CHAPTER I I

OBJECTIVE AND METHODOLOGY

INTRODUCTION

This chapter deals with the spatial, demographic, social and economic features of the Kheda district, major objectives of the study, selection of the sample and research methodology adopted for the analysis of risk and uncertainty related to the selected foodgrain and non-foodgrain crops.

Characteristics of the District

Geographical Area :

The district Kheda is located in the Central Gujarat between 22.9 and 23.18 degree north latitude and 72.55 and 73.18 degree east longitude on the west coast.
Demography

The total population of the district (1981 census) was 30,01,194 forming 8.66 per cent of the total population of Gujarat (3.4 crores), which is spread over 962 villages of 10 talukas. The density of population in the district was found to be much higher (418 per sq.km.) than that in the State (173 per sq.km.). The annual growth rate of population in the district was found slightly lower 2.27 per cent as compared to the State average 2.77 per cent as per 1981 census. The literacy rate of population in the district was 49.25 per cent (1981 census), which is much higher than that of 43.75 per cent of the State. The proportion of rural population in the total was found to be higher (80 per cent) in the district than that in the State (69 per cent). The sex ratio in the district was found to be lower (915 per 1000 males) than that in the State (942 per 1000 males).

According to 1971 census, the proportions of cultivators, agricultural labourers and other workers were found to be 48.35, 23.82 and 27.83 per cent respectively of the total work force in the district, while in 1981, the corresponding proportions were found to be 40.50, 26.87 and 32.53 per cent respectively. This shows the slow transfer of population from agricultural activities to non-agricultural activities.
Land Use Pattern

The land use pattern of the district clearly shows that the gross cropped area (GCA) was reported to be 84.81 per cent (5,81,000 he.) of the total reporting area (6,85,100 he.) in 1979-80. The proportions of net area sown and area sown more than once were reported to be 74.27 and 10.54 per cent respectively in the total reporting area. The area under forest, barren and uncultivable land, land kept for non-agricultural uses, cultivable waste, permanent pasture, other than grazing land and current fallow were reported to be 1.55, 4.70, 11.49, 0.38, 4.02, 3.24 and 0.35 per cent of the total reporting area respectively.

The cropping pattern of the district reveals that the area under cereals, pulses and non-foodgrain crops were 51.82, 3.56 and 44.62 per cent respectively in 1979-80. Further, among cereals the proportions of rice, wheat, jowar, bajara, maize and other cereals worked out to 12.31, 8.43, 0.07, 20.24, 2.09 and 8.04 per cent respectively in the GCA. Among non-foodgrain crops the area under cotton, sugarcane, tobacco, edible oilseeds, non-edible oilseeds, fodder crops and other non-foodgrain crops were reported to be 10.18, 0.13, 12.50, 4.31, 0.27, 4.65 and 12.58 per cent of the GCA respectively.
The irrigation facility was found on 37.11 per cent of the GCA of the Kheda district in 1979-80. Out of this

CHAPTER : III

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Characteristics of the District

Geographical Area:

The district Kheda is located in the Central Gujarat between 22.9 and 23.18 degree north latitude and
(ii) To estimate and measure the extent of risk by using the technique of regression analysis.

(iii) To study the impact of different types of risk on the economy of non-foodgrain crops of the district.

(iv) To examine the variability of agricultural production through area and yield variability.

(v) To examine the income variability among the different farm holding groups through the farm level analysis of cost and revenue per hectare.

(vi) To study the factors responsible for yield variability in non-foodgrain crops.

(vii) To suggest suitable policy measures to minimize the adverse impact of risk and uncertainties, particularly the crop insurance scheme and its variability for different crops of the district.

Hypotheses:

This study has made an attempt to test the following hypotheses:

(i) Crop enterprise involves risk in both the irrigated and non-irrigated regions. Though between the two, the degree of risk is relatively high in the non-irrigated region.
(ii) Aggregate gross output, expenditure and net return per hectare are found to be higher in the irrigated region than those in the non-irrigated region. The same hypothesis holds true for each individual crop in the irrigated area studied here.

(iii) Among foodgrain crops, rice involves relatively high degree of risk, while among non-foodgrain crops, cotton involves relatively high degree of risk.

Sample:

The sampling was done at three stages of: (i) selection of talukas, (ii) selection of villages, and (iii) selection of farmers.

Selection of Talukas:

Out of 10 talukas of Kheda district, Borsad and Thasara talukas were purposively selected. It was felt that the selection of talukas must be such that there is modern technology in use and that there should not be any significant variation in the nature of soil, climate, cropping pattern and sources of irrigation.

Selection of Villages:

For each of the selected talukas, the villages were divided into two groups. The first group covers villages
with irrigation facilities over 10 per cent of their respective GCA, while the second group contains villages with less than 10 per cent of their GCA under irrigation. From each of these two groups, 6 villages were randomly drawn. Of course, while selecting 6 villages from the first group, a care was taken to see that in each of them, there prevail one or more sugarcane growers. Thus, in all 12 villages from each of Borsad and Thasara talukas were selected (for detail see Chart I) for the purpose of a detailed study.

Selection of Farmers:

For the selection of farmers, a village-wise list of farmers, irrespective of size of holding groups was prepared. Out of the farmers listed, 5 farmers from each village, were randomly selected. Afterwards, they were classified into four groups of land holdings, from 0.01 to 1.0 hectare as marginal farmers, from 1.01 to 2.00 hectares as small farmers, from 2.01 to 4.00 hectares as medium farmers and 4.01 hectares and above as large farmers (see table 4.1). In all 31 marginal, 30 small, 23 medium and 36 large farmers constitute the sample of this study. The total strength of sample farmers thus comes to 120, 60 each from Borsad and Thasara talukas.
Chart - II-1

Sample Design

Kheda District

Selected Talukas

BORSAAD

THASARA

Selected villages from irrigated area

Selected villages from non-irrigated area

1. Vasana
2. Anklav
3. Misraya
4. Santokpura
5. Borsad
6. Bochasen

1. Badalpur
2. Kalu
3. Kathana
4. Kankapura
5. Dali
6. Dehwan

1. Ambav
2. Dabhsar
3. Kosam
4. Thasara
5. Dakor
6. Sukhi-Muvadi

Selected villages from non-irrigated area

1. Malvan
2. Raipur
3. Rampur
4. Sui
5. Simlaj
6. Vallabhpura
Fig. II-1.
Table 2.1: The number of sample farmers by farm size groups in the selected talukas of Kheda district

<table>
<thead>
<tr>
<th>Farm size group</th>
<th>Borsad taluka</th>
<th></th>
<th>Thasara taluka</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Irrigated area</td>
<td>Non-irrigated area</td>
<td>Total</td>
<td>Irrigated area</td>
<td>Non-irrigated area</td>
</tr>
<tr>
<td>Marginal</td>
<td>4</td>
<td>19</td>
<td>23</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Small</td>
<td>12</td>
<td>9</td>
<td>21</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Medium</td>
<td>8</td>
<td>1</td>
<td>9</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Large</td>
<td>6</td>
<td>1</td>
<td>7</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>All Farmers</td>
<td>30</td>
<td>30</td>
<td>60</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

Period of Study:

The study is an empirical in nature and is based on two types of data, viz., primary and secondary ones. An individual farmer's schedule was designed and questionnaire-cum-personal interview method was used to collect primary data from the selected 120 farmers of the district. The primary data were collected for each plot of the farm holding of the selected farmers. The data pertain to the three agricultural years from 1977-78 to 1979-80.
The secondary data were collected from the different government and semi-government institutions, particularly Director of Agriculture, Gujarat State, Ahmedabad, District Agriculture Officer, Nadiad, Kheda district and Central Soil and Water Conservation Research and Training Centre, Vasad, Kheda district. They pertain to rainfall, maximum and minimum temperature, morning and evening humidity, cloudy days and sunny days, irrigation, crop-wise production, area and yield, land use and cropping pattern of the district. The secondary data collected were for the period of decade from 1970-71 to 1979-80.

Research Methodology :

The nature and significance of risk and uncertainty have been pursued through the review of research studies in the field of risk and uncertainty. To more elaborate the concept of risk, risk, uncertainty and the difference between them have been examined on the basis of several recognised theories and research works. Further, risk in Indian agriculture has been examined with the help of data received from the all India statistics and through appropriate statistical tools. The variability in agricultural production was analysed through mean, standard deviation, coefficient of correlation, rank correlation and coefficient of variations.

* The period selected here covers the decade from 1970-71 to 1979-80 because the data pertaining to cloudy days, sunny days and minimum and maximum temperature and humidity were not available for the years after 1979-80.
The extent of risk and its measurement have been attempted in three sections. The crop-wise variability of total production, area and yield per hectare of selected foodgrain and non-foodgrain crops for the period 1971 to 1980 and their comparison between period I (1971 to 1975) and period II (1976 to 1980) have been examined in detail. Here the coefficient of variation has been used as a most suitable technique of variability. As the period of comparison is short, the c.v. has not been adjusted with trend value. For each of the risk variable like rainfall, temperature, humidity, cloudy days and sunny days the daily information were gathered and by averaging them monthly estimates were computed.

The c.v.s. of production, area and yield have been compared for the irrigated and non-irrigated regions, foodgrain and non-foodgrain crops and period I and period II for the selected talukas. To examine the extent of different risk variables more precisely the linear regression function of the following form has been used:

\[ y = a_0 + a_1 x_1 + a_2 x_2 \ldots \ldots \ldots a_9 x_9 \]

where, \( a_0, a_1, a_2 \ldots \ldots a_9 \) are the regression coefficients, estimated by step-wise least square equation.
Yield per hectare (independent variable)
Annual rainfall (in mm)
Irrigated area (in hectares)
Variable cloudy days (in number)
Overcast cloudy days (in number)
Maximum temperature (in °C)
Minimum temperature (in °C)
Morning humidity (in percentage)
Evening humidity (in percentage)
Sunny days (in numbers)

The analysis of risk has been attempted at the individual as well as the aggregate level for the selected crops. In the aggregate analysis the average per hectare income, expenditure and net return for each farm holding group were examined. The aggregate analysis has been based on the secondary data collected from 120 selected farmers for 3 years ending 1979-80. The comparison of gross income, expenditure and net return has been made between the two regions (irrigated and non-irrigated) and talukas (Borsad and Thasara). For this purpose mean, c.v., probability distribution of income, expenditure and net return and income-expenditure ratio were examined. For the crop-wise
analysis the comparison of risk among and between the selected foodgrain and non-foodgrain crops were examined. For each crop and group of crops (foodgrain and non-foodgrain) the comparison of gross income, input-output ratio, net return and drop outs of crop on the basis of frequency distribution of the sample farmers was made. Here the drop out cases were used as an important criteria to indicate risk element in different crops. Because the higher degree of risk reflected through loss results into drop out of the particular crop.