Methodology
A general description of the study area, the data base, the sampling techniques, tools and techniques used for analysis are presented in this chapter. For a better understanding, this chapter is arranged in an appropriate sequence under the following sections.

3.1 Description of the study area
3.2 Selection of sample
3.3 Data collection
3.4 Methods of analysis

3.1: Description of the study area

The utility of the research can be better appreciated when the results are analyzed with the background information of the study region such as physical, social and economic conditions. This will facilitate in understanding the decision making by the researcher.

3.1.1: Geographical location

Karnataka state is situated in the western part of Deccan peninsula of India lying between 11°31" and 18°45" North latitudes and 78°40' East longitudes. The state is bounded by Maharashtra in the North and Goa and Arabian Sea in the west, with a coastal line of 300 Kms. It has common borders with Andhra Pradesh on the East and Tamil Nadu and Kerala on the South. It is the seventh largest state of India covering an area of 1.92 lakh square kilometres which accounts for 5.83 percent of the total area of the country. The state is divided in to 10 agro climatic zones taking into consideration the rainfall pattern-quantum and distribution, soil types, texture, depth and physio-chemical properties, elevation, topography, major crops grown and type of vegetation.
3.1.2: Demographic characteristics

According to 2001 census, the total population of the state is 52,850,562, of which 26,898,918 (50.89%) are male and 25,951,644 (49.11%) are female. This represents a 17.25 per cent increase over the population in 1991. The density of population is 275.6 per km². About 34 per cent of the people live in urban areas. The literacy rate is 67 per cent with 76 per cent, of males and 57 per cent of females being literate.

3.1.3: Study Area

This study was conducted in Karnataka state comprising two districts, namely Tumkur and Gulbarga.

3.1.3.1: Gulbarga district

Gulbarga district is situated between 16° 12' to 17° 14' North latitude and 76° 04' and 77° 42' East longitude. The average rainfall is 777mm with major portion of the rains being received from the south-west monsoon rain. March to May is the hot weather season. Southwest monsoon prevails between June to September. This district receives rain from northeast monsoon in the months of October and November. Winter season is from December to February. Maximum temperature of 43 °C will be in the month of May, whereas minimum temperature of 12°C prevails in the month of December.

The soils of this district are deep to very deep black, medium black, sandy loam and light textured soils. The crops grown in Gulbarga district are redgram, green gram, blackgram, bengalgram, jowar, bajra, paddy, wheat, ground nut, sunflower, sesamum, maize, redgram and other minor millets. The area under redgram during the year 2004-05 was 3, 49,894 hectares which accounted for 65.73 percent of the total area under redgram in the state. Similarly,
production of redgram is 1,36,616 tonnes, accounted for 68.43 per cent of the total production of the state.

Gulbarga district consists of 10 taluks with a geographical area of 16, 10,208 ha. Out of which forest area, net cultivable area and irrigated area are 69,089, 14, 08,172 and 1, 96,304 ha respectively. The population of Gulbarga district is 31, 30,922 (2001 census) with a literacy rate of 41.34 per cent. (Annexure II). . The study was taken up in two taluks of Gubarga district namely Afzalpur and Sedam (Fig. 3.1)

3.1.3.2: Tumkur district

Some basic statistics pertaining to Tumkur district and the selected study taluks for the year 2004-05 are provided in Appendix III.

Tumkur district is in the maidan tract and is situated in the east central part of Karnataka with a geographical area of 10.65 lakh hectares. It lies between 12°45' and 14°12' North Latitude and between 76°21' and 77°31' East Latitude. Tumkur district comprises of 10 taluks with a total population of 25, 84,711. More than 80 per cent of the population resides in rural areas and are agriculturally oriented. Majority of the land holders in the district are classified as marginal (48.54%) followed by small (25.61%), semi medium (17.01%), medium (7.69%) and large farmers (1.15%). The literacy rate of the district is 59 per cent.

Tumkur district receives an annual rainfall ranging between 700-715 mm, spread over 50 rainfall days, during the period from May to November. The precipitation recorded during years 2002-03 and 2003-04 was less than the average, but rain fall received in 2004-05 was more than the average. The maximum temperature of 38°C is experienced during the months of April-May, while the minimum temperature of 10°C is experienced during the months of November-December (Tumkur district at a glance, 2004-05).
The soils of the district are predominantly sandy loamy, with smaller areas of red loams. The soils are derived from granite, gneisses and schist. The soils are red to brownish in colour, shallow and fairly deep and intermixed with fairly large amount of coarse gravel and pebbles. The pH range is 8-9. Being well drained, they lack adequate water holding capacity. The soils of the district are conducive for growing plantation crops in general and coconut crop in particular. These soils also support the cultivation of field crops such as ragi, groundnut, greengram, etc. The study was taken up in two taluks of Tumkur district namely Madhugiri and Koratagere (Fig. 3.1)

**Table 3.1: Land use pattern of Tumkur and Gulbarga districts**

(In hactare)

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Particulars</th>
<th>Tumkur</th>
<th>Gulbarga</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Geographical area</td>
<td>10,17,748</td>
<td>16,10,208</td>
</tr>
<tr>
<td>2.</td>
<td>Forest area</td>
<td>53,352</td>
<td>69,089</td>
</tr>
<tr>
<td>3</td>
<td>Net area sown</td>
<td>7,26,988</td>
<td>14,08,172</td>
</tr>
<tr>
<td>4</td>
<td>Net Irrigated area</td>
<td>4,82,071</td>
<td>1,96,304</td>
</tr>
</tbody>
</table>

Source: *District Statistical Information Center, Tumkur and Gulbarga.*

**Table 3.2: Demographic profile of the Tumkur and Gulbarga districts**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Particulars</th>
<th>Tumkur</th>
<th>Gulbarga</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Geographical area (ha)</td>
<td>10,17,748</td>
<td>16,10,208</td>
</tr>
<tr>
<td>2.</td>
<td>Taluks (numbers)</td>
<td>10.0</td>
<td>10.0</td>
</tr>
<tr>
<td>3.</td>
<td>Villages (numbers)</td>
<td>2708</td>
<td>1,437</td>
</tr>
<tr>
<td>4.</td>
<td>Population (numbers)</td>
<td>25,84,711</td>
<td>31,30,922</td>
</tr>
<tr>
<td>5.</td>
<td>Density of population (per sq. km)</td>
<td>168.0</td>
<td>192.0</td>
</tr>
</tbody>
</table>

Source: *District Statistical Information Center, Tumkur and Gulbarga.*
Table 3.3: Taluk-wise distribution of Hoblis, villages, survey numbers and number of RTCs in Gulbarga and Tumkur district

<table>
<thead>
<tr>
<th>Name of the taluk</th>
<th>Hoblis</th>
<th>No. of villages</th>
<th>Survey numbers</th>
<th>No. of RTCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koratagere</td>
<td>4</td>
<td>251</td>
<td>10,905</td>
<td>62,934</td>
</tr>
<tr>
<td>Madhugiri</td>
<td>6</td>
<td>321</td>
<td>1,74,640</td>
<td>1,06,343</td>
</tr>
<tr>
<td>Afzal Pur</td>
<td>3</td>
<td>91</td>
<td>8,966</td>
<td>59,650</td>
</tr>
<tr>
<td>Sedam</td>
<td>4</td>
<td>111</td>
<td>16,497</td>
<td>64,493</td>
</tr>
</tbody>
</table>

Source: Revenue Department, Government of Karnataka (2005).

Table 3.4: Distribution of Hoblis, villages, survey numbers and number of RTCs in Gulbarga and Tumkur district

<table>
<thead>
<tr>
<th>Name of the taluk</th>
<th>Hoblis</th>
<th>No. of villages</th>
<th>Survey numbers</th>
<th>No. of RTCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumkur</td>
<td>50</td>
<td>2,722</td>
<td>18,42,186</td>
<td>10, 23, 749</td>
</tr>
<tr>
<td>Gulbarga</td>
<td>48</td>
<td>1,394</td>
<td>2, 48,931</td>
<td>7, 88,314</td>
</tr>
</tbody>
</table>

Source: Revenue Department, Government of Karnataka (2005).

3.2: Selection of sample

The study was taken up in the two representative administrative zones of Karnataka namely, Tumkur and Gulbarga. One district from each zone and two taluks in each district were selected randomly. Since the COLR process has been implemented in the entire state it was very much necessary to cover two representative zones namely northern (Gulbarga district) and a southern administrative zone (Tumkur district) and hence making a purposive selection of two zones.

It proposed to select a sample of two hundred kiosk users from four taluks in two districts among the two zones of Karnataka. Further, the opinion of a total twenty revenue officials from selected taluks were collected in order to know the merits and demerits of COLR and suggestions for the improvements in the existing system. These revenue officials included the concerned District Collectors (DC),
Thasildhars, Deputy Thasildars, Revenue inspectors (RI) and from the village accountants (VA). Further, information on the COLR was also collected from the top revenue officials at the apex level (at the secretariat level).

Separate questionnaires were designed for different sets of respondents, i.e. for the targeted kiosk users (land owners), for the different revenue officials and for the other kiosk users.

3.3: Data collection

For evaluating the objectives of the study, necessary data collection was categorized into primary data and the secondary data. First, the needed and available secondary data was collected form the state Revenue department, from the concerned district panchayath offices and from the selected taluk panchayath offices. Some of the secondary information on the international and national level was colleted from the central level. Various sources like, internet, journals, state department libraries and university libraries were utilized for collecting the data. All the information was collected by using a fine tuned format prepared for this purpose. The secondary information was mainly collected on the, state statistics of COLR, on its implementation and progress, on performance and views. Much detailed information were collected from the district and taluk level on the number of RTC computerized, number of hoblies, number of villages covered, the date of implementation, the mile stone of computerization in their district/taluk and on other related information.

In addition to the secondary information, the much important essential primary data was collected from randomly chosen respondents who were the end users (the land owners) of the computerized Kiosk. Only such persons who visited kiosk for obtaining the RTC/land documents were selected for the interview.
3.4: Methods of analysis

The methods of analysis employed in the present study are elaborated under the following headings

3.4.1 Tabular analysis

3.4.2 Garrets ranking technique

3.4.3 Logit model

3.4.1: Tabular analysis

Simple and conventional tabular analysis was used to get useful results. The common tools used were, averages, percentages, ratios and cross tabulation. With the help of these tools, the general information about the respondents with respect of age and gender of the respondents, literacy level, caste, average income, family size, average land holdings, average expenditure, etc., were compiled.

3.4.2: Logit model

The probability of participation/adoption by the people in obtaining the RTC depends on a number of factors. The people’s willingness to participate (adopting) in obtaining the RTC is analyzed in the framework of logistical regression. The people’s willingness to participate follows a binary choice, since farmer has option, willing to participate or not in obtaining the computerized RTC. If farmer is willing to participate in getting/obtaining the RTC, a value of one was assigned for the dependent variable and if farmer is not willing to participate a zero value was assigned.

The year of schooling, family size and size of holding is expected to have positive impact of an individual in willing to participate in obtaining the RTC. While age factor may have negative association
with participation of an individual in obtaining the COLR

\[ Y_i = A + \sum B_i X_i + U_i \] ........................(1)

Let \( Y_i = i^{th} \) farmer's willingness to participate or not obtaining the Computerized RTC. This describes the response of farmer to the participation obtaining the COLR

\( Y_i = 1 \) for farmers willing to participate obtaining the RTC

\( Y_i = 0 \) for farmers not willing to participate in obtaining the RTC

\( X_i = \) independent variable determining \( Y \).

\( U_i = \) the error term

Independent variables considered are:

\( X_1 = \) Age

\( X_2 = \) Years of schooling

\( X_3 = \) Family size

\( X_4 = \) Distance

\( X_5 = \) Size of holding

\( X_6 = \) Income of the respondent

Assuming \( E(U_i) = 0 \), we have, \( E(Y_i \text{ given } X_i) = A + \sum B_i X_i \) ........................ (2)

If \( P_i = \) probability that \( Y_i = 1 \), i.e., probability that the farmer willing to participates obtaining the RTC, then, \( 1 - P_i = \) probability that \( Y_i = 0 \) i.e., the probability that farmer does not wish to participate in obtaining the RTC
Now, \( E(Y_i \text{ given } X_i) = \sum_{i=1}^{n} Y_i P_i \)

\[ = 0(1-P_i) + 1(P_i) = P_i \] \hspace{1cm} (3)

Comparing (2) and (3), we have

\[ E(Y_i \text{ given } X_i) = A + \sum B_i X_i = P_i \] \hspace{1cm} (4)

Equation (3) is a linear probability model (LPM) giving conditional probability of respondents participating or not in obtaining the RTC. In order to estimate LPM, we cannot use ordinary least square, because,

1. The error term \( U_i \) is not normally distributed, since \( U_i \) becomes discrete as the choice is binary,

2. Variance \( (U_i) \) is heteroscedastic, as \( U_i \) is discrete

3. The OLS estimate of \( P_i \) may not lie between zero and one because the predicted values lie even outside \((0,1)\) range

4. Estimation of the LPM by OLS assumes that probability of participation in obtaining the COLR increase at constant rate irrespective of the value of independent variable.

But in reality, the relationship between \( P_i \) and \( X_i \) is not linear. The probability of participation approaches zero at slower and slower rate, as \( X_i \) becomes small and the probability approaches one at slower and slower rate as \( X_i \) becomes large. Since, \( P_i = E(Y_i = 1 \text{ given } X_i) \) non linearly increases with \( X_i \), let us consider \( P_i \) to be a logistic function of \( Z_i \), given by
Where,

\[ Z_i = A + \sum B_i X_i \]

We observe that as \( z \) ranges from \(-\infty \) to \(+\infty \), \( P_i \) ranges from \( 0 \) to \( 1 \), and that \( P_i \) is non-linearly related to \( z \).

If \( P_i = \frac{1}{1 + e^{-z_i}} \) .................................................. (5)

Subtracting \( P_i \) from 1 on both sides in equation (5), we have,

\[ 1 - P_i = 1 - \frac{1}{1 + e^{-z_i}} \]

Or

\[ 1 - P_i = \frac{e^{-z_i}}{1 + e^{-z_i}} \]

\[ 1 - P_i = \frac{\frac{1}{e^{z_i}}}{1 + \frac{1}{e^{z_i}}} \]

Then,

\[ 1 - P_i = \frac{1}{1 + e^{z_i}} \] ........................................... (6)

Therefore, from equations (4) and (5), \([P_i / (1 - P_i)] = e^z \)

Here \([P_i / (1 - P_i)] \) is called the odds ratio, which indicates the ratio of the number of chances in favor of farmer's willingness to participate
in obtaining the Computerized RTC one chance of not willing to participate in obtaining the COLR. Taking logarithm of this odds ratio to the base $e$, we get,

$$\text{Loge} \left[ \frac{\Pi}{1 - \Pi} \right] = z = A + \sum B_i X_i, \hspace{1cm} (7)$$

Or

$$L^* = z = A + \sum B_i X_i, \hspace{1cm} (8)$$

Here, $L^*$ is called the Logit and it follows logistical regression.

### 3.4.3: Garrets ranking technique

From policy point of view, studying of constraints faced by the respondents is one of the important aspects of research. The respondents were asked to rank (in the order of severity) the constraints faced during the obtaining of new computerized RTC and these ranks were converted to scores by referring to Garret's table.

In this study, Garrett's ranking technique was used to analyze the constraints faced by the respondents. The order of the merit given by the respondents was converted into ranks by using the formula:

Garrett's formula for converting ranks into percent is given by

$$\text{Percent position} = 100 \times \frac{(R_{ij} - 0.50)}{N_j}$$

Where $R_{ij}$ = Rank given for $i^{th}$ item by $j^{th}$ individual

$N_j$ = Number of items ranked by $j^{th}$ individual

The percent position of each rank was converted to scores by referring to tables given by Garret and Woodworth (1969). Then for each factor, the scores of individual respondents were summed up and divided by the total number of respondents for whom scores were gathered. The mean scores for all the factors were ranked, following the decision criterion that lower the value the more important is the constraint to farmers.