital management recorded the least number of respondents under high group (13.33%).

Analysis of the total sample (n = 225) clearly pointed out that in general coconut growers were moderate to good in their resource use management. A large majority of the farmers (88%) showed a resource use management score above 37.86.

Coconut being the principal crop in the study area farmers mainly depended on the cultivation of coconut for their livelihood. Percapita availability of land in Kerala is only 0.14 ha (1991-1992), a clear indication of land as a limiting factor. Due to this cultivation was largely confined to small homesteads and this might have forced them to show some degree of excellance in resource use management to

keep the units economically viable. More over, since majority of the farmer respondents were experienced and educated with high level of achievement motivation and scientific orientation, a better resource use management level was only logical.

On further classification of the respondents based on components of resource use management, the highest degree of efficiency could be observed in water management followed by pesticide management, management of manures, labour management, land management, capital management, information management and fertilizer management in that order for majority of the respondents.

The results indicating superior levels of judicious water consumption and conservation activities might have resulted from their higher levels of knowledge on scientific management practices consequent to relatively higher degree of extension participation and extension guidance as evidenced from the observations of the study. Water was also found to be considered as an input of lesser cost compared to other critical inputs in farming by these farmers.

In the case of pesticide management though a good majority of respondents belonged to the medium category, the range of scores indicated that the distribution was not at appreciable levels. This might be probably due to the lack of adoption of prophylatic measures against insect pests and diseases of the crop, mainly influenced by the inadequacy of the observability attribute of such measures. Moreover, most of the plant protection problems in coconut are identified only in advanced stages of infestation.

Lower levels of efficiency observed in the case of fertilizer management compared to other resources, may be due to high cost of chemical fertilizers as ex

pressed by the respondents themselves. The recommendations of split application of fertilizers as well as use of fertilizers after soil testing had not been perceived as highly essential by the respondents, which might also have contributed to this trend.

It is obvious from the results presented in the table that farmers were efficient in their management of manures. The observed lower limit for medium group was 38.18 and upper limit for high category 93.33. Majority of the farmers were found to be in this score range (89.33%). Almost all the farmer respondents were found to be applying manures at an average of 23 kg/palm/year, most of them adopting this practice as per the recommendation. Farmers also had a feeling that their local varieties of coconut needed only manures and irrigation for production and fertilizer application was perceived as harmful. All these might have contributed for their high level of efficiency in the use of manures.

A large majority of farmer respondents (88.89%) were accumulated in the score range of 51.86 to 86.87, regarding labour management indicating moderate to high efficiency in labour management. The study had revealed that farmers were experienced with fairly high levels of knowledge on scientific management. This might have given them enough wisdom and foresight to do things with some degree excellance and to utilize available labour force efficiently by careful planning and judicious distribution, thereby leading to better labour management.

In the case of land management also farmers clearly showing their efficiency, the high and medium category together contributing almost 98 per cent. The high category alone contributed nearby 20 per cent (18.22%) of the respondents. It was observed from the study that 88 per cent of the respondents cultivated one or

more intercrops along with coconut. The cropping intensity of Kerala was 132 per cent, this itself was a clear indicator of land utilization (KAU, 1989). Heavy rainfall and flood problems faced by the farmers through the years also might have taught them to adopt proper soil conservation measures. All the above discussed facts could have influenced the management of land resources in a favourable manner and hence the results.

Capital management by the farmer respondents was not very much appreciable. Majority of the respondents were (74.22%) accumulated in the medium category with a score range of 31.28 to 56.55. Eventhough farmers could be experienced there are certain limiting factors in the management of capital. These limiting factors might have resulted in low efficiency regarding capital management of respondents in the present study. Coconut is mainly grown in small holdings with relatively low productivity (30-35 nuts/palm/year). This coupled with low prices is likely to reduce investment in coconut cultivation. The low prices also force the farmers to sell their produce to middle men and majority of small growers sell their produce in the coconut garden itself. The uneconomic size of holding and poor staying power of the small farmers prevent farmers from engaging in value addition practices like grading, converting into copra, oil, etc. In addition to this the high wage rates prevalent in Kerala also could have contributed to the low efficiency in capital management.

4.1.2 Zone-wise distribution and comparison of respondents based on resource use management

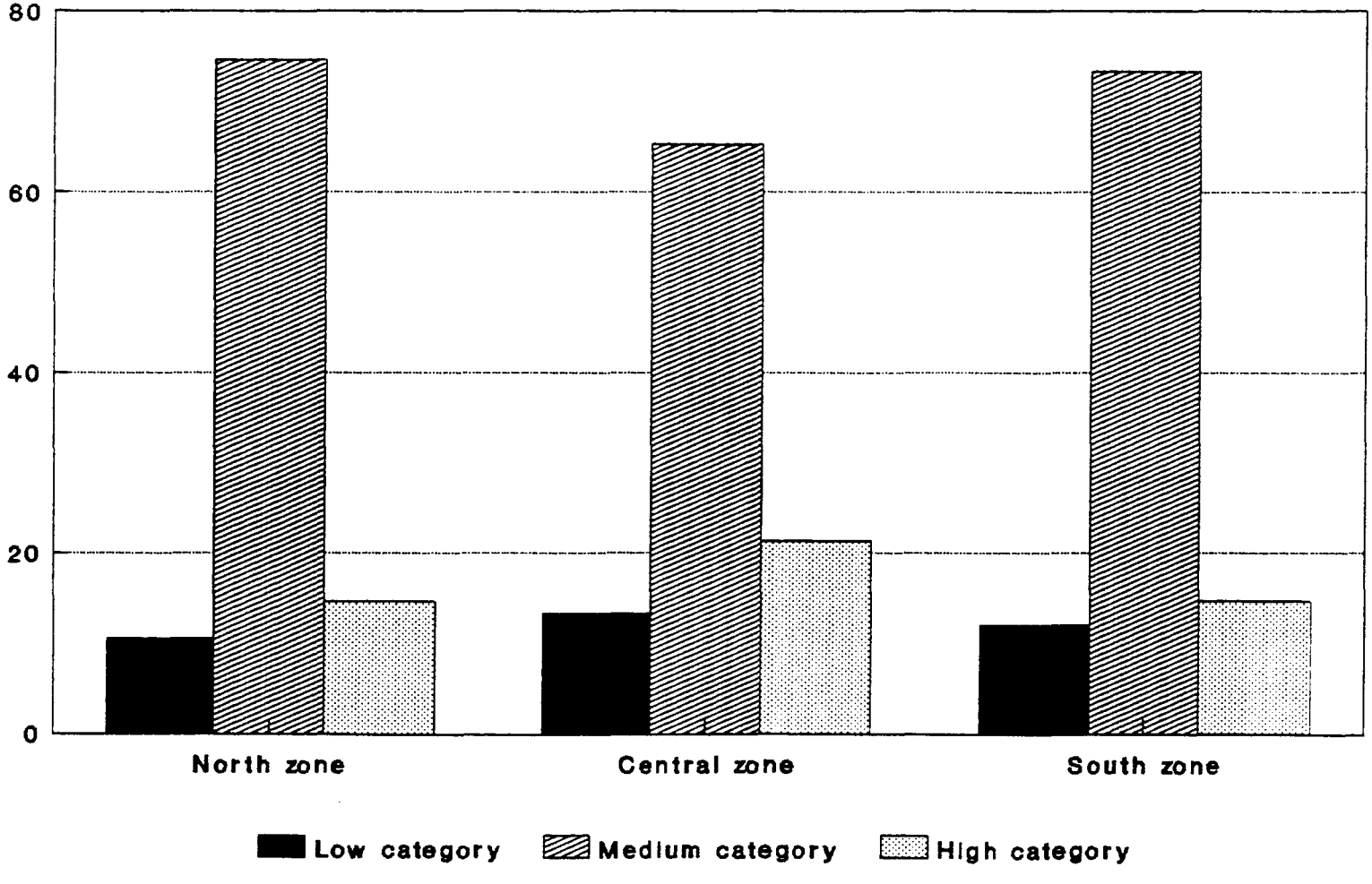
Pattern of zone-wise distribution of respondents based on resource use management is given in Table 3. The results show that central zone accounted for

Table 3. Zone-wise distribution and comparison of respondents based on resource use management

Sl.No.	Zone	Category	Range	Frequency	Per cent
I	North (n = 75)	Low	33.13 to 37.85	8	10.67
		Medium	37.86 to 58.98	56	74.67
		High	58.99 to 73.33	11	14.67
II	Central (n = 75)	Low	30.00 to 37.85	10	13.33
		Medium	37.86 to 58.98	49	65.33
		High	58.99 to 96.67	16	21.33
III	South (n = 75)	Low	31.82 to 37.85	9	12.00
		Medium	37.86 to 58.98	55	73.33
		High	58.99 to 75.76	11	14.67

Potential range 20.00 to 100.00

Fig.5. Zone-wise distribution of respondents based on resource use management



more number of respondents (21.33%) in high resource use management category with an observed score range of 58.99 to 96.67. North zone and south zone contributed same number of respondents in the high category (14.67%). Majority of the respondents belonged to the medium category for all three zones. Only 10 to 14 per cent of the total farmer respondents were found to fall in the low category for the different zones.

A comparison of the high groups of the three geographical zones of Kerala indicated that north and south zones lagged behind the central zone in resource use management. A glance of the observed score range of high categories presented in Table 3 show a maximum score range of 58.99 to 96.67 for the farmer respondents of the central zone with respect to resource use management. Mean while the observed score range for north and south zones were 58.99 to 73.33 and 58.99 to 75.76 respectively.

The score range for medium category was 37.86 to 58.98 for all three zones. In this category the maximum number of respondents was recorded in northern zone (74.67%) followed by south zone (73.33%) and central zone (65.33%).

A close observation of Table 3 revealed that the respondents from central zone had better resource use efficiency in the high category of management with an observed score range of 58.99 to 96.67. Here farmers seem to have achieved maximum efficiency in using their available resources. The plausible reason for this could be that the central zone contributed more area under irrigation among the three zones which could have provided an opportunity to grow one or more intercrops in coconut gardens. It was observed in the study that a large majority of the central zone farmers were cultivating one or more inter crops in coconut garden. This was in conformity to

the observations made in NARP status report (KAU, 1989) which revealed that the central zone had a cropping intensity of 136 per cent. This was more than that of the north zone (108%). This high irrigation potential could be the reason for high efficiency in fertilizer management by central zone farmers (Table 7). It is a fact that application of fertilizer in moist soil will help to get better result, which could also facilitate split application. In addition to this crop residues from the intercrops might help the farmers to ensure the availability of green manures to certain extent.

Farmers' high level of knowledge on scientific management, extension participation and experience also might have contributed to their resource use and hence the result.

From the distribution of farmers in terms of their resource use management as evidenced in Table 3, it could be inferred that north and south zone show more scope for improvement in their resource use. Here farmers could reach only a maximum score of 73.33 and 75.76 for north and south zones respectively, while the maximum possible score was 100.

4.1.3 Zone-wise distribution and comparison of respondents based on the components of resource use management

The results of zone-wise distribution comparison and relative performance of coconut growers based on the components of resource use management are presented and discussed here.

4.1.3.1 Zone-wise distribution and comparison of respondents based on land management

A close look at Table 4 reveals that majority of farmers belonged to the

Table 4. Zone-wise distribution and comparison of respondents based on land management

Sl.No.	Zone	Category	Range	Frequency	Per cent
I	North (n = 75)	Low	30.00 to 49.28	8	10.67
		Medium	49.29 to 72.64	51	68.00
		High	72.65 to 93.33	16	21.33
II	Central (n = 75)	Low	33.33 to 49.29	13	17.33
		Medium	49.30 to 72.64	45	60.00
		High	72.65 to 90.00	17	22.67
III	South (n = 75)	Low	40.00 to 49.29	4	5.33
		Medium	49.30 to 72.64	63	84.00
		High	72.65 to 80.00	8	10.67

Potential range 20.00 to 100.00

medium category with respect to land management. Maximum number of respondents (84%) in this category was found in south zone followed by north (68%) and central zones (60%). Understandably the number of respondents in the low group for south zone (5.33%) was much lower than that of north (10.67%) and central zones (17.33%). It was interesting to note that when the respondents belonging to high and medium category were put together south zone accounted for more number of re spondents (94.67%). From the data presented in Table 4, it is obvious that the farmers in south zone performed well in land management. The possible reason for this better performance might be better soil conservation measures adopted by the south zone farmers, consequent to undulating topography which might have forced them to construct terraces, bunds and other structures whereever necessary.

It was noted that, though the annual rainfall in the northern region found more, the effective rainfall was only 40 per cent while it was 80 per cent in southern region (KAU, 1989). It was further reported that the rainfall in southern region was relatively more evenly distributed which facilitated more intercropping in coconut gardens resulting in higher cropping intensity. This might also have turned out to be another contributing factor for the better performance level in land management in the southern region.

Apart from the above facts, in the southern zone there is an increased possibility for adoption of appropriate spacing between plants due to the higher intercropping pattern. This also might have added to the land management efficiency of the respondents in the south.

4.1.3.2 Zone-wise distribution and comparison of respondents based on water management

It is evident from Table 5 that among the three geographical zones of Kerala central zone accounted for more number (34.66%) of farmers in the high category for water management. The same zone also contributed maximum number of farmers in medium and high category taken together (97.33%) followed by south zone (96%) and north zone (94.67%). Moreover it would be relevent to note that number of farmers in high category for water management in central zone was very high (34.66%) compared to the other two zones.

The results presented in Table 5 clearly indicate that central zone farmers were at appreciable levels in water management. The main reason for such a result might be the higher area under irrigation for coconut cultivation in the central zone. The analysis of data obtained on study area from panchayat level Krishi Bhavans (Table 1) revealed that out of the total coconut area in each zone, 49.69 per cent was under irrigated category in central zone followed by north zone (19.59%) and south zone (17.93%).

The number of irrigation sources and availability of diesel and electric pumpsets were more in central zone compared to north zone and south zone (KAU, 1989). This might have also enabled the farmers to use their water resources properly.

4.1.3.3 Zone-wise distribution and comparison of respondents based on management of manures

The zone-wise distribution of farmers in low, medium and high category for the component-management of manures is presented in Table 6. It could be

Table 5. Zone-wise distribution and comparison of respondents based on water management

Sl.No.	Zone	Category	Range	Frequency	Per cent
I	North (n = 75)	Low	25.00 to 26.75	4	5.33
		Medium	26.76 to 66.36	57	76.00
		High	66.37 to 92.50	14	18.67
II	Central (n = 75)	Low	25.00 to 26.75	2	2.67
		Medium	26.76 to 66.36	47	62.67
		High	66.37 to 95.00	26	34.66
III	South (n = 75)	Low	25.00 to 26.75	3	4.00
		Medium	26.76 to 66.36	64	85.33
		High	66.37 to 90.00	8	10.67

Potential range 20.00 to 100.00

Table 6. Zone-wise distribution and comparison of respondents based on management of manures

Sl.No.	Zone	Category	Range	Frequency	Per cent
I	North (n = 75)	Low	33.33 to 38.17	42	56.00
		Medium	38.18 to 63.96	19	25.33
		High	63.97 to 93.33	14	18.67
II	Central (n = 75)	Low	20.00 to 38.17	7	9.33
		Medium	38.18 to 63.96	56	74.67
		High	63.97 to 93.33	12	16.00
III	South (n = 75)	Low	33.33 to 38.17	9	12.00
		Medium	38.18 to 63.96	59	78.67
		High	63.97 to 86.67	7	9.33

Potential range 20.00 to 100.00

observed from the table that central zone comprises of maximum number of respondents (90.67%) in medium and high categories taken together followed by south (88%) and north zones (44%).

The observed score range for high group in south zone was 63.97 to 86.67 which was notably lesser than that of north and central zones (63.97 to 93.33). This indicates the presence of untapped potential among respondents in south zone regarding management of manures.

It may also be noted that majority of farmers (56%) in the north zone was poor in their management of manures.

It could be concluded from the table that central zone was relatively superior in the management of manures compared to the other two zones.

With regard to this superiority in the management of manures by central zone coconut growers, it could possibly be related with facts like availability of more crop residues consequent to growing more intercrops as evidenced from the high cropping intensity (136%) which in turn could be attributed to better facilities for irrigation.

It is interesting to note that livestock rearing was predominantly more in central zone. This may be due to the presence of institutions like the Veterinary College and other government agencies engaged in livestock development in this zone. Livestock rearing substantially increases the availability of FYM for crop production.

The study also revealed that more compost pits had been constructed in the central zone. In raising green manure crops as a regular practice also central zone

Table 7. Zone-wise distribution and comparison of respondents based on fertiliser management

Sl.No.	Zone	Category	Range	Frequency	Per cent
I	North (n = 75)	Low	20.00 to 21.64	17	22.67
		Medium	21.65 to 57.93	45	60.00
		High	57.94 to 90.00	13	17.33
II	Central (n = 75)	Low	20.00 to 21.64	14	18.67
		Medium	21.65 to 57.93	50	66.67
		High	57.94 to 90.00	11	14.66
III	South (n = 75)	Low	20.00 to 21.64	25	33.33
		Medium	21.65 to 57.93	40	53.33
		High	57.94 to 87.50	10	13.33

Potential range 20.00 to 100.00

was found to perform better followed by south and north zones. All the above mentioned facts conform to the finding of the study that central zone is relatively superior in the management of manures than the other two zones.

4.1.3.4 Zone-wise distribution and comparison of respondents based on fertilizer management

A perusal of the results in Table 7 indicates that majority of coconut growers (81.33%) were in the medium and high categories for fertilizer management in the case of central zone followed by north zone (77.33%) and south zone (66.66%). Maximum number of farmers in the high category was in north zone (17.33%).

The results show that all the three zones recorded lowest scores for their low category with respect to fertilizer management, the score range for this category being 20.00 to 21.64. Among the zones, south zone recorded maximum number of farmers (33.33%) followed by north (22.67%) and central zones (18.67%) in the low fertilizer management category.

The pre eminence of central zone over the other zones in fertilizer management could be done to better irrigation facilities prevalent in central zone. This could have enabled the farmers to apply fertilizers at the correct time and levels and in split doses, thereby increasing efficiency of fertilizer use. The survey revealed that the number of respondents applying split doses of fertilizers were more in central zone.

It is also obvious from the table that a sizeable number of respondents in all the three zones lagged far behind in the efficient management of fertilizers. The plausible reason for this was very much evident from the constraints perceived by the

Table 8. Zone-wise distribution and comparison of respondents based on pesticide management

Sl.No.	Zone	Category	Range	Frequency	Per cent
I	North (n = 75)	Low	21.82 to 23.03	7	9.33
		Medium	23.04 to 55.07	57	76.00
		High	55.08 to 74.55	11	14.67
II	Central (n = 75)	Low	20.00 to 23.03	6	8.00
		Medium	23.04 to 55.07	52	69.33
		High	55.08 to 92.73	17	22.67
III	South (n = 75)	Low	20.00 to 23.03	6	8.00
		Medium	23.04 to 55.07	62	82.67
		High	55.08 to 85.00	7	9.33

Potential range 20.00 to 100.00

farmers in coconut cultivation. High cost of fertilizers coupled with low market price of coconut and a prevelent belief that fertilizer application is determental to the soil and crop were major factors limiting fertilizer application and its proper management.

4.1.3.5 Zone-wise distribution and comparison of respondents based on pesticide management

The data presented in Table 8 reveal that more than two-third of the farmers in the three zones belonged to the medium category of pesticide management with an observed score range of 23.04 to 55.07. The number of farmers in this category was maximum (82.67%) in south zone followed by north zone (76%) and central zone with 69 per cent of farmers in this category occupying third place.

Central zone (22.67%) had more farmers in the high category regarding pesticide management. North and south recorded much less farmers in this category with 14.67 per cent and 9.33 per cent respectively.

Medium and high category together contributed 92 per cent farmer-respondents in central and south zones and 90.67 per cent in north zone.

From the results it is easy to establish that central zone farmers were more efficient than those in north and south zones regarding the management of pesticides. Among the zones more respondents in the high group was also in the central zone and the observed score range also was promising (55.08 to 92.73). This may be due to the influence of higher levels of knowledge on scientific management and extension participation exhibited by the central zone farmers compared to other zones. In the case of north zone the respondents could achieve only an observed score range of 55.08 to 74.55 in the high management category. This might be attributed to the

low level of knowledge on scientific management of farmer respondents. It was also revealed by the study that most of the farmers were ignorant about the need for prophylatic measures against pests and diseases. In many cases incidence was noticed only at advanced stages of infestation. This could also have contributed to the low efficiency in the management of pesticides. This results indicate the need for further improvement in the yield of pesticide management.

4.1.3.6 Zone-wise distribution and comparison of respondents based on labour management

A glance at Table 9 indicates that unlike other components labour management demonstrated very little variation in the score range for different categories in all the three zones except for the low category in central zone. As in the case of pesticide management two-third of farmer-respondents of all the selected zones were in medium management category with respect to labour management also.

Medium and high categories together contributed 93.33 per cent coconut growers in south zone, 88 per cent in central zone and 86.67 per cent in north zone.

Another notable finding is that while 12-13 per cent of the total respondents in north and central zones were in low category of labaour management it was negligible in southern Kerala with a meagre 6.67 per cent in that category.

Analysis of data pointed out that south zone was comparatively better in labour management. It could be substantiated by number of logical reasons. Among these the climatological conditions prevalent in south Kerala assumes added significance. According to the NARP status report (1989) some what uniform distribution of rainfall in south provide better chances for intercropping in coconut gardens thereby

Table 9. Zone-wise distribution and comparison of respondents based on labour management

Sl.No.	Zone	Category	Range	Frequency	Per cent
I	North (n = 75)	Low	46.67 to 51.85	10	13.33
		Medium	51.86 to 67.89	54	72.00
		High	67.90 to 86.67	11	14.67
II	Central (n = 75)	Low	22.00 to 51.85	9	12.00
		Medium	51.86 to 67.89	51	68.00
		High	67.90 to 84.44	15	20.00
III	South (n = 75)	Low	46.67 to 51.85	5	6.67
		Medium	51.86 to 67.89	63	84.00
		High	67.90 to 84.44	7	9.33

Potential range 20.00 to 100.00

absorbing more labourers. The range of observed cropping intensity in the study area was 100 to 368 per cent. This substantiates the above view south zone farmer respondents were comparatively more educated (Table 14). Their scientific orientation level and knowledge on scientific management was observed to be higher than that of north zone. These coupled with more accessability to infrastructural facilities also could be reasons for the observed result regarding labour management.

In the north zone coconut is mainly grown as a monocrop in many places. This region experience prolonged dry spells if the pree monsoon showers fail and rainfall from north east monsoon was found to be very less (KAU, 1989). Heavy rains during south-west monsoon cause flood and severe soil loss. All these limit the possibility for intercropping as in south and central zones. Along with this, limited irrigation facilities (only 19.59% of the total coconut area was found to be irrigated in the selected north zone panchayats) and consequent low fertilizer usage also restricts labour use in north zone, due to the non availability of labourers in peack seasons. Farmers were found to have been forced to select even unskilled labourers available in the local area. Apart from this respondents were poor in knowledge on scientific management, this in turn naturally reducing their ability to plan properly. Labour use without proper planning and direction defenitely reduces the efficiency of labour management.

4.1.3.7 Zone-wise distribution and comparison of respondents based on information management

It is clear from Table 10 that maximum number of respondents in high and low information management category was distributed in central zone with 21.33 per cent and 16 per cent respectively.

Table 10. Zone-wise distribution and comparison of respondents based on information management

Sl.No.	Zone	Category	Range	Frequency	Per cent
I	North (n = 75)	Low	34.00 to 41.01	8	10.67
		Medium	41.02 to 60.39	58	77.33
		High	60.40 to 86.00	9	12.00
II	Central (n = 75)	Low	34.00 to 41.01	12	16.00
		Medium	41.02 to 60.39	47	62.67
		High	60.40 to 84.00	16	21.33
III	South (n = 75)	Low	34.00 to 41.01	11	14.67
		Medium	41.02 to 60.39	56	74.67
		High	60.50 to 70.00	8	10.66

Potential range 20.00 to 100.00

Among the zones majority of farmers (77.33%) in the medium category was found in the north zone followed by south with 74.67 per cent and central zone with 62.67 per cent of respondents.

It is also evident from the table that north zone contributed more respondents in the medium and high category of information management taken together (89.33%) followed by south zone (85.33%) and central zone (84%) in that order.

Eventhough the potential minimum score for information management was 20, the observed minimum score was 34.00 for all the three zones. At the same time maximum observed score was 86.00, 84.00 and 70.00 respectively for north, central and south zones.

From the observed range of scores and number of respondents in the medium and high categories taken together north zone ranks first with respect to information management. In northern Kerala coconut is mainly grown as a monocrop in many places and farmers draw their main income from coconut cultivation rather than from intercrops. The information seeking behaviour of coconut growers is more probably because it is the major crop grown. This is further supported by the respondents' higher degree of achievement motivation on coconut cultivation and seeking extension guidance and extension participation (Table 14) indicating that farmers maintained fairly good rapportwith agricultural extension agencies in that locality.

One of the striking features noticed from the observed score ranges for information management of the three zones was that there still existed substantial potential in utilizing information technology.

In south zone the respondents could reach only upto 70 per cent of the potential range. The main reason for the same had been reflected as a constraint in information management. According to the opinion of even educated farmers, low production and low price rate of coconut was the major reason for poor and improper utilization of information sources.

4.1.3.8 Zone-wise distribution and comparison of respondents based on capital management

An overall observation of Table 11 reveals that distribution of farmer respondents in the medium category for north, central and south zones are comparable. Approximately three-fourths of the respondents of the above mentioned zones are distributed in the medium category with respect to capital management.

Among the zones, north recorded maximum (90.67%) number of respondents in the medium and high category taken together followed by south (89.33%) and central (85.33%) zones. Maximum number of respondents (14.67%) in the high category and minimum number of respondents (9.33%) in the low category for capital management were also observed in the north zone of Kerala.

The results of the study established that farmers of north zone was more efficient in the management of capital compared to central and south zones of Kerala. As discussed earlier north zone is the major coconut growing tract of Kerala. In many places it is grown as a monocrop. The cropping intensity of north zone (108%) itself reveal the importance of coconut in northern region. As a main source of income farmers give due consideration for the cultivation of coconut, the management of capital resources for its cultivation, marketing of coconut and byproducts and purchase of inputs etc. Farmers' high level of achievement motivation and economic

Table 11. Zone-wise distribution and comparison of respondents based on capital management

Sl.No.	Zone	Category	Range	Frequency	Per cent
I	North (n = 75)	Low	27.50 to 31.27	7	9.33
		Medium	31.28 to 56.55	57	76.00
		High	56.56 to 87.50	11	14.67
II	Central (n = 75)	Low	22.50 to 31.27	11	14.67
		Medium	31.28 to 56.55	57	76.00
		High	56.56 to 87.50	7	9.33
III	South (n = 75)	Low	25.00 to 31.27	8	10.67
		Medium	31.28 to 56.55	59	78.67
		High	56.56 to 80.00	8	10.66

Potential range 20.00 to 100.00

Table 12. Zone-wise relative performance of respondents on the different components of resource use management

Sl. No.	Components	North zone (n=75) Mean	Rank	Central zone (n=75) Mean	Rank	South zone (n=75) Mean	Rank	F value
1	Land management	62.34	1	60.51	1	60.11	1	1.064^{NS}
2	Water management	45.29	6	53.70	3	40.70	6	8.226**
3	Management of manures	52.59	3	51.09	5	49.53	3	1.171^{NS}
4	Fertilizer management	41.27	7	41.83	8	36.27	7	1.706^{NS}
5	Pesticide management	38.68	8	43.27	6	35.22	8	4.658*
6	Labour management	59.93	2	60.40	2	59.32	2	0.493^{NS}
7	Information management	50.60	4	52.58	4	48.93	4	2.84^{NS}
8	Capital management	45.68	5	42.21	7	43.87	5	1.30^{NS}

** Significant at 1 per cent level
* Significant at 5 per cent level
NS Not significant

motivation in this zone compared to other zones (Table 14) provide further proof for the better management of capital by the north zone farmer-respondents.

4.1.4 Zone-wise relative performance of respondents on the different components of resource use management

It is evident from Table 12 that the relative performance of respondents on the various components of resource use management was identical in the north and south zones of Kerala while it was slightly different in central Kerala.

In north and south Kerala farmers performed better in 'land management' followed by 'labour management', 'management of manures', 'information management', 'capital management', 'water management', 'fertilizer management' and 'pesticide management'.

In central zone, farmers' performance was in the order of 'land management', 'labour management', 'water management', 'information management', 'management of manures', 'pesticide management', 'capital management' and 'fertilizer management'. A close look at the table reveals that for all the selected zones, farmers' performance was similar for components like 'land management' (Rank I), 'labour management' (Rank 2) and 'information management' (Rank 3).

The significance of these rank orders were checked by using F values calculated after angular transformation of the data. The results showed that there was significant difference in rank ordering regarding the compoents 'water management' (significant at 1 per cent level) and pesticide management (significant at 5 per cent level) among the three zones. All other components were statistically similar in rank ordering.

From the above finding it should be able to reject the null hypothesis that there will be no significant difference in the performance of resource use management components between the farmers of the three geographical zones in the case of water management and pesticide management. At the same time all other components except water management and pesticide management, the null hypotheses that there will be no significant difference in the performance of these components between the zones was accepted.

The above order of ranking indicated that central zone farmers are better performers in water management and pesticide management. This may be due to the reasons that, central zone had more irrigated area under coconut, more number of water sources and water lifting devices enabling them to emerge on top in water management activities. Central zone farmers' higher level of knowledge on scientific management and extension participation compared to other zones (Table 14) might have influenced them to adopt proper plant protection activities. It was also noticed in the study that in central zone more number of farmers adopted prophylatic measures against pest and diseases. Cumulative effect of all these could have helped the coconut growers in central zone to emerge first in pesticide management among the different zones.

4.2 Relationship between personal, socio-psychological and situational variables and resource use management

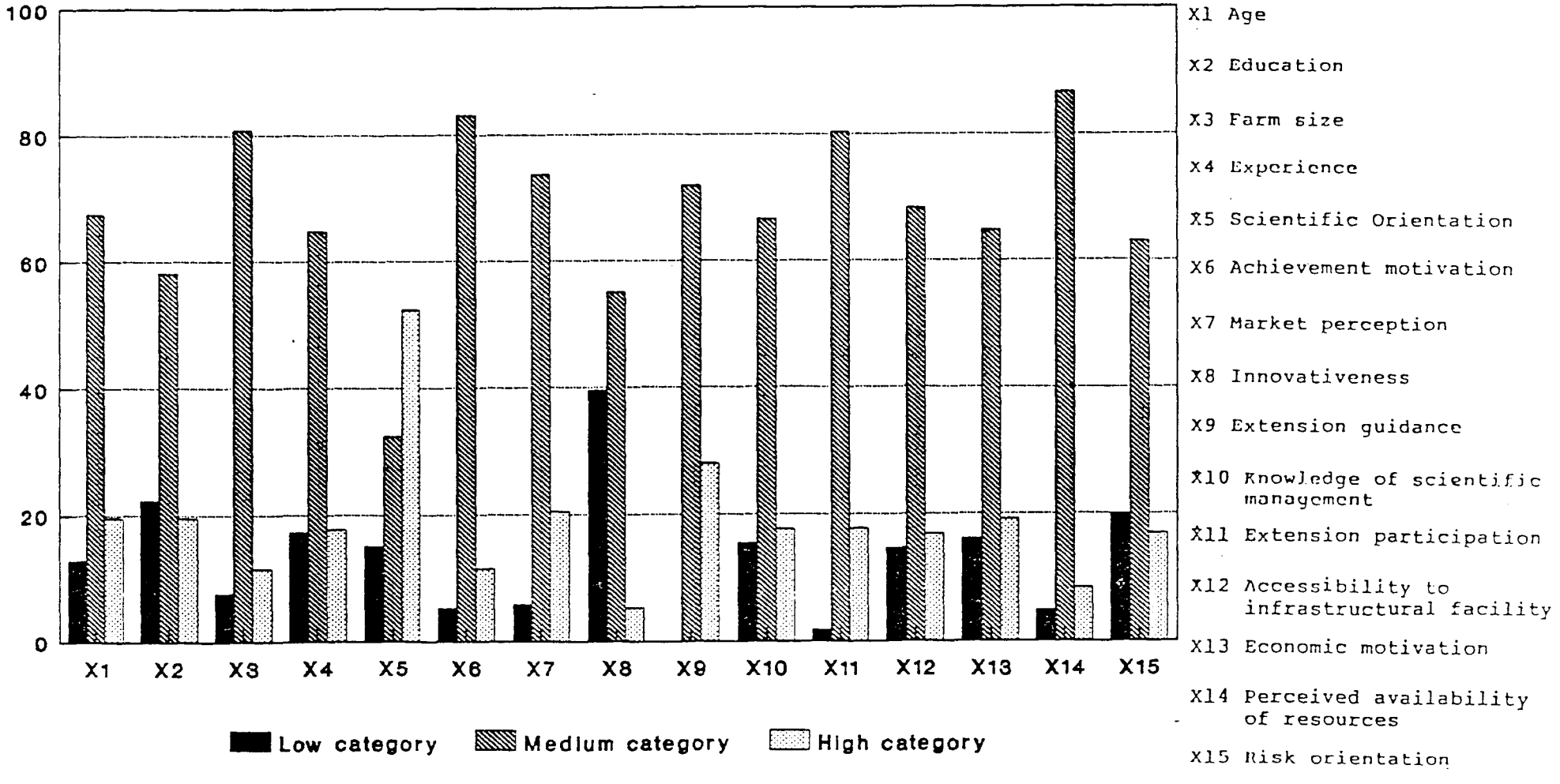
4.2.1 Distribution of respondents based on personal, socio-psychological and situational variables

A perusal of the results presented in Table 13 reveals that majority of

Table 13. Distribution of respondents based on personal, socio-psychological and situational variables (n = 225)

Variable No.	Variable name	Category	Range	Frequency	Percent
X_1	Age	Low	Below 36.04	29	12.89
		Medium	36.04 - 63.43	152	67.55
		High	Above 63.43	44	19.56
X_2	Education	Low	Below 3.32	50	22.22
		Medium	3.32 - 5.74	131	58.22
		High	Above 5.74	44	19.56
X_3	Farm size	Low	Below 0.23	17	7.56
		Medium	0.23 - 1.23	182	80.89
		High	Above 1.23	26	11.55
X_4	Experience	Low	Below 10.42	39	17.33
		Medium	10.42 - 32.98	146	64.89
		High	Above 32.98	40	17.78
X_5	Scientific orientation	Low	Below 18.95	34	15.11
		Medium	18.95 - 25.59	73	32.44
		High	Above 25.59	118	52.44
X_6	Achievement motivation	Low	Below 0.9	12	5.33
		Medium	0.9 - 3.24	187	83.11
		High	Above 3.24	26	11.56
X_7	Market perception	Low	Below 1.73	13	5.78
		Medium	1.73 - 3.49	166	73.78
		High	Above 3.49	46	20.44
X_8	Innovativeness	Low	Below 1.08	89	39.56
		Medium	1.08 - 2.24	124	55.11
		High	Above 2.24	12	5.33
X_9	Extension guidance	Low	Below 1.79	0	0
		Medium	1.79 - 3.87	162	72
		High	Above 3.87	63	28
X_{10}	Knowledge on scientific management	Low	Below 4.58	35	15.56
		Medium	4.58 - 7.34	150	66.67
		High	Above 7.34	40	17.77
X_{11}	Extension participation	Low	Below 0.39	4	1.78
		Medium	0.39 - 5.67	181	80.44
		High	Above 5.67	40	17.78
X_{12}	Accessibility to infrastructural facility	Low	Below 15.82	33	14.67
		Medium	15.82 - 23.04	154	68.44
		High	Above 23.04	38	16.88
X_{13}	Economic motivation	Low	Below 1.83	36	16.00
		Medium	1.83 - 5.83	146	64.89
		High	Above 5.83	43	19.11
X_{14}	Perceived availability of resources	Low	Below 11.50	11	4.89
		Medium	11.50 - 22.54	195	86.67
		High	Above 22.54	19	8.44
X_{15}	Risk orientation	Low	Below 15.07	45	20.00
		Medium	15.07 - 24.05	142	63.11
		High	Above 24.05	38	16.89

Fig.6. Distribution of respondents based on personal, socio-psychological and situational variables



the farmer respondents were in the medium category for all the selected independent variables except scientific orientation. In the case of scientific orientation majority came under high category (52.44%).

Apart from scientific orientation maximum number of respondents in the high category of extension guidance (28%) followed by market perception (20.44%), age and education (19.56% each) and economic motivation (19.11%).

It was also interesting to note that no respondent fell under low category for extension guidance. Only less than 10 per cent of the total respondents were found to be in the low category for farm size (7.56%), achievement motivation (5.33%), market perception (5.78%), extension participation (1.78%) and perceived availability of resources (4.89%).

Maximum number of respondents in the low category was observed for the variable innovativeness (39.56%) followed by education (22.22%) and risk orientation (20%). For all the other variables, the number of respondents in the low category ranged between 10 and 20 per cent.

The results presented in Table 13 reveals that maximum number of respondents in high category was observed for the variable scientific orientation. This could be probably due to the relatively higher degree of social synergy prevalent in the state of Kerala, essentially contributed by the multitude of formal education avenues available here.

Meanwhile it was also observed that maximum number of respondents in the case of risk orientation and innovativeness were in lower category. From this finding, it may be concluded that farmers are more rational in their behaviour. High

Table 14. Zone wise comparison of personal, socio-psychological and situational variables

Variable No.	Variable name	Mean score			'F' value
		North zone	Central zone	South zone	
X_1	Age	50.29	52.43	46.48	3.562*
X_2	Education	4.45	4.51	4.63	0.254^{NS}
X_3	Farm size	0.74	0.89	0.57	8.423**
X_4	Experience	22.53	24.45	18.12	6.651**
X_5	Scientific orientation	22.40	21.25	23.16	6.779**
X_6	Achievement motivation	2.24	2.01	1.95	1.359^{NS}
X_7	Market perception	2.59	2.65	2.60	0.125^{NS}
X_8	Innovativeness	1.64	1.64	1.69	0.168^{NS}
X_9	Extension guidance	2.96	2.89	2.63	2.580^{NS}
X_{10}	Knowledge on scientific management	5.64	6.13	6.11	3.101*
X_{11}	Extension participation	3.00	3.68	2.41	4.703**
X_{12}	Accessibility to infrastructural facility	18.43	19.43	20.43	6.237**
X_{13}	Economic motivation	4.13	3.52	3.85	2.671^{NS}
X_{14}	Perceived availability of resources	14.93	17.96	18.13	11.260**
X_{15}	Risk orientation	19.63	19.76	19.28	0.493^{NS}

** Significant at 1 per cent level
* Significant at 5 per cent level

level of scientific orientation could have helped the farmers to rely more on established facts rather than innovations. When farmers depend more on evidences it is only natural that their risk orientation and innovativeness are low.

Further, it could be observed from the results that only very few respondents were distributed in the lower category for achievement motivation and market perception. Coconut cultivation in Kerala is mainly confined to small and marginal farmers and it forms their main source of income. This naturally might have motivated the farmers to show some degree of excellence in coconut cultivation. The same fact might have prompted them to show certain concern about market fluctuations and possibility for better returns.

4.2.2 Zone-wise comparison of respondents based on personal, socio-psychological and situational variables

Zone-wise comparison of personal, socio-psychological and situational variables presented in Table 14 revealed that among the 15 variables age, farm size, experience, scientific orientation, knowledge on scientific management, extension participation, accessibility to infrastructural facilities and perceived availability of resources differed significantly between the zones. The remaining variables were not found to be statistically different.

With regard to the variable farm size, farmers of central zone came up with a higher mean value followed by those of north zone and south zone. The same trend was observed in the case of age, experience and extension participation. The central zone had more number of farmers having comparatively larger farm size. From the study it had become clear that central zone accounted for more area under irrigation. In the present study total farm size had been measured as the number of

hectares of land owned by and cultivated by a farmer which included both garden land and wet land. Wet lands having cultivation more than once was multiplied by two so as to get a standardized estimate. Naturally central zone with more of wet lands evidenced the above result. Central zone farmers also manifested higher levels of knowledge on scientific management. This may be due to their keen interest and participation in various extension programmes organised by the Department of Agriculture and other agencies. It is also pertinent to point out here that the Kerala Agricultural University Headquarters and many of the Kerala Agricultural University research stations are located in the central zone. The University and its research stations have a number of outreach programmes in the form of Lab-to-Land, Village adoption, seminars, exhibitions, etc. which might have benefitted the farmers in the vicinity. This could also be cited as a reason for the high level of knowledge of the central zone farmers.

Variables like scientific orientation, accessibility to infrastructural facility and perceived availability of resources also showed significant difference between the zones. Here farmers of south zone possesed higher mean scores than north and central zones. Higher levels of scientific orientation may be due to the influence of more educational facilities available in southern Kerala compared to other zones. Transportation and other infrastructural facilities also were observed to be more in south compared to north and central Kerala. This might have reflected on farmers perception about available of resources and infrastructural facilities and hence the result.

4.2.3 Simple correlation analysis of personal, socio-psychological and situational factors with resource use management

The findings of simple correlation analysis revealed that all selected

Table 15. Correlation between personal, socio-psychological and situational factors and resource use management

(n = 25)

Variable No.	Variable name	Correlation coefficient
X_1	Age	0.200*
X_2	Education	0.429**
X_3	Farm size	0.483**
X_4	Experience	0.478**
X_5	Scientific orientation	0.554**
X_6	Achievement motivation	0.796**
X_7	Market perception	0.658**
X_8	Innovativeness	0.554**
X_9	Extension guidance	0.721**
X_{10}	Knowledge on scientific management	0.683**
X_{11}	Extension participation	0.751**
X_{12}	Accessibility to infrastructural facility	0.529**
X_{13}	Economic motivation	0.716**
X_{14}	Perceived availability of resources	0.402**
X_{15}	Risk orientation	0.745**

** Significant at 1% level
* Significant at 5% level

independent variables were positively and significantly correlated with resource use management of coconut growers. Based on these results the null hypothesis that there will be no significant relationship between farmers' personal, socio-psychological and situational factors and their resource use management was rejected. Among the variables, achievement motivation was found to have maximum value for 'r' indicating high correlation with resource use management followed by extension participation, risk orientation, extension guidance and economic motivation in that order.

4.2.4 Multiple linear regression analysis

Correlation analysis gives only the relationship of an independent variable with the dependent variable. But the present study also aims to assess the contribution of the independent variables individually and in combination, to the variance in resource use management. Multiple linear regression analysis was employed for this purpose.

Multiple linear regression analysis was done with the 15 independent variables against the dependent variable resource use management the finding of which are presented in Table 16. The F value (37.50) obtained indicated that the variables together contributed significantly to the variation in resource use management of the farmers. The R^2 value was 0.729 which shows that 72.9 per cent of the variation in resource use management was explained by these 15 variables taken together. Hence the hypotheses that the personal, socio-psychological and situational factors of the farmer respondents do not cause variation in their resource use management was rejected.

Table 16. Multiple regression analysis of personal, socio-psychological and situational variables with resource use management

(n = 225)

Variable No.	Variable name	Regression coefficient 'b'	't' value
X_1	Age	3.4097^{NS}	0.764
X_2	Education	-2.3451^{NS}	-0.508
X_3	Farm size	3.0538**	3.399
X_4	Experience	7.1852^{NS}	1.226
X_5	Scientific orientation	9.0428^{NS}	0.487
X_6	Achievement motivation	3.3659**	4.589
X_7	Market perception	-3.1020^{NS}	-0.414
X_8	Innovativeness	-1.2663^{NS}	-1.292
X_9	Extension guidance	8.5281^{NS}	1.171
X_{10}	Knowledge on scientific management	1.2074*	2.144
X_{11}	Extension participation	6.0759*	2.319
X_{12}	Accessibility to infrastructural facility	1.7908^{NS}	1.253
X_{13}	Economic motivation	-1.9058^{NS}	-0.464
X_{14}	Perceived availability of resources	-4.8846^{NS}	-0.571
X_{15}	Risk orientation	3.0265^{NS}	1.537

** Significant at 1% level
* Significant at 5% level
NS - Not significant

Intercept = 18.6529
R^2 = 0.729
F = 37.50

Out of the 15 variables, eleven variables viz. age, education, experience, scientific orientation, market perception, innovativeness, extension guidance, accessibility to infrastructural facility, economic motivation, perceived availability of resources and risk orientation did not showed significant values in the analysis. In this case the hypotheses that there would be no significant contribution to the variation in resource use management by each of these eleven variables was therefore accepted.

Meanwhile the remaining four variables such as farm size, achievement motivation, knowledge on scientific management and extension participation threw up highly significant partial 'b's indicating substantial contribution to the variation in resource use management of coconut growers. Hence the hypotheses that there would be no significant contribution for these variables towards variation in resource use management was rejected.

The regression equation predicting the resource use efficiency using personal, socio-psychological and situational variables was as follows.

$$Y = 18.6529 + 3.4097(X_1)^{NS} - 2.3451(X_2)^{NS} + 3.0538(X_3)^{**} + 7.1852(X_4)^{NS} + 9.0428(X_5)^{NS} + 3.3659(X_6)^{**} - 3.1020(X_7)^{NS} - 1.2663(X_8)^{NS} + 8.5281(X_9)^{NS} + 1.2074(X_{10})^{*} + 6.0759(X_{11})^{*} + 1.7908(X_{12})^{NS} - 1.9058(X_{13})^{NS} - 4.8846(X_{14})^{NS} + 3.0265(X_{15})^{NS}$$

4.2.5 Step down regression analysis

Step down regression analysis was employed to identify the best set of variables that could predict the dependent variable. There are two criteria for selecting a resultant equation

i) To make the equation useful for predictive purposes, it is required that the model should include as many independent variables as possible so that reliable fitted values can be determined.

ii) Because of the cost involved in obtaining information on a large number of independent predictor variables and subsequently monitoring them the equation should include as few independent variables as possible.

According to Draper and Smith (1966) a compromise between these two opposed criteria is called 'selecting the best regression equation'. The step-wise regression analysis can satisfy this purpose. Hence in the present study, the independent variables which had significant correlation with resource use management were used for the step-wise analysis and the results are presented in Table 17.

A perusal of the Table 17 brings to focus certain interesting findings. As per the results independent variables such as farm size (X_3), experience (X_4), achievement motivation (X_6), knowledge on scientific management (X_{10}) and extension participation (X_{11}) together could predict 71.77 per cent variation in resource use management. All other variables together could contribute only a meagre 1.14 per cent variation in resource use management. The best suited regression equation with the above said five variables contributing major variation in resource use management was as follows.

$$Y = 25.85 + 2.906\ (X_3) + 0.108\ (X_4) + 3.754\ (X_6) + 1.313\ (X_{10}) + 0.835\ (X_{11})$$

Table 17. Step down regression analysis of the personal socio-psychological and situational variables with resource use management (n =225)

Step No.	Variables for regression	Value of R^2	'F' value
1	X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}	0.7291	37.50** (15,209)
2	Down X_7	0.7289	40.32** (14,210)
3	Down X_5	0.7286	43.57** (13,211)
4	Down X_{13}	0.7283	47.36** (12,212)
5	Down X_2	0.7281	51.84** (11,213)
6	Down X_{14}	0.7276	57.17** (10,214)
7	Down X_1	0.7266	63.49** (9,215)
8	Down X_{12}	0.7248	71.13** (8,216)
9	Down X_9	0.7230	80.92** (7,217)
10	Down X_8	0.7212	93.98** (6,218)
11	Down X_{15} (Remaining variable are X_3, X_4, X_6, X_{10} and X_{11}	0.7177	111.34** (5,219)

** Significant at 1% level

where,

X_1 - Age

X_2 - Education

X_3 - Farm size

X_4 - Experience

X_5 - Scientific orientation

X_6 - Achievement motivation

X_7 - Market perception

X_8 - Innovativeness

X_9 - Extension guidance

X_{10} - Knowledge of scientific management

X_{11} - Extension participation

X_{12} - Accessibility to infrastructural facility

X_{13} - Economic motivation

X_{14} - Perceived availability of resources

X_{15} - Risk orienta[illegible]

4.2.6 Path analysis

Path analysis was carried out in this study with the intention of finding out the direct and indirect effects of the personal, socio-psychological and situational variables of the farmers on their resource use management. All the variables were included for this purpose.

The results of the analysis are presented in Table 18 and illustrated in Fig.7. From the analysis, it was evidenced that the variable achievement motivation had the maximum direct effect (0.3721) on resource use management followed by knowledge on scientific management (0.1577). extension participation (0.1519), farm size (0.1436) and risk orientation (0.1287) in the descending order. The remaining variables viz., extension guidance, experience, accessibility to infrastructural facility, age and scientific orientation appeared to have negligible direct effect on resource use management.

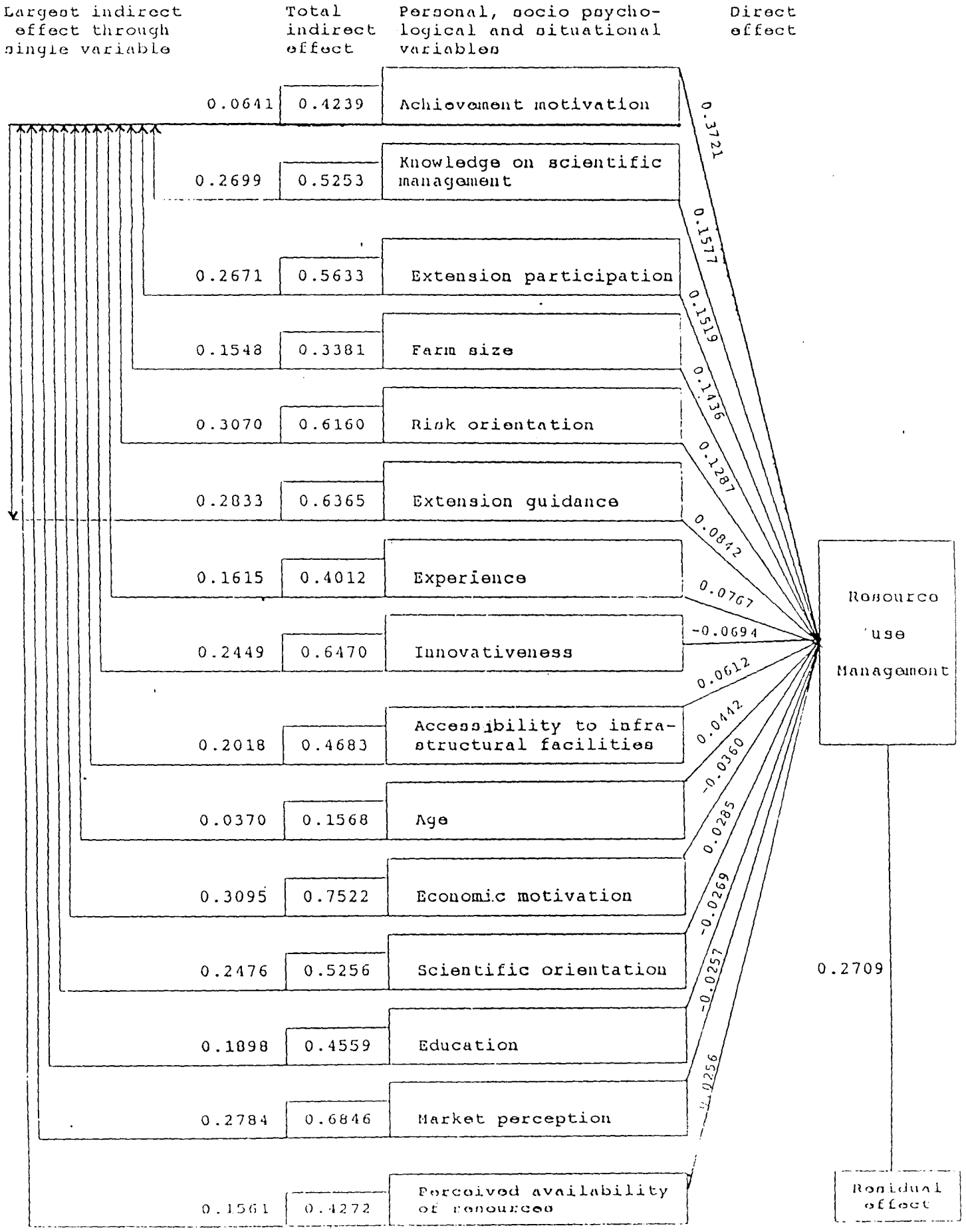
It was notable that variables such as education, market perception, innovativeness, economic motivation and perceived availability of resources showed a negative direct effect.

Interestingly, the variable economic motivation which had a negative direct effect, contributed largest total indirect effect on resource use management followed by market perception and innovativeness. Market perception and innovativeness too had a negative direct effect but came second and third in the case of total indirect effect. The remaining variables in the descending order of total effect on resource use management were extension guidance, risk orientation, extension participation, scientific orientation, knowledge on scientific management, accessability to

Table 18. Path analysis of personal, socio-psychological and situational variables on resource use management

Variable No.	Variable Name	Direct effect	Rank	Total indirect effect	Rank	Largest indirect effect	Through variable number
X_1	Age	0.0442	10	0.1568	15	0.0370	X_6
X_2	Education	-0.0269	13	0.4559	10	0.1898	X_6
X_3	Farm size	0.1436	4	0.3381	14	0.1548	X_6
X_4	Experience	0.0767	7	0.4012	13	0.1615	X_6
X_5	Scientific orientation	0.0285	12	0.5256	7	0.2476	X_6
X_6	Achievement motivation	0.3721	1	0.4239	12	0.0641	X_9
X_7	Market perception	-0.0257	14	0.6846	2	0.2784	X_6
X_8	Innovativeness	-0.0694	8	0.6470	3	0.2449	X_6
X_9	Extension guidance	0.0842	6	0.6365	4	0.2833	X_6
X_{10}	Knowledge on scientific management	0.1577	2	0.5253	8	0.2699	X_6
X_{11}	Extension participation	0.1519	3	0.5633	6	0.2671	X_6
X_{12}	Accessability to infrastructural facilities	0.0612	9	0.4683	9	0.2018	X_6
X_{13}	Economic motivation	-0.0360	11	0.7522	1	0.3095	X_6
X_{14}	Perceived availability of resources	-0.0256	15	04272	11	0.1561	X_6
X_{15}	Risk orientation	0.1287	5	0.6160	5	0.3070	X_6

Fig. 7 Path diagram showing the direct and indirect effects of personal, socio-psychological and situational variables on resource use management



infrastructural facility, education, perceived availability of resources, achievement motivation, experience, farm size and age.

The table further reveals that all the variables except achievement motivation had their larget indirect effect through the variable achievement motivation whereas achievement motivation had its largest indirect effect through extension guidance.

The correlation analysis (Table 15) regression analysis (Table 16) and path analysis (Table 18) conclusively prove that the most important variable significantly affecting resource use management was achievement motivation. According to McClelland (1961) people with a high need to achieve can be described as continually striving to do things better. This tendency might have reflected on better resource use management by the farmers with higher degree of achievement motivation.

It could be observed from the various analyses that five variables namely, achievement motivation, farm size, extension participation, knowledge on scientific management and experience had more influence on the resource use management of coconut growers of Kerala.

The probable reasons for the observed nature of relationship of selected personal, socio-psychological and situational variables with resource use management of the coconut growers in the study are discussed below.

1. Achievement motivation

Achievement motivation of coconut growers was found to be positively and significantly related to their resource use efficiency. This variable had maximum

direct effect on resource use management of coconut growers. Achievement motivation plays an important role in doing a job with a certain standard of excellence in the managerial performance of farmers. McClelland (1961) found that enterpreneurs and managers are especially likely to have high achievement motivation. He further added that individuals having high level of achievement motivation can become successful leaders. People with high levels of n-ach prefer tasks with moderate difficulty. If a task is very easy, it will lack challenge. High achievement motivators receive no feelings of accomplishment from doing tasks that fail to challenge their ability. Similarly, they avoid tasks that are too difficult where the probability of success is very low. 'Management' as a concept, emphasises on this strategic trait and therefore it is only logical to assume that farmers with high achievement motivation would have corresponding degree of excellence in their resource use management also. This may be the reason for this variable emerging as most influential in determining resource use management. Badachickar (1985), Chari and Nandapurkar (1987) and Ananthar-aman (1991) also reported that achievement motivation had positive relationship with managerial efficiency.

2. Farm size

The results of the study clearly indicated that coconut gorwers having large farm size tend to exhibit better use of available resource. Multiple regression equation had revealed that an increase in the farm size would lead to an increase in resource use management by 3.0538 units, other factors being kept constant. This variable had also showed positive and significant correlation and direct effect on the dependent variable resource use management. Larger area under coconut cultivation requires better management to ensure more returns by reducing unit cost of cultiva-

tion. Usually fragmented and small areas under cultivation render management of land, labour, plant protection, etc. difficult. Transporation of inputs and produce also will be uneconomic for small holdings compared to large farms. The finding of Singh (1973) was in line with the above result that the size of holding positively correlated with efficiency in resource use.

3. Extension participation

The variable extension participation displayed significant contribution and relationship with resource use management of coconut growers. The social interaction model of diffusion of innovations (Havelock, 1969) suggested that most people wait until they discuss the innovation with others who already have experience with it, before adopting the innovation themselves. The formation of Kera Samrakshana Samithies under each Krishi Bhavan, has substantially increased the opportunities for extension participation and exchange of latest farm technologies. While conducting the study the researcher found that most of the coconut growers had memberships in these samithies. This coupled with higher literacy levels of Kerala farmers would be the probable reason for the observed nature of result. A related study by Reddy (1983) reporting that extension participation was associated with management orientation lends support to the present finding.

4. Knowledge on scientific management

Knowledge on scientific management had positive and significant contribution to resource use management. Understandably, it is an essential pre-requisite for better resource use helping a grower to take appropriate decisions at correct times as well as execution of various activities in terms of management of resources such as

land, water, fertilizer, labour, capital etc. Knowledge on scientific management may in turn be due to the high level of education and experience of coconut growers in the study area. A well established agricultural extension network in the form of Krishi Bhavan in each panchayat and the existence of other organisations of like the Coconut Development Board, Kerala Agricultural University, etc. might have definitely contributed to the farmers' knowledge on scientific management. The finding of Abraham (1980), Bora (1989) and Anantharaman (1991) also indicated the same trend of relationship between knowledge on scientific management and management efficiency of farmers.

5. Experience

An experienced farmer is sure to make a better evaluation of different management practices and is likely to be more prompt in decision making too. This was well established by the positive and significant relationship between experience in coconut cultivation and resource use management evinced by the study. The studies of Balasubramanian and Kaul (1982) and Jayakrishnan (1984) are also supportive of this finding.

6. Risk orientation

This variable showed a positive and significant correlation and direct effect on resource use management. In risk taking ability, farmers differ in their willingness to take chances. This propensity to assume or avoid risk has been shown to have an impact on how long it takes managers to make a decision and how much information they require before making their choice. McClelland (1961) opined that risk orientation will be more for high achievement motivators. In the present study

also the observed importance of achievement motivation may be the reason for positive and significant correlation and direct effect of risk orientation on resource use management.

7. Extension guidance

The study results indicated that extension guidance and resource use management were positively and significantly related. It also showed up a comparatively higher direct effect on resource use management. It is logical to assume that in any field guidance from competant agencies in the right direction will motivate and help individuals to perform a work in a more professional manner. In the present study also coconut growers who received better extension guidance showed better resource use management. The findings of Desai (1981) and Prakashkumar (1986) also lend support to this finding.

8. Innovativeness

Astonishingly this variable was not found to contribute significantly to the variation in resource use management as indicated by a nonsignificant partial regression coefficient. According to Rogers (1983) the group innovators as relatively more impulsive, getting carried away by new ideas, rather than waiting to weigh their pros and cons. They may not stock to those ideas either. This could be the reason for the above finding in the present study.

9. Accessibility to infrastructural facility

This variable was found to have positive and significant correlation and

direct effect on resource use management. A wide network of infrastructural facilities interms of input agencies, processing facilities, marketing outlets, credit institutions etc. have a definite influence over cultivation of any crop. Coconut also can be no exception. This finding was in conformity with the result of Bora (1989) who observed that closeness with agricultural support system was positively related to returns to management. Eventhough path analysis showed a direct effect, its contribution to resource use management was not significant. The plausible reason for this might be the low market price of coconut, a major constraint perceived by the farmers in the utilization of many resources. This may be a barrier in utilizing the full potentialities of easily accessible infrastructural facilities also by a large majority of farmers and hence the result.

10. Age

Age was found to be positively related to resource use management. Eventhough it had a direct effect, the contribution to resource use management was nonsignificant. Normally aged farmers are expected to have more experience in farming. But in the case of coconut cultivation it was noted during the survey that aged farmers were more reluctant to use fertilizers and plant protection chemicals. Many of them believed that these chemical applications will be hazardous to the productivity and vigour of palms in the long run. This might be the possible reason for the nonsignificant relation between age and resource use management.

11. Economic motivation

Quite surprisingly, economic motivation was found to have nonsignificant contribution and negative direct effect on resource use management in this study.

In any enterprise, one of the main objectives is to get maximum profit. Considering coconut cultivation as an enterprise, farmers' aim is to get maximum profit from land. But prevailing conditions in the state stand as an obstacle in achieving this objective. These barriers are major constraints perceived by the growers in resource use management, low productivity and low market price of coconut. This situation might have led the farmers to ignore coconut cultivation and switch over to other profitable intercrops or farm business and hence the result.

12. Scientific orientation

The variable scientific orientation had positive and significant correlation and positive direct effect (0.0285) on resource use management. Kerala farmers' high literacy level might be the reason for this finding. At the same time it was revealed in the multiple regression analysis that contribution by this variable was nonsignificant. High level of scientific orientation alone will not help the better use of resources unless other circumstances also are favourable for its efficient utilization. For example high cost of fertilizer deter farmers from its application and proper management. From the survey it could be observed that, eventhough there was facility for soil testing, since the results were not properly conveyed from Krishi Bhavans/soil testing laboratories, the farmers were not very enthusiastic in sending samples for soil testing. In water management, scarcity of irrigation water was a major problem. It has already been proved that, sudden stoppage of irrigation during dry months will adversely affect the yield of palms. Similarly although a farmer might be well aware about pests and diseases, unavailability of skilled labour for spraying and other operations might have reduced the efficiency of pest and disease control. More over, low productivity coupled with poor prices of coconut stands as a barrier to investing more

money in coconut cultivation. These constraints perceived by the farmers themselves explain to a certain extent the nonsignificant contribution of scientific orientation to resource use management.

13. Education

It was interesting to note that this variable had negative and nonsignificant contribution to resource use management of coconut growers. 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. Anantharaman (1991) also observed that education had nonsignificant contribution to managerial efficiency of cassava farmers.

The probable reason for the present finding might be the reluctance of Kerala youth, especially those who are educated in taking agriculture as a profession. In this context the observation of Namboodiripad (1995) expressed in the seminar on crisis in Kerala's education assumes added significance. He pointed out that in Kerala the main emphasis was on passing examinations and getting a white collar job. But only the most brilliant reach this objective. Thousands of other young men and women are left with mediocre qualifications and a false pride which prevent them from engaging in anything productive. This has grown to the proportions of a social evil in Kerala. It is a sad plight to observe that education nowadays is viewed only as a stepping stone to the employment market and the spirit of education enlightement is slowely evaporating. Given the fact that educational attainment no longer is an indicator of a person's rationality in thinking and behaving, the farmers who had higher educational attainment, therefore, could not be expected to be rational in making use of the resources. The results of the present study also is a pointer in this direction.

14. Market perception

In the present study market perception was found to have no significant contribution and registered negative direct effect (-0.0257) on resource use management of coconut growers.

Actually market perception depends on farmers' knowledge about different types of markets, market intermediaries, various marketing channels, market preference, etc. The study showed that farmers' perception about markets has little relevence to resource use management. In the investigation it was observed that majority of small farmers possessed low volume of marketable surplus. They found graded selling of this low volume surplus and transportation to distant markets as nonviable and difficult. Eventhough the farmers were well aware about the marketing structure, immediate need for money forced them to sell their produce to middlemen. High labour cost and unavailability of labourers in the peak season along with financial crisis pushed small growers into a position where selling their produce after processing it in the form of copra, oil etc. was out of question. The foregoing discussion substantiates the poor relationship between market perception and resource use management in the study.

15. Perceived availability of resources

This variable did neither have significant predictive power nor any appreciable direct effect on resource use management. Availability of resources alone can not be assumed to guarantee their efficient use. Other factors like the farmer's personal, potential and socio-psychological characteristics are bound to influence re-

source use management as has been clearly evinced by the study. Therefore the above result is only logical.

4.3 Resource use management and income

Annual net income derived from coconut cultivation was derived for the purpose of the study by deducting operational costs from the annual gross income.

4.3.1 Resource use management and its components in relation to income from coconut cultivation

Results of the simple correlation analysis between resource use management and its components and income are presented in Table 19. It is evident from the table that resource use management and its eight components are positively and significantly related with income. This result establishes that the better the coconut growers' performance on these components the higher will be their income from coconut cultivation. Based on the above finding the null hypothesis that the efficiency of resource use management does not have any influence on income from coconut cultivation was rejected.

4.3.2 Predictive power of the components of resource use management on income

In order to assess the predictive power of the components of resource use management on income, multiple linear regression analysis was carried out.

The results of multiple linear regression analysis presented in Table 20 revealed that all the eight components together contributed 82.8 per cent variation in income from coconut cultivation. Among the eight components water management, fertilizer management and capital management were found significant at 1 per cent

Table 19. Correlation of resource use management and its different components with income (n = 225)

Sl.No.	Items	Correlation coefficient
I	Resource use management	0.819**
a.	Land management	0.424**
b.	Water management	0.812**
c.	Management of manures	0.481**
d.	Fertilizer management	0.657**
e.	Pesticide management	0.619**
f.	Labour management	0.558**
g.	Information management	0.683**
h.	Capital management	0.642**

** Significant at 1% level

Table 20. Multiple regression analysis of the components of resource use management with income (n = 225)

Sl.No.	Resource use management components	Regression coefficient (b)	't' value
1	Land management	2.1385^{NS}	1.309
2	Water management	1.7346**	17.277
3	Management of manures	1.3665^{NS}	0.841
4	Fertilizer management	7.0298**	4.504
5	Pesticide management	1.7444^{NS}	0.980
6	Labour management	1.3491^{NS}	0.446
7	Information management	3.2091^{NS}	1.077
8	Capital management	7.5554**	3.756

** Significant at 1% level
NS - Not significant

Intercept = -5.7444
R^2 = 0.828
F = 130.06

level, all other components being statistically non significant. The multiple regression equation predicting the income was as follows.

$$Y = -5.744 + 2.1385(X_1)^{NS} + 1.7346(X_2)^{**} + 1.3665(X_3)^{NS} + 7.0298(X_4)^{**} + 1.744(X_5)^{NS} + 1.3491(X_6)^{NS} + 3.2091(X_7)^{NS} + 7.5554(X_8)^{**}$$

4.3.3 Relative importance of the components of resource use management in contributing to the variations in income

Though the multiple linear regression analysis gives the joint influence of all the selected components of resource use management on income it is always better to have a simpler model in which there are lesser number of predictors in explaining the variation. So to find out the best subset among the components of resource use management and their relative contribution on income step-wise regression analysis was done.

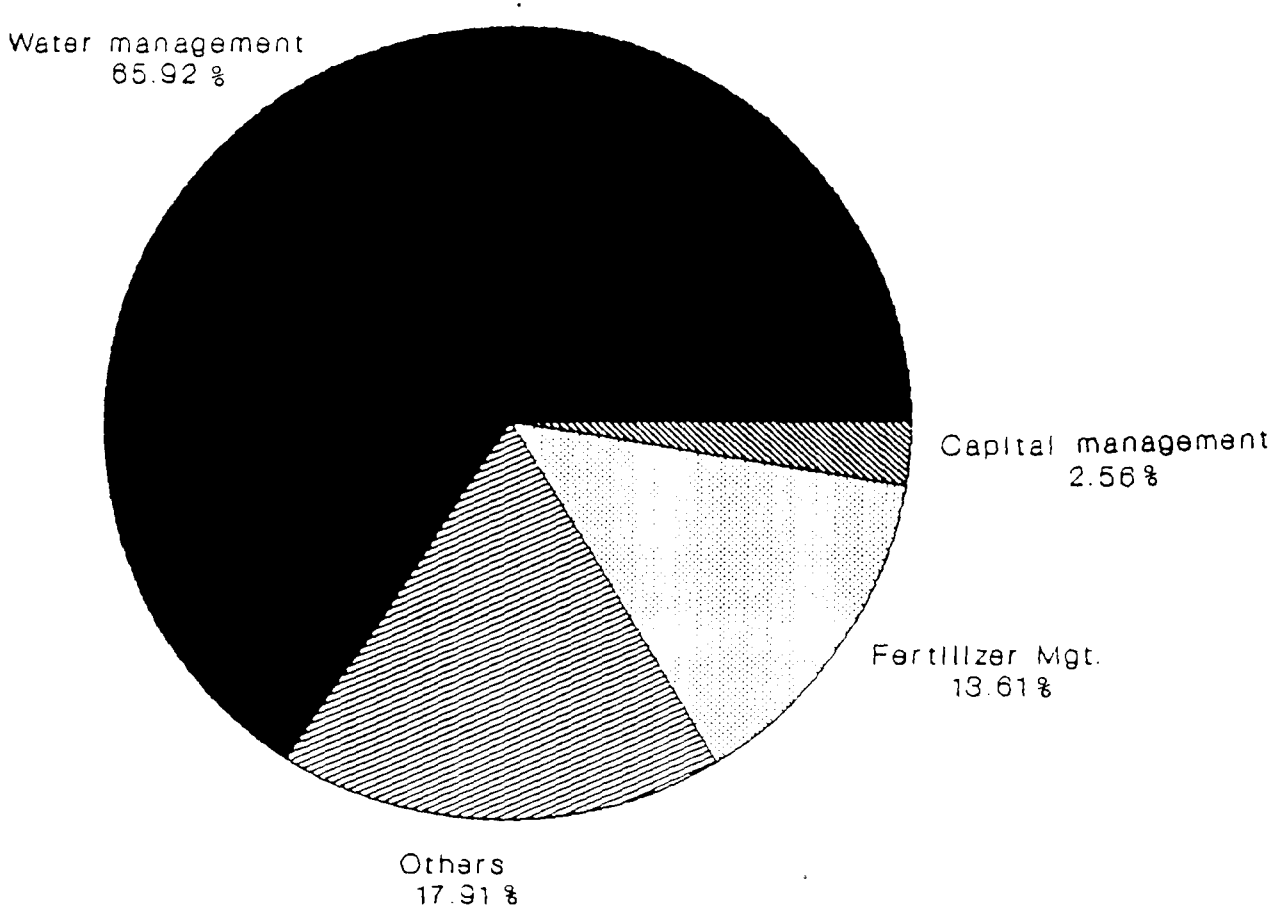
It could be observed from the results of step-wise regression analysis presented in Table 21 that among the eight components water management emerged as the first and most important, explaining 65.92 per cent of the total variation in income. The next important component was fertilizer management. It accounted for 13.61 per cent of the variation followed by capital management (2.56%) and information management (0.38%). The step which gave the highest R^2 value was taken as the last step which comprised of all the four components discussed above, together explaining 82.47 per cent of variation in income from coconut cultivation.

Based on the above findings the hypothesis that there would be no significant difference among the components of resource use management in terms of their contribution to income was rejected.

Table 21. Step-wise regression analysis of the compoents of resource use management with income (n = 225)

Sl.No.	Components entered	Value of R^2	Percentage of variation explained	Increase in percentage variation
1	Water management (X_2)	0.65916	65.92	65.92
2	Water management (X_2) Fertilizer management (X_4)	0.79528	79.53	13.61
3	Water management (X_2) Fertilizer management (X_4) Capital management (X_8)	0.82092	82.09	2.56
4	Water management (X_2) Fertilizer management (X_4) Capital management (X_8 Information management (X_7)	0.82465	82.47	0.38

Fig. 8. Percentage contribution of components of resource use management to income



The positive and significant correlation between the components of resource use management and income (Table 19) indicated that the farmers' better performance on these components will definitely enhance income from coconut cultivation. The multiple regression analysis (Table 20) established that the eight components of resource use management together contributed 82.8 per cent variation in income. Among these eight components water management, fertilizer management and capital management were found significant at one per cent level. The results of step down regression (Table 21) brought out the exact percentage of variation contributed by each of these components on income.

Water management has a crucial role in the production and productivity of coconut palms. Provision of summer irrigation to coconut palms growing under purely rainfed conditions has been seen to be very beneficial. From the survey it could be understood that farmers were aware about it. Nelliat and Gopalasundaram (1988) observed that ordinary tall palms could yield 95 to 100 nuts/palm/year with summer irrigation while the average yield of palms under rainfed conditions was in the range of 13 to 65 nuts/palm/year. It was also noticed that interruption of irrigation in irrigated gardens would lead to serious set back in yield and general condition of palms. This finding itself illustrates the importance of water management and naturally, if the farmer is efficient in the use of this scarce resource, he is likely to get more yield and thereby higher income. Therefore water management, asserting its role as the most important in determining production, productivity and income as evinced by the study is highly justifiable. As an expensive input having a direct effect on production, management of fertilizers has got much importance in agriculture. Aravindhakshan (1988) reported that for increasing and sustaining the productivity of coconut

palms three basic requirements have to be satisfied-irrigation, fertilizer application and regular systems of replanting and under planting. From these findings the importance of fertilizer application for increased production and productivity and its implications on income is very clear. The present study revealed that income to the extent of 13.61 per cent could be explained by this component. In fertilizer management, farmer has to consider a number of managerial options. How and when fertilizer is to be applied assumes even more importance than the actual quantity applied while considering the efficiency of fertilizer use. Tandon (1958) opined that the main objective of the farm manager is to secure maximum continuous income by the efficient use of available resources. Majority of farmers perceived the high cost of fertilizer as a major constraint in applying fertilizers. This further underscores the importance of its efficient use and management and vindicates the findings of the present study.

The present study revealed capital management as the third important component contributing to income. In any farming operation capital is a strategic resource, which should be judiciously used to enhance production and income from the enterprise. Martin *et al.* (1979) stated that the goal of profit maximization does stress the efficient use of capital resources. Therefore it is only logical that this component has come out as important in determining income.

4.4 Factors/constraints affecting resource use management

The factors/constraints affecting resource use management as perceived by the respondents are presented in Tables 22 to 29.

Regarding the component land management (Table 23) more than 80 per cent of the farmers attributed high labour cost as a major constraint for not following

Table 22. Factors/constraints in land management

Sl.No.	Factor	Frequency	Percentage
1	High labour cost	183	81.33
2	Unavailability of labour	93	41.33
3	Small cultivated area	80	35.56
4	Lack of awareness about suitable intercrops	31	13.78
5	Lack of knowledge about spacing	30	13.33
6	Lack of conviction	28	12.44

Table 23. Factors/constraints in water management

Sl.No.	Factors	Frequency	Percentage
1	Scarcity of irrigation	161	71.56
2	High cost of installation of pumpsets	83	36.89
3	Small cultivated area	83	36.89
4	Lack of awareness about scientific water management practices	46	20.44
5	Lack of conviction about the benefits of water conservation measures	29	12.89

timely soil conservation measures and scientific agricultural practices. At the same time 41.33 per cent of farmers opined unavailability of labourers followed by small cultivated area (35.56%) as important problems in efficient land management activities. Further 13.78 per cent of respondents reported lack of knowledge about suitable intercrops followed by lack of knowledge about spacing (13.3%) and lack of conviction (12.44%) about land management activities as major constraints.

With regard to water management (Table 23) scarcity of irrigation water was ranked first by 71.56 per cent of respondents as a constraint followed by high cost of installation of pumpsets and small cultivated area (36.89% each) as arriers for proper water management activities. Lack of awareness about scientific water management practices and lack of knowledge about the benefits of water conservation were also reported by respondents as factors adversly affecting water management.

Lack of sufficient manures was perceived as a major constraint in the management of manures (Table 24) followed by its high cost. Lack of knowledge about suitable green manure crop and its cultivation was found as barrier in the popularisation of green manure crop cultivation. Other constraints were found to be comparatively of better significance.

High cost of fertilizer was the major reason ascribed by more than 70 per cent of the coconut growers for inefficient fertilizer management activities (Table 25). It was also interesting to note that nearly 30 per cent respondents still believe that fertilizer application is deterimental to the health, vigour and long range yielding capacity of palms. This kind of perception prevents them from applying fertilizers in the coconut garden. Scarcity of irrigation water was found to be a barrier in split application of fertilizers by 28 per cent of respondents. Lack of knowledge was re-

Table 24. Factors/constraints in management of manures

Sl.No.	Factor	Frequency	Percentage
1	Lack of sufficient manures	87	38.67
2	High cost of manures	62	27.56
3	Lack of awareness about suitable green manure crops	47	26.89
4	Lack of knowledge about scientific cultivation of green manure crops	34	15.11
5	Lack of conviction about the quality of different types of manures	31	13.78
6	Small cultivated area	20	8.89
7	Unavailability of good quality green manure seeds	15	6.67

Table 25. Factors/constraints in fertilizer management

Sl.No.	Factor	Frequency	Percentage
1	High cost of fertilizer	158	70.22
2	Belief that fertilizer application is detrimental to the health, vigour and long range yielding capacity of palms	67	29.78
3	Scarcity of irrigation water	63	28.00
4	Lack of awareness	49	21.78
5	Unavailability of required fertilizers	33	14.67
6	Soil test results properly not conveyed	30	13.33
7	Lack of conviction	27	12.00

ported in the case of soil sample collection and time of fertilizer application by 21.78 per cent of coconut growers. Farmers complained that soil test results were not properly conveyed from the concerned agencies limiting from proper fertilizer application and management. Lack of conviction in fertilizer management was reported by 12 per cent of total respondents.

As far as pesticide management was concerned (Table 26), 63.11 per cent of respondents reported that pest and disease attack was noticed only at the crucial stage of infestation, rendering control difficult. Lack of knowledge about suitable plant protection measures was identified as a barrier by 60.89 per cent of coconut growers. More than 50 per cent of farmers said they were unaware of the expiry date of plant protection chemicals. Nearly half of the respondents expressed that they lack knowledge in recognising pest and disease attack. Lack of conviction about prophylatic measures and lack of knowledge about suitable plant protection chemicals had also been pointed out as constraints in pesticide management.

Unavailability of labourers during peak season was perceived as a major constraint in labour management by nearly 50 per cent of the respondents (Table 27). Small cultivated area (47.56%) followed by shortage of skilled labourers (44.89%) were further problems in the efficient management of labour. In many cases lack of family labour prevented them from giving proper directions and supervision. Lack of awareness about scientific agricultural practices and its conviction were also reported as barriers in scientific and efficient labour management to the desired level.

In the case of information management, lack of in terest due to low market price of coconut was expressed as the first and most important constraint by 33.33 per cent of respondents (Table 28). Nearly one third of farmer-respondents

Table 26. Factors/constraints in pesticide management

Sl.No.	Factor	Frequency	Percentage
1	Attack notice at the crucial stage of infestation	142	63.11
2	Lack of awareness about suitable plant protection measures	137	60.89
3	Lack of awareness about the expiry date of plant protection chemicals	121	53.78
4	Lack of knowledge and skill in recognising pest and disease attack	109	48.44
5	Lack of conviction	88	39.11
6	Lack of knowledge about suitable plant protection chemicals	77	34.22
7	High cost of plant protection chemicals	71	31.56

Table 27. Factors/constraints in labour management

Sl.No.	Factors	Frequency	Percentage
1	Unavailability of labourers during peak season	112	49.78
2	Small cultivated area	107	47.56
3	Shortage of skilled labourers	101	44.89
4	Lack of family labour	81	36.00
5	Lack of awareness	69	30.67
6	Lack of conviction	33	14.67

Table 28. Factors/constraints in information management

Sl.No.	Factor	Frequency	Percentage
1	Lack of interest due to low market price of coconut	75	33.33
2	Does not help much when coconut cultivation is confined to small area	70	31.11
3	Lack of interest due to same message	69	30.66
4	Lack of conviction	50	22.22
5	Lack of timely and accurate information	46	20.44
6	Lack of knowledge on information sources	28	12.44

expressed that since cultivation was confined to smaller units information management could not be expected to yield particular benefits. Meanwhile 30.66 per cent of respondents reported that poor information seeking behaviour was mainly due to lack of newness in the message.

With regard to capital management (Table 29) more than 65 per cent of respondents perceived low profit from coconut cultivation as the major hindrance to proper capital management. Fixed wage rate was another barrier in reducing cost of cultivation for nearly 40 per cent of respondents. Third important constraint in capital management was reported as low marketable surplus by 36.44 per cent of the respondents. This put them in a position where they could neither avoid middle-men nor resort to graded selling to fetch better prices. Lack of conviction and awareness (29.78% each) also were recorded as factors adversely affecting capital management.

The results presented in Tables 22 to 29 revealed that in general the major factors affecting resource use management based on perception by a majority of respondents were in the order of high labour cost, scarcity of irrigation water, high cost of fertilizers and poor returns from coconut cultivation due to low market price.

It could also be seen from the table that lack of awareness and lack of conviction were common constraints in relation to components, land management, water management, management of manures, fertilizer management, labour management and capital management. Lack of knowledge was found as a constraiant in the case of land management, management of manures, fertilizer management and information management. Studies by Ramanathan *et al.* (1987) and Anantharaman (1991) had also reported lack of awareness, knowledge and conviction as major constraints perceived by farmers in resource utilization.

Table 29. Factors/constraints in capital management

Sl.No.	Factor	Frequency	Percentage
1	Lack of interest in capital management due to poor returns from coconut cultivation	147	65.33
2	Fixed wage rate	88	39.11
3	Inability to bypass middlemen and adopt graded selling	82	36.44
4	Lack of conviction	67	29.78
5	Lack of awareness	67	29.78

High labour cost had been perceived as a major barrier in undertaking various land management activities. It is quite normal, especially when the price of produce is far from remunerative in the market. Shortage of labourers was another factor hindering land management and labour management. This draws support from the findings of Anantharaman (1991). Scarcity of irrigation water was the major factor affecting water management followed by high cost of installation of pumpsets.

Santha *et al.* (1993) also reports a similar finding. In the management of manures lack of sufficient manures was the most important constraint. This result was also in line with the findings of Santha *et al.* (1993). Majority of the respondents perceived high cost of fertilizer on the major barrier in the application and management of that particular resource. Singh and Sharma (1986) lends support to this finding. According to their opinion of one-third of total respondents the major factor adversely affecting information management was the lack of interest due to low price of coconut in the market. This was quite logical, since majority of the coconut farmers belonged to the small and marginal categories. Proper utilization of the message definitely involves financial implication. Due to the prevalent poor market price of coconut the farmers could not have been very enthusiastic in adopting these messages and hence the result.

The major constraint to financial management was low proft from coconut cultivation. This might have dissuaded coconut growers from further investments in coconut cultivation.

Suggestions for the improvement of factors adversely affecting resource use management

In the present study farmers were asked to give suggestion for the improvement of their perceived constraints in coconut cultivation. Their general opinions are given below.

As the major source of income for a large majority, the farmers felt that the Govt. should take initiative to ensure remunerative market prices for coconut. They further opined that without proper financial back up farmers will not be in a position to adopt expensive scientific technology. They demanded that Government should raise the subsidy for coconut cultivation given through the Krishi Bhavans.

Many of the farmers suggested the necessity for uniform working time and work target for labourers. They further remarked that it can be done through Kera Samrakshana Samithies working in each area in collaboration with the Department of Agriculture and with the help of labour unions. Farmer respondents also recommended that plant protection operations, harvesting and transportation of inputs and produce be arranged for a group of farmers thereby helping to reduce cost of cultivation. At present these various operations are not being properly handled by the Kera Samrakshana Samithies. Therefore farmers demanded that these samithies be strengthened by proper administration through Krishi Bhavans.

Generally in resource use management farmers showed lack of awareness, knowledge and conviction. In order to rectify this respondents suggested result oriented training programmes with the whole hearted co-operation and participation of farmers, extension personnel and subject matter specialists. For increasing labour efficiency it was also found necessary to provide training in various aspects of the

works involved. The timing and venue of these training programmes should be according to the convenience of participants. Many of them suggested sunday training programmes for this along with free supply of inputs.

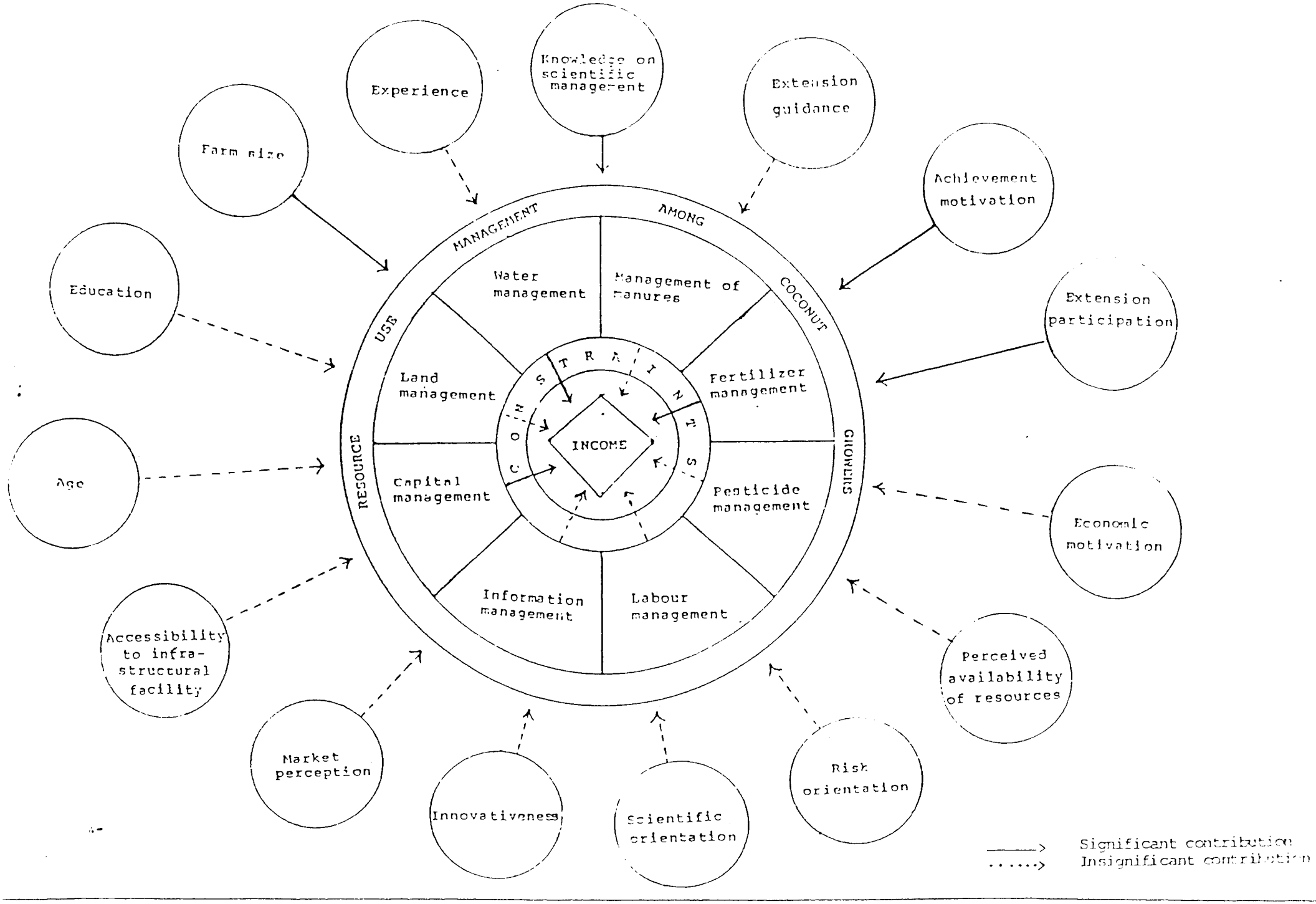
Regarding better use of available water resources farmers voiced some novel opinion. For this farmers recommended immediate renovation of common ponds and wells. All these activities should be arranged in such a way as to ensure benefit to maximum number of farmers.

4.5 Empirical model of the study

The results of the study have been diagramatically represented in the empirical model presented in Fig.9.

As could be seen from the figure there are some major deviations in the relations between the independent variables, dependent variable and the criterion variable in the empirical model contrary to those conceived in the conceptual model. Of the 15 independent variables only four variables viz., farm size, knowledge on scientific management, achievement motivation and extension participation contributed significantly to the variation in the dependent variable resource use management. Similarly out of the eight components of resource use management only three - water management, fertilizer management and capital management had significant contribution to income from coconut cultivation.

FIG. 9. EMPIRICAL MODEL OF THE STUDY



Summary

CHAPTER-V

SUMMARY

Management is a vital aspect which decided the success or failure of any enterprise. Today's agriculture wrestling with the vagaries of nature, scarce resources and uncertainty has to heavily depend on efficient management and available resources for survival. For a sustainable and remunerative agriculture farmer has to consider a number of managerial options.

As the major plantation crop and main source of income for the majority of Kerala farmers coconut cultivation is the main plank of their livelihood. But today farmers are passing through a difficult phase due to low productivity and high cost of cultivation coupled with low market price for coconut. And since there is little scope for expansion of area under coconut cultivation, efficient use of available resources alone is the panacea to enhance productivity and income. The farm management task of extension worker is one of giving organized guidance to increase the managerial skill and ability of farmers by helping to identify their problems, analyse them, weigh risks against benefits, and make sound management decisions. For this he needs accurate resource use management data. Against this background the present study was taken up with the following objectives.

1) To study the efficiency of resource use management among coconut growers of Kerala.
2) To study the influence of personal, socio-psychological and situational variables on resource use management.

3) To study the influence of resource use management on income.

4) To identify the factors affecting resource use management and elicit suggestions for the improvement of resource use management.

The study was conducted covering the three major geographical zones of Kerala viz., Southern, Central and Northern Kerala. Three districts Thiruvananthapuram, Thrissur and Kozhikkode respectively were selected to represent the three zones. These districts were selected purposively owing to the reason that they accounted for the largest area under coconut cultivation in each zone. From the selected districts one block each was identified at random. The selected blocks were Nemom, Ollukkara and Meladi from South, Central and North zones respectively. From the selected blocks 75 respondents each were selected at random from 9 randomly selected panchayats, thus 225 farmers constituting the final sample for the study.

The dependent variable 'resource use management' was measured with the help of a scale developed for the study and standardized using accepted scientific procedures for estimating reliability and validity.

Age, education, farm size, experience, scientific orientation, achievement motivation, market perception, innovativeness, extension guidance, knowledge on scientific management, extension participation, accessibility to infrastructural facility, economic motivation, perceived availability of resources and risk orientation were the independent variables selected for the study. Either adopted scales or schedules developed for the study were used for measuring them.

The data were collected using a pre-tested and structural interview schedule during 1992-1994.

Analysis of data was carried out using appropriate statistical procedures like mean, standard error, frequencies, percentages, analysis of variance, correlation, multiple regression, step-wise regression, path analysis, angular transformation and $\sqrt{x}$ transformation.

Salient findings of the study are presented below:

1. An overall analysis of resource use management among coconut growers revealed that nearly 70 per cent (69.33) of the respondents were in the medium resource use management category. A moderate 18.67 per cent recorded high efficiency in resource use management.

2. The component wise analysis again indicated that more than 70 per cent of the farmer respondents belonged to medium category with respect to water management, management of manures, pesticide management, labour management and capital management. Regarding land management and information management also majority was included in the medium group. It was also noted that more than 25 per cent respondents come under lower category of resource use management for fertilizer management. More than 40 per cent of respondents belonged to high group in the case of land management and water management.

3. Zone wise analysis of respondents based on resource use management showed that central zone (Central Kerala) accounted for more number of respondents

(21.33%) in high resource use management group with an observed score range of 58.99 to 96.67. But majority of the respondents belonged to the medium category for all the three zones.

4. Zone wise analysis of resource use management components revealed that central zone farmers were more efficient in the management of water, manures, fertilizers and pesticides. In the case of land management and labour management south zone was comparatively better than the other zones. At the same time in the case of information management and capital management north zone was found better.

5. Zone wise relative performance of respondents based on the components of resource use management indicated that except water management and pesticide management none of the other components differed significantly among the farmers of the three zones.

6. Distribution of respondents based on personal, socio-psychological and situational variables for the total sample revealed that majority of respondents belonged to the medium category for all the selected independent variables except scientific orientation. In the case of scientific orientation majority came under high category (52.44%). Zone wise comparison of personal, socio-psychological and situational variables showed that, the farmers of the three selected zones differed significantly regarding, age, farm size, experience, scientific orientation, knowledge on scientific management, extension participation, accessibility to infrastructural facility and perceived availability of resources.

7. The findings of simple correlation analysis revealed that all the selected independent variables were positively and significantly correlated with the dependent variable resource use management.

8. Multiple regression analysis revealed that the 15 independent variables put together contributed significantly to the resource use management of coconut growers to the extent of 72.9 per cent of the variation.

9. The results of step down analysis of the personal, socio-psychological and situational variables with resource use management indicated that variables namely, farm size, experience in farming, achievement motivation, knowledge on scientific management and extension participation together could predict 71.77 per cent variation in resource use management.

10. Path analysis of personal, socio-psychological and situational variables with resource use management confirmed that achievement motivation had maximum direct effect on resource use management, followed by knowledge on scientific management, extension participation, farm size, and risk orientation in the descending order. It was also found that variables such as education, market perception, innovativeness, economic motivation and perceived availability of resources indicated a negative direct effect on resource use management. The remaining variables contributed only negligible direct effect.

11. Results of simple correlation analysis between resource use management and its components with income revealed that resource use management and its eight components were positively and significantly correlated with income from coconut cultivation.

12. Multiple regression analysis revealed that the eight components of resource use management together could explain 82.8 per cent variation in income. Among the components, water management, fertilizer management and capital management were significant at 1 per cent level. Other components were non-significant in relation to its contribution to income from coconut cultivation.

13. Step-wise regression analysis indicated that the component water management alone could contribute 65.92 per cent of variation in income followed by fertilizer management (13.61%), capital management (2.56%) and information management (0.38%).

14. The major factors/constraints faced by coconut growers in the efficient management of resources under various resource use management components were high labour cost, inadequate irrigation water, high cost of fertilizers low market price of coconut, unavailability of labour during peak season, lack of awareness, lack of knowledge and lack of conviction.

Implications of the study

1. The resource use management scale developed for the study would be useful measuring device in assessing the efficiency of resource use management among coconut growers even at the panchayat/Krishi Bhavan level, which will help extension personnel to get detailed management data. The data thus obtained can be used to analyse the problems, suggest alternatives and to find out solution. This scale would be helpful to other crop enterprises also with suitable modification.

2. The components of resource use management identified would be helpful to detect problems in each specific area of resource use. Accordingly extension personnel can plan resource management programmes for farmers. This can very well work as a guideline for farmers, extension personnel and scientists.

3. High cost of cultivation and low market price of produce were found to be the major factors/constraints in coconut cultivation. For rectifying this proper policy decision from the part of the Government is needed. Government may think of raising subsidies, or fixing support price. For ensuring remunerative price, marketing may be arranged through public/co-operative regulated marketing system.

4. In the management of many of the components of resource use, lack of awareness, lack of knowledge and lack of conviction were found as adversely affecting factors. This highlights the need for resource use training programmes for farmers who are weak in respective fields of resource management. Department of Agriculture can take up various strategic programmes with the aim of increasing farmers' awareness and knowledge.

5. Based on the result of the study north Kerala and south Kerala need more attention in resource use management compared to central Kerala. The extension agencies need to take up programmes in areas lapsing behind in resource use management.

6. One of the major finding of this study was negative direct effect of education on resource use management. The probable reason were also explained. The Government should take effective policy action to attract youth to agriculture.

7. Among the various components of resource use management, water management, fertilizer management and capital management were found to be more important with respect to their contribution to income. This also warrants more attention and care in the proper management of these components.

8. Among the selected independent variables farm size, experience in farming, achievement motivation, knowledge on scientific management and extension participation were found to contribute significantly to the variation in resource use management of coconut growers. Development personnel may take note of these aspects also.

Suggestions for future research

To render the generalisations made in the study more applicable, a comprehensive study covering wider geographical area and including more independent variables should be designed in the immediate future.

The present study had considered resource use management among coconut growers alone. But substantial variation in resource use behaviour is bound to exist among farmers cultivating different crops. Inorder to make the study more objective, it would be more appropriate if resource use management of farmers cultivating different crops are assessed in a more exhaustive manner.

An evaluation of the various training programmes conducted for the benefit of coconut growers by different agencies will be helpful to find out the limitation of these programmes in the context of resource use.

Comparative studies on utilization of resources by coconut growers in progressive and non-progressive areas may be taken up to understand real resource use management problems.

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Appendices

APPENDIX-I

KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF AGRICULTURAL EXTENSION
COLLEGE OF HORTICULTURE, VELLANIKKAR - 680 654

Resource Use Management among Coconut Growers of Kerala

Interview Schedule

Zone	Sub-division
District	Krishi Bhavan
Block	Name of farmer
Village	Address

PART-A

1. Age of the farmer :

2. Education : Illiterate/can read only/ can read and write/Primary School/Middle School/High school/College/Above College

3. Farm size

Particulars	Area in hectares Unirrigated/irrigated	Crops grown	Area in hectares Unirrigated/irrigated
a) Land		a)	
b) Paddy field		b)	
Total		c)	
		d)	

4. Experience in coconut cultivation (year) :

5. Scientific orientation

Statements	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
a) New methods of farming give better results to a farmer than the old methods (+)					
b) The way of farming of our forefathers is still the best way to farm today (-)					
c) Even a farmer with lot of experience should use new methods of farming (+)					
d) Though it takes times for a farmer to learn new methods in farming, it is worth the efforts (+)					
e) A good farmer experiments with new ideas in farming (+)					
f) Traditional methods of farming have to be changed in order to rise the level of living of a farmer (+)					

6. Achievement motivation

Please complete the sentences by choosing the appropriate anwers

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) Other regarded as a quality of leadership

7. Market perception

Please record your responses with regard to marketing your produce

a) By increasing production adopting the recommended practices, do you think a farmer will be benefitted by way of remunerative prices for his added produce

Yes/No

b) Do you think that graded selling of coconut can fetch better price

Yes/No

c) Do you othink selling coconut after processing in the form of copra, oil, etc. is profitable

Yes/No

d) Do you think that, after assessing prices at different markets, selling the produce at a market that offers higher price is profitable

Yes/No

8. Innovativeness

Please choose the correct answer for the question

When would you prefer to adopt an improved practice in farming?

a) As soon as it is brought to my knowledge

b) After I have seen some other farmers using it successfully

c) Prefer to wait and take my own time

9. Extension guidance

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

a)	Technical guidance received during the last one year, was	:	Very adequate/Adequate/ Not adequate
b)	Technical guidance received was	:	Very much useful/Much useful/Least useful

10. Knowledge on scientific management

I. Please choose the correct answer for each statement/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 with out 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 verifying its market demand. True/False

11. Extension participation

Please indicate frequency of participations in extension activities in your locality

Activities	Always attending whenever conducted	Sometimes	Never
a) Meetings			
b) Seminars			
c) Exhibitions			
d) Film shows			
e) Farmers days			
f) Demonstrations			
g) Field days			
h) Any other			

12. Accessibility to infrastructural facility

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

Facilities	Easily accessible	Accessible without much difficulty	Accessible with much difficulty
a) Copra market			
b) Credit institutions			
c) Co-operative institutions			
d) Krishi Bhavan			
e) Fertilizers/pesticides			
f) Oil mills			
g) Godown facilities			
h) Transport facilities			
i) Sprayers/other implements			
j) Any other			

13. 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 reasonable profit, the enjoyment in farming life is also important for me (2)		
	iii) I would invest in farming to the maximum to gain large profit (3)		
B.	i) I would not hesitate to borrow any amount of money inorder to run the farm properly (3)		
	ii) Instead of growing new cash crops which cost more money I follow the routine farming practices (1)		
	iii) It is not only monitory benefit but also the enjoyment of the 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 would excessive borrowing of money for farm investigation (2)		

14. Perceived availability of resources

Please indicate your response based on your perception about the availability of various items listed below:

Items	More	Optimum	Less
a) Land			
b) Capital			
c) Labourers			
d) Technical guidance			
e) Pesticides			
f) Fertilizer			
g) FYM/Compost			
h) Irrigation water			
i) Agricultural implements			

15. Risk orientation

What is your degree of agreement for the following statements?

Statements	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1	2	3	4	5	6
a) A farmer should grow large number of crops to avoid greater risks involved in growing one or two crops (+)					
b) A farmer should take more of chance in making a big profit than to be content with a smaller but less risky profit (+)					
c) A farmer who is willing to take greater risk than the average farmer usually does better financially (+)					

Contd.

1	2	3	4	5	6
d) It is good for a farmer to take risk when he knows his chances of success is fairly high (+)					
e) It is better for a farmer not to try new farming methods unless most others in the locality have used it with success (-)					
f) Trying entirely new method in farming by a farmer involves risk but is worthy (+)					

PART-B
Resource use management

Please indicate how often the activities listed below under various components are practised by you. If you are not practising an activity always please give reason for it.

Sl. No.	Activities	Always	Frequently	Sometimes	Rarely	Never	Reason
1	2	3	4	5	6	7	8
	A. Land management						
1.	In coconut cultivation spacing recommended by the Kerala Agricultural University is adopted						
2.	Recommended intercrops are raised in the coconut garden scientifically						
3.	Importance is given to soil conservation measures in coconut garden						
4.	Soil conservation measures are done prior to the onset of mansoon						
5.	Recommended spacing is adopted for intercrops in coconut garden						
6.	Intercrops which do not adversely affect the yield of coconut are grown						
	B. Water management						
7.	Water harvesting structures are made to conserve the rain water received in coconut garden						
8.	Available irrigation facilities in the coconut garden are utilized						

Contd.

1	2	3	4	5	6	7	8
9.	Once irrigation for coconut palms is started it is continued						
10.	Irrigation is scheduled according to the type of soil						
11.	Methods to increase irrigation efficiency are adopted						
12.	Cheap and efficient methods of irrigation are adopted						
13.	Towards the end of north-east mansoon soil is tilled to conserve soil moisture and check weed growth						
14.	To conserve soil moisture in coconut garden husk burrial method is followed						
C.	Management of manures						
15.	The recommended quantity of green leaf manure/organic manure are given to the crop						
16.	The opportunities to grow green leaf manure crops in coconut garden are utilized						
17.	Green leaf manure crops are ploughed into the soil at the correct stage (prior to flowering)						
18.	Programmes are planned to ensure the availability of green leaf manure every year						
19.	Organic manures are adopted as per the recommended method						
20.	Compost is preferred over fresh cowdung						

Contd

1	2	3	4	5	6	7	8
D. Fertilizer management							
21.	The fertilizer are applied based on the soil analysis report						
22.	Fertilizers are applied as per the recommended methods						
23.	Fertilizers are given to the crop in split doses						
24.	Fertilizers are applied only when there is enough moisture in the soil						
25.	Soil samples are collected at the correct time						
26.	Scientific methods are used to collect soil samples						
27.	Fertilizers are applied only two weeks after the application of lime to the soil						
28.	Fertilizers are applied to each intercrop as per their recommended dosages						
E. Pesticide management							
29.	To detect the occurance of pest and diseases on the crop the garden is inspected frequently						
30.	Pesticides are used to control the pest and diseases in coconut garden						
31.	Control measures are adopted only after confirming the correct causal agent of the damage						

Contd.

1	2	3	4	5	6	7	8
32.	Advice of experts are sought in situations where it is difficult to identify the cause of the damage						
33.	Insecticides are applied only in correct dosages						
34.	Insecticides are sprayed before 9 O'clock in the morning or after 3 O'clock in the evening						
35.	Bordeaux mixture as recommended is sprayed as a prophylatic measure against fungal diseases						
36.	Care is taken not to buy pesticides after expiry date						
37.	Pesticides are selected according to the type of pest						
38.	Pest control methods which are found to be the best in the field are adopted						
39.	Integrated pest and disease control measures are adopted						
F.	Labour management						
40.	Skilled labourers are employed in areas where special skills are required in coconut cultivation						
41.	The efficiency of the workers are assessed based on the quality of work done and not on the quantity of work done						
42.	Services of labourers are ensured prior to the begining of cultivation operation						

Contd.

1	2	3	4	5	6	7	8
43.	Family labour is utilized in coconut cultivation instead of completely depending on hired labourers						
44.	Proper guidance is given to the labourers						
45.	Scientific agricultural practices are demonstrated to labourers for them to know						
46.	The implements are selected based on the nature of the work to be done						
47.	Agricultural operations are carried out at the right time						
48.	A record of the number of labourers utilized for each operation in the field is maintained						
G.	Information management						
49.	Articles on coconut cultivation in news papers and other periodicals are followed						
50.	Price situations prevailing in different markets are watched						
51.	Enquiries are made about the places from where agricultural subsidies and other supports will be available						
52.	Attend training programmes and seminars on agriculture						
53.	Share information on various agricultural activities with fellow farmers						
54.	Enquiries are made about the reliable sources of inputs						

Contd.

1	2	3	4	5	6	7	8
55.	Information obtained from different sources on the same aspect is analysed and the best one selected						
56.	Listen to the agricultural programmes broadcast through radio						
57.	Watch programmes on agriculture telecast by Doordarshan						
58.	Assess whether the recommended agricultural practices are in harmony with the existing situation						
H.	Capital management						
59.	Keep a record on cost of cultivation						
60.	Labourers are paid according to the work done by them						
61.	The produce is sold in the form, which will fetch maximum market price						
62.	Avoid the involvement of middlemen in the marketing of produce						
63.	Prices of byproducts are also taken into consideration seperately, to assess the possibilities of marketing						
64.	Prefer straight fertilizers over complex fertilizers						
65.	Enquire about the places from where agricultural inputs could be obtained at a lower price						
66.	Utilize the supports offered by the government and other agencies in coconut cultivation						

PART-C

No. of palms/ha

Sl. No.	Particulars	Men		Women		Materials	
		No. Hired/ Family	No.of hours	No. Hired/ Family	No.of hours	Qty.	Value
1.	Cost of						
	i) FYM						
	ii) Fertilizers						
	N						
	P						
	K						
	iii) Application charges						
	iv) Sand						
2.	Mulching						
	a) Husks						
	b) Leaves						
	c) Others						
3.	Inter cultivation						
	i) Ploughing						
	ii) Manual weeding						
	iii) Earthing up						
4.	Plant protection						
	i)						
	ii)						
	iii)						

5. Irrigation
   (specify method & wages rate)

6. Watch and Ward

7. Harvesting charges

   a) Cash

   b) Kind

8. Heaping charges

9. Carting to home

   Rate/Cart

10. Total

		Qty.	Value
Returns	Nuts		
	Dry leaves		
	Total		

****

APPENDIX - II

Intercorrelation matrix between the independent variables and resource use management

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1.000															
2	-0.191	1.000														
3	0.129	0.280	1.000													
4	0.706	0.125	0.242	1.000												
5	-0.093	0.566	0.201	0.170	1.000											
6	0.100	0.510	0.416	0.434	0.665	1.000										
7	0.073	0.468	0.336	0.398	0.593	0.748	1.000									
8	0.008	0.446	0.266	0.329	0.576	0.658	0.586	1.000								
9	0.105	0.378	0.430	0.410	0.548	0.761	0.697	0.637	1.000							
10	0.040	0.666	0.343	0.344	0.712	0.725	0.695	0.645	0.625	1.000						
11	0.158	0.342	0.415	0.435	0.490	0.718	0.641	0.568	0.796	0.594	1.000					
12	0.023	0.313	0.196	0.265	0.450	0.542	0.537	0.494	0.515	0.580	0.520	1.000				
13	0.153	0.462	0.360	0.437	0.660	0.832	0.732	0.631	0.709	0.696	0.720	0.548	1.000			
14	0.012	0.310	0.238	0.172	0.400	0.420	0.409	0.427	0.438	0.514	0.423	0.474	0.470	1.000		
15	0.087	0.529	0.331	0.422	0.653	0.825	0.760	0.674	0.761	0.763	0.712	0.612	0.825	0.513	1.000	
16	0.200	0.429	0.483	0.478	0.554	0.796	0.658	0.554	0.721	0.683	0.751	0.529	0.716	0.402	0.745	1.000

APPENDIX - III

Path analysis with 15 independent variables on Resource use Management

Variable No.	X_1 Age	X_2 education	X_3 Fram size	X_4 Experience	X_5 Scientific orientation	X_6 Achievement Motivation	X_7 Market perception	X_8 Innovativeness	X_9 Extension guidance	X_{10} Knowledge of scientific management	X_{11} Extension participation	X_{12} Accessibility to infrastructural facility	X_{13} Economic motivation	X_{14} Perceived availability of resources	X_{15} Risk orientation
X_1	0.0442	0.0051	0.0186	0.0542	-0.0027	0.0370	-0.0019	-0.0006	0.0008	0.0064	0.0240	0.0014	-0.0055	-0.0003	0.0112
X_2	-0.0085	-0.0269	0.0402	0.0096	0.0161	0.1898	-0.0121	-0.0309	0.0318	0.1051	0.0520	0.0191	-0.0166	-0.0079	0.0681
X_3	0.0057	-0.0075	0.1436	0.0186	0.0057	0.1548	-0.0086	-0.0184	0.0362	0.0541	0.0630	0.0120	-0.0130	-0.0061	0.0425
X_4	0.0312	-0.0034	0.0348	0.0767	0.0048	0.1615	-0.0103	-0.0228	0.0345	0.0543	0.0661	0.0162	-0.0157	-0.0044	0.0543
X_5	-0.0041	-0.0152	0.0289	0.0131	0.0285	0.2476	-0.0153	-0.0399	0.0461	0.1123	0.0745	0.0275	-0.0238	-0.0102	0.0841
X_6	0.0044	-0.0137	0.0598	0.0333	0.0189	0.3721	-0.0193	-0.0457	0.0641	0.1144	0.1090	0.0332	-0.0300	-0.0107	0.1062
X_7	0.0032	-0.0126	0.0482	0.0306	0.0169	0.2784	-0.0257	-0.0406	0.0586	0.1097	0.0973	0.0329	-0.0264	-0.0105	0.0978
X_8	0.0004	0.0120	0.0382	0.0252	0.0164	0.2449	-0.0151	-0.0694	0.0536	0.1018	0.0862	0.0302	-0.0227	-0.0109	0.0868
X_9	0.0046	-0.0102	0.0618	0.0134	0.0156	0.2833	-0.0179	-0.0442	0.0842	0.0986	0.1208	0.0315	-0.0256	-0.0112	0.0980
X_{10}	0.0018	-0.0179	0.0493	0.0264	0.0203	0.2699	-0.0179	-0.0448	0.0526	0.1577	0.0902	0.0355	-0.0251	-0.0131	0.0981
X_{11}	0.0070	-0.0092	0.0596	0.0334	0.0140	0.2671	-0.0165	-0.0394	0.0669	0.0936	0.1519	0.0318	-0.0259	-0.0108	0.0917
X_{12}	0.0010	-0.0084	0.0282	0.0203	0.0128	0.2018	-0.0138	-0.0342	0.0433	0.0914	0.0790	0.0612	-0.0198	-0.0121	0.0788
X_{13}	0.0068	-0.0124	0.0518	0.0333	0.0188	0.3095	-0.0188	-0.0438	0.0597	0.1099	0.1094	0.0330	-0.0360	-0.0120	0.1062
X_{14}	0.0005	-0.0083	0.0342	0.0132	0.0114	0.1561	-0.0105	-0.0269	0.0368	0.0810	0.0642	0.0290	-0.0169	-0.0256	0.0660
X_{15}	0.0039	-0.0143	0.0475	0.0324	0.0186	0.3070	-0.0196	-0.0468	0.0641	0.1203	0.1082	0.0375	-0.0297	-0.0131	0.1287

All diagonal values are direct effects of the variables

Other values in the raw are indirect effect of that particular variable

RESOURCE USE MANAGEMENT AMONG COCONUT GROWERS OF KERALA

By

HARIDASAN, V.

ABSTRACT OF A THESIS

Submitted in partial fulfilment of the
requirement for the degree of

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Faculty of Agriculture
Kerala Agricultural University

Department of Agricultural Extension
COLLEGE OF HORTICULTURE
Vellanikkara, Thrissur

1995

ABSTRACT

The present study was conducted during 1992-'94 to assess the resource use management among coconut growers of Kerala. The data were collected with the help of a pretested structured interview schedule from randomly selected 225 respondents representing the three major geographical zones of Kerala viz., North, Central and South.

The dependent variable resource use management was measured using an index developed for the purpose of the study under eight identified components namely, 'land management', 'water management', 'management of manures', 'fertilizer management', 'pesticide management', 'labour management', 'information management' and 'capital management'. The analysis revealed that all the components were positively and significantly related to resource use management. However, the maximum contribution to income was found to be from water management, fertilizer management and capital management.

Analysis showed that nearly 70 per cent of the respondents were in the medium category of resource use management. Only 18.67 per cent recorded high efficiency in resource use management. Zone-wise analysis revealed that central zone farmers were more efficient in the management of water, manures, fertilizers and pesticides. In the case of land management and labour management south zone was found more efficient. While north zone showed better efficiency in information and capital management.

Among the selected 15 independent variables farm size, achievement motivation, knowledge on scientific management and extension participation were found to contribute significantly to the variations in resource use management.

The highest direct and indirect effect on resource use management was due to achievement motivation and economic motivation.

The major constraints perceived by the farmers in resource use management were in the order of 'high labour cost', 'scarcity of irrigation water', 'high cost of fertilizers' and 'poor returns from coconut cultivation due to low market price'.