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3. Research Methodology

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Since the core objective of the study is to identify and study the process for supply chain management with performance indicators of supply chain in cellular industry thus the primary focus was to gather the factors from literature which is important for the task at hand & to ensure that they are correlated factors in practice also. Primary data was collected using questionnaire cum interview methodology and was analyzed using different techniques. In addition to that research is focused on impact of Supply Chain Management on Productivity and efficiency. Further focus is on the factors for minimizing supply chain costs, maximizing outputs and remove various barriers for effective SCM. At last focus will be to suggest a model of effective SCM for cellular phone industry.

3.1 Preparation of the respondents Database

3.1.1 On line TRAI data base was referred to get the list of the existing telecomm service provider Top performers with presence in GSM at national level with maximum users from industry were selected to make the research more precise and accurate.

1) Airtel (Bharti) 2) Hutch (Vodafone) 
3) Reliance Comm. 4) Tata Tele 
5) BSNL 6) Aircel 
7) Spice 8) Idea 
9) MTNL 10) BPL 
11) HFCL 12) Shyam

Since the number of Organizations was available, we preferred to go with GSM service providers with maximum presence at National level with maximum users. However, the following two Organizations finally agreed to participate in the survey viz.

1) Airtel
2) Hutch (Vodafone)
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3.1.2 Ancillaries (Suppliers / Partners to Cellular Industry)

As one of the major purposes of considering major Ancillaries was to consider their linkage with the main service provider with respect to information exchange. It was decide to build the stratified sample of ancillary organizations. For, this Cellular service provider were requested to give their 10 ancillary units. Most of them replied that they keep on varying from location to location. But they have highlighted the name of the same. Details of all these were obtained from different resources and list were prepared as follows.

1) Ericsson  2) Nokia  
3) Siemens  4) Nortel  
5) Corning  6) IBM  
7) Nortel  8) Hinduja TMT  
9) Teletech  10) Mphasis  
11) Sing Tel  12) Microsoft  
13) Google  14) Wimax  
15) Qualcomm  16) Huawei

The detailed profile of two main service providers in GSM (Cellular Industry) selected for research subject is given in the following next chapter.

3.2 Questionnaire Design

The questionnaires were designed based on the study of literature and brain storming sessions held with management faculty and practicing managers. Feedback of the respondents, received during testing of the questionnaire was also considered. The final form of the questionnaire was frozen after 4 iterations and was arranged in different sets. Following variables were identified for the purpose of this study .appendix A.1 shows the complete questionnaires (Six Sections) as used for the survey.

3.2.1 Factors important to the Overall Organization success

Various factors were identified and framed in the form of different sections in questionnaire. These factors were identified on the basis of literature and also the brain storming with practitioners and management faculty. These factors were divided into different sections as per there relevance and were kept in set of questionnaire.
3.2.2 List of factors contributing to success or failure.

Various factors were identified and divided into relevant categories.
a) Section A of questionnaire (1-27 questions) was made with relevance to have inputs from Administration employees of the participating companies.
b) Section B of questionnaire (28-35 questions) was focused on performance parameters
c) Section C of questionnaire (36-41 questions) was focused on problem area of cellular industry
d) Section D of questionnaire (42-50 questions) was focused on market review of customers
e) Section E of questionnaire (51-56 questions) was focused on importance of SCM
f) Section F of questionnaire (1-11 questions) was focused on inputs from suppliers and partners.
g) Section G of questionnaire (1-32 questions) was focused to understand the main factors for efficient and effective SCM

3.3 Testing of Questionnaires

The questionnaires have been tested on the following criteria.

3.3.1 Reliability

Cronbach’s Alpha reliability of the scale was more than 0.6 in all the questionnaires thus indicating the goodness of the scale measurements. Further details have been given in section 6

3.3.2 Content Validity

i) A detail discussion was done with (top management), guide & key persons from Organizations about the following features of the questionnaires

- Comprehension
- Depth Of Study
- Relevance to today’s scenario

Observations & Feedback:

- Questionnaire was found to be comprehensive
- Followings points were suggested for incorporation in questionnaire
  1) Divide question into different sections
  2) Each section should be relevant to particular group of people
3) Every individual questions should be in different sections to understand the specific importance of SCM so Questionnaire should be divided into different sections like for Administration staff, for performance review, for analysis of problem area, for importance of SCM, for partners and suppliers etc.

Appropriate changes were made in the questionnaires, wherever applicable

ii) Ease of Response -10 respondents were test administered using the questionnaire cum interview method

Observations & Feedback:-

- The Questionnaires were reported comprehensive.
- The respondents were able to respond faster when asked verbally. On an average 20-25 minutes were required per respondent. However, the interactions with individual / functional heads lasted for around 30-40 minutes. The functional heads contacted were for stores, Production, SAP & QA.

3.3.3 Sensitivity

Likert Scales were used wherever the perceptions under investigation. In general a 5-point scale was adopted. Further sensitivity was ensured as valid by taking multiple questions pertaining to similar theme, which helped in counteracting. This care was taken while designing mapping scheme for the questionnaire used for data collection to the proposed suggestions and solutions.

3.3.4 Mapping to Objectives

The questionnaires were traced to the research objectives well before the data collection was started to ensure the fulfillment of the objectives. Figure below exhibits the mappings of the objectives to the questionnaires.

3.4 Primary Data Collection

The data was collected by administering the questionnaire with the participating respondents. Wherever, the respondent so desired, option cards were used to fill up their responses. Most of them preferred to fill them on their own. Some partially structured discussions were held with keen respondents in various functional areas with a view to get more insight into the SCM practices and culture in the organization. The individual heads related to SCM were
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interviewed with an objective to understand their SCM infrastructure, organizational practices, culture, problems & plans.

Figure 3.1: Mapping of Questionnaires to research Objectives

- **Questionnaire Section A**: SCM - Process Evaluation of participating Organizations → **Objective 1**
- **Questionnaire Section B**: SCM – Performance indicator Evaluation of Org → **Objective 2**
- **Questionnaire Section C, D**: Study of SCM problems and inputs from customers to increase productivity and efficiency → **Objective 3**
- **Questionnaire Section F, G**: Study of factors, while taking inputs from Vendors, suppliers and Partners to minimize cost and Max Output → **Objective 4**
- **Questionnaire Section C**: Study of various barriers for effective SCM → **Objective 5**
3.4.1 Sampling Plan

The following norms were considered for the choice of respondent in each participating organization.
The universe consist of top management who are board members whose number is 26 at present. Middle level management consist of 600 number and lower level consist of 2000 at present. Small vendors consist of 92 and major vendor consist of 66 numbers. Following rules were followed for selecting respondents in the organization for each Strata.

a) For Top Management 30% of the population
b) For Middle Management 10% of the population
c) For Lower Level Management 5% of the population
d) Small Vendors consisted 35% of the population
e) Major Vendors consisted 30% of the population
f) For Customers -75 considered from each organization

Thus the sample cross section comprise about top/middle/lower executive covering various disciplines of supply chain. The sampling technique used for present study is stratified random sampling technique used for administrating the questionnaire. Research was Limited to Delhi & NCR region. The respondent of different offices of Airtel & Hutch were approached directly and requested to fill in the questionnaire. In addition the questionnaire was mailed to the some respondent who was far off. Additionally the respondent were assured of confidentially of there responses.
### Table 3.1: Sample Distribution (Company Wise)

<table>
<thead>
<tr>
<th>S. No</th>
<th>Participating Comp. Total Population Sample</th>
<th>Airtel Total Population considered</th>
<th>Airtel Responses</th>
<th>Hutch Total Population Considered</th>
<th>Hutch Responses</th>
<th>Actual Response</th>
<th>% Resp. Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Management</td>
<td>8</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>62.50</td>
</tr>
<tr>
<td>Middle Management</td>
<td>60</td>
<td>30</td>
<td>18</td>
<td>30</td>
<td>24</td>
<td>42</td>
<td>70.00</td>
</tr>
<tr>
<td>Lower Management</td>
<td>100</td>
<td>50</td>
<td>33</td>
<td>50</td>
<td>45</td>
<td>78</td>
<td>78.00</td>
</tr>
<tr>
<td>Small Vendors / Ancillary</td>
<td>32</td>
<td>16</td>
<td>15</td>
<td>16</td>
<td>14</td>
<td>29</td>
<td>90.6</td>
</tr>
<tr>
<td>Major Vendors / Ancillary</td>
<td>20</td>
<td>10</td>
<td>9</td>
<td>10</td>
<td>8</td>
<td>17</td>
<td>85.00</td>
</tr>
<tr>
<td>Total</td>
<td>220</td>
<td>110</td>
<td>77</td>
<td>110</td>
<td>94</td>
<td>171</td>
<td>77.72</td>
</tr>
</tbody>
</table>

![Pie chart showing sample distribution by category]
### Table: 3.2 Sample Distribution (Type of Organization wise)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Type Of Organization (Total Population)</th>
<th>(N)</th>
<th>% (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Participating Ancillary (Suppliers/Partners)</td>
<td>52</td>
<td>23.6</td>
</tr>
<tr>
<td>2</td>
<td>Participating from Cellular Service Provider</td>
<td>168</td>
<td>76.4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>220</td>
<td>100</td>
</tr>
</tbody>
</table>

![Pie chart showing distribution of ancillary and service provider organizations.](chart.png)
Table 3.3  Sample Distribution (Company Wise) (Reference TRAI Pg. 41, April 2006) :-
Subscriber base of Cellular Service Provider as on 31.03.2006

<table>
<thead>
<tr>
<th>Service Providers</th>
<th>Airtel</th>
<th>BSNL</th>
<th>Reliance</th>
<th>Hutch</th>
<th>Idea</th>
<th>Tata</th>
<th>Aircel</th>
<th>MTNL</th>
<th>Spice</th>
<th>BPL</th>
<th>HFCL</th>
<th>Shyam Telelink</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Share</td>
<td>21.72</td>
<td>19.58</td>
<td>19.21</td>
<td>17.04</td>
<td>8.18</td>
<td>5.38</td>
<td>2.9</td>
<td>2.27</td>
<td>2.14</td>
<td>1.49</td>
<td>0.07</td>
<td>0.03</td>
</tr>
</tbody>
</table>

![Pie Chart: Market Share Distribution](chart.png)
### Table 3.4 Sample Distribution of Questionnaire in relation with Objectives

<table>
<thead>
<tr>
<th>Objective-Mapping</th>
<th>Objective 1</th>
<th>Objective 2</th>
<th>Objective 3</th>
<th>Objective 4</th>
<th>Objective 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions</td>
<td>27</td>
<td>8</td>
<td>15</td>
<td>43</td>
<td>6</td>
</tr>
</tbody>
</table>

---

![Pie Chart](chart.png)
Table 3.5 Sample Distribution and Responses from Cellular Service Provider – Airtel

<table>
<thead>
<tr>
<th>Top Mgmt.</th>
<th>Middle Mgmt.</th>
<th>Lower Mgmt.</th>
<th>Small Vendors</th>
<th>Major Vendors</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2</td>
<td>18</td>
<td>33</td>
<td>16</td>
</tr>
<tr>
<td>15</td>
<td>10</td>
<td>4</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Airtel Population Considered</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airtel Population Response</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3.6 Sample Distribution and responses from Cellular Service Provider – Hutch

<table>
<thead>
<tr>
<th>Level</th>
<th>Hutch Population Considered</th>
<th>Hutch Population Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Mgmt.</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Middle Mgmt.</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Lower Mgmt.</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>Small Vendors</td>
<td>30</td>
<td>16</td>
</tr>
<tr>
<td>Major Vendors</td>
<td>50</td>
<td>8</td>
</tr>
<tr>
<td>Hutchinson</td>
<td>45</td>
<td>10</td>
</tr>
</tbody>
</table>

Note: The table and graph illustrate the sample distribution and responses from different levels within a cellular service provider, with Hutch being one of the providers.
Table 3.7 Sample distribution and response comparison between Airtel & Hutch

<table>
<thead>
<tr>
<th>Category</th>
<th>Airtel Response</th>
<th>Hutch Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Mgmt.</td>
<td>2</td>
<td>45</td>
</tr>
<tr>
<td>Middle Mgmt.</td>
<td>18</td>
<td>33</td>
</tr>
<tr>
<td>Lower Mgmt.</td>
<td>33</td>
<td>24</td>
</tr>
<tr>
<td>Small Vendors</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Major Vendors</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>

Graph showing the comparison of response distribution between Airtel and Hutch.
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3.4.2 Duration of the Survey

Data collected between Jan 2006 – July 2007

3.5 Data Analysis Techniques

SPSS Package was applied to compile and analyze the data collected from the field survey. Frequency distribution were studied to gather the first hand information on various variables. Further data was analyzed for

a) Mean and related statistics was analyzed on various responses from Organizations , Type of Company at various different levels of respondents
b) Major Factor were taken from various researches and put to respondents to analysis there importance
c) Frequency distribution was calculated of various responses
d) Percentage of response on different ratings were analyzed.
e) Chi Square and p value was calculated through SPSS software to understand the significance