QUALITY MANAGEMENT IN AGRICULTURAL RESEARCH IN KERALA AGRICULTURAL UNIVERSITY - A CRITICAL ANALYSIS

By

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THESIS

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DECLARATION

I hereby declare that the thesis entitled **"Quality management in agricultural research in Kerala Agricultural University- A critical analysis"** 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 for the award to me of any degree, diploma, fellowship or other similar title, of any other University or Society.

SMITHA BABY

CERTIFICATE

Certified that the thesis entitled **"Quality management in agricultural research in Kerala Agricultural University – A critical analysis"** is a record of research work done independently by **Miss. Smitha Baby**, under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to her.

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We, the undersigned members of the Advisory Committee of **Miss.Smitha Baby**, a candidate for the degree of **Master of Science in Agriculture** with a major in **Agriculture Extension,** agree that this thesis entitled **"Quality management in agricultural research in Kerala Agricultural University – A critical analysis"** may be submitted by Miss. Smitha Baby in partial fulfillment of the requirement for the degree.

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Dedicated to my beloved Parents

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INTRODUCTION

1.INTRODUCTION

Quality doesn't happen by accident, it has to be planned.

- Joseph Juran (1988)

Agricultural research has grown to its present importance in India because of its great contribution to the farming community during the green revolution period. Green revolution, being one of the biggest success stories of India cited globally, enabled the country to convert its nightmarish 'begging bowl' status to that of 'self-sufficiency', with a quantum jump in the food grain production from a mere 50.8 million tonnes during 1950-51 to 209 million tonnes in1999-2000 (The Hindu, 2001). The Indian Council of Agricultural Research (ICAR) has been in the forefront, guiding and coordinating these developments. However, the research responsibilities at the state level rest with the agricultural universities.

The agricultural research system in India is probably the largest agricultural research system in the world, with about 27,500 scientists and more than 100,000 supporting staff actively engaged in research. Investment in agricultural research is also so large that about seven per cent of the total outlay for agriculture and allied programmes through Five Year plans go for research and education (Balaguru and Raman, 1998). The present system has been developed over years of experimentation and experience and has withstood the test of time by remaining sensitive to the changing needs and challenges.

Despite the above said achievements, it remains a hard reality that a quarter of population in India is still below poverty line. This demands a thorough review of our developmental activities. New ideas, innovations and improved agricultural techniques - the

developmental activities. New ideas, innovations and improved agricultural techniques - the outcomes of research – are the stepping-stones to progressive agriculture. It is a fact that in order to accelerate the rate of progress in Indian agriculture, we will have to get a breakthrough in the efforts to increase the quality of agricultural research. Often the researcher is too busy applying his scientific skills to fascinating problems to leave much time for thinking about the quality of research. Everybody would accept that it would be desirable to improve the quality of agricultural research. But the question is 'How?' What does research quality mean? This in itself posses something of a problem as there is no general view on how to differentiate between good quality and poor quality research. There are no quantitative standards to rate a research project as good, bad or in between.

Quality of agricultural research is often associated with the end results alone. If the results do not have practicability and wide acceptability, the research is often dumped as poor quality. Such an approach can be extremely frustrating and disappointing to the researcher concerned, seriously affecting his morale and motivation.

Quality in fact could be identified at various stages of agricultural research starting from conceiving a research problem, designing suitable project and preparing the final report such that even in the absence of a viable end product the researcher could be credited with due merit. According to Lloyd (1996), conceiving a research project is the essence of research. It is said that research is essentially a mental process. A research problem is solved in some fellow's head - the thinking step usually comes first and the experiment then follows as a testing of the idea. Hence quality can be identified in a discriminating selection of the problem, the organization of the work and the method of attacking the problem.

upgraded to good, good to better and the better to best, much effectiveness in agricultural research would result and this will benefit all the stakeholders - the farmer group and the researcher inclusive.

Horton and Dror (1993) stated that the most potentially useful standard for monitoring and evaluating agricultural research is its optimal quality - that is how good it could possibly be. However, the difficulties of transforming the concepts of optimal quality and performance into practical, usable indicators and measures are very great.

According to Brady (1973), the quality of scientists will determine the quality of research that is done. Success in research depends to a very large extent on the abilities and motivation of the individual scientist, as well as the opportunities afforded him for carrying out his work within a favourable environment (Anderson, 1982). This leads to the view that various personal, psychological, job and organizational characteristics may have an influence on quality management in agricultural research.

Keeping the foregoing in view, the present study was undertaken with the over-riding objective of studying quality management in agricultural research in Kerala Agricultural University .The specific objectives of the study were

1) To identify the dimensions of quality management in relation to agricultural research
2) To standardise a measuring instrument for quantifying quality management in agricultural research and to measure the quality management in agricultural research in Kerala Agricultural University.

3) To study the influence of selected personal, psychological, job and organizational characteristics on quality management in agricultural research.
4) To identify the problems related to quality management in agricultural research in Kerala Agricultural University.

Scope of the study

Final evaluation of completed research projects to assess project quality has been a part of research management. Several agencies that fund competitive research may need to assign priorities among different research proposals. However, so far little efforts have been made to analyse the concept of quality management in agricultural research. The absence of quantitative standards to assess the quality management in agricultural research has also made research project evaluation highly subjective or biased. Hence an in depth analysis of the dimensions of quality management in agricultural research and their perceived importance in deciding the final quality of agricultural research, attempted in the present study may contribute in a big way to the understanding and management of quality in various phases of agricultural research. Further an attempt to develop a standardised and comprehensive measurement device to assess the quality management in agricultural research is probably a pioneering venture in this line. The composite scale developed in the present study will be immensely useful to research funding agencies for preliminary screening of research proposals as well as discriminating between poor and good research efforts.

Further the study probes into the relationships of selected personal, psychological and job/ organizational variables with the quality management in agricultural research, the

results of which may prove invaluable in quality management efforts in agricultural research. An investigation into the problems related to quality management in agricultural research in Kerala Agricultural University has also been attempted in the study, which may help to bring out some practical recommendations to the application of quality management in agricultural research in Kerala Agricultural University.

Limitations of the study

Man's experience with knowledge proves again and again that the more he knows, the more he finds he has yet to learn. As one becomes familiar with a subject, one also becomes conscious of its limitations.

The *ex post facto* research design followed in the study itself has its own lacunae, though it is the only suitable design for this type of study. The researcher also admittedly feels that since the investigation was completely based on the expressed opinions of subjects holding formal positions in the organization, these opinions may not be free from personal bias and prejudice, though every care was taken to avoid this and make the study as objective as possible. As early as in 1957, Edwards had highlighted an underling limitation of the studies of this type-"the reluctance of many individuals to give public expression to their feelings or attitudes on controversial issues, is of course a disadvantage of direct questioning".

Since the present study was undertaken as part of the requirements for the M.Sc. programme of the researcher, the concepts couldn't be explored in greater depth and in a more comprehensive manner due to constraints of time and resources.

Presentation of the study

The report of the study has been spread out under six chapters as given below. The first chapter deals with the introduction, wherein the statement of the problem, objectives, the scope and limitations of the study are discussed. The second chapter covers review of the related studies in the light of the present investigation. The third chapter relates to the details of the methodology used in the process of investigation, followed by the results presented in the fourth chapter. The findings of the study have been discussed in the fifth chapter and chapter six gives a summary of the study followed by the references and appendices.

LITERATURE REVIEW

2. LITERATURE REVIEW

An extensive and exhaustive literature review is the base for any systematic scientific enquiry. The main objective of this chapter is to review the theoretical and empirical information available from similar or at least related studies.

Since the early part of the 20th century great efforts have been made to define quality and to achieve both a commonality of understanding and practice of quality management principles for business organizations. But studies on application of quality management principles and practices in agricultural education, research and extension did not seem to have caught the imagination of researchers to any appreciable degree. Hence past researches related to the present study were not available in adequate numbers. However, attempt has been made to collect some related literature from available sources, which can serve as the torchbearers in this particular field.

The literature is reviewed under the following broad headings.

2.1. Concept of Quality Management

2.2. Concepts related to agricultural research and its quality dimensions.

2.3. Measurement of Quality

2.4. Selected personal, psychological and job/organizational characteristics and their relationship with quality management in agricultural research.

2.5. Conceptual framework for the study

2.1. Concept of Quality Management (QM)

Quality management is based on a number of ideas. It means thinking quality in terms of all functions of the enterprise and is a start-to-finish process that integrates interrelated functions at all levels. Quality is a complex concept that has become one of the most universally appealing in all management theory. Quality is a sense of appreciation that something is better than something else. It varies by facets of human activity. In general, quality is often used to signify the 'excellence' of a product or service.

New Webster's Dictionary gives the meaning of quality as the 'degree of excellence'.

Crosby (1980) defined quality as 'Conformance to requirements'.

According to Deming (1986) quality can be defined as the totality of features and characteristics of a product or service that bear on its ability to satisfy a given need.

Juran (1991) defined quality as "fitness for use".

In the analytical studies on quality, Garvin (1988) identified the following approaches for quality management.

(1) The Aesthetic approach

This is a transcendental approach in which fine quality is treated as distinct from poor quality on the basis of aesthetic considerations. According to this approach, quality is achieving or reaching for the higher standard as against being satisfied with the sloppy or the fraudulent products. The quality of masterpieces like Michael Angelo's *Monalisa* or the symphony of Beethoven is defined on the basis of this type of approach.

(2) The Product based approach

This approach identifies specific features or attributes that can be measured to indicate higher quality, on the basis of objective measures for quality. This approach assumes that the absence or presence of an attribute, as the case may be, implies higher quality. Thus water with less pollutants and fruits with more of desired vitamins are treated as of higher quality than water with pollutants and fruits with less of the desired vitamins.

(3) The Elements approach

This approach to definition of quality is focused on an understanding of the elements of quality. If a product or service was rated better than another on one or more of these dimensions, it would be a higher quality. When this approach is used, the ranking could be high on one dimension, yet low on another dimension.

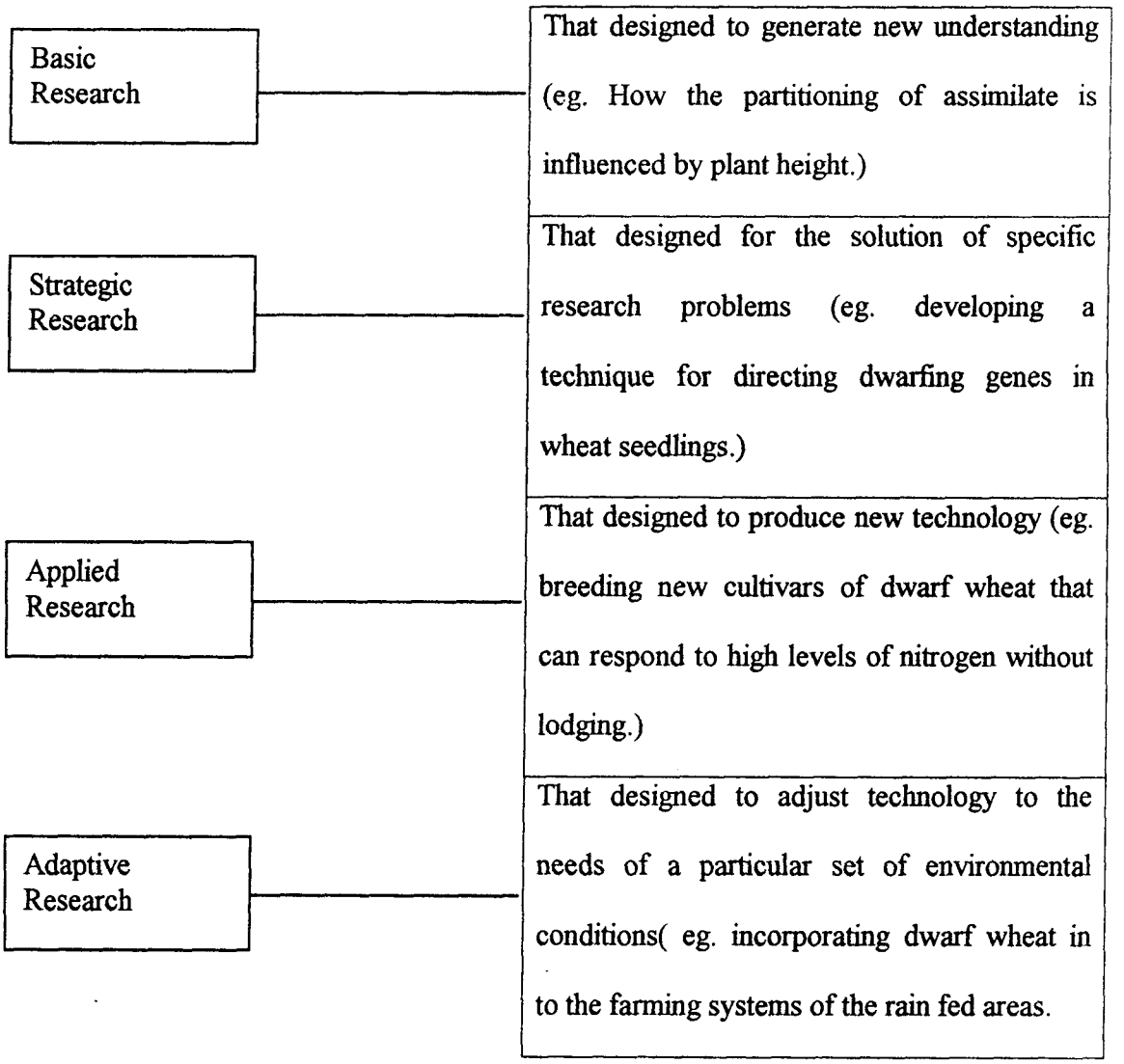
The elements approach incorporates all earlier approaches to quality without leaving out any concerns of these earlier approaches. For this reason this approach appears more useful to define and measure quality than any of the earlier approaches.

2.2.Concepts related to agricultural research and its quality dimensions.

According to Klopsteg (1945) research is the original and creative intellectual activity, carried out in the laboratory or field, which endeavours to discover new facts and to appraise and interpret them properly in the light of previous knowledge.

As explained by Arnon (1968) agricultural research is, by its very definition, research whose objective is to apply a wide variety of scientific disciplines to the development of new approaches to agricultural production and to the solution of problems besetting the farmer. It is, therefore, essentially applied research.

Definition of different categories of research given by Baum (1986) is as follows.



It is evident that both basic and applied or adaptive research is complementary and essential stages in planned agricultural research. It is the nature of the problem and not the motivations of the researcher that determines whether basic research or adaptive research is

necessary or preferable to solve a specific problem. Therefore in agricultural research, the effort is to be directed towards mission-oriented research, whether basic or applied.

According to Madamba (1965), some of the basic principles that may be used as guidelines in agricultural research operations are

1. The research programme must not only respond to current needs of developing agriculture but also be sensitive to the needs of future. Applicable results of research conducted elsewhere should be utilised fully. Elements of the research programme must provide for a thorough study of the basic principles and nationwide adoption and application to various ecological conditions.
2. The agricultural research programme should be balanced in terms of commodities and problems of greatest importance, various supporting disciplines and appropriate combination of basic, applied, adaptive and developmental aspects.
3. The research organization and programme should be flexible and should provide for a continuing appraisal of programs, progress and priorities. Research activities should be directed at priority problems. Research thrusts should be production-oriented designed to solve problems in the field and cognizant of marketing requirements and bio-economic factors.
4. A team approach in solving problems should be developed. Different institutions and agencies responsible for research must maintain a smooth flow of communication among themselves to avoid duplication of efforts.
5. Available scientific talent should be fully utilized and continuous professional improvement must be provided. This is facilitated by a close coordination of research among educational institution and other research agencies. Quality and training of

scientists must be appropriately recognized and rewarded. Efficiency must be emphasized to gain public and financial support.

6. In responding to public needs, the research programme should be insulated from political pressures.
7. Finally, the three basic guidelines-relevance, excellence and co-operation should be kept in mind at all times.

Lloyd (1966) stated that conceiving a research project is the essence of research. According to Lloyd, formulation of objective is also so important that the solution becomes evident when the problem is properly stated.

Brooks (1966) proposed the following specific criteria for assigning priorities among different research proposals.

- Whether a specific answer to the problem proposed can be reasonably anticipated.
- Whether facilities and support needed for the research are available.
- Whether the results of the proposed research may contribute to the long-term goals of the agency that provides the support.
- The originality of the research and its technical soundness.
- The possibility that it will illuminate work in other scientific fields.

Arnon (1975) stated that the larger the financial and human resources that are being invested in research, the greater the need for a sound formulation of objectives and reliable methods of evaluation for selecting research areas and projects. According to Arnon, some of the factors to be considered in the preliminary screening of research projects are

- Is the subject within the general field of assignment and professional competence of the researchers working on the project?
- Is the idea novel?
- Are the necessary scientific manpower and technical supporting personnel available?
- Is the research plan appropriate to the objectives to be attained?
- The objectives of the research, clearly stating the problem and its relevance to the goals of the organisation.
- The importance of the work, with all the pertinent data needed to substantiate the significance of the research.
- The outline of previous work in the field, indicating what is new in the proposed approach.
- The plan of work which must be clear, specific and appropriate to the realisation of the proposed objectives.
- The cost estimates, which must be realistic.

The researcher must also sell his research results to his customer. Sometimes it requires as much as ingenuity to sell a research result as was needed to solve the problem.

Clover and Balsley (1974) proposed the following checklist as a general guide for estimating effectiveness of a research report.

- The findings and their interpretations clearly stated and adequately substantiated by evidences.
- The conclusions should be logical and based on the evidence supplied in the report.
- The recommendations should be practical. They should be feasible in view of the financial conditions of the target group.

- The research methods and sources of information used should be described in sufficient detail to enable the reader of the report to evaluate their soundness.
- It should be written in an unbiased and logical manner.

Gapasin (1993) identified the following dimensions for the final evaluation of completed research projects to assess quality.

- The relevance of project objectives
- The cost effectiveness of the project
- The contribution to knowledge
- The outputs produced
- Adoption and use of new information and technologies

2.3. Measurement of Quality

Arnon (1975) stated that the scoring model of project evaluation appears to be most appropriate for agricultural research. The model helps to incorporate qualitative factors that are relevant to project selection. The scoring model proposes weighting in accordance with the relative importance of the criteria used for research evaluation. The composite project score obtained from the combined criteria-performance scores can be used for ranking of the research projects; the higher the score, the higher the priority ranking.

Norton (1993) reported that quality scales may be used as tools for priority setting in decision making as well as for evaluating research proposals, on-going or completed research projects.

In a study conducted to assess the quality of education in technical institutes, Jeglekar (1999) suggested that quantifiable indicators could be used to objectively assess the quality of education.

The scoring model for project evaluation, however, is inherently subjective and inevitably subject to human 'errors and bias'. Still a most important advantage is the simplicity and speed with which the scoring model can be applied.

2.4. Selected personal, psychological and job/ organizational characteristics and their relation with quality management in agricultural research

Zollinger (1980) in his study on scientific discovery concluded that the fundamental basis of scientific discovery was logic, but that basis was disguised by psychological factors. The quality of research, by and large depends on the intensity of sincerity and devotion on the part of researchers. In other words, the quality of scientists may have an influence on the quality of research that is done.

Anderson (1982) also reported that success in research depends to a very large extent on the abilities and motivation of the individual scientist, as well as the opportunities offered to him for carrying out his work with in a favourable environment. From the above findings it can be safely concluded that quality of agricultural research may be determined by a multitude of factors. Hence, after a thorough perusal of available literature and meaningful discussions with experts in the agricultural research field, 14 variables expected to have an influence on the quality of agricultural research were identified for inclusion in the conceptual model of the study. Not many studies delineating the relationships between these

variables and quality of research were available. However, certain related studies are reviewed here.

2.4.1. Experience

Veerabhadraiah (1980) and Reddy (1982) found no significant association between experience and job performance of ADAs and agricultural extension personnel respectively.

Jhansi (1985) reported that there was no significant relationship between experience and productivity of agricultural scientists.

Poornakumar (1988) identified a positive and significant association between experience and job performance of Assistant Professors in Tamil Nadu Agricultural University.

Singh and Singh (1992) found that the total years of service had no significant contribution to the scientific productivity of women scientists in the ICAR systems.

George (1996) also reported that experience had no significant association with work motivation of teachers in Kerala Agricultural University.

More recently, Kalaivani (1999) indicated that experience acted as one of the crucial parameters in explaining the job performance of ADAs and AOs in Tamil Nadu.

Majority of the studies thus do not indicate any significant role for experience in adding to productivity, performance etc. A similar trend is not unlikely in the present study with quality management also.

2.4.2. Training

Benor et al (1984) emphasised the importance of training for upgrading skills and professional competency.

Jhansi (1985) reported that there was no significant association between training received and productivity of agricultural scientists.

Mathew (1989) identified that training showed a poor non-significant relationship with managerial leadership of ADAs, in Kerala.

Kanagasabai (1995) found that job performance of extension workers were uniform irrespective of their number of trainings underwent.

Meenambigai (2000) reported that training has significant association with job performance of extension personnel. This corroborated earlier findings of Reddy (1982).

It may be seen that the studies reviewed above do not provide any firm ground to predict an exacting relationship between training and quality management.

2.4.3. Achievement motivation

Various studies suggested that by raising levels of achievement motivation of people through counselling or special training, success could be improved in their occupational performance (McClelland 1964; Prasad 1983; Reddy 1983a).

However, Janardhana (1979) and Jhansi (1985) recorded that achievement motivation was not related with job performance and extension productivity respectively.

Later, studies by Radhakrishnamoorthy (1987) and Poornakumar (1988) revealed that achievement motivation was positively and significantly associated with job performance.

Mathew (1989) also reported that achievement motivation had a positive and significant relationship with managerial leadership of ADAs in Kerala.

More recently, George (1996) found a positive and significant association between achievement motive and work motivation of teachers in Kerala Agricultural University.

Hence it appears only logical to predict a significant role for achievement motivation in the present study also.

2.4.4.Technical competence

The concept of technical competence is described by Katz (1955) as follows:

"It involves an understanding of proficiency in a specific kind of activity, particularly one involving methods, processes, procedures and techniques. It involves specialized knowledge, analytical ability and faculty in the use of tools and techniques of the specific discipline.

Bhagat and Allie (1989) defined sense of competence as individual's internal, psychological feelings concerning how competent they seem to be themselves but not necessarily how competent they really are. The results of their study revealed that sense of competence was positively related to performance ratings .

Mathew (1989) reported that technical competence had positive and highly significant association with managerial leadership of ADAs of kerala.

Nehru (1993) reported a positive and significant association between technical competence and job efficiency.

Cyriac (1999) observed that technical competence had a negative and indirect effect on burnout through job satisfaction

Nambiar(1998) also indicated that perception about professional competence as one of the main components of work environment.

2.4.5 Scope for personal development

In any organization, organizational facilties such as opportunities to undergo training programmes and exposure to advanced technologies would facilitate the personnel to rise up to the desired level. Scope for personal development refers to the perception of the individuals about these facilities.

Talukdar (1984) observed that facilities provided by the organization to develop the abilities of ADOs had a positive influence on their productivity.

Satapathy and Choudhary (1990) in their study at Orissa University of Agriculture and Technology observed that providing participation in professional seminars, opportunities for self-growth and scope to prove merit were closely related with output of the scientists.

Nambiar (1998) reported a positive and significant association between scope for personal development and the work environment in Krishi Bhavans.

Based on the above findings it was considered worthwhile to include scope for personal development as a variable in the present study and test its association with quality management in agricultural research.

2.4.6. Scientific orientation

Scientific orientation refers to an individual's orientation towards the scientific advances in a particular field.

Not many studies establishing the relationship between scientific orientation and consequence variables like performance, productivity etc could be traced.

However, Porchezhian (1991) and Vinayagam (1998) reported a positive and significant relationship between scientific orientation and entrepreneurial behaviour.

2.4.7. Job satisfaction

Job satisfaction is one of the widely used concepts in organisational psychology and the analysis of behavioural processes surrounding it has been very popular among behavioural scientists.

Gilner (1961) defined job satisfaction or dissatisfaction as the result of various attitudes the person holds towards his job, towards related factors and towards life in general. Indeed some psychologists especially those associated with the human relations school of motivation theory, see job satisfaction as a primary goal of organisations.

Phyllis (1975) stated that satisfied worker was in general a more flexible, better-adjusted person who has come from a superior family environment or who has the capacity to overcome the effects of an inferior environment.

Locke (1976) defined job satisfaction as the pleasurable emotional state resulting from the perception of one's job as fulfilling or allowing the fulfillment of one's important job values, provided these job values are compatable with one's needs.

Radhakrishnamoorthy (1987) reported that job satisfaction of AOs was positively and significantly related with their planning and organising role.

Sundaraswamy (1987) observed that job performance level of AAOs showed a highly positive relationship with job satisfaction. Poornakumar (1988) found that job satisfaction had positive and highly significant association with job performance of Assistant Professors in Tamil Nadu Agricultural University.

Kanagasabai (1995) and Meenambigai (2000) also corroborated the positive relationship between job satisfaction and job performance.

Cyriac (1999) reported that job satisfaction had a negative relationship with burnout.

The preceding discussion provides ample evidence to establish job satisfaction as an important factor influencing outcome variables like performance, productivity etc. A similar trend may be predicted in the present study also.

2.4.8. Job commitment

Ambastha (1980) found that farm scientist with more job commitment had more communication with various categories of farmers and extension personnel.

Reddy and Jayaramaiah (1988) observed that organisational commitment of the Village Extension Officers working in the T & V system of Andra Pradesh had a positive and significant relation with their job effectiveness.

More recently, Cyriac (1999) reported that job commitment expressed an indirect effect on burnout through job satisfaction.

Based on the above findings, a positive relationship between job commitment and quality of research is hypothesised in the present study.

2.4.9. Attitude towards job

Attitude is the degree of positive or negative affect associated with a psychological effect. Finley et al (1955) believed that efficiency of workers would be increased if positive attitude towards work were encouraged.

Mongia (1976) emphasised that high productivity could be achieved if the attitude of the workers towards their work is maintained at favourable level.

Recently, Kalaivani (1999) reported that attitude towards job was one of the crucial parameters in explaining the job performance of ADAs and AOs. Cyriac (1999) found that attitude towards job had indirect effect on burnout through job satisfaction.

Hence, it appears only logical to predict a positive relationship between attitude towards job and quality management in agricultural research.

2.4.10. Perceived workload

Workload is the average pressure of work assigned to an individual in an organisation within a specified time. Jhansi (1985) found no significant association between perception of workload and extension productivity of agricultural scientists.

Reddy (1986) reported a positive and highly significant association between perception of workload and productivity of Village Extension Officers under the T & V system in Andhra Pradesh. Mathew (1989) found that perceived workload had no significant relationship with managerial leadership of ADAs in Kerala.

Quite strangely, Sabaratnam (1992) observed that the number of research projects a scientist had at a time showed a negative correlation with scientific manpower efficiency in the ICAR research system.

The literature available, however, is not sufficient to draw any meaningful conclusion on the effect of this variable on performance outcomes. The present study may throw further light on this aspect.

2.4.11. Task identity

According to Turner and Lawrence (1965) the job must provide outcomes which are intrinsically meaningful or otherwise experienced as worthwhile to the individual, if he is to be able to experience positive feelings about himself as a result of his efforts. In terms of Turner and Lawrence, when the job is high on task identity, the worker can perceive that he has accomplished something of consequence. According to them such jobs are characterised by a) a distinct sense of the beginning and ending of a transformation process b) high

visibility of the transformation to the employee c) high visibility of the transformation in the finished product d) a transformation of considerable magnitude. For a worker who has high needs for developing and using his competence, a job with such characteristics generally would be expected to be experienced as highly meaningful and worthwhile.

Prasannakumar (1985) found a positive and significant relationship between task identity and organizational commitment of AAOs working under T& V system in Karnataka.

Mathew (1989) reported that task identity showed positive and highly significant association with managerial leadership.

George (1996) also found a significant association between task identity and work motivation of teachers in Kerala Agricultural University.

2.4.12. Job autonomy

The autonomy dimension, as reported by Turner and Lawrence (1965) would seem to tap the degree which workers feel personal responsibility for their work and also freedom and discretion in scheduling the work and carrying it out. He must believe that the work he does is his own; and he is personally responsible for whatever successes and failure occur as a result of his work.

Prasannakumar (1985) found no significant association between job autonomy and organisational commitments of AAOs. Mathew (1989) also reported that job autonomy had virtually no association with managerial leadership.

Later, Sundaraswamy (1987) found a positive and significant relationship between job autonomy and job performance of AAOs. George (1996) also reported that job

autonomy was significantly associated with work motivation of teachers in Kerala Agricultural University.

2.4.13. Organizational climate

Chatopadyay and Agarwal (1979) have tried to understand the concept of organizational climate by examining various available models. They described organizational climate as a psychological environment prevailing in the organisation, which is an outcome of a number of variables in the societal system; organisation and also the individual members.

Prakasam (1986) defined organizational climate as the shared perception of the employees who work and live together in the organisation. It is the sum total of individual perceptions regarding organizational procedures, policies, practices and it represents the psychological environment in the organization, consisting of individual opinions framed upon the micro events that happen to them as well as to others over a period of time.

Jhansi (1985) found no significant relationship between organizational climate and extension productivity of agricultural scientists.

Later, Jagirdhar (1987) reported a significant association between organisational climate and job satisfaction. Ranganathan (1989) observed that organisational climate had a highly significant positive association with organizational effectiveness in the T & V system. Mathew (1989) reported a significant and positive relationship between organizational climate and managerial leadership of ADAs of Kerala.

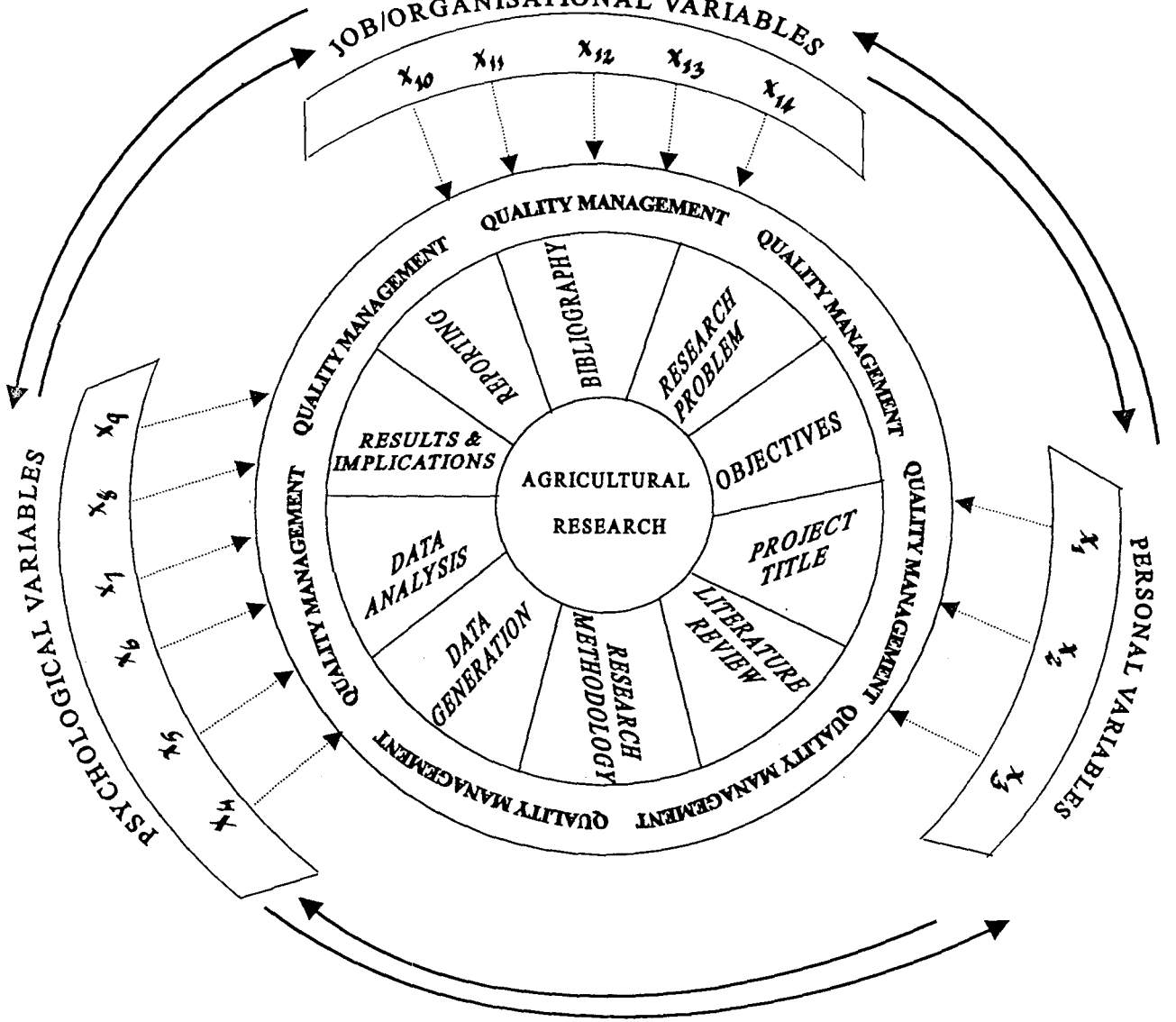
George (1996) observed that organizational climate had a positive and highly significant relationship with work motivation of teachers in Kerala Agricultural University.

2.5.Conceptual framework for the study

The main objective of the conceptual framework attempted in this section is to provide an effective backdrop against which the theoretical conclusions and the relationships predicted among the multifarious characteristics in this study could be empirically verified. Studies in the past have unequivocally proved that performance dimensions go beyond the competencies such as skills and knowledge of the individual. Performance dimensions are broader and deeper than what a person must know and be able to do in order to function well in his or her job. They include attitudes, values and character traits. As Anderson (1982) pointed out, success in research depends to a very large extent on the abilities and motivation of the individual scientists as well as the opportunities accorded to him for carrying out his work within a favourable environment. Hence if we can identify those performance dimensions, which are most highly correlated with job success, we can put them together to form a blueprint for outstanding performance in both thought and action.

The studies reviewed here could clearly illustrate that performance is an interactive effect of various personal, psychological, job and organizational factors. There is no reason to believe that the variable quality management is unaffected by such performance factors. Thus quality management in agricultural research is conceptualized in the present study to be the direct and indirect consequence of different interactive factors, some of them personal (experience, training, and technical competence), others psychological (achievement motivation, scientific orientation, scope for personal development, job satisfaction, job commitment, attitude towards job) and still others job and organizational (job autonomy, task identity, infrastructure facilities, perceived workload and organizational

climate), the empirical validation of which may provide much insight to understanding this vivacious phenomenon. The conceptual model proposed here is represented in Fig 2.1.



X_1 - Experience
X_2 - Training
X_3 - Technical competence
X_4 - Scientific orientation
X_5 - Achievement motivation
X_6 - Scope for personal development
X_7 - Attitude towards job

X_8 - Job commitment
X_9 - Job satisfaction
X_{10} - Job autonomy
X_{11} - Task identity
X_{12} - Perceived work load
X_{13} - Infrastructure facilities
X_{14} - Organisational climate

FIG. 2.1 CONCEPTUAL MODEL FOR THE STUDY

METHODOLOGY

3. METHODOLOGY

The present investigation was undertaken with the main objective of analyzing the quality management in agricultural research in Kerala Agricultural University. A general description of the methodology and procedures followed in conducting this research study is furnished in this chapter under the following sub-headings.

3.1. Research Design

3.2. Locale of the study

3.3. Selection of the sample

3.4. Selection of variables for the study

3.5. Operationalisation and measurement of the dependent variable: Quality Management

3.6. Operationalisation and measurement of the independent variables.

3.7. Problems related to quality management in agricultural research in Kerala Agricultural University

3.8. Data collection procedure

3.9. Statistical tools employed for the analysis of data

3.1 Research Design

Based on the analysis of available literature and keeping in view the objectives of the study, it could be well inferred that most of the attributes included in the study were *ex post facto* in nature and offer little chance to be manipulated by the researcher. Therefore, *ex post facto* research design was considered appropriate to be used for the study. According to Kerlinger (1964) *ex post facto* research is systematic empirical enquiry in which the researcher doesn't have direct control over the independent

variables because their manipulation have already occurred or because they are inherently not manipulable.

3.2. Locale of the study.

The study was conducted in the main campus of Kerala Agricultural University and eight Agricultural Research Stations located in the central zone. The main campus of Kerala Agricultural University at Vellanikkara is 9 km east of Thrissur town on the Thrissur-Palakkad highway (NH-47). The College of Horticulture, College of Forestry and the College of Co-operation, Banking and Management are located in the main campus. The eight agricultural research stations located in the central zone are Regional Agricultural Research Station ((RARS), Pattambi, Cashew Research Station, Anakkayam, Agricultural Research Station, Mannuthy, Cashew Research Station, Madakkathara, Banana Research Station, Kannara, Agronomic Research Station, Chalakkudy, Aromatic and Medicinal Plants Research Station, Odakkali and Pineapple Research Station, Vazhakulam.

In addition to state funds, the University receives assistance from ICAR, World Bank, Department of Electronics, FERRO, USDA, Hindustan Cocoa Products Ltd., Coffee Board, Department of Bio-Technology, Department of Agriculture and Co-operation, Department of Science and Technology, Department of Soil Conservation, Department of Atomic Energy, Directorate of Cashew Development, Directorate of Cocoa, Areca nut and Spices Development, FACT, IFFCO, FAO, EC and various other agencies.

3.3 . Selection of the sample.

The sample for the study consisted of all the externally aided research projects completed from 1995 onwards in the Kerala Agricultural University main

campus and all the agricultural research stations in the central zone. The principal investigators of these projects were the respondents for the study. Since the completed KAU research projects during the period were not sufficient enough to be considered as sample for the study, the externally aided projects alone were purposively selected as the sample for this study.

The list of projects and their principal investigators were collected from the annual report of KAU 1996-97 & 1997-98 and also from the respective research stations. Out of the total 70 possible respondents only 65 were in position at the time of investigation. Further, only 55 scientists responded to the questionnaire within the stipulated time of two months despite repeated reminders and personal follow up. These 55 scientists finally made up the sample for the study.

3.4. Selection of variables for the study

The very objective of the study necessitated the selection of the dependent variable: quality management.

With regard to the independent variables, a list of 23 variables seemingly related to quality management was prepared based on the review of available literature. The list of variables was then given to 30 judges comprising social scientists in the College of Horticulture, Vellanikkara, College of Co-operation, Banking and Management, Vellanikkara, College of Veterinary and Animal Sciences, Mannuthy. They were requested to examine the variables critically and rate the relevancy of each variable in relation to quality management in agricultural research, on a 3-point continuum ranging from 'more relevant', 'relevant' and 'less relevant' with weights 3,2 and1 respectively. The scores for each item were summated over all the respondents and a relevancy co-efficient for each variable was worked out by dividing the total score obtained by the

total possible score. The variables with a relevancy co-efficient of 0.8 and above were finally selected for inclusion in the study. Accordingly, 14 variables viz. experience, training, technical competence, scientific orientation, achievement motivation, scope for personal development, attitude towards job, job commitment, job satisfaction, task identity, job autonomy, perceived workload, infrastructure facilities and organisational climate were selected.

3.5. Operationalisation and measurement of the dependent variable

Drawing from theoretical conclusions and considered views of experts, quality management was operationalised for the present study as "excellence in every stage of agricultural research starting from conceiving a research project, conducting it and preparing the final report".

A variety of approaches have been attempted in the past to assess the quality management in industrial and educational fields. The 'elements approach' suggested by Garvin (1988) is one among them. It includes an understanding of the elements of dimensions of quality. If a product or service was rated better than another on one or more of these dimensions it would be considered a higher quality. When this approach is used, the ranking could be high on one dimension yet low on another dimension

Norton (1993) reported that quality scales might be used as tools for priority setting in decision making as well as for evaluating research proposals, ongoing or completed research. In a study conducted to assess the quality of education in technical institutes, Joglekar (1999) suggested that quantifiable indicators can be used to objectively assess the quality of education.

Drawing liberally from the experience of the earlier approaches and theoretical conclusions, a new course was attempted in the present study to measure the quality management in agricultural research in Kerala Agricultural University by developing a composite scale as detailed below.

3.5.1.Dimensions of quality management in agricultural research.

Delving into the vast volume of available literature and having threadbare discussions with the resource persons in the field of agricultural research, ten different dimensions of quality management in agricultural research were finalised. It was decided to give specific weights (scale values) to each dimension based on their perceived importance in deciding the final quality of agricultural research.

3.5.2. Determination of scale values.

Normalised Rank Method suggested by Guilford (1954) was used for determining the scale values. The method has got a unique advantage that it can be used with any number of variables and also does not require a large number of judges. Gowda (1977) and Mathew (1989) used this method to compute scale values for the dimensions of communication behaviour of farmers and dimensions of managerial leadership respectively. As per the method, the ten different stages of agricultural research were ranked by a group of judges based on their importance in deciding the final quality of agricultural research. Rankings were obtained from 36 judges who involved experts in agricultural research in Kerala Agricultural University. Rankings from the judges were then tabulated and a frequency distribution denoted by 'f_{ji}' was worked out for each dimension over all the ranks. For different numbers of stimuli ranked 'n' corresponding 'C' values were available from the Table. Then, 'fji' multiplied by the corresponding 'C' value and summated over all the ranks gave a total score '$\Sigma f_{ji}C_i$' for each dimension.

'$\Sigma f_{ji}C_i$' was further divided by the total number of judges and the consequent value 'Rj' was subjected to linear transformation to arrive the scale value 'Rc' using the formula.

$$Rc = 2.357\,Rj - 7.01$$

The procedure in detail may be seen in appendix II

3.5.3. Selection of items.

Based on review of available literature and discussions with those involved in agricultural research, dimensions of quality related to each stage of agricultural research were prepared. Care was taken to exhaust the universe of content and was then subjected to item analysis.

3.5.4 Item analysis

The items along with necessary instructions were then sent to 50 judges composed of experienced agricultural scientists in Kerala Agricultural University. The judges were requested to assess the relevancy of each item in reflecting the quality of agricultural research on a 5-point continuum ranging from 'most relevant' to 'least relevant', weighted 5,4,3,2 and 1 respectively. Only 36 judges responded within a time span of one month. The scores for each item were summated over all the respondents and a relevancy co-efficient was worked out by dividing the total score obtained with the total possible score. The items with a relevancy coefficient of 0.7 and above were selected for inclusion in the final scale.

3.5.4. Reliability of the scale.

Reliability is the ability of a test instrument to yield consistent results from one set of measures to another. A good instrument should evoke responses that are valid and yield nearly the same results if administered twice to the same respondents (Good and Hatt,1952). According to Kerlinger(1964) reliability is the accuracy or precision of a

measuring instrument. Of the various methods of estimating test reliability, the split-half technique was employed in the present study. From a single administration of a single form of a test, it is possible to arrive at a measure of test reliability by various split-half procedures. In this procedure, two scores are obtained for each sample by dividing the test into comparable halves in different ways; the easiest being finding the scores on the odd and even items of the test. Accordingly, the scale was administered to 30 non-sample respondents and two half scores obtained for each respondent were then correlated. The correlation coefficient (r =0.936) thus obtained was found to be highly significant indicating excellent reliability for the scale.

3.5.5. Validity of the scale.

An index of validity helps to ascertain whether a test instrument measures what it claims to measure. Validity is the most important criterion by which a test may be judged. English and English (1958) defined validity of a scale as the property, which ensures that obtained test scores measure the variable they are supposed to measure. The validity of the present scale was ascertained using the following procedures.

(a) Content validity

According to Thakur (1993) content validity is the representativeness of the items in the scale with reference to the universe of items of the property being measured. It includes both face validity and sampling validity. Content validity of the scale was measured by two means. The items selected for inclusion in the scale were based on extensive literature review and discussion with experts in the subject. This was one means of establishing content validity. The items thus obtained were then subjected to the opinion of panel of judges to find out whether the items were relevant/ important for inclusion in the scale or not. This was the second means of establishing content validity.

In this process the items were subjected to rigorous editing. Many items got eliminated and many were modified and refined prior to submitting them to judges' rating. These thorough and rigorous procedures followed in developing the scale automatically ensured it high face validity and sampling validity.

(b) Construct validity.

The notion of construct validity arises because of the complex and intangible traits associated with the variable included in the study. Anastasi (1961) indicated some specific techniques that could be utilized to establish construct validity. They are:

1) Correlation with a criterion
2) Correlation with other tests
3) Factor analysis
4) Internal consistency and
5) Effect of experimental variables on test scores

For the purpose of this study, the first technique was employed to establish the construct validity of the scale.

1) Correlation with a criterion.

Cronbach (1960) has delineated three steps in the procedure for establishing construct validity. They are:

a) Deciding what constructs possibly account for the test performance
b) Deriving hypothesis from the theory involving the construct
c) Testing the hypothesis empirically

The first two steps were properly taken care of during the construction of the scale. Regarding the second step, it was hypothesized that a higher level of quality management corresponded to a higher level of achievement motivation. An individual

with a higher level of achievement motivation will naturally try to excel in any activity he undertakes and hence can be expected to be keen in quality management. The assumption posited in the hypothesis is thus quite logical.

To test the hypothesis empirically, which constituted the third step, the achievement motivation scores of 30 non- sample respondents and the quality management scores of their research projects were correlated. The 'r' value obtained (0.5425) was found to be positive and significant and the hypothesis was accepted, thus clearly establishing the construct validity of the scale.

3.5.6. Administration of the scale.

The final scale was administered to the respondents along with the questionnaire for a self-rating of any one of the externally aided project they completed. While administering the scale, the respondents were requested to rate their projects on each of the item in the scale against the continuum given ranging from minimum 1 to maximum 10. After getting the responses, the scores were summated over all the items under a dimension and it was multiplied by the weight (scale value) of that dimension. The product thus obtained was the quality management score for each dimension of the research. The scores over all the stages of agricultural research yielded the composite quality management score for each research project. The possible range of scores on this scale was 44 to 595.

3.6. Operationalisation and measurement of the independent variables.

3.6.1.Experience.

It was operationalised as the number of completed years of service by the respondents in the field of agricultural research at the time of enquiry.

3.6.2. Training

It was operationalised for the purpose of the study as the total number of trainings attended by the scientist in service within and outside the organization. It was calculated in weeks.

3.6.3. Technical competence.

It refers to the extent to which the respondent felt that he/she was competent in the various aspects of agricultural research. The variable was measured using a schedule developed for the study by the researcher. Five broad areas pertaining to agricultural research were identified in consultation with experts and the respondents rated their technical competence against each of these areas on a 3-point continuum: 'more competent', 'competent' and 'less competent' and weighted 3,2 and1 respectively. A total score was obtained for each individual by summating the weights over all the five areas. The score ranged from 5 to 15. The details of the schedule may be seen in Appendix III

3.6.4. Achievement motivation

The variable pertained to the value associated with an individual, which drives him to excel in his job in order to attain a sense of accomplishment. Different researchers have used different methods for measuring achievement motivation in the past. Edwards (1957) used personal preference schedules, McClelland (1958) advocated organised fantasy in stories (TAT) and Morrison (1962) devised a method of sentence completion for scheduling this concept. However, Hafeez (1968), Singh (1974),Reddy (1976) and Rao (1983) measured achievement motivation using questionnaire method. For the purpose of this study, the modified scale of Hafeez (1968) was adopted. It was a five-item scale with five alternatives to each item. The respondent was requested to pick

one alternative to each item. Scoring was done using the method of summated rating and the possible score range on this scale was 5 to 25.

3.6.5. Scientific orientation

It was operationalised as the degree to which the individual has orientation towards scientific advances in the field. The scientific orientation scale developed by Supe (1969) was adopted with suitable modifications for measuring this variable. The scale consisted of five items which were rated on 5-point continuum ranging from strongly agree to strongly disagree, weighted 5,4,3,2 andl respectively. The total score for a respondent was the summation of weights over all the items. The range of possible scores on this scale was 5 to 25.

3.6.6. Scope for personal development.

It was operationalised as the perception of the individual as to what he feels about the organisational facilities such as opportunities to undergo training programmes and exposure to advanced technologies, which would facilitate him to rise up to the desired level. The variable was measured using the scale developed by Nambiar (1998). It was a six-item scale with four negative statements and two positive statements. The responses were obtained on a 5-point continuum ranging from strongly agree to strongly disagree, weighted 5,4,3,2 andl respectively. The scoring pattern was reversed for the negative statements. The scores summated over the six items constituted the total score for an individual. The range of scores on this scale was 5 to 25.

3.6.7. Attitude towards job.

It refers to the degree of favourable and unfavourable feeling associated with one's job. The variable was quantified using the attitude questionnaire of Texas Instruments; with suitable modifications. The questionnaire had seven statements out of

which the first four were negative and the remaining three were positive. The responses were obtained on a 5-point continuum ranging from strongly agree to strongly disagree, weighted 5,4,3,2 and1 respectively. The scoring pattern was reversed for negative statements. The possible score range on this scale was 5 to 25.

3.6.8. Job satisfaction

It refers to the degree of satisfaction or dissatisfaction of an individual towards various components of his/her job. Over the years various ways of measuring job satisfaction was tried. As stated by Locke (1976) interest in the consequences of job satisfaction has generated a tremendous volume of research. The variable was measured in the present study adopting the scale developed by Laharia (1978) and applied by Reddy (1986) and Mathew (1989). The scale consisted of 12 items touching various aspects of an individual's job and position in an organisation, rated on a 5-point continuum ranging from 'very much satisfied' to 'very much dissatisfied, weighted 5,4,3,2 and1 respectively. The total score for a respondent was the summation of weights over all the items. The range of possible score on this scale was 12 to 60.

3.6.9. Job commitment

It was operationalised as the extent of involvement of the scientist in different activities in relation to his/her job. The modified scale of Joseph (1983) was used for measuring this variable. It was a five-item scale rated on a 5-point continuum ranging from 'strongly agree' to 'strongly disagree' weighted 5,4,3,2 and1 respectively. The scoring pattern was reversed for the fourth statement, which was negative. The scores were summated over all the items to arrive at the total score for an individual. The possible score range on this scale was 5 to 25.

3.6.10. Task identity.

Task identity refers to the degree to which a job requires completion of a 'whole and identifiable piece of work viz. doing a job from beginning to end with a visible outcome. This variable was measured using the scale developed by Hackman and Lawler (1971) with a slight modification in the scoring system. The scale consisted of a simple question regarding task identity in the scientists' job with three choices reflecting this characteristic in varying degrees, 'very little', 'moderate' and 'very much', with scores 1,2 and 3 respectively. The respondents were requested to answer the question based on their perceptions regarding task identity in their jobs by choosing the most appropriate alternative from among the choices.

3.6.11. Job autonomy.

It refers to the degree to which a job provides substantial freedom, independence and discretion to the individual in scheduling the work and determining the procedures to be used in carrying it out. Hackman and Lawler (1971) developed a scale to measure job autonomy while studying employee reactions to job characteristics. The same scale was applied for this study also. Three choices manifesting autonomy in varying degrees:'very little', 'moderate,' and 'very much', weighted 1,2 and 3 respectively in answer to the question 'how much autonomy do you have on your job?' formed the main body of the scale. Based on their perceptions concerning autonomy in their jobs, the respondents were required to choose the appropriate alternative.

3.6.12. Perceived workload

Workload refers to the average pressure of work assigned to an individual in an organization within a specified time. The variable was quantified using the scale

developed by Kirmeyer and Dougherty (1988). On this scale subjects rated the extent to which they felt 'busy or rushed', 'pressured', 'that the amount of work they did interfered with how well it got done', and 'that the number of requests, complaints or problems dealt with was more than expected' on a 5-point continuum. The points of the continuum were ' strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree' with scores 4,3,2,1 and 0 respectively. The scores summated over the four items constituted the total score for an individual. The range of scores on this scale was 0 to16.

3.6.13. Infrastructure facilities.

It was operationalised as the extent of availability of infrastructure facilities in the university to do quality research as perceived by the scientists. To measure this variable the respondents were requested to record their perception about the availability of infrastructure facilities in the university on a five point continuum ranging from most sufficient to least sufficient, weighted 5,4,3,2 and 1 respectively.

3.6.14. Organisational climate.

It was operationalised as the sum total of an individual's perceptions with respect to organizational procedures, policies and practices. The modified scale of Litwin and Stinger (1968) was used for measuring this variable. The scale consisted of nine items involving different dimensions of organizational climate, rated on 3-point continuum: 'agree', 'somewhat agree' and 'disagree' with scores 3, 2 and1 respectively. The scoring pattern was in the reverse order for the first statement, which was negative. The scores were summated over all the items to arrive at the total score for an individual. The possible score range for this scale was 9 to 27.

3.7.Problems related to quality management in agricultural research in kerala Agricultural University.

Based on discussions with agricultural scientists in the university, the major problems, which may influence the quality of agricultural research in Kerala Agricultural University, were identified. These problems were listed and included in the questionnaire. The response to each problem was obtained in a 3-point continuum: 'more relevant', 'relevant' and 'less relevant' with weights 3,2 and 1 respectively. Relevancy co-efficients for each problem was worked out by dividing the total score obtained for each problem with the total possible score. Based on these values the problems were ranked.

3.8.Data collection procedure

In the present study, data were collected using a pre-tested, structured and standardized questionnaire. Devout attention and utmost care had been spared in finalising the wording and format of the questionnaire to eliminate mistakes and any element of ambiguity regarding the various items. The print, layout and font size also had been chosen with maximum discretion to make the questionnaire appealing, attractive and handy. The questionnaire complete in all respects with an addressing letter and clear instructions were then given to the respondents in person during July 2001.By the last week of August 2001, 55 questionnaires had been received back.

3.9.Statistical tools employed for data analysis.

Data collected from respondents were coded, compiled and analysed using the following statistical techniques. Data analysis was done in the statistical department of the College of Horticulture, Vellanikkara.

3.9.1.Conversion of raw scores into standardised scores

Since the different scales used in the study had unequal number of items, the possible maximum score for the scales varied considerably. This necessitated the conversion of these scores into some other comparable form of data. The raw scores on each of the dimensions of quality management scale were also transformed into standard scores. The formula used for conversion of raw scores to standard score was:

Standard score = Total score obtained / Possible maximum score x 100

3.9.2.Pearson's product moment correlation.

This measure was used to assess the nature and degree of relationship between the independent variables and the dependent variable (y) and also among the independent variables. The computed values of 'r' were tested for their significance using table values at n-2 degrees of freedom.

3.9.3 Multiple correlation and regression analysis.

In the simple correlation analysis (Pearson's product moment correlation) each one of the independent variables was hypothesised to have an amount of independent effect on the dependent variable. The relationships were expressed in terms of simple correlation co-efficient. But, the dependent variable is not solely influenced by any of these variables, but by all of them, through their reciprocal and interactive relationships. Thus the need for multiple correlation and regression analysis arises.

The multiple correlation co-efficient (R) represents the zero-order correlation between the actual score and predicted score of the dependent variable obtained from the independent variables under consideration. The square of the multiple correlation co-efficient (R^2) represents the proportion of the total variation explained by the independent variables jointly in the regression equation.

Multiple regression analysis was employed to determine the relative importance of each independent variable in explaining changes in the dependent variable.

3.9.4.Step-wise regression

Step-wise regression was employed to obtain information regarding the best subgroup of variables and the relative contribution of each of these independent variables (x_i) to the variations in the dependent variable (y). Step-wise regression analysis selects the best subset of variables in predicting variations in the dependent variable in such a manner that

a) it yields the largest multiple correlation among all subsets
b) inclusion of the remaining variables does not significantly improve the prediction of the dependent variable.

3.9.5.Multivariate path co-efficient analysis.

Path analysis originally developed by Wright (1921) followed by Li (1955), Land (1969) and Singh and Choudhary (1979) was put to use to know the nature of influence of the independent variables in terms of direct and indirect effects on the dependent variable in the prediction model used. Only those variables identified in the step-wise regression analysis as having a reasonable contribution to the variations in the dependent variable were included for this part of the analysis.

RESULTS

4. RESULTS

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

4.1. Dimensions of quality management in agricultural research.

4.2.Distribution of respondents with respect to selected independent and dependant variables.

4.3.Relationship between selected personal, psychological, job/organizational variables and quality management.

4.4.Inter correlation among the independent variables.

4.5.Contribution of selected personal, psychological and job/ organizational variables in explaining variations in quality management.

4.6.Relative importance of selected independent variables in explaining variations in quality management.

4.7.Direct and indirect effects of the selected independent variables on quality management.

4.8.Problems related to quality management in agricultural research in Kerala Agricultural University.

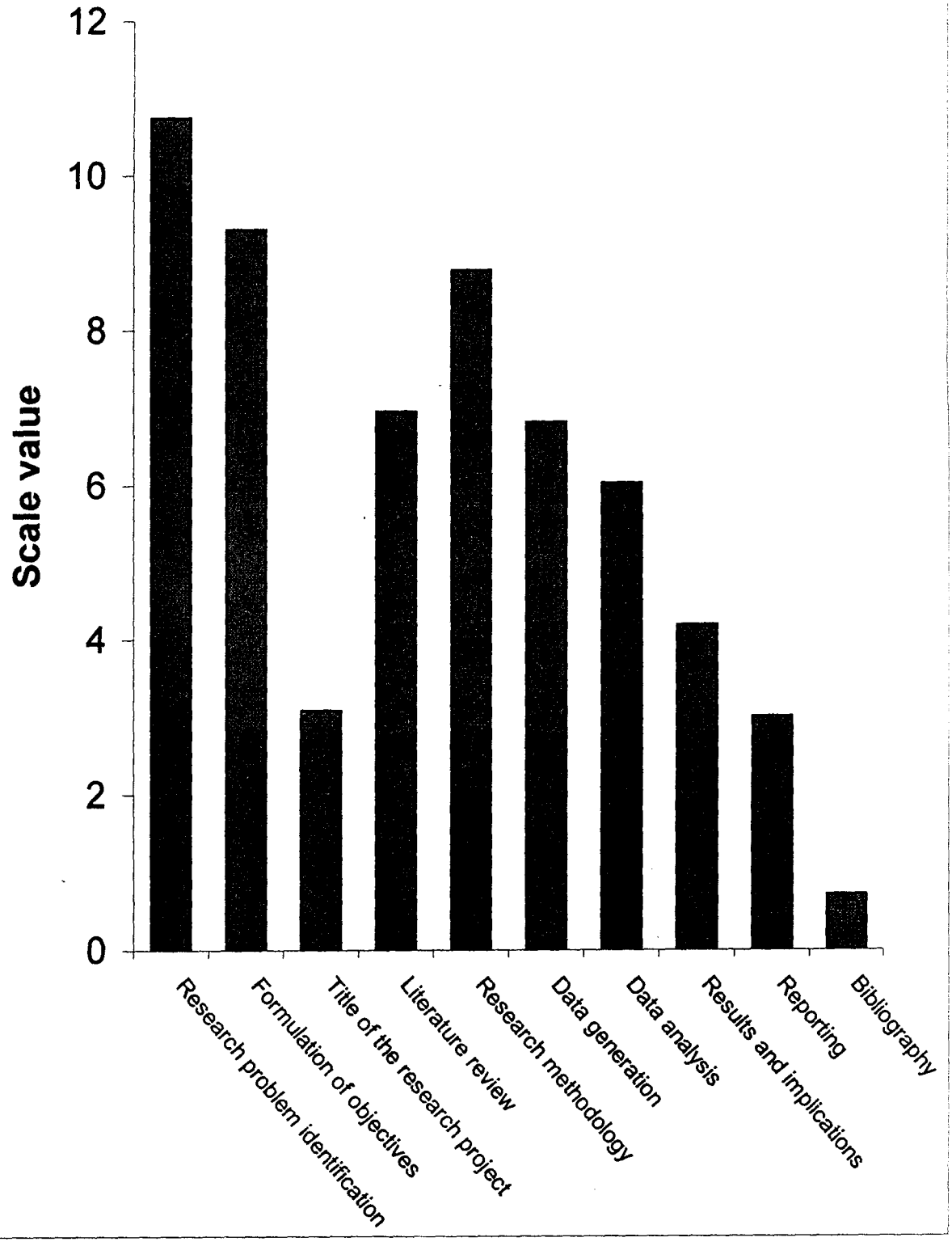
4.1. Dimensions of quality management in agricultural research

Table 4.1 presents the scale values obtained by different dimensions of quality management in agricultural research, which was based on the perceived importance of each dimension in deciding the final quality of agricultural research. It is observed from the Table that among the 10 different dimensions of quality management in agricultural research, research problem identification got the highest scale value, followed by ' formulation of objectives', 'research methodology', 'Literature review', 'data generation', 'data analysis', 'results and implications', ' project title', 'reporting' and ' bibliography' in descending order.

Table 4.1 Dimensions of quality management in agricultural research with their scale values

Sl.No.	Dimensions	Scale value
1.	Research problem identification	10.74
2.	Formulation of objectives	9.3
3.	Title of the research project	3.08
4.	Literature review	6.94
5.	Research methodology	8.76
6.	Data generation	6.8
7.	Data analysis	6.02
8.	Results and implications	4.19
9.	Reporting	3.0
10.	Bibliography	0.72

Fig 4.1 Perceived importance of the dimensions of quality management in the final quality of agricultural research



4.2. Distribution of respondents with respect to selected independent and dependant variables

The respondents were categorised in to ' high', 'medium' and 'low' group by arbitrarily fixing the score range. For all the variables except experience and training, the possible score range was 0 to 100. For experience and training the categorisation was done based on mean and standard deviation.

The results of the study relating to distribution of the respondents with respect to quality management in agricultural research are given in Table 4.2. It is encouraging to note from the Table that a good majority of the respondents (75 %) belonged to the 'high' category and the remaining 25 % respondents were found to fall in the 'medium' category.

Categorisation and distribution of respondents based on selected personal, psychological and job/ organizational variables may be found on Table 4.3, 4.4 and 4.5.As could be observed from the tables, a good majority of the respondents belonged to the 'medium' category with respect to most of the variables. However, scientific orientation and job commitment were seen to have majority of the respondents in the 'high' group and further, with respect to technical competence majority belonged to the 'medium' category.

4.3 Relationship between selected personal, psychological, job/organizational variables and quality management.

A cursory glance of the data presented in the Table 4.6 indicates the relationship of the selected personal, psychological and job/ organizational variables with quality management. The computed 'r' values had been tested for their significance by comparing with the table values at n-2 degrees of freedom. Strange though, only two variables viz. scope for personal development and task identity expressed significant relationship with quality management. All the other 12 variables were found to have poor correlation with the dependent variable: quality management. The empirical model for the study showing the observed relationship is presented in Fig. 4.2.

Table 4.2. Distribution of respondents with respect to quality management

Sl.No.	Category	Score range	Frequency	Percentage
1.	High	Above 80	41	75
2.	Medium	50-80	14	25
2.	Low	Below 50	-	-

Table 4.3. Distribution of respondents based on selected personal variables

Sl.No	Variables	Category	Score range	Frequency	Percentage
1.	Experience	High	Above 24	7	13
		Medium	14 to 24	34	63
		Low	below 14	13	24
2.	Training	High	Above 28	3	5
		Medium	4 to 28	39	71
		Low	below 4	13	24
3.	Technical competence	High	Above 80	24	44
		Medium	50-80	31	56
		Low	below 50	-	-

Table 4.4 Distribution of respondents based on selected psychological variables.

Sl.No.	Variables	Category	Score range	Frequency	Percentage
1.	Scientific orientation	High	Above 80	30	55
		Medium	50-80	25	45
		Low	below 50	-	-
2.	Achievement motivation	High	Above 80	12	22
		Medium	50 to 80	40	73
		Low	Below 50	3	5
3.	Scope for personal development	High	Above 80	4	7
		Medium	50 to 80	29	53
		Low	Below 50	22	40
4.	Attitude towards job	High	Above 80	9	7
		Medium	50 to 80	42	53
		Low	Below 50	4	40
5.	Job commitment	High	Above 80	30	55
		Medium	50-80	25	45
		Low	below 50	-	-
6.	Job satisfaction	High	Above 80	4	7
		Medium	50 to 80	41	75
		Low	Below 50	10	18

Table 4.5. Distribution of respondents with respect to selected job/ organizational variables.

Sl.No.	Variables	Category	Score range	Frequency	Percentage
1.	Job autonomy	High	Above 80	16	29
		Medium	50 to 80	38	69
		Low	Below 50	1	2
2.	Task identity	High	Above 80	14	25
		Medium	50 to 80	40	73
		Low	Below 50	1	2
3.	Perceived work load	High	Above 80	8	15
		Medium	50 to 80	32	58
		Low	Below 50	15	27
4.	Infrastructure facilities	High	Above 80	-	-
		Medium	50 to 80	20	36
		Low	Below 50	35	64
5.	Organisational climate	High	Above 80	4	7
		Medium	50 to 80	31	56
		Low	Below 50	15	27

4. 4 Inter correlation among the independent variables.

The inter correlation matrix for the independent variables as given in Table 4.7 provides a broad picture of the relationships among the selected independent variables. It could be seen from the table that half of the variables included in the study were inter correlated with each other. Among the variables, organizational climate showed a positive and significant relationship with variables like scope for personal development, attitude towards job and job satisfaction. Also job commitment showed a positive and significant association with perceived workload, technical competence and achievement motivation. There was a positive and highly significant relation between job satisfaction and scope for personal development.

4.5 Contribution of selected personal, psychological and job/ organizational variables in explaining variations in quality management: results of multiple regression analysis.

The correlation coefficients established the independent effect of each of the selected personal, psychological and job/ organizational variables on quality management. The relationship had been expressed in terms of zero-order correlation coefficients. However, a closer look will reveal that quality management is not influenced by any of these factors in isolation, but rather by all of them as part of an interdependent system through their reciprocal and interactive relationships. A solution to this problem can be obtained by applying the multiple correlation and regression analysis. The multiple regression analysis was employed in this study to analyse the proportion of total variation in the dependent variable explained jointly by the independent variables and also to determine their relative importance in contributing to this variation.

The data furnished in the Table 4.8 clearly indicate that all the independent variables taken together accounted for only 29.39 percent of variation in the dependent variable: quality management.

Table 4.6. Correlation between the selected independent variables and quality management

n = 55

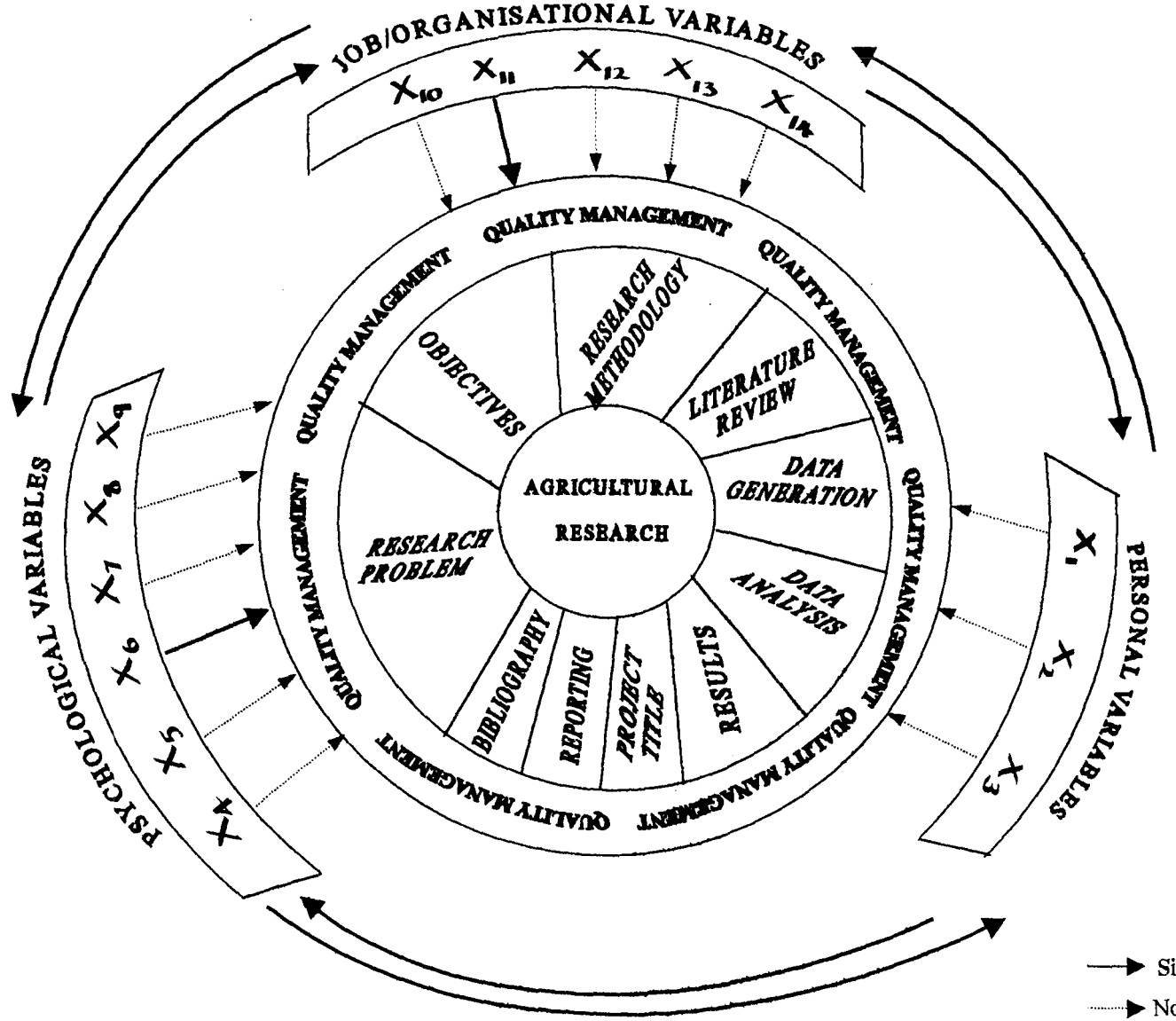
Variable No.	Selected variables	Value of 'r'
x_1	Experience	0.1566
x_2	Training	0.0746
x_3	Technical competence	0.2191
x_4	Scientific orientation	-0.0040
x_5	Achievement motivation	0.0213
x_6	Scope for personal development	0.2854*
x7	Attitude towards job	0.1930
x_8	Job commitment	0.1194
x_9	Job satisfaction	-0.0187
x_{10}	Job autonomy	0.1196
x_{11}	Task identity	0.2913*
x_{12}	Perceived workload	-0.0364
x_{13}	Infrastructure facilities	-0.0069
x_{14}	Organizational climate	0.1516

* Significant at 0.05 level

Table 4.7 Intercorrelation matrix of independent variables

	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_1	1	0.169	0.281*	0.088	0.069	-0.132	-0.163	0.126	-0.112	0.243	-0.039	0.259	0.003	-0.129
x_2		1	0.203	-0.147	0.25	0.088	0.089	0.196	0.079	0.112	0.062	0.156	0.116	-0.046
x_3			1	0.083	0.232	0.049	0.086	0.449*	0.067	0.139	0.055	0.338*	-0.143	-0.03
x_4				1	0.099	-0.065	-0.027	0.198	-0.242	-0.152	0.059	0.196	-0.118	-0.099
x_5					1	0.152	0.11	0.563*	0.09	-0.062	0.088	0.146	0.025	-0.011
x_6						1	0.545	0.215	.544*	0.184	0.024	-0.343*	0.06	0.563*
x_7							1	0.231	.511*	0.114	0.107	-0.153	0.012	0.540*
x_8								1	0.117	0.037	0.031	0.383*	0.167	0.173
x_9									1	0.276	0.023	-0.139	0.272	0.545*
x_{10}										1	0.115	0.185	-0.065	0.027
x_{11}											1	0.086	0.027	0.165
x_{12}												1	0.093	-0.089
x_{13}													1	0.223
x_{14}														1

* Significant at 0.05 level



X_1 - Experience
X_2 - Training
X_3 - Technical competence
X_4 - Scientific orientation
X_5 - Achievement motivation
X_6 - Scope for personal development
X_7 - Attitude towards job

X_8 - Job commitment
X_9 - Job satisfaction
X_{10} - Job autonomy
X_{11} - Task identity
X_{12} - Perceived work load
X_{13} - Infrastructure facilities
X_{14} - Organisational climate

FIG. 4.2 EMPIRICAL MODEL FOR THE STUDY

4.6. Relative importance of selected independent variables in explaining variations in quality management: Results of step-down regression analysis.

Multiple regression analysis gave the joint influence of all the selected independent variables on quality management. But it is always better to have a reduced model in which there is less number of predictors on quality management, step-down regression analysis was done. Various steps of the analysis are presented in Table 4.9. The stopping rule for step-down regression, suggested by Chatterjee and Price (1977) was adopted here i.e. stop if minimum absolute 't' ratio is >1.This ended up with the selection of five variables namely experience (x_1), technical competence (x_3), scope for personal development (x_6), job satisfaction (x_7) and task identity (x_{11}). The selected variables along with their regression co-efficient, standard error and 't' value are presented in Table 4.10. It is interesting to note that the regression model with selected five predictors is fit enough to explain 26.74 percent of the total variation in dependent variable where as the full model with 14 variables yielded only 29.31 percent.

4.7. Direct and indirect effects of the selected independent variables on quality management: Results of path coefficient analysis.

The correlation coefficient establishes the nature and degree of influence of each independent variable on the dependent variable while multiple regression co-efficient indicates the joint influence of all these independent variables together on the dependent variable. However, both the procedures fail to explain the direct and indirect effects of these variables on the dependent variable. This prompted the researcher to proceed to multivariate path analysis, a statistical technique used to determine the direct and indirect effects of predictor variables on a consequent variable.

In the present study, the selected five variables, which had maximum predictive power in explaining variation in quality management, were subjected to multivariate path analysis the results of which are furnished in Table 4.11.

Table 4.8 Predictive power of the selected independent variables on quality management.: results of multiple regression analysis.

n = 55

Variable No.	Selected variables	Partial regression coeff. 'b'	Standard error of 'b'	't' value
x_1	Experience	0.293	0.249	1.268
x_2	Training	-0.011	0.080	1.231
x_3	Technical competence	0.108	0.097	1.445
x_4	Scientific orientation	-0.064	0.110	1.248
x_5	Achievement motivation	-0.058	0.106	1.647
x_6	Scope for personal development	0.217	0.114	2.386*
x_7	Attitude towards job	0.085	0.121	1.865
x_8	Job commitment	0.014	0.171	2.294*
x_9	Job satisfaction	-0.210	0.127	2.060*
x_{10}	Job autonomy	0.005	0.083	1.374
x_{11}	Task identity	0.161	0.078	1.108
x_{12}	Perceived workload	-0.015	0.078	1.849
x_{13}	Infrastructure facilities	0.011	0.095	1.248
x_{14}	Organizational climate	-0.004	0.125	2.133*

$R^2 = 0.2931$, $F = 1.18$

* Significant at 0.05 level

Table 4.9 Results of step-down regression analysis

Step No.	Variables for regression	R^2	Multiple correlation coeff.	F value
1.	$x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, x_9, x_{10}, x_{11}, x_{12}, x_{13}, x_{14}$	0.2931	0.5414	1.18
2.	Down x_{14}	0.2931	0.5414	1.31
3.	Down x_{10}	0.2930	0.5413	1.45
4.	Down x_8	0.2929	0.5412	1.62
5.	Down x_{13}	0.2927	0.5410	1.82
6.	Down x_2	0.2924	0.5407	2.07
7.	Down x_{12}	0.2918	0.5402	2.37
8.	Down x_4	0.2849	0.533	2.68
9.	Down x_7	0.2768	0.5262	3.06

Remaining variables $x_1, x_3, x_6, x_9, x_{11}$

Table 4.10. Multiple regression analysis of variables selected through step-down regression

Variable no.	Characters	Partial regression coeff. 'b'	Standard error of 'b'	't' value
x_1	Experience	0.253	0.215	1.175
x_3	Technical competence	0.095	0.078	1.218
x_6	Scope for personal development	0.237	0.081	2.919*
x_9	Job satisfaction	-0.167	0.097	1.718
x_{11}	Task identity	0.158	0.068	2.316*

$R^2 = 0.2674$

* Significant at 0.05 level

Table 4.11. Path analysis of selected variables with quality management

Sl. No.	Selected variables	Variable no.	Direct effect		Total indirect effect		Max.indirect effect	
			Effect	rank	Effect	rank	Effect	variable
1.	Experience	x_1	0.1520	IV	0.0046	IV	0.0439	x_3
2.	Technical competence	x_3	0.1565	III	0.0626	II	0.0427	x_1
3	Scope for personal development	x_6	0.4272	I	-0.1418	V	0.0078	x_3
4.	Job satisfaction	x_9	-.2511	V	0.2324	I	0.2323	x_6
5.	Task identity	x_{11}	0.2841	II	0.0072	III	0.0104	x_6

A perusal of the Table 4.11 brings to focus certain interesting findings. As per data, the highest direct effect was recorded by scope for personal development followed by task identity, technical competence, experience and job satisfaction in the descending order.

The results in the Table further revealed that job satisfaction, which had a comparatively smaller direct effect indicated the largest total indirect effect and the variable scope for personal development, which had the maximum direct effect showed the least total indirect effect.

Further the data in terms of maximum indirect effect of selected variables on quality management suggested that job satisfaction and task identity showed their maximum indirect effect through scope for personal development. The variable scope for personal development showed its maximum indirect effect through technical competence while technical competence had its maximum indirect effect through experience.

4.8. Problems related to quality management in agricultural research in KAU.

The problems related to quality management in agricultural research were identified and opinion of the scientists about these problems were analysed. The problems were ranked based on their score value indicating their importance in influencing quality management in agricultural research. The problems with their score value and ranks are presented in Table 4.12. The problem " inadequate and insufficient mechanism for planning and determining research priorities" and " cumbersome and time-consuming procedures for committing and using research funds" were identified as the most important ones, while " bureaucratic and political interference in research activities" was perceived to be least affecting the quality management in agricultural research in Kerala Agricultural University.

Table 4.12. Problems related to quality management in agricultural research in KAU

Sl. No.	Problems	Relevancy coeff.	Rank
1.	Inadequate opportunities for exposure to modern scientific fields	0.79	IV
2.	Insufficient training of research personnel to improve their professional competence	0.79	IV
3.	Inadequate and insufficient mechanism for planning and determining research priorities	0.84	I
4.	Cumbersome and time consuming procedures for committing and using research funds	0.84	I
5.	Lack of an integrated and multi disciplinary approach in project selection and implementation	0.80	III
6.	Manpower constraints and inadequate infrastructure to carry out the research works	0.77	V
7.	Lack of proper guidance and support from experts for implementing the research projects	0.65	VII
8.	Too much non-research assignments for research scientists, such as administrative work	0.79	IV
9.	Inadequate and defective mechanism for monitoring and periodical evaluation of research work	0.82	II
10.	Lack of an effective tool to assess the research productivity	0.82	II
11.	Inadequate reward systems to attract and motivate the researches	0.80	III
12.	No consideration of the researcher's aptitude in assigning the research projects	0.68	VI
13.	Bureaucratic and political interference in various research activities	0.59	VIII

DISCUSSION

5.DISCUSSION

The salient results of the present study are interpreted and discussed in this chapter under the following sub-headings.

5.1 Dimensions of quality management in agricultural research

5.2 Distribution of respondents with respected to selected independent and dependent variables.

5.3 Influence of selected personal, psychological and job/organisational characteristics on quality management.

5.4 Direct and indirect effects of the selected variables on quality management.

5.5 Problems related to quality management in agricultural research in Kerala Agricultural University.

5.1 Dimensions of quality management in agricultural research

Table 4.1 provides a clear insight into the dimensions of quality management in agricultural research. A perusal of Table 4.1 revealed that 'research problem identification' emerged as the most important dimension of quality management in agricultural research. This indicates that quality can be identified primarily in the innovative, meaningful and imaginative selection of the research problem itself. This finding corroborates the view of Lloyd (1966) that conceiving a research project is the essence of research, a research problem is solved in some fellow's head – the thinking step usually comes first and the experiment then follows as a testing of the idea.

'Formulation of objectives' was identified as the next important dimension of quality management in agricultural research. It is reasonable to conclude that formulation of

objectives could be one of the important dimensions of quality management in agricultural research as the objectives clearly define the focus and direction of research. As Lloyd (1966) stated, formulation of objectives is so important that the solution becomes evident when the problem is properly stated. Arnon (1975) also emphasised the need for a sound formulation of objectives and considered it as one of the most important yardsticks in the preliminary screening of research projects.

'Research methodology' emerged as the next important dimension of quality management in agricultural research. It is only logical that a good methodology ensures the technical soundness of the research work. Quality can definitely be associated with the identification and selection of appropriate standardised tools and proven scientific methods for approaching and attacking the problem.

'Literature review' also evoked a considerably high scale value. It is well accepted that any systematic scientific enquiry has its foundations built upon studies conducted in the past. It provides a firm ground from where to launch your offensive. Hence a quality literature review can certainly be expected to add to the total quality of agricultural research.

Contrary to popular belief, a comparatively low scale value for the dimension 'research results' may appear strange and misleading, but deserves special attention. While there is a general tendency to associate the quality of agricultural research with the end results, the present finding is a thought provoking one. While this finding never needs to be considered as downplaying the importance of a widely acceptable and practicable research result, it projects a new line of thinking that even in the absence of a viable end result, a research work should never be dumped as poor quality.

5.2 Distribution of respondents with respect to selected independent and dependent variables.

As revealed in Table 4.2, majority of the respondents showed a'high level' of quality management in their research work and it is encouraging to note that none of them belonged to the 'low' category. Any superficial inquiry in to this area would be mere speculation. However, it is reasonable to assume that the well-experienced, competent and competitive agricultural scientists in Kerala Agricultural University are really concerned about the quality of their research work, probably emanating from a keen interest to be rated as the best among peers within and outside the organisation.

A perusal of the Tables 4.3, 4.4 and 4.5 reveal that with respect to the variables, technical competence, scientific orientation and job commitment, all the respondents belonged to either 'high' or 'medium' categories. This means that on these variables, all the respondents could secure more than half of the possible score on the scale. However, it should be noted that regarding most of the remaining variables, majority of the respondents were under the 'medium' category. This indicates that majority of the respondents of the study perceived themselves to be neither 'high' nor 'low' with respect to the variables under study.

5.3 Influence of selected personal, psychological and job/organisational characteristics on quality management.

A bird's eye view of Table 4.10 reveal that the variables experience, technical competence, scope for personal development, job satisfaction and task identity alone together contributed 26.74 per cent variation as against 29.31 per cent by 14 variables

(Table 4.8) together in explaining the variation in quality management. However, it may be noted that though the R^2 value of 29.31 offers scope for enough explanation, a sizeable 70.69 percent of variation in the dependent variable lies outside the variables included in the study. Probably other factors like research planning, monitoring and evaluation etc. and some other personality traits of the scientists might be attributed to this aberrant findings. Also, the self-rating method adopted in the study might have caused some inflation on the quality management scores. From the best subset of variables predicting the variation in quality management (Table 4.10) only two variables, scope for personal development and task identity showed a positive and significant relationship with quality management, though the other three variables had also contributed considerably to the variation in quality management.

In any organisation, organisational facilities such as opportunities to undergo training programmes and exposure to advanced technologies would facilitate the personnel to rise up to the desired level. Scope for personal development refers to the perception of the employees about these facilities and thereby the opportunity for self-growth and the scope to prove their excellence. It is not surprising to see that officials like scientists give much value to this factor. Herzberg's(1966) motivation-hygiene theory also put forth opportunity for growth in the job as a critical motivating factor. Hence the present finding that a positive and significant relationship between scope for personal development and quality management is quite natural. The finding is in conformity with Satapathy and Choudhary (1990) who reported that providing participation in professional seminars, opportunities for self-growth and scope to prove merit were closely related with the output of scientists.

Another important finding is the positive and significant association between task identity and quality management. According to Turner and Lawrence (1965), when the job is high on task identity, the worker is in a better position to realise that he has accomplished something of consequence. For officials like scientists, the job characteristics like task identity may provide positive emotional feelings that result from good job performance. Job characteristic theory by Hackman and Oldham (1976) states that specific job characteristics like task identity provide psychological conditions that lead to greater motivation and performance. This view holds good in the context of the present study, as George (1996) has already reported a positive and significant association between task identity and work motivation of teachers in Kerala Agricultural University. All these clearly vindicate the above finding.

Experience and technical competence were also found to have contributed to the variations in quality management, though the influence was not significant. It is reasonable to assume that officials with more experience put forth better performance. A similar trend was found in the studies of Poornakumar (1988) and Kalaivani (1999) where experience acted as one of the crucial parameters in explaining job performance. It is also logical to say that a sense of competence in the officials give them more confidence and pride and they will be keen to maintain a position of excellence in their field. However, both experience and technical competence showed a non-significant association with quality management, which may be due to poor discrimination of the respondents on these variables.

A negative, but insignificant relationship between job satisfaction and quality is another intriguing finding. This may have several reasons. As Morse (1953) reported, personal characteristics like intelligence, use of skills and level of aspiration may influence

job satisfaction. People who are more intelligent and competent on their work may find insufficient challenge in their job and it may lead to boredom and dissatisfaction. It could also be assumed that the overall job satisfaction of the employees is strongly related to their higher order needs i.e. self-esteem and self-actualisation. Hence it is likely that the more intelligent and competent scientists in Kerala Agricultural University, who are more ambitious about the quality of their research work may remain dissatisfied in many of the other aspects of their job and organisation in terms of position, respect, compensation etc. Cherrington *et al* (1971) found that reward structure mediated the relationship between satisfaction and performance i.e., when the performance was appropriately rewarded, the satisfaction – performance relationship was positive and vice versa. Thus there is no reason to accept the notion that only satisfied workers are productive. The relationship may be much more complex and indirect.

While it is often thought that achievement motivation contributes to work motivation and performance, the poor correlation between achievement motivation and quality management in the study calls for special attention. This finding doesn't agree with the earlier observations of George (1996) that achievement motivation was positively and significantly associated with work motivation of teachers in Kerala Agricultural University. This leads to the conclusion that some other motivational factors have interplayed here. It is reasonable to assume that officials like scientists may value their growth need, which involves more challenge and creativity. Growth needs are major motivational factor in the ERG theory of Alderfer (1969). Growth needs focus on the self such as opportunity for personal growth and development in the job situation. Maslow's self-esteem and self-actualization needs are said to be equivalent to Alderfer's growth needs. A strong positive

association between scope for personal development and quality management elicited in the present study may also support this view. Hence the above finding is justifiable.

5.4 Direct and indirect effects of the selected independent variables on quality management.

Table 4.11 throws light on some of the finer aspects of the relationships between the selected independent variables and quality management. The path coefficient analysis is usually employed to outline the direct and indirect effects of predictor variables on the outcome variable unexplored by either correlation or regression analysis. In the present study, five selected variables obtained in step down regression analysis were subjected to path analysis to sketch out their pattern of direct and indirect effects on quality management.

As regards largest total indirect effect, job satisfaction, though non-significantly correlated with quality management, was found to occupy the first position. Since this variable had least direct effect on the variation in quality management, it is reasonable to assume that it might have been operating indirectly through some other variables, which justifies the above finding. The other variables in the order of importance of their total indirect effect were technical competence, task identity, experience and scope for personal development.

Table 4.11 opened up further information on the maximum indirect effect of the variables on quality management. The variables job satisfaction and task identity showed their maximum indirect effect through scope for personal development. It leads to the conclusion that the psychological variable job satisfaction and specific job characteristic like task identity have got a definite bearing on the perceptions on scope for personal

development. It is reasonable to assume that individuals with high job satisfaction and who feel a high task identity on their job may perceive a high scope for personal development on their job. It is also interesting to observe that experience and technical competence showed their maximum indirect effect mutually through each other. This means that those who are more experienced had more technical competence, which resulted in high quality management.

5.5 Problems related to quality management in agricultural research in Kerala Agricultural University.

A perusal of Table 4:12 reveal that inadequate and insufficient mechanism for planning and determining research priorities and cumbersome and time consuming procedures for committing and using research funds were perceived as the most important problems related to quality management in agricultural research in Kerala Agricultural University. Planning and determining research priorities is a vital step in the research policy formulation of any research organisation. Hence it is imperative that the University has a sound and scientific mechanism to determine the research priorities. As a first step, the vision and mission for the university is to be defined. Once the vision is in place, the mission has to be set in motion by translating it into appropriate policies and procedures. Operationalisation of the agreed, goals, roles and functions in terms of specific research projects and matching of the same with available manpower resources and opportunities is the next step. Finally, adoption of a strategy for executing this plan down to its finest detail. Currently, scientists appear to be agreed that such a fluent mechanism for goal-oriented progress in research is conspicuously lacking in the university. Lack of an effective tool to assess the research productivity and an inadequate mechanism for monitoring and evaluation

of research work emerged as the next important problems related to quality management in agricultural research in Kerala Agricultural University. In most of the technology systems the number of research publications are used as an indicator of scientific productivity. But use of publications as a major index of scientific productivity has been strongly criticized in that the efficiency of any research set up must be determined by the extent to which the technology can be applied for development rather than its worth for publication. However, an objective and critical evaluation of any research activity is difficult since the process of evaluating research is seldom standardised. It would be a formidable task to combine the various components of scientific productivity into a single meaningful measure. Satapathy and Choudhary (1990) concluded that the parameters for measurement of scientific productivity among farm scientists consisted of the following factors in the order of descending importance; production of specific technology, acceptance of the technology by the farmers, publication of results in local newspapers, inclusion of the findings in the package of practices, publication of research papers of state/national/international level, feedback for details by the users, guiding of Ph.D and M.Sc. scholars, presentation of scientific papers, reference of research work by other scientists, number of projects completed, recognition of research work by way of reward/award and writing of technical books. The management should reach a consensus on these parameters, which can be used as an effective tool for assessing the research productivity.

Monitoring and evaluation of research work may be adopted as a strategy to ensure quality of agricultural research in Kerala Agricultural University. A monitoring cell can be established for this purpose.

"Lack of an integrated and multidisciplinary approach in project selection and implementation" and "inadequate reward systems to attract and motivate the researches" were rated as the next two important problems related to quality management in agricultural research. The need for interdisciplinary co-operation on complex, problem-oriented projects is widely advocated. The University should reorient its research policy in this direction, which would help to evolve a system approach in agricultural research. The reward systems currently in vogue are not generally compatible with the goals of the technology systems. In the present reward system, which is based mainly on the number of scientific articles published, practical pamphlets and bulletins aimed at technology transfer to farmers are given little attention while assessment. Moreover, no specific mechanism exists to encourage researchers to produce this type of information. Researchers gain little or no peer recognition for working effectively with transfer of technology. As Eponou (1993) reported, management should design new systems that reward technology generation and transfer, rather than scientific publication.

Regarding the other problems related to quality management in agricultural research the imaginative and competent research administration in Kerala Agricultural University would have to be geared into action in the following measures.

- Continuous professional improvement of the available scientific talent in the University through providing opportunities for exposure to modern scientific fields and also providing adequate training for the research personnel.

- Availability of adequate manpower and infrastructure to carry out the research works in time.
- The research personnel should be exempted from non-research tasks like administrative work so that they can concentrate more on the actual research work

SUMMARY

6. SUMMARY

Research is one of the prime responsibilities of an agricultural university. New ideas, innovations and improved agricultural techniques - the outcomes of research - are the stepping-stones to progressive agriculture. It is generally accepted that if we wish to accelerate the rate of growth in agriculture; we will have to get a breakthrough in the efforts to increase the quality of agricultural research. However there is no uniform view on the concept of quality management in agricultural research. Quality of agricultural research is often associated with the end results. If the results do not have practical utility and wide acceptability, the research is often dumped as poor in quality. This perceptive could be extremely frustrating and disappointing to the researcher concerned, seriously affecting his morale and motivation.

Quality, in fact could be identified at various stages in agricultural research starting from conceiving a research project to completing it and preparing the final report, such that even in the absence of viable end results, the researcher could be credited with due merit.

Horton and Dror (1993) stated that the most potentially useful standard for monitoring and evaluating agricultural research is its optimal quality-that is how good it could possibly be. However the difficulties of transforming the concepts of quality and performance into useable indicators or measures are very great. The final evaluation of completed research projects to assess the project quality has been a part of research management. Still, there have been little efforts to develop a standardised tool for quantification of quality management in agricultural research.

According to Brady (1973) the quality of scientists will determine the quality of research that is done. Success in research depends to a very large extent on the abilities and motivation of the individual scientists as well as the opportunities offered to him for carrying out his work within a favourable environment (Anderson, 1982).

Taking into cognisance the above aspects, the present study was conceived with the main purpose of studying the quality management in agricultural research in Kerala Agricultural University. The specific objectives of the study were as follows:

1) To identify the dimensions of quality management related to agricultural research
2) To standardise a measuring instrument for quantifying quality management in agricultural research and to measure the quality management in agricultural research in Kerala Agricultural University.
3) To study the influence of selected personal, psychological, job and organisational characteristics on quality management in agricultural research.
4) To identify the problems related to quality management in agricultural research in Kerala Agricultural University.

The very objective of the study necessitated the selection of dependent variable: quality management in agricultural research. Quality management in agricultural research was operationally defined as excellence in every aspect of agricultural research, starting from conceiving a research project to completing it and preparing the final report. In the first part of the study, the critical dimensions related to quality management in agricultural research were identified. A composite scale was developed using Guilford's (1954) Normalised Rank Method and was tested for reliability and validity using accepted scientific procedures. The scale was used for quantifying the dependent variable quality management.

As regards the selected independent variables, either adopted scales or schedules developed for the study were used for measuring them.

Ex post facto research design was adopted for the study. A pre-tested, structured and standardised questionnaire was used for data collection. All the externally aided research projects completed after 1995 in the central zone were considered as the sample for the study and the principal investigators of these projects formed the respondents. However a little over 20 per cent of the selected scientists failed to respond to the questionnaire and finally 55 scientists constituted the respondents of the study.

Data analysis was carried out using appropriate statistical tools like frequency, percentage, correlation, multiple-regression and path co-efficient analysis.

Salient findings of the study are presented below:

- Ten different dimensions of quality management related to agricultural research were identified and were weighted based on their perceived importance in deciding the final quality of agricultural research. Research problem identification emerged as the most important dimension of quality management in agricultural research, followed by formulation of objectives, research methodology, literature review, data generation, data analysis, results and implications, project title, reporting and bibliography in their descending order of importance.
- A good majority of the respondents (75%) showed a ' high level' of quality management in their research work. The remaining 25 per cent belonged to the 'medium' group of quality management.

- Scope for personal development and task identity were the two independent variables that showed a positive and significant correlation with quality management in agricultural research.
- Five independent variables viz.; experience, technical competence, scope for personal development, job satisfaction and task identity together contributed 27.64 percent variation in the dependent variable quality management, out of the total 29.3 per cent variation constituted by all the 14 independent variables. Among these variables job satisfaction showed a negative trend in its relationship with quality management.
- Scope for personal development had the largest direct effect on quality management, while the largest indirect effect was attributed by job satisfaction.
- Job satisfaction and task identity showed their maximum indirect effect through scope for personal development. Experience had its maximum indirect effect on quality management through technical competence.
- Inadequate and insufficient mechanism for planning and determining research priorities and cumbersome and time consuming procedures for committing and using research funds were perceived to be the most important problems related to quality management in agricultural research in Kerala Agricultural University.

Implications of the study

The results emanating from the study on the subtle details of the quality management concept in agricultural research would provide deeper insight to policy makers and top management of the university on how to cultivate and foster the quality management principle in the field of agricultural research.

The development and standardisation of the measurement device designed for quantifying quality management in agricultural research in the study would offer a meaningful and worthwhile tool for research project evaluation at the post graduate level in agricultural universities and by the research funding agencies.

The study could also bring out some critical issues related to quality management in agricultural research in Kerala Agricultural University. It is high time that the imaginative and competent research administration in the university to take some immediate steps towards developing an effective mechanism for determining research priorities as well as monitoring and evaluation of agricultural research for quality management. Further the study could also reveal the need to develop new systems that reward technology generation and transfer, rather than scientific publication.

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APPENDICES

APPENDIX - 1

KERALA AGRICULTURAL UNIVERSITY

Dr.Joy Mathew
Associate professor,
Dept. of Agril. Extension,
College of Horticulture,
Vellanikkara .

Date.....

Sir/Madam,

This is in connection with a research study undertaken by Miss Smitha Baby, Msc (Ag) student of this department, under my guidance. In the study entitled "Quality Management in Agricultural Research in KAU-A Critical Analysis" she is trying to identify the dimensions of quality in relation to agricultural research.

In view of your vast experience and expertise in the research field we are extremely happy and honoured to request you to be a judge for this study.

According to Deming, Quality can be defined as the totality of features and characteristics of a product or service that bear on its ability to satisfy a given need, viz. how we could rate a research project as good, bad or in between. In fact quality can be identified at various stages of agricultural research starting from conceiving a research project, completing it and preparing a final report.

Considering your busy schedule, it could be hard, but still we request you to be kind enough to spare some time to go through the two schedules furnished overleaf and record your well considered opinion and wise counsel to help us complete the study in time

Thanking you,

Yours sincerely,

(Joy Mathew)

To

SCHEDULE I

Given below are the various stages of agricultural research, identified by reviewing vast volumes of available literature and discussions with experts. we request you to **rank the stages according to their importance in deciding the final quality of agricultural research**. It may appear to you that all the stages are equally important. However, your expertise and experience could bring out the very subtle differences among the various stages enabling them to be rated on a continuum of importance. You may give the numeral 1 to the most important stage, the numeral 10 to the least important one and ranks in between for the other stages.

Stages of Agricultural Research	Rank value
Identification of research problem	
Formulation of hypothesis (research question) and objectives	
Title of the research project	
Literature review	
Research methodology	
Data generation	
Data analysis and interpretation	
Documentation (Reporting of results)	
Results and implications	
Bibliography	

SCHEDULE II

Following are the dimensions of quality in relation to each stage of agricultural research. We request you to examine the dimensions critically regarding their relevancy for inclusion in the final scale and rate them on a five point continuum ranging from most relevant to least relevant .You may please add any other dimension which you think is related and rate them also.

IDENTIFICATION OF RESEARCH PROBLEM

DIMENSIONS	Most relevant	More relevant	Relevant	Less relevant	Least relevant
Need based research problem					
Wider scope					
Researchability of the problem					
Compactness and manageability					
Importance and urgency					
Usefulness					
Social relevance					
Feasibility of research in terms of resources available					
Financial feasibility					
Technical feasibility					
Innovativeness					
Originality					
Competency boundness					
Policy boundness					
Time boundness					
Matching with the aptitude of the researcher					

FORMULATION O F HYPOTHESIS (RESEARCH QUESTION)
&
OBJECTIVES

DIMENSIONS	Most relevant	More relevant	Relevant	Less relevant	Least relevant
Problem focused					
Specific					
Clear and measurable					
Realistic in terms of money and infrastructure available					
Address relevant issues related with the problem					
Time bound objectives					
Indication of the expected outcome of research					
Environmental sustainability of the expected results					
Financial viability of the expected results					
Social viability of the expected results					
Adoptability of the expected results					

TITLE OF THE RESEARCH PROJECT

DIMENSIONS	Most relevant	More relevant	Relevant	Less relevant	Least relevant
Convey the content message					
Brief to the extent possible					
Clear and unambiguous					
Read well					
Use of common terms and scientific names, if any					
No abbreviations					
Catchy style					

LITERATURE REVIEW

DIMENSIONS	Most relevant	More relevant	Relevant	Less relevant	Least relevant
Extensive and exhaustive					
Progressive build up of the research already done					
Pertinent to the concept of research topic					
Highlight the research gap in the field					
Drawn from all possible sources					
Inclusion of even the primitive studies in the field					
Inclusion of studies showing the adoption factors related to the proposed technology					
Chronologically ordered					

RESEARCH METHODOLOGY

DIMENSIONS	Most relevant	More relevant	Relevant	Less relevant	Least relevant
Selection of right study area					
Appropriate season or time of study					
Use of quality inputs					
Appropriate research design					
Use of representative sample					
Appropriate sampling techniques					
Suitable data collection technique					
Standardised procedure					
Use of innovative methodology					
State- of- the-art techniques					

DATA GENERATION

DIMENSIONS	Most relevant	More relevant	Relevant	Less relevant	Least relevant
Accuracy and reliability of data					
Completeness of data					
Pertinence of data					
Data about any new information or uncommon things found during the study					
Data about the geographical factors and social background of the study area					
Data about the influence of extraneous factors on the sample					

DATA ANALYSIS AND INTERPRETATION

DIMENSIONS	More relevant	Most relevant	Relevant	Less relevant	Less relevant
Summarisation of data into understandable and meaningful form					
Use of reliable and accurate data for analysis					
Appropriate statistical methods for analysis					
Reliable interpretations of data analysis					
Simple way of interpretation					
Generalisability of inference					

DOCUMENTATION (REPORTING OF RESULTS)

DIMENSIONS	Most relevant	More relevant	Relevant	Less relevant	Least relevant
Comprehensive form of presentation					
Focus on the objectives of the study					
Highlight the implications of the results					
Simple, readable and accurate form of presentation					
Authoritative documentation					
Minimum reporting of the technical aspects					
Findings are adequately substantiated					
Logical and valid conclusions					
Unbiased reporting					
Indication of constraints of the study					
Recommendations for further research					

RESULTS AND IMPLICATIONS

DIMENSIONS	Most relevant	More relevant	Relevant	Less relevant	Least relevant
Respond to current needs of developing agriculture					
Sensitive to the needs of future					
Wide applicability of results					
Environmental sustainability of results					
Financial viability					
Social viability					
Wide adoptability					

BIBLIOGRAPHY

DIMENSIONS	Most relevant	More relevant	Relevant	Less relevant	Least relevant
Extensive and exhaustive					
Source of reliable and accurate information					
Clear and informative					
Presentation style –acceptable and updated					
Use of first hand information					

APPENDIX II

Scale values for the dimensions of quality management in agricultural research using Normalised Rank method

Frequency matrix

Rank	Problem identification	Formulation of Objectives	Project title	Literature review	Research methodology	Data generation	Data analysis	Results and implications	Reporting	Bibliography	Σ	'C' value
1	25	5		1	3	1	1				36	8
2	5	12		8	8	1	2				36	7
3	1	12		6	11	4	1	1			36	7
4	2	4	2	4	13	5	6				36	6
5	2	2	5	4	1	14	5	2	1		36	6
6		1	1	4		9	14	5	2		36	5
7	1		2	3		1	6	15	8		36	5
8			6	3		1	1	9	15	1	36	4
9			13	3				4	7	9	36	4
10			7						3	26	36	3
$\sum f_{ji}$	36	36	36	36	36	36	36	36	36	36	360	
$\sum f_{ji} C_i$	271	249	154	213	241	211	199	171	153	118		
R_j*	7.53	6.92	4.28	5.92	6.69	5.86	5.53	4.75	4.25	3.28		
R_c**	10.7	9.3	3.08	6.94	8.76	6.8	6.02	4.19	3	0.72		

* $R_j = \sum f_{ji} C_i / \sum f_{ji}$

** $R_c = 2.357 R_j - 7.01$

APPENDIX III

KERALA AGRICULTURAL UNIVERSITY

Smitha Baby
PG scholar

Dept. of Agricultural Extension,
College of Horticulture,
Vellanikkara.

To

Dear Sir/Madam,

I have taken up a study entitled **"Quality Management in Agricultural Research in KAU-A Critical Analysis"** as part of my PG programme. I am extremely happy and honoured to have you as one of the respondents for my study. Please find enclosed a questionnaire and record your honest and accurate responses without hesitation. Your valued reactions are vital for the successful completion of my study. I request you to kindly spare some of your precious time to fill the questionnaire and return it at an early date.

Thanking you

Yours sincerely

(Smitha Baby)

Vellanikkara
06-07-01

Directions

- Please read through the items carefully.
- Record your honest response to each item.
- Though some of the statements may seem apparently meaningless or irrelevant, they have been included with specific purpose.

- Do not leave out any item. Without complete information, the research will remain incomplete.

- **Please rest assured that this study is purely for academic purpose and that your identity will be strictly kept confidential.** Hence do not hesitate to provide your honest responses. The success of my research programme depends entirely on your goodwill and co-operation.

Questionnaire

1. Name :
2. Designation :
3. Experience in agricultural research : ---------- Years
4. Training received in the service : ---------- no.of weeks
5. Title of any research project you completed after 1995 :
6. Type of the project: Kindly indicate by a tick (✓)mark.

AICRP ICAR Ad hoc KAU Others

7. **Following have been identified as the dimensions of quality related to various stages of agricultural research . You may kindly rate the project you have completed (mentioned above) on these dimensions against the continuum given ranging from minimum 1 to maximum 10 by tick (✓) marking the relevant score. The score indicates the degree to which you rate the importance of particular dimension in relation to your project. If any of the given items seems to be not related to your project, kindly record "NA" against it.**

Stage I: Problem Identification

Sl.No	Dimensions	1	2	3	4	5	6	7	8	9	10
1	The research problem was need based										
2	The research problem was perceived to be researchable										
3	The research problem was important										
4	The research on the problem was perceived to be useful										
5	The research problem was socially relevant										
6	The research was perceived to be feasible in terms of resources available										
7	The research problem was urgent										
8	The research problem was within the feasibility of research techniques available										

Sl.No	Dimensions	1	2	3	4	5	6	7	8	9	10
9	The research problem was innovative										
10	The research problem was perceived to have originality										
11	It was felt that the research could be completed in a reasonable time period										
12	The research problem matched your aptitude										

Stage 2:Formulation of Hypothesis and objectives

Sl.No	Dimensions	1	2	3	4	5	6	7	8	9	10
1	The objectives were focused on the research problem										
2	The objectives were specific										
3	The objectives were clear and measurable										
4	The objectives were realistic in terms of resources available										
5	The objectives could address relevant issues related with the problem										
6	The objectives were time bound										
7	A socially viable research outcome was expected										
8	The research outcome was expected to be adoptable										

Stage 3: Title of the research project

Sl.No	Dimensions	1	2	3	4	5	6	7	8	9	10
1	The title could convey the content of the study										
2	The title was brief to the extent possible										
3	The title was clear and unambiguous										
4	The title was good to read.										

Stage 4: Literature Review

Sl.No	Dimensions	1	2	3	4	5	6	7	8	9	10
1	An extensive and exhaustive literature review was done										
2	The literature review could bring out a progressive build up of the research already done										
3	The literature review was pertinent to the research topic										
4	The research gap in the field was highlighted in literature review.										
5	Literature was drawn from all possible sources										
6	Studies showing the adoption factors related to the proposed technology was included in the literature review.										

Stage 5:Research Methodology

Sl.No	Dimensions	1	2	3	4	5	6	7	8	9	10
1	The research was conducted at right location										
2	Time or season of study was appropriate										
3	Quality inputs were used for the research										
4	An appropriate research design was used										
5	A representative sample was used for the study										
6	The sampling technique were scientific and appropriate										
7	The data collection methods were techniquely correct										
8	An innovative research methodology was used for the study										

Stage 6:Data Generation

Sl.No	Dimensions	1	2	3	4	5	6	7	8	9	10
1	Accurate and reliable data were generated in the study										
2	Complete data related to the study were gathered										
3	The data were pertinent to the study										
4	Data about any new information/ uncommon phenomenon encountered during the study were collected										

Stage 7:Data Analysis

Sl.No	Dimensions	1	2	3	4	5	6	7	8	9	10
1	The data could be summarized into a meaningful and understandable form										
2	Reliable and accurate data alone were used for analysis										
3	Appropriate statistical methods were used for analysis										
4	Logical interpretations were made from data analysis										
5	A simple way of interpretation was adopted										

Stage 8:Results and implications

Sl.No	Dimensions	1	2	3	4	5	6	7	8	9	10
1	The results were able to respond to the current needs of developing agriculture										
2	The results were sensitive to the future needs										
3	The results were felt to be widely applicable										
4	The results were environmentally sustainable										
5	The results were financially viable										
6	The results were socially viable										
7	The results were widely adoptable										

Stage 9:Reporting of Results

Sl.No	Dimensions	1	2	3	4	5	6	7	8	9	10
1	The research report was comprehensive										
2	Reporting was done keeping the objectives in mind.										
3	The implications of research outcome were highlighted										
4	A simple, readable and accurate form of presentation was adopted										
5	The findings were adequately substantiated										
6	Logical and valid conclusions were made										
7	The reporting was unbiased										
8	Constraints in the study were indicated in the report										
9	Recommendations for further research was included in the report										

Stage 10: Bibliography

Sl.No	**Dimensions**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	The bibliography was reliable and accurate.										
2	An acceptable and updated style was adopted										
3	First hand information was used										

7. To what extent do you feel you are competent in the following aspects of agricultural research? Please tick (✓) mark the most appropriate alternative you feel for each item given below.

	More competent	Competent	Less Competent
a. Identification of relevant research problem			
b. Preparation of research proposal			
c. Designing and organizing research			
d. Data analysis and interpretation			
e. Presenting the reports			

8. Kindly indicate your frank response to the items given below by ticking (✓) the most appropriate alternative.

SA=Strongly Agree, A= Agree, U= Uncertain, DA=Disagree,
SD= Strongly Disagree.

	SA	A	U	DA	SD
a) Advanced methods in research give better results than the traditional methods					
b) A successful researcher experiments with new ideas					
c) A scientist with a lot of experience should try to use innovative methods.					
d) Traditional methods of research have to be changed in order to raise the research quality.					
e) Though it takes time for a researcher to bring out new methods, it is worth the efforts.					

9. The statements given below reflect a very important aspect of human behaviour. Kindly indicate your honest reaction to the following statements by tick (✓) marking the appropriate alternative.

1) How true it is to say that you wish to do something which others can hardly do?

Quite unlikely	Not very true	Not true	Fairly True	Quite true

2) How many situations do you think you will take pains to overcome obstacles and attain a high standard?

Most	Many	Some	Few	Very Few

3) How often do you feel encouraged when you are assigned a difficult task?

Hardly ever	Seldom	About half the time	Frequently	Nearly always

4) How often do you seek opportunity to excel others?

Hardly ever	Seldom	About half the time	Frequently	Nearly always

5) How often do you enjoy a long spell of continuous activity to solve a difficult problem?

Hardly ever	Seldom	About half the time	Frequently	Nearly always

10. What is your opinion about the scope for personal development in your organization? For each of the items given below, kindly tick (✓)mark the level of agreement or disagreement you personally feel.

	SA	A	U	DA	SD
a. My organization only extracts work but pays little attention to personal development avenues.					
b. External training is provided for researchers frequently in my organization.					
c. Training needs are decided at top not considering the capabilities of researchers					
d. My organization does not consider personal development as an important activity in research and development.					
e. Researchers rely mostly on past experiences to do tasks and have no knowledge of advances in the field.					
f. Scientists returning from training are given opportunities to try what they have learnt.					

11. For each of the statements given below, kindly tick (✓) mark the level of agreement or disagreement you personally feel.

SA=Strongly Agree, A= Agree, U= Uncertain, DA=Disagree, SD= Strongly Disagree.

	SA	A	U	DA	SD
a) I have little opportunity to use my abilities in my present job.					
b) Some times I feel that my job counts very little in my organization					
c) My job is often dull and monotonous					
d) There is too much pressure on my job.					
e) I feel that I am doing something worthwhile in my job.					
f) I receive adequate training for my needs.					
g) My job seems to be leading to the kind of future I want.					

12.To what extent you are committed to the job as agricultural scientist? kindly indicate your response to the items given below by tick (✓) marking the appropriate alternative you feel for each item.

	SA	A	U	DA	SD
a) I feel a sense of responsibility in carrying out my duties.					
b) I devote most of my time for performing my duties.					
c) I am careful in gathering up to date information in the research field.					
d) If given a chance I will opt for jobs other than agricultural scientist.					
e) I try to meet my clients personally and solve their problems.					

13. How satisfied are you on the various aspects of your job? Kindly tick (✓)mark the most appropriate alternative you feel for each item

	Very much satisfied	Satisfied	Partially satisfied	Dissatisfied	Very much dissatisfied
a) Present salary					
b) Promotional opportunities					
c) Physical facilities provided in the organization					
d) Residential facilities					
e) Praise and recognition for good work					
f) Opportunity to work with team spirit.					
g) Help, guidance and encouragement from superiors					
h) Opportunity for self development					
i) Freedom to pursue new ideas					
j) Freedom for flexibility in work					
k) Status and prestige in the organization					
l) Scope to prove your merit and excellence.					

14. How much 'autonomy' do you have on your job?; how much are you left on your own to do your work? Kindly tick (✓) mark the alternative which best describes you from the three alternatives given below.

a) Very little; I have almost no 'say' about scheduling my work. The works and procedures are all laid out for me in detail.

b) Moderate autonomy; I make some of the decisions about my work, but many of them are made for me.

c) Very much; I have almost all of the 'say' about scheduling of my own work. I alone decide what procedures to be used.

15. To what extent do you do a 'whole' piece of work (as opposite to doing part of a job which is finished by some others)? Kindly indicate your opinion by ticking (✓) the alternative which best describes you from the three alternatives given below.

a) I do one small part of a job, there are many others who do the other part of the job. I may not see the final result. ☐

b) I do a moderate size 'chunk' of the work, there are others involved too, but my contribution is clear. ☐

c) I do an entire piece of work. I do the job from start to finish and what is done is clearly 'mine'. ☐

16. What is your opinion about your workload? Kindly indicate your opinion by ticking (✓) the most appropriate alternative for each item.

SA=Strongly Agree, A= Agree, U= Uncertain, DA=Disagree,
SD= Strongly Disagree.

	SA	A	U	DA	SD
a) I feel busy or rushed					
b) I feel pressured					
c) I feel that the amount of work I did interfered with how well it got done					
d) I feel that the number of requests, complaints or problems dealt with was more than expected.					

17. To what extent do you feel that the infrastructure facilities in the organization are sufficient to do quality research . Kindly indicate your opinion by tick (✔)marking the appropriate column.

Most Sufficient	More Sufficient	Sufficient	Less Sufficient	Least Sufficient

18. What is your impresssion about the 'climate' prevalent in your organization? Kindly indicate your response to each item by tick (✔) marking the most appropriate alternative you feel.

	Agree	Agree to somewhat	Disagree
a) In my organization there are many rules , procedures and practices to which I have to conform rather than being able to work as I see fit.			
b) I can make decisions and solve problems without checking with superiors at each step.			
c) My organization recognizes and rewards good work			
d) My organization emphasize on taking risks and assuming challenging goals			
e) There is a friendly and informal atmosphere in my organization			
f) Mutual support and helpfulness is prevalent among the superiors and associates in my organization.			
g) My organization sets high performance standards and emphasize on doing a good job.			
h) My organization emphasize on hearing different opinions from its members			
i) I feel that I belong to my organization and am a valuable member of the organization.			

QUALITY MANAGEMENT IN AGRICULTURAL RESEARCH IN KERALA AGRICULTURAL UNIVERSITY - A CRITICAL ANALYSIS

By

SMITHA BABY

ABSTRACT OF THE THESIS

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ABSTRACT

The study on "Quality management in agricultural research in Kerala Agricultural University – A critical analysis" was conducted with the objective of analyzing the quality management related to agricultural research in Kerala Agricultural University. The respondents of the study comprised of 55 agricultural scientists who were the principal investigators of the externally aided projects completed after 1995 in the central zone.

Ten critical dimensions of quality management in agricultural research were identified and their perceived importance in deciding the final quality of agricultural research were analysed. Research problem identification emerged as the most important dimension of quality management in agricultural research, followed by formulation of objectives, research methodology, literature review, data generation, data analysis, results and implications, project title, reporting, and bibliography in their descending order of importance.

A composite scale was developed for quantifying quality management in agricultural research and applied to the selected sample. A good majority of the respondents (75%) showed a high level of quality management in their research work. The remaining 25% belonged to the 'medium' group of quality management.

The influence of selected personal, psychological, job/ organizational characteristics on quality management in agricultural research was studied. Scope for personal development and task identity were the two independent variables that showed a positive and significant correlation with quality management in agricultural research.

Five independent variables viz. experience, technical competence, scope for personal development, job satisfaction and task identity together contributed 27.64 per cent variation in quality management, out of the total 29.3 per cent variation constituted by all the 14 independent variables.

Job satisfaction and task identity showed their maximum indirect effect through scope for personal development. Experience had its maximum indirect effect on quality management through technical competence.

The critical problems related to quality management in agricultural research in Kerala Agricultural University were analysed. Inadequate and insufficient mechanism for planning and determining research priorities and cumbersome and time consuming procedures for committing and using research funds were perceived to be the two most important problems.

The study, it is believed, could bring out the subtle details of quality management concept in agricultural research, which would provide deeper insight to the policy makers and top management of the University on how to cultivate and foster this vital value in the field of agricultural research.