CHAPTER-II  
RESEARCH METHODOLOGY

Research Design and Methods of the Study

Present study is an attempt to highlight the growth process and spatial pattern of passenger oriented wayside facilities. The emphasis is on the characteristics of these facilities and evaluation of the satisfaction level of users of these facilities. It analyses the physical, economic and socio-cultural impact of these facilities on surrounding communities. Present research work is restricted to the study of the characteristics of the following selected national highways, which pass through the length and breadth of the state of Haryana.

- **National Highway-1**: From Singhu (Kundli) border (Delhi) to Sambhu border (Punjab) covering a distance of 180 km.
- **National Highway-2**: A stretch of 74 km from Badarpur border (Delhi) to Karwan (Kosi) border (Uttar Pardesh).
- **National Highway-8**: A stretch of 101 km, from Kapushera boarder (Delhi) to Jai Singh Pur Khera border (Rajasthan).
- **National Highway-10**: From Tikri border (Delhi) to Mandi Dabwali border (Punjab) covering a stretch of 313 km long (NHAI, 2007 and 2012).

These selected National Highways have been divided into following sections.

**National Highway-1**

- Section A from Sambhu border (Punjab) to Pipli (Kurukshetra) including Ambala City, Ambala Cantonment and Shahabad (Markanda) covering a distance of 50 km.
- Section B comprises of Pipli (Kurukshetra), Nilokheri, Trawari and Karnal up to Gharaunda with a distance of 45 km.
- Section C includes stretch from Gharaunda up to Samalkha including Panipat with a distance of 42 km.
- Section D spread over a stretch of 43 km from Samalkha to Singhu (Kundli) border (Delhi) including Ganaur, Murthal, Bahalgarh Chowk and Kundli.
Source: State Natural Resources Data Management System (NRDMS) Centre, HSCST, Chandigarh, 2001
National Highway-2

- Section A from Karwan (Kosi) border to Palwal city (including) which includes Palwal and Hodel towns with a length of 38 km.
- Section B from Palwal city (excluded) to Badarpur border including Ballabgharh and Faridabad covering a distance of 36 km.

National Highway-8

- Section A from Jai Singh Pur Khera border (Rajasthan) to Dharuhera industrial complex with a length of 39 km.
- Section B from Dharuhera industrial complex to the end of Manesar covering a distance of 27 km.
- Section C from Manesar to Kapushera border (Delhi) with a length of 35 km.

National Highway-10

- Section A Mandi Dabwali border (Punjab) to Sirsa city (excluded) covering a distance of 59 km
- Section B Sirsa city (included) to Fatehabad (excluded) covering a distance of 48 km.
- Section C Fatehabad (Included) to Hisar city (excluded) covering a distance of 50 km.
- Section D Hissar City (included) to Mundhal intersection covering a length of 52 km.
- Section E Mundhal intersection to Rohtak City (excluded) covering a length of 50 km.
- Section F Rohtak city (included) to Tikri border (Delhi) with a length of 54 km (Fig. 2.1).

In the beginning a list of passenger oriented wayside facilities available along selected national highways was prepared on the basis of pilot survey. Identified passenger facilities were classified in following five major groups and sixteen sub-groups as shown in (Fig. 2.2).
These classified passenger oriented wayside facilities were further categorized into permanent and temporary structure on the basis of material used in construction.

A comprehensive field survey of passenger oriented wayside facilities located on all the four selected national highways was carried out in 2007 to find out the establishment year of these facilities on the basis of which these were divided in following three time-periods to understand their periodic development pattern.

- **First Phase:** Up to 1966
- **Second Phase:** 1967-1991
- **Third Phase:** After 1991

Source: Field Survey, 2007
First phase cover the time till the formation of Haryana state in 1966. Second phase include the period from formation of Haryana to beginning of new economic reforms in India in 1991. Third phase include the period of new economic reforms from 1991 to 2007 when the field survey conducted. All the temporary building structure facilities are considered in the third phase of the periodic development.

Per Unit Distance Spatial Pattern of Passenger Facilities

To understand the per unit distance concentration of passenger facilities on the basis of per ten kilometers (ptk) distance along national highway have been recorded keeping in view the convenience of study and comparative accounts.

The quality of passenger facilities, satisfaction level of highway users and impacts of these facilities on surrounding communities with respect to physical, economic and socio-cultural aspects were studied by conducting field survey in the year 2007-2008 and 2010-2011. The survey was conducted with the help of a self prepared questionnaire primarily based on a pilot survey of the study area. The questionnaire has been divided into four schedules.

- **Schedule-I** (Appendix-I) is divided in two sections. Section-I contains the questions regarding quality and characteristics of food-joints including hotels, restaurants and dhabas, and the characteristics of their staff, as well as legal status of these food-joints. Section-II includes questions used to know the satisfaction level of users of these food-joints.

- **Schedule-II** (Annexure-II) is also divided in two parts. Section-I includes the questions regarding the characteristics, quality and legal status of fuel filling stations and characteristics of staff employed on fuel filling stations. Section II comprises the questions regarding the satisfaction level of the facilities users.

- **Schedule-III** (Annexure-III) is also divided in two sections. Section-I: This section includes the question regarding the functional characteristics, quality of traffic police stations and characteristics of staff working on traffic police stations. Section II contains the questions necessary to know the satisfaction level of the users of this facility.
Schedule-IV (Annexure-IV) includes questions pertaining to the impact of the growth of passenger oriented wayside facilities on the surrounding communities. This schedule is further divided into three sections. Section-I deals with the questions related to the physical impact, section-II contains questions related to economic impact, while section-III related to socio-cultural impact.

The researcher collected information through three schedules (I, II, III), by making personal observations on the basis of interviews with facilities owners, their staff and users of these facilities on the spot from all four selected national highways in, 2007-2008, while information through schedule-IV were collected only from those specific places (clusters of facilities) and were situated out of cities where at least ten facilities are concentrated at single place. The following is the list of places from where schedule-IV was filled.

- NH-1: Mohra, Tyora-Tyori-Rattangarh, Dhantor, Jhanjhari, Broli, Murthal and Bahalgarh.
- NH-2: Karwan (Kosi) boarder, Bamni Khera, Palwal (outer boundary) near Om Hospital.
- NH-8: Nikhri, Bilaspur, Panchgaon and Nakhrola.
- NH-10: Suchan, Badopal, Mayyar, Mundhal Mor, Kharawar and near Ismaila.

The researcher visited these places in, 2010-2011 several times and gathered the observations of surrounding communities by interviewing the people on the basis of the constructed questionnaire and focused group discussion (FGD).

**Data Sources**

Present study relies on both primary and secondary data. The secondary data related to the development of national highways, and quality and availability of passenger oriented wayside facilities along selected national highways in Haryana and its impact on highway users and surrounding communities is partially available with many private and public sector organizations such as:-

- Ministry of Road Transport and Highway (MORTH), New Delhi India
- National Highway Authority of India (NHAI)
These institutions are involved in the development, maintenance, planning and safety for national highways. However, the data from these sources has a limited use for the purpose of this study. Therefore, the present findings are mainly based on the primary data collected through the field survey conducted in, 2007-2008 and 2010-2011.

**Primary Data**

The major thrust of this study is to understand the availability and qualities of the passenger oriented wayside facilities along selected national highways in Haryana and their impact on highway users and surrounding communities. Information pertaining to the aspects such as growth process, spatial pattern and qualities of passenger oriented wayside facilities, satisfaction level of highway users, impact of wayside facilities on economic, physical and socio-cultural environment of the surrounding communities were collected through personal interviews with facilities owners, staff employed on these facilities, users of these facilities, and surrounding communities of facilities complexes and with the help of a structured questionnaire in, 2007-2008 and 2010-2011.

**Selection of Samples**

The present study is primarily based on field survey. The information relating to growth process, building structure and spatial pattern of passengers’ facilities was collected through personal interviews and field survey along all the selected national highways. All the passenger facilities were plotted on the map by physically visiting them across all the highways.
It was not feasible to study all passenger facilities to find out their quality, characteristics, satisfaction level of highway users and impact of these facilities on surrounding communities. Moreover, time and money constraints do not allow for universal survey therefore sample survey was preferred. Samples of different facilities were taken in the manners as mentioned below;

Food-Joints

Ten per cent samples of the food-joints were randomly selected from each section of national highway corridors but where numbers were less than ten at least one sample was taken (if available). A total of 112 food joints including 13 hotels, 17 restaurants and 82 dhabas were selected from different national highways (Table 2.1).

Table 2.1: Number of Samples of Food-Joints

<table>
<thead>
<tr>
<th>NH</th>
<th>Hotel</th>
<th>Restaurant</th>
<th>Dhaba</th>
<th>Total Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH -1</td>
<td>4</td>
<td>4</td>
<td>28</td>
<td>36</td>
</tr>
<tr>
<td>NH -2</td>
<td>2</td>
<td>3</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>NH -8</td>
<td>3</td>
<td>3</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>NH -10</td>
<td>4</td>
<td>7</td>
<td>28</td>
<td>39</td>
</tr>
<tr>
<td>Study Area</td>
<td>13</td>
<td>17</td>
<td>82</td>
<td>112</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2007-2008

Fuel Filling Stations

About ten per cent samples of the fuel-filling stations were randomly selected from each section of national highway corridors and where number was less at least one sample was taken for comparative analysis of this facility. A total of 33 fuel filling stations including 10 on NH-1, 4 on NH-2, 8 on NH-8 and 11 on NH-10 were selected (Table 2.2).

Table 2.2: Number of Fuel Filling Stations Samples

<table>
<thead>
<tr>
<th>National Highway</th>
<th>Total Fuel Filling Stations</th>
<th>Number of Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH -1</td>
<td>92</td>
<td>10</td>
</tr>
<tr>
<td>NH -2</td>
<td>34</td>
<td>4</td>
</tr>
<tr>
<td>NH -8</td>
<td>70</td>
<td>8</td>
</tr>
<tr>
<td>NH -10</td>
<td>85</td>
<td>11</td>
</tr>
<tr>
<td>Study Area</td>
<td>281</td>
<td>33</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2007-2008
Traffic Police Stations

One traffic police station from each district was selected for the detail analysis. Therefore, a total of 14 traffic police stations including 5 on NH-1, 2 on NH-2, 2 on NH-8 and 5 on NH-10 have been included in the present study.

Samples of Highway users

As many as 4 samples from each hotel; 4 from each restaurant; 2 from each dhaba; 4 from each fuel filling station and 7 from each traffic police station (8 in case of NH-8) were selected from each national highway corridor for comparative analysis of the satisfaction level. A total of 516 passengers’ facilities users including 52 from 13 hotels, 68 from 17 restaurants 164 from 82 dhabas, 132 from 33 fuel filling stations and 100 from 14 traffic stations were selected (Table 2.3).

Table 2.3: Number of Samples of Highway Users

<table>
<thead>
<tr>
<th>NH</th>
<th>Hotel</th>
<th>Restaurant</th>
<th>Dhaba</th>
<th>Fuel Filling Station</th>
<th>Traffic Police Station</th>
<th>Total Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH 1</td>
<td>16</td>
<td>16</td>
<td>56</td>
<td>40</td>
<td>35</td>
<td>163</td>
</tr>
<tr>
<td>NH 2</td>
<td>8</td>
<td>12</td>
<td>26</td>
<td>16</td>
<td>14</td>
<td>76</td>
</tr>
<tr>
<td>NH 8</td>
<td>12</td>
<td>12</td>
<td>26</td>
<td>32</td>
<td>16</td>
<td>98</td>
</tr>
<tr>
<td>NH 10</td>
<td>16</td>
<td>28</td>
<td>56</td>
<td>44</td>
<td>35</td>
<td>179</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>68</td>
<td>164</td>
<td>132</td>
<td>100</td>
<td>516</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2007-2008

Impact on Surrounding Communities

To know the perception of surrounding communities with respect to impact of all passenger facilities on their communities, 15 respondents have been surveyed from each cluster of passenger facilities. So, a total of 330 persons including 135 from NH-1, 45 from NH-2, 60 from NH-8 and 90 from NH-10 were selected for the study.

Data Analysis

A research project contains a large amount of raw data and many variables. It become very difficult, cumbersome and time consuming to extract anything concrete
from this raw data. The use of some techniques in order to process the data for achieving the targeted objectives is essential. It saves a lot of valuable time, makes the processing of the data less cumbersome and easy to handle. Their uses help in revealing the precise picture of the research.

The collected qualitative and quantitative data related to the growth, spatial pattern, building structure, quality and characteristics of selected facilities and their impact on surrounding communities has been tabulated, processed, analyzed and interpreted by using simple percentage technique. The diagrams have been employed to examine the desired information and maps have been prepared in ARC GIS 9.1 Only permanent building structured facilities have been shown in maps.

**Satisfaction Level**

The satisfaction level of facilities users has been determined by using Adenrele Awotona’s index of satisfaction level. Facilities users’ level of satisfaction with respect to particular facility was evaluated by asking them specific number of questions or variables delimited for each facility. Each respondent was requested to identify his or her degree of satisfaction with each of the variables on a five point scale ranging from 1 to 5. Satisfaction index level of a passenger or highway user on 1-5 scale is noted in the light of the following grading:

<table>
<thead>
<tr>
<th>Scales</th>
<th>Status of a Particular Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Poor</td>
</tr>
<tr>
<td>2</td>
<td>Average</td>
</tr>
<tr>
<td>3</td>
<td>Good</td>
</tr>
<tr>
<td>4</td>
<td>Very Good</td>
</tr>
<tr>
<td>5</td>
<td>Excellent</td>
</tr>
</tbody>
</table>

**Computation of Indices of Satisfaction (SI)**

All the scores given by each respondent to all variables are added up to calculate the total actual score. This is then divided by maximum possible score depending on the number of variables i.e. if the variables are 10 then it will be 10x5=50. The result is then multiplied by 100 to obtain index of satisfaction (SI) of respondent as a percentage. Thus:
Based on the above given method SI’s for all the respondents using a particular facility is thus calculated.

**Grouping of Indices of Satisfaction Index Based on Standard Deviation Method**

In order to group the SI’s on the basis of standard deviation method, first the mean and standard deviations are calculated separately for all the SI’s of respondents for each facility.

**Mean S.I. for a Particular Facility is given by**

\[
SI (\bar{X}) = \frac{\sum_{i=1}^{N} SI_i}{N}
\]

Where \(SI (\bar{X})\) = mean value of S.I.

\[
\sum_{i=1}^{N} SI_i = \text{sum of satisfaction index of all respondents.}
\]

\(SI_i = \text{satisfaction index of ith respondents}\)

**Standard Deviation is calculated as:**

\[
\text{S.D.} = \sqrt{\frac{\sum_{i=1}^{N} (SI_i - SI)^2}{N}} \quad \text{or} \quad (X - \bar{X})^2
\]

Where: \(\text{S.D.} = \text{Standard Deviation}\)

\[
\sum_{i=1}^{N} SI = \text{sum of satisfaction index of all respondents.}
\]

\(SI_i = \text{satisfaction index of ith respondent.}\)

\(SI = \text{Mean value of SI}\)

\(N = \text{No. of respondents.}\)

With the help of mean and standard deviation all the respondents of each facility were divided into three level of satisfaction by using the following formula:
<table>
<thead>
<tr>
<th>Category</th>
<th>Level of Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ Mean +1 S.D.</td>
<td>High</td>
</tr>
<tr>
<td>Mean – 1 S.D. to &lt; Mean +1 S.D.</td>
<td>Medium</td>
</tr>
<tr>
<td>&lt; Mean – 1 S.D.</td>
<td>Low</td>
</tr>
</tbody>
</table>

**Limitations of the Study**

Present study is largely based on information collected through field survey. The field survey method itself has some of its own inherent deficiency. The responses of the targeted people are not always free from bias. Therefore, it is very difficult to arrive at actual truth. Secondly, the secondary data obtained from government department is incomplete in several respects. In the absence of authentic information it could not be possible to arrive at the final conclusion in some aspects. Thus the author has made some moderation on the basis of his field survey.