Chapter 1

INTRODUCTION

All the available projections of population, per capita income and demand for food on the one hand and production and marketable surplus on the other, tend to present a large and growing gap in so far as the developing countries are concerned (72). Though India has become more or less self-sufficient in food production, its per capita consumption and nutritional level need to be improved. In addition, India being a fast developing country particularly in the field of agriculture, it may have to think of extending its helping hand to reduce the global gap between food production and demand. It is in this context that serious considerations have to be given to find ways and means to increase food production in India (76). The only solution seems to be the adoption of modern agricultural technology at an accelerated rate, which demands application of improved inputs such as seed, fertilizer, pesticide, farm power and machinery, and irrigation water. However, at the present, the farmers are confronted with the problems of not getting these inputs in time and at economical cost. Another problem which they have to face is lack of facilities for proper maintenance and repairs of farm machinery. These problems are likely to increase manyfolds with the increase in adoption of modern agricultural technology.

In order to overcome these limitations, the attempts are being made to organise larger number of agro-service centres.

The agro-service centres aim at providing integrated services and supplies in rural areas according to local needs (2). The services which may be rendered are general consultancy, soil testing, land development, well drilling and development, installation of pumpsets, custom hiring of farm machinery, post-harvest handling of farm produce, maintenance, repair and servicing of agricultural equipment, and training and demonstration of modern farming systems. The supplies may include seed, fertilizer, pesticide, fuel, lubricant, spare parts, animal and poultry feeds, and agricultural equipment. At present there are about 3,200 agro-service centres functioning in different parts of India and there is a proposal to raise this number to 5,000 by the year 1985(83). So far, location of these centres has been influenced by political, personal and/or organisational factors. Financial and social aspects have not been given due importance. As a result, most of these centres are unable to cater to the needs of the localities effectively. This may be due to their inadequacy in numbers and/or their improper location-allocation. This aspect, therefore, requires a thorough scientific analysis to develop guide lines for establishing the centres in future.

The problem involves determination of number, size and location of agro-service centres, and allocation of demand points to the located centres in a defined region. For a given region the requirements of services and supplies at different demand points can be estimated. The probable locational sites can be identified using feasible set approach (65). The transport cost between the demand points and the service centre can be determined on the basis of different movements broadly involving human beings, machinery and agricultural inputs.

The number of centres can be decided on the basis of financial constraints and public utility. With the increase in number of centres, the transport cost decreases while the fixed cost increases. Thus, there must be an optimal number of centres which will minimize total cost. However, as it is a public utility, cost alone should not be taken as the deciding factor. Therefore, the overall cost must be minimized subject to the condition that every user must have particular level(s) of facility(ies) within specified distance(s). This condition can be satisfied with the use of a suitable location-allocation model.

Most of the location-allocation problems have been analysed either as private sector or public sector problems. A reasonably accurate statement of the objective of location

decision about private sector is the minimization of cost or maximization of profit to a private owner. Public facility location decisions are made in response to a different set of owners, the society as a whole, and the goals, objectives and constraints are no longer easily quantifiable nor even they are necessarily in commensurate units or easily defined. Most of the public location models have used some sort of surrogates as a measure of utility, such as average travel distance or time, subject to a fixed number of centres or limited investment (67). Even then the optimal solutions have been complex and time consuming experiences. The present trend is to make some simplification and to get a near optimal solution within a reasonable computing time.

While developing the methodology for location-allocation of agro-service centres in developing countries like India, prevailing economical, human, and social constraints must be borne in mind. Several studies (12,27,29,35,54,62) have indicated that, if land and labour productivity of small farms in developing countries, is to be increased, a meaningful selective mechanisation is considered indispensible.

Selective farm mechanisation has been introduced in India to a considerable extent, mostly depending upon the size of holdings and the operations performed. The pace of mechanisation in Indian agriculture can be visualised by the sharp

increase in tractor population, amounting to 85 per cent per year, on an average, over the last three decades from 1946 to 1976 (54). Inspite of this phenomenal increase in tractor population, average draught power available in the country is only about 0.36 hp/ha and tractor's share is only 11.6 per cent (5). The percentage of human and animal power in agriculture is on the decline for last several decades and this trend is likely to get further accelerated in future. Thus, if the minimum farm power requirement of 0.5 hp/ha is to be made available, this will require necessarily induction of inanimate sources of energy at a rapid pace in Indian agriculture (9,34). This indicates that the animate and inanimate sources of energy and associated equipment will continue to co-exist in Indian agriculture in the foreseable future.

So far, no study has been reported on location-allocation of agro-service centres under the selective farm mechanisation. The present study was, therefore, undertaken with a view to develop scientific methodology for this problem. The specific objectives of this study were :

(i) To identify and adopt a general mathematical model for facilities location;

(ii) To modify the general model to suit location-allocation of agro-service centres;

(iii) To identify and adopt suitable solution procedure for the model;

(iv) To develop methodology for quantification of agro-services and supplies required in a region;

(v) To develop procedure for determination of initial investment and annual fixed cost for agro-service centres;

(vi) To apply the model and the methodology for location-allocation of agro-service centres in a given region.

Raichur district situated in north-eastern part of Karnataka state (South India) offered an excellent opportunity to test the methodology developed for location-allocation of agro-service centres, as it is a fast developing district and has very good potential for future growth of agriculture and agro-based industries, owing to its fertile soil and expanding irrigation facilities. The acquaintance of the author with the region and easy access to the data sources due to his association with Raichur for over a decade gave an additional impetus to choose the district for the case study.