4.1 Introduction

This chapter describes the research approaches and research design choices made in the present study. Discussion on sampling procedures used, methods used for data collection, research instrument and operationalization of research variables are presented. Further, procedures used for testing the research instrument reliability and validity are discussed. At each stage, rationale for each action is discussed explaining the reason behind those actions and making specific design choices.

4.2 Research Paradigm and Research Approach

We can find two main research paradigms in the literature, the positivist paradigm and phenomenological paradigm. The key idea of the positivist paradigm is that the social world exists externally, and that its properties should be measured through objective methods, rather than being inferred through sensations, reflections or intuition (Easterby-Smith et al., 1991). Positivism, which emerged from the work of 19th century French philosopher Auguste Comte, defines knowledge in terms of empirically verifiable observation (Masadeh, 2012).

Positivist studies generally use quantitative methods for empirical testing of formulated hypothesis (Buttery and Buttery, 1991). These types of studies usually involve obtaining data through surveys with relatively large samples and analyzing the structured data using statistical methods. The positivistic approach or paradigm explores the facts or the reasons for the social phenomenon without the subjective interpretation from the researcher and the stress is on logical reasoning applied to the research so that precision, objectivity and rigour are the guiding forces rather than hunches,
experience and intuition for investigating research problems (Collis and Hussey, 2003).

Phenomenology takes more or less the opposite approach, positing a view of reality as wholly constructed, subjective and social in nature. This approach entails an epistemology that seeks knowledge through the social ‘meaning’ of phenomena, rather than their measurement (Easterby-Smith et al., 1991; Blaikie, 1993; Hussy and Hussy, 1997). The phenomenological paradigm is concerned with the understanding and exploration of the phenomenon from participant’s own frame of reference. The research is based on unstructured data obtained through mainly qualitative methods like field work studies and case research methods.

In the present study, a positivistic approach has been used as it relies mainly on quantitative data, using relatively large samples and is concerned with hypotheses testing, structured research design and objective method using cross-sectional design.

Literature on research methods discuss two methods to arrive at conclusions in research. These methods for scientific way of logical reasoning are deductive and inductive methods. Deduction begins with an expected pattern that is tested against observations, whereas induction begins with observations and seeks to find a pattern within them (Babbie, 2009). The steps that are followed in deductive approach are (Babbie, 2009)

- Specify the topic
- Specify the range of phenomena your theory addresses.
- Identify and specify your major concepts and variables
- Find out what is known (propositions) about the relationships among those variables.
- Reason logically from those propositions to the specific topic you are examining

On the other hand in inductive method, the researcher begins with various observations and measures and continues by finding patterns and regularities, formulating tentative hypothesis that can be observed. Finally the
researcher may develop some general conclusions and theories. These conclusions and theories are subject to further confirmation based on subsequent evidence.

Usually in a social research both the logical process of induction and deduction are used together in a complimentary way. Both the deductive and the inductive reasoning process are applied in scientific investigations (Sekaran, 2003). In this research, both inductive and deductive methods are used by developing the hypothesis based on extensive literature review and interaction with the practitioners, development of research instrument, followed by collection of data required to test the hypothesis.

There are two prominent research approaches quoted in the literature: Qualitative research and Quantitative research. Qualitative research methods normally entail reasoning from induction, gathering data and drawing conclusions from a multiplicity of interpretations and perceptions, beginning with observation, rather than a single, objective truth or rationality (Neuman, 1997). Qualitative research tends to focus on the collection of detailed amounts of primary data from relatively small samples of subjects by asking questions or observing behaviors (Hair et al., 2003).

Quantitative approaches are generally based on the logic of deduction, beginning from accepted theories or premises and testing them rationally. Science in quantitative approaches is associated with objective truth, while qualitative research tends to focus on subjective experience (Neuman, 1997; Newman and Benz, 1998). Quantitative research places heavy emphasis on using formalized standard questions and predetermined response options in the questionnaires or surveys administered to large number of respondents. Quantitative research methods are directly related to descriptive research designs than to exploratory designs (Hair et al., 2003).

In the present study, mainly quantitative research method is used in main survey using a structured questionnaire. However, during the initial stage of exploration, qualitative approach is used with personal interviews.
with the MSME owners and B2B e-marketplace service providers and collecting qualitative data through e-marketplace website visits.

4.3 Types of Research Designs used

The research design is the blueprint of the research and describes the methods used for collection, measurement and analysis of data. According to Kerlinger (1986), research design is the plan and structure of investigation so conceived as to obtain answers to research questions. The plan is overall scheme or program of the research. It includes what the investigator will do from writing hypothesis and their operational implications to the final analysis of data. A research design expresses both the structure of the research problem and the plan of investigation used to obtain empirical evidence on the relations of the problem Kerlinger (1986).

The present research uses descriptive research design using survey method. Descriptive research is marked by a clear statement of the problem, specific hypothesis and detailed information needs (Malhotra, 1999). The study uses survey based research method and is structured with clearly stated hypothesis and investigative questions. Cross sectional design is used in the present study as the information from any given sample of population element is collected only once.

We can find two types of investigations in the literature: Causal study and correlational study. Finding out relationship among variables in the descriptive research process is labeled as correlation study which, according to Cooper and Schindler (2003), is a subset of descriptive study. A correlational study is conducted in the natural environment of the organization with minimum interference by the researcher with the normal flow of work (Sekaran, 2003). Causal study are in which researcher wants to delineate the cause of one or more problems. In studies conducted to establish cause-and-effect relationships, the researcher tries to manipulate certain variables so as to study the effects of such manipulation on the dependent variable of interest (Sekaran, 2003).
The present study is a correlation type of investigation as we examine the relationship among variables of interest and adoption of B2B e-marketplace.

4.4 Research Process

The various stages of the research process followed in the present study are shown in Figure 4.1. These steps are followed as per the research process suggested by Cooper and Schindler (2003). The first phase is the exploration phase. Exploration begins with the search of published data and researchers often seek out to people who are well informed on topic (Cooper and Schindler, 2003). According to Cooper and Schindler (2003), an unstructured exploration allows researcher to develop and revise research question. Zikmund (2003) defines this phase as ‘problem discovery phase’ and emphasizes that exploratory research during the initial phases of the research aims to progressively narrow the scope of the research topic. According to Zikmund (2003), exploratory phase also aims to transform discovered problems with defined ones, incorporating specific research objectives. According to Kothari (2004), in social science research, it is considered advisable to do some field observation and researcher may take preliminary survey often called pilot survey.

In the present study, opinions and views of primary stakeholders in the research outcome: MSME owners and B2B e-marketplace service providers were explored to develop specific research questions and define the problem. During this phase following activities were undertaken to define and refine research problem.

- Extensive literature review to understand the MSME adoption of ICT and electronic commerce.

- Interview with MSME owner/managers to identify problems and benefits of using B2B e-marketplaces by the MSMEs. Interview with 30 MSMEs in two cities of Karnataka: Udupi and Manipal, was undertaken.
- Review of literature on business models of B2B e-marketplaces. Around 15 popular B2B e-marketplace websites operating in India were reviewed to identify the services provided by them.

- Interview with the sales managers of two e-marketplace vendors in India was undertaken to understand their service offerings for the MSMEs. One e-marketplace with advertising revenue model and another e-marketplace with transaction based revenue model were chosen.

![Research Process Diagram]

*Figure 4.1: Research Process*
Based on the findings of the exploration phase, research problem was defined. Specific research questions for the study were developed and hypotheses were formulated. A conceptual research framework was developed.

In the next stage, research design was developed. Decisions on the sampling design and the data collection methods to be used were taken. Multi-stage sampling design was used in the present study. Survey method using direct contact method was used to collect data. Cross-sectional design was used for the study. Research Instrument was developed and pilot study to pre-test the instrument was done. Next, the final main survey of the MSMEs was undertaken. The data collected was then compiled and analyzed. Inferences and conclusions were drawn based on the results of the data analysis.

4.5 Ethical considerations in the research

Ethical issues are given lot of importance in social science research. Several issues such as voluntary participation, no harm to the participants, ensuring anonymity and confidentiality, avoiding deception and fair reporting has been emphasized as some important ethical considerations in social science research (Babbie, 2009). Brief discussion on the due care taken in the present study is presented below.

Voluntary Participation:

The major tenet of social science research is that participation in the research should be voluntary and no one is forced to participate in the research. As the firms participating in the survey had to fill a long questionnaire, they were briefed on the objectives of the research and assured of confidentiality of data to motivate them to participate voluntarily. The data was collected by making personal visits to the firms and the firms not willing to participate and spend time were not included in the study.
No Harm to the participants:

Unlike several social science research studies, no personal questions were asked to the respondents. The study focused on firm specific questions rather than those involving respondent’s personal lives. Therefore, the present research had no questions that lead to embarrassment/harm to the participants.

Anonymity and confidentiality:

In the present research the respondents were assured of confidentiality of the data provided by them. However, since the data was collected through personal interview by visiting their firms and not through mail survey, identity of the respondent was revealed to the researcher, anonymity was not ensured. The respondents were assured that the data would only be used for generalization of the observation and no specific mention of their company name or brand would be revealed in the research report or in results. This practice was followed religiously to ensure the interest of the respondents participating in the research.

Deception:

The researcher while visiting the companies provided all the identity information and affiliations to reveal his identity and purpose of the visit. The data was collected only after briefing the respondents about why and what data is required for the study and how it will be used.

Analysis and reporting:

The researcher has ensured that to the best of his knowledge, due care is taken for collecting and analyzing data. The results reported are the outcome of the in-depth analysis.
4.6 Operationalisation of Research variables

The present research is correlation type of study and the relationship between the one dependent variable and several independent variables are investigated. The dependent variable in the study is adoption of B2B e-marketplace by MSME. The variable ‘MSME adoption of B2B e-marketplace’ is operationalized as a dichotomous variable and the respondent MSMEs are classified either as adopters or non-adopters based on whether they have voluntarily registered with at least one B2B e-marketplace or not.

The usage level and degree of adoption may vary from one firm to another. Therefore, for the purpose of analysis and to understand MSME participation level in the B2B e-marketplace, the adopters have been further classified into following three stages:

- **Exploration stage**: MSMEs that have registered (usually free), but not started conducting any activities online
- **Trial stage**: MSMEs that have registered and have been conducting transactions, but still evaluating the merits and demerits
- **Commitment stage**: MSMEs that have online marketing as a part of their strategy and there exists planned allocation of resources to avail various services provided by the e-marketplace.

The three participation levels have been operationalized as follows as defined by Grewal et al. (2001) and Son and Benbasat (2007) as follows

**Exploration Stage**
- We are registered in the B2B e-marketplace, but carry virtually no business via e-marketplace.
- We are evaluating the pros and cons of doing business via the B2B e-marketplace.

**Trial Stage**
- We have made several transactions via the B2B e-marketplace.
- We are still evaluating the pros and cons of doing business via the B2B e-marketplace.
Research Design and Methodology

- Doing business via the e-marketplace has still not become an important part of our business operations.

Commitment Stage

- We are making transactions via the B2B e-marketplace whenever necessary.
- Doing business via the B2B e-marketplace is an important part of our business operations.

The independent variables identified through literature review that are hypothesized to influence adoption of B2B e-marketplace are organization resources, mimetic pressures, adoption among suppliers, perceived dominance of supplier adopters, adoption among customers, and perceived dominance of customer adopters, product characteristics, demand uncertainty, market volatility, perceived relative advantage, perceived complexity and compatibility. Table 4.1 summarises the various constructs and their sources.

‘Organisation resources’ is defined as a function of human resources, technological and business resources of the firm. Based on the review of studies by Molla and Licker (2005) and Mehrten et al. (2001), this construct was developed to suit the current context. As the original constructs were developed in the context of e-commerce adoption in general, the items were modified to suit B2B e-marketplace adoption, in specific.

‘Human resources’ refer to the availability (accessibility) of employees with adequate information technology (IT) and other skill needed to use B2B e-marketplace (Molla and Licker, 2005). ‘Technological resources’ refer to the IT base of the organization, the extent of computerization and experience with network-based applications (Molla and Licker, 2005). ‘Business resources’ cover capabilities and assets, risk taking behavior and financial resources (Molla and Licker, 2005). These three resources are referred together as organization resources.
## Table 4.1: Research variables and their sources

<table>
<thead>
<tr>
<th>No.</th>
<th>Constructs</th>
<th>Sub constructs</th>
<th>Items Modified and adapted from</th>
<th>Modified and adapted from</th>
<th>Number of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Organisation Resources</td>
<td>Human Resources</td>
<td>Molla and Licker (2005)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technological Resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business Resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mimetic Pressures</td>
<td>Adoption among competitors</td>
<td>Teo et al. (2003)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perceived Success of Competitor Adopters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Adoption among suppliers</td>
<td></td>
<td>Teo et al. (2003)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Perceived Dominance of Supplier Adopters</td>
<td></td>
<td>Teo et al. (2003)</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Adoption among customers</td>
<td></td>
<td>Teo et al. (2003)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Perceived Dominance of Customer Adopters</td>
<td></td>
<td>Teo et al. (2003)</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>Product Characteristics</td>
<td>Asset Specificity</td>
<td>Son and Benbasat (2007)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product Complexity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Demand Uncertainty</td>
<td>Frequency Uncertainty</td>
<td>Son and Benbasat (2007)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Uncertainty, Volume Uncertainty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Market Volatility</td>
<td></td>
<td>Bello and Gilliland (1997)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Perceived Relative Advantage</td>
<td></td>
<td>Rogers (1995)</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>11</td>
<td>Perceived Complexity</td>
<td></td>
<td>Rogers (1995)</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>12</td>
<td>Compatibility</td>
<td></td>
<td>Rogers (1995)</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>
‘Mimetic pressures’ refers to bandwagon effect and mimetic actions of organisations that imitate successful practices of other organisations. In the present study, mimetic pressures construct as used by Teo et al. (2003) and Son and Benbasat (2007) is used. It is conceptualized as the extent of adoption by competitors within an industry and perceived success of competitor adopters.

‘Adoption among suppliers’ refers to the extent of adoption of B2B e-marketplace by the suppliers of the MSMEs and is operationalized as in the study Teo et al. (2003).

‘Adoption among customers’ refers to the extent of adoption of B2B e-marketplace by the customers of the MSMEs and is operationalized by modifying the construct as in the study Teo et al. (2003).

‘Perceived dominance of supplier adopters’ is adapted from Teo et al.(2003) and Son and Benbasat(2007). It refers to coercive pressure from trading partners such as suppliers to adopt B2B e-marketplaces.

‘Perceived dominance of customer adopters’ is adapted from Teo et al.(2003) as MSMEs are more dependent on their customers and their influence on adoption of new innovations is evident from the literature. It refers to coercive pressure from customers to adopt B2B e-marketplaces.

‘Product characteristics’ construct is modified and adapted from Son and Benbasat(2007) and is defined as a function of asset specificity and product complexity.

‘Asset specificity’ refers to the extent to which a product used by a firm cannot be easily utilized by other firms and ‘product complexity’ refers to the amount of information necessary to describe the attributes of a product (Malone et al., 1987; Son and Benbasat, 2007). The construct ‘product complexity’ was originally referred as complexity in Son and Benbasat (2007). In the present study, it is renamed as product complexity to avoid ambiguity with another independent variable “perceived complexity”. The constructs of Son and Benbasat (2007) were in the context of organization buyers;
therefore, the constructs used in the present study were modified and adapted from the suppliers or selling organization perspective.

‘Demand uncertainty’ is modified and adapted from Son and Benbasat (2007) construct and is a function of two sub constructs ‘frequency uncertainty of demand’ (extent to which the frequency of sales of the product sold by MSME is predictable) and ‘volume uncertainty of demand’ (extent to which volume of sales of the product sold by the MSME is predictable). The above constructs were originally developed for purchasing organization context. In the present study, these constructs were adapted and modified from the selling organization perspective. Both frequency uncertainty and volume uncertainty were conceptualized as two item constructs.

‘Market volatility’ is measured as a multi-item scale adapted from the studies of Bello and Gilliland (1997). It is the uncertainty attributable to the market environment in which products are traded. This is the only variable that is not measured as a five point Likert scale. A stable market environment was coded as 1 and a volatile market environment was coded as 2.

‘Perceived relative advantage’ is adapted from Diffusion of Innovation theory (Rogers, 1995) and is defined as the degree to which doing transactions with e-marketplace is perceived as better than the traditional way of business.

‘Perceived complexity’ is adapted from Diffusion of Innovation theory (Rogers, 1995) and is defined as the degree to which e-marketplace is perceived as difficult to understand and use.

‘Compatibility’ is adapted from Diffusion of Innovation theory (Rogers, 1995) and is defined as the degree to which e-marketplace is perceived as being consistent with existing values, past experiences, and needs of potential adopters.
4.7 Sample Design

Sample design is an important component of research design. As per Malhotra (1999), sample design process includes five steps: (1) Define population, (2) Determine sampling frame, (3) Select sampling technique, (4) Determine sample size, (5) Execute the sampling process. These steps in the context of the present study and described in the following sections.

4.7.1 Geographical scope of the study

The present study was conducted in three select cities of Karnataka state in India. Karnataka is one of the 28 States in India and is among the top five industrial states in the country. Karnataka has a mix of large industrial public sector undertakings, large and medium privately owned industries and a very wide and dispersed MSME sector. Recently, Karnataka has emerged as the IT capital of the country with its capital, Bengaluru, recognized globally as the Silicon Valley of Asian region.

Karnataka’s industrial sector is vibrant with industries in key sectors like telecommunication, electronics, information technology, precision engineering, aerospace, automobiles, readymade garments, bio-technology and food processing etc. The strong base of large and medium scale industry established in Karnataka has huge opportunities for vibrant small scale sector in the state.

The Karnataka state is rich in natural resources and is known for its salubrious climate. It has a strong resource base of highly educated people, backed by an extensive educational infrastructure comprising of world-renowned schools, colleges, institutes of higher learning and research and development centres. The State is also linked by air with international centres and also has a wide network of roads, railways, seaports, airports and communication network.

According to the fourth census of MSMEs, Karnataka is ranked at fifth position in terms of number of MSMEs with more than 1.36 lakh MSMEs and
ranked fourth position in terms of number of people employed (7.89 lakh people). Karnataka is also fourth position in exports with a contribution of 5,471 crore rupees worth exports (8 per cent of total exports of India). The sector wise export performance of the state is included in Appendix 2. The state has around 227 MSME clusters. Karnataka is also among the top ten states with 6.18% of units suffering from sickness/incipient sickness. In Karnataka, out of total 1,36,186 enterprises, 1,33,524 are micro, 2562 small enterprises, and 100 are medium enterprises (Ministry of MSME, 2011a).

The Karnataka state has 29 districts and 176 taluks and has been considered as one among the top choices for investors. District wise number of MSMEs in Karnataka is enclosed in Appendix 3. The present study was conducted in three districts of Karnataka: Bangalore (Urban), Dakshina Kannada and Udupi.

Bangalore, being the capital of Karnataka is the major industrial hub and has highest number of MSMEs in the state. Dakshina Kannada district is one of the emerging industrial hub of the district. A number of industrial parks are in pipeline in the state’s industrial plan. Udupi district is the third district and was selected as the district has significant number of rural enterprises as well.

4.7.2 Population of the study

The Unit of Analysis in the present study is the Micro, Small and Medium enterprise in the manufacturing sector.

According to Malhotra (1999), population is the aggregate of all the elements that share some common set of characteristics and that comprise the universe for the purpose of the research problem. In the present study population is finite and comprises of all Micro Small and Medium enterprises in the manufacturing sector in Karnataka. According to Annual Report of Dept. of Industries & Commerce for 2009-10, a total 16,11,655 MSME were found working, out of which, 37 per cent of MSMEs units were in manufacturing
(5,96,312) and 63 per cent of MSMEs were service industries (Department of Industries and Commerce, Government of Karnataka, 2010).

4.7.3 Sampling frame

The study is conducted in three select districts of the state considering the time and cost involved in collecting data. The regions that were selected for the study were Udupi district, Dakshina Kannada district and Bangalore (Urban) district.

There was no single source which covered cross section of MSMEs from the urban/rural areas and various industrial sectors/thrust sectors of Karnataka. As the 4th census was underway during the data collection period, Directorate of Industries and Commerce database was not updated with the data of medium enterprises.

Therefore, sampling frame was developed from four sources

1. List of MSMEs provided by Directorate of Industries and Commerce, Government of Karnataka (included micro, small enterprises based on 3rd census).

2. Directory of Karnataka small scale industries association (KASSIA) (included updated data on Bangalore based micro, small and medium enterprises).

3. Directory of MSMEs obtained from District Industrial Centre (DIC), Yeyyadi, Mangalore, Dakshina Kannada district.

4. Directory of MSMEs obtained from Udupi District Industrial Association.

The majority of the MSMEs registered in KASSIA were from Bangalore (Urban) region, the directory from DIC, Dakshina Kannada and Udupi district industrial associations were added to have representations from small firms in rural/non-urban regions. A total of 12,000 manufacturing MSMEs in these regions addresses were obtained and was used as the sampling frame.
4.7.4 Sampling Procedure and Sample Size

Multi-stage sampling method is used to select the sample for the study. In the first stage, the three districts were selected for the study. The three districts are Bangalore (Urban), Dakshina Kannada and Udupi districts. These three districts were selected to ensure a cross section of MSMEs in sample from various industry types and include MSMEs from both urban and rural areas.

In the second stage, stratified sampling was used with size of the firm as the basis of the stratification. The size of the MSME is defined in India based on investment on plant and machinery and they have been grouped into three groups: as micro, small and medium. The size was selected as the parameter for stratification to ensure sampling elements to be homogeneous. Literature review showed that size of the firm had a significant influence of the adoption of ICT. Past research has found that firm size is an important determinant of adoption of IT (Chen and Fu, 2001).

The official definitions of MSMEs in India have divided MSMEs into three groups based on the firm’s investment in plant and machinery as discussed in Chapter 2. For manufacturing enterprises, they have been grouped as micro (investment less than 25 lakh rupees), small (investment is more than twenty five lakh rupees but does not exceed five crore rupees) and medium (investment is more than five crore rupees but does not exceed ten crore rupees). In the present study, to ensure representation from all sizes of MSMEs, the group “Small” was divided further into two groups:

**Small-Group1:** MSMEs with investment in plant and machinery more than 25 lakh rupees and less than one crore rupees.

**Small-Group 2:** MSMEs with investment in plant and machinery more than one crore rupees and less than five crore rupees.

This was done as there was huge variance in the investment in the original group ‘Small’ and to ensure homogeneous MSMEs in the strata. Thus the MSMEs were divided into four groups/strata based on their investment in plant and machinery in this study as follows:
- **Micro** - MSMEs with investment less than 25 lakh rupees
- **Small-Group 1** - MSMEs with investment greater than 25 lakh but less than one crore rupees
- **Small-Group 2** - MSMEs with investment more than one crore but less than five crore rupees
- **Medium** - MSMEs with investment more than five crore and less than 10 crore rupees.

As 90 per cent of the MSME units are micro firms, proportionate stratified sampling was not found suitable as sample would be skewed towards micro firms. In the pilot study, it was found that majority of the micro firms were non-adopters of B2B e-marketplace. Therefore, if proportionate sampling is chosen, it would result in sample having more number of non-adopters. As the study required a good number of adopters to be included in the sample, it was decided to collect data from each stratum in equal number.

According to Kothari (2004), proportional allocation is considered most efficient and an optimal design when the cost of selecting the item is equal for each stratum, there is no difference in within-stratum variances and the purpose of sampling happens to be to estimate the population value of some characteristic. But in case the purpose happens to be to compare the differences among strata, then equal sample selection from each stratum would be more efficient even if the strata would differ in sizes (Kothari, 2004).

In the present study, 50 companies from each of the four strata (total 200 contacted) were contacted over telephone. Within each stratum, random sampling was employed to select the MSMEs. Out of 200 companies contacted, 122 MSMEs agreed to participate in the survey. This resulted in the response rate of 61 per cent. Based on their consent to participate in the study, a personal visit was made to these firms and interview with the owner/manager was conducted. In three cases, the questionnaire was mailed through email and telephonic interview with owner/manager was conducted. The sample size used in similar studies were also reviewed (as summarized in the Table 4.2) to ensure that the sample size is adequate for the purpose of the study.
Table 4.2: Sample sizes in similar prior studies

<table>
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<tr>
<th>Author</th>
<th>Region</th>
<th>Study type</th>
<th>Sample size</th>
<th>Sampling method</th>
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<td>B2B E-business, Large corporates</td>
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<td>snowballing technique</td>
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<td>Teo et al. (2003)</td>
<td>Singapore</td>
<td>Intention to adopt Financial EDI</td>
<td>222</td>
<td>Random sampling</td>
</tr>
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<td>Teo, Ranganathan, 2004</td>
<td>Singapore</td>
<td>B2B Electronic Commerce adoption; Large Firms</td>
<td>108</td>
<td>random sampling</td>
</tr>
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<td>Molla and Licker, 2005b</td>
<td>South Africa</td>
<td>Electronic Commerce, Large firms</td>
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<td>systematic random sampling</td>
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<td>SMEs, Stratified sampling</td>
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<td>Electronic commerce, SMEs</td>
<td>115</td>
<td>SMEs</td>
</tr>
<tr>
<td><strong>B2B e-marketplace studies</strong></td>
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<tr>
<td>Joo and Kim, 2004</td>
<td>South Korea</td>
<td>B2B e-marketplace, Large corporate(buyers)</td>
<td>39</td>
<td>systematic sampling</td>
</tr>
<tr>
<td>Son and Benbasat, 2007</td>
<td>Canada</td>
<td>B2B e-marketplace, Large corporate buyers</td>
<td>183</td>
<td>random sampling</td>
</tr>
<tr>
<td>Chong et al. (2011)</td>
<td>China</td>
<td>B2B e-marketplace, SMEs</td>
<td>114</td>
<td>random sampling</td>
</tr>
</tbody>
</table>
Determining sample size involves several factors such as budgetary constraints, time, sample sizes used in similar studies, nature of analysis and adequacy for statistical tests, unit of analysis etc.

In the present study, the final sample size used for the analysis is 122 as per the sampling procedure explained as above. As the unit of analysis in the present study is a firm and the adoption was found to be low among MSMEs, this sample was considered adequate for the data analysis.

4.7.5 Data Collection Method

Survey research can use several methods to collect data such as self-administered questionnaires through mail, telephone, internet or personally administering the questionnaire. In the present study, the data was collected from the 122 MSMEs through a personally administered structured questionnaire. The respondents were Owner/Managers of the MSMEs. The MSMEs that agreed to participate in the survey were interviewed in person by the researcher. The primary advantage of this method according to Cooper and Schindler (2003) are good co-operation from participants, interviewer can probe answers and illiterate participants can be reached. This method allowed the researcher to gain deeper insights into the perception of the MSME owners about B2B e-marketplace. The data was collected from MSMEs in the Udupi, Dakshina Kannada and Bangalore (Urban) districts of Karnataka state. The data was collected during the period May 2010- December 2010.

4.8 Research Instrument

The research instrument used in the study is a structured questionnaire. The questionnaire method was selected as it allowed the researcher to collect data systematically and address the research issues in the standardized and economical way. The research instrument was developed based on the constructs identified in the literature review, reviewing the website of the B2B e-marketplace service providers and
feedback of MSME owners and B2B e-marketplace service providers during exploratory phase of the research.

4.8.1 Development of Research Instrument

The questionnaire was designed to study the perceptions of the respondents on various research issues. Questions were addressed not just to company operations but to company relationships and interactions with business customers and suppliers since these relationships may have decisive impact on the decision to adopt B2B e-marketplaces. The questionnaire was divided into six major parts.

The first part measures awareness of the firm towards B2B e-marketplace and organization resources to adopt B2B e-marketplace. Awareness refers to the organisation’s perception, comprehension and projection of benefits and risks of B2B e-marketplace. The various statements to measure awareness level of MSMEs towards B2B e-marketplace are as follows:

- Our organization is aware of e-marketplaces relevant to our business.
- Our organization is aware of our competitor’s use of e-marketplaces.
- Our business recognizes the opportunities and threats enabled by e-marketplaces.
- Our organization has a good understanding of services and business models of the e-marketplaces.
- We have a clear understanding of the potential benefits and risks of using e-marketplaces

In the first part, statements to measure the independent variable organization resources is present. The construct organization resources was developed as a function of human resources, technical resources and business resources sub constructs as discussed in the section 4.5.
The second part includes statements related the *product characteristics and* market environment related factors. The concepts and measures suggested by Son and Benbasat (2007) and Teo et al. (2003) are used in this part. The constructs *product characteristics* (sub constructs *asset specificity* and *product complexity*), *Demand Uncertainty* (sub constructs frequency uncertainty and volume uncertainty), *market volatility*, *mimetic pressures* (sub constructs: *adoption among competitors, perceived success of competitor adopters*), *adoption among suppliers, perceived dominance of supplier adopters*, *Adoption among customers* and *Perceived dominance of customer adopters* constructs are included in this part.

The third part includes the statements to measure e-marketplace related factors. Roger’s Diffusion of Innovation is used to identify constructs. The three constructs of diffusion of innovation such as *perceived relative advantage*, *perceived complexity* and *compatibility* were included in the study.

The fourth part measures various aspects of the adoption. This part is administered only for the adopters of the e-marketplace. Questions related to which e-marketplace they had registered and the reason for choosing the e-marketplace, statements to understand their stage of adoption, services of B2B e-marketplace used by MSMEs and benefits of use of B2B e-marketplace are included in this section.

The services provided by the B2B e-marketplaces were identified through literature review, discussion with e-marketplace marketing managers and studying the services provided by around 15 B2B e-marketplace websites operating in India. The intention was to understand for what purpose the MSMEs used the B2B e-marketplaces. The following services were included in the study:

- Identification of suppliers for our raw materials/industrial equipments
- Identification of new customers for exploring new markets
- Providing product and company information
- Finding competitor information
• Find new business opportunities
• Find good bargains for products
• Update on industry news/ trade fairs etc.
• Conduct buying selling transactions electronically
• Participate in auctions
• Get credit rating to improve brand image and trust worthiness of the company

This part of the questionnaire also includes questions related to benefits of using B2B e-marketplace by the adopters. Based on the literature review (Stockdale and Standing, 2004) and exploratory study benefits of B2B e-marketplaces were shortlisted and included in the questionnaire. The following benefits were included in the study. However, there was an open ended question to allow the respondents to specify any other benefit achieved that is not included in the list.

• B2B e-marketplace has enabled us to get new customers and increase sales
• B2B e-marketplace has provided better brand image among our customers
• B2B e-marketplace has helped us in finding new suppliers and reduce search and procurement costs
• The use of e-marketplace has provided flexibility in administration and communication with our business partners
• B2B e-marketplace has enabled us to get information on competitors and industry news at one single source
• B2B e-marketplace has enabled us to improve our customer services
• B2B e-marketplace has enabled us to update product information instantly and cost effectively
• B2B e-marketplace has enabled us to enter the supply chains of larger companies in our industry.
The fifth part has statements pertaining to the barriers to e-marketplace adoption by MSMEs. Based on the literature review (Stockdale and Standing, 2004) and exploratory study barriers to adopt B2B e-marketplace were shortlisted. This section is administered to both adopters and non-adopter MSMEs. The following barriers were included in the study.

- *Using e-marketplace is complex*
- *We have no support from the e-marketplace vendors and they do not understand our needs*
- *Our firm is not aware of services provided by the e-marketplaces*
- *We do not trust transactions through e-marketplaces*
- *We feel it would be expensive for our firm to adopt e-marketplaces*
- *Our current suppliers/customers are not ready to use e-marketplaces.*
- *The e-marketplace is not suitable for our product as the products have to be highly customized for our customers*
- *We are dependent on traditional intermediaries in global trading*
- *There are lack of technology standards adopted among e-marketplace vendors*

However, there was an open ended question included to allow the respondents to specify any other barrier that is not listed in the questionnaire.

In the final part, there are general questions related to the firm such as firm’s investment, industry it operates, products of the firm and MSME owner/manager’s information.

The five-point Likert scale was used for all dependent variables except market volatility. The five-point Likert scale was also used to measure awareness level, benefits of B2B e-marketplace use and barriers. The scale measured the degree to which the respondent agreed with a given statement. The highest agreement was indicated as strongly agree and the least agreement was indicated as strongly disagree. The five point Likert scale was
used as it is unambiguous and to have uniformity the same scale was used throughout. The all the items measured in five point Likert scale were coded as 5 for strongly agree, 4 for agree, 3 for neither agree nor disagree, 2 for disagree and 1 for strongly disagree. The construct market volatility was measured as three item scale with each item with two values. The stable market environment was coded as 1 and a volatile market environment was coded as 2. Services of B2B e-marketplace used by the MSMEs were measured as binary variable (0: not used, 1: used).

4.8.2 Pilot Study

Several authors (Kothari (2004); Saunders et al. (2011)) emphasize that pilot study should be undertaken to pre-test the questionnaire. Pilot study will enable researcher to obtain assessment of validity of questionnaire as well (Saunders et al., 2011). According to Cooper and Schindler (2003), research instrument should pilot tested to detect weaknesses or errors in the instrument. The pilot test should be conducted with the subjects from the target population and simulate the procedures and protocols that have been designated for data collection (Cooper and Schindler, 2003). According to them, the size of the pilot groups may range from 25 to 100 subjects, depending on the method to be tested, but the respondents do not have to be statistically selected.

In the present study, a pilot study with a random sample of 30 MSMEs was conducted to evaluate the information provided in the questionnaire and to test the readability of the questionnaire. The objective of the pilot test was to pretest the questionnaire with the respondents and ensure that there was no ambiguity in the questionnaire. The respondents had no major issues with the questionnaire.

4.8.3 Reliability and Validity of the Scales

All constructs included in the study were drawn from previous studies in the literature. Although the scales used in the study were previously reported in the literature, scale validation procedure was performed using
exploratory factor analysis and Cronbach Alpha. This was done to ensure that the scale used is valid and reliable for this specific purpose and context of the study.

**Reliability of the instrument**

The reliability of a measure indicates the extent to which it is without bias and ensures consistent measurement across time and various items. It is a measure of stability and consistency with which instrument measures the concept (Sekaran, 2003). The inter-item consistency reliability is tested using a popular method suggested by Cronbach. He proposed coefficient Alpha (called Cronbach Alpha) for multi-point scaled items. The higher the coefficients, the better the measuring instrument (Sekaran, 2003).

Alpha coefficient ranges in value from 0 to 1 and may be used to describe the reliability of factors. A test with robust reliability is expected to display a Cronbach Alpha above 0.9. However, values above 0.7 are acceptable indicators of internal consistency as suggested in literature (Nunnally, 1967). In this research we have used Cronbach Alpha to test the reliability of the measures used in the instrument.

**Validity of the instrument**

The measure is considered valid when it actually measures what it is intended to measure (Churchill, 1979). Validity ensures the ability of a scale to measure the intended concept. Literature suggests research of this type to have three groups of validity: content validity, criterion validity and construct validity (Sekaran, 2003).

The instrument used in this research has a proven content and criterion related validity as it is a derivative of instruments used in the previous studies. However, since the measures was modified and reworded to suit B2B e-marketplace adoption, the content validity was checked again.

The content validity is primarily judgmental and intuitive, consultation of panel of marketing managers of two leading B2B e-marketplaces was taken
and suggestions were incorporated in the instrument. The services provided by the e-marketplace, possible benefits and uses of e-marketplace were identified and incorporated in the questionnaire. In addition to this, 15 B2B e-marketplaces operating in India were visited to study the services they offered. The measures and factors used in the study have emerged from the literature review and exploratory study undertaken before the development of the instrument. The questionnaire was also reviewed by researchers to ensure content validity.

The creation of multi-item scales and review of these scales by researchers and practitioners provide our constructs and their associated items with content validity (Malhotra and Grover, 1998). The questionnaire was administered to two researchers, 2 B2B e-marketplace marketing managers to test the readability and to ensure completeness of the questionnaire.

The questionnaire was subjected to item validation through Factor Analysis, the purpose of which was to determine the internal structure of the set of a given number of items. Principal Component Analysis (PCA) method with Varimax Rotation with Kaiser Variation was used to generate factors.

4.9 Statistical Techniques used

The data collected through the descriptive study was tabulated in SPSS 16.0 for statistical analysis. Descriptive statistics was used to understand the characteristics of the adopters and non-adopters and various independent variables in the study. Statistical tests such as independent sample t-test and ANOVA were used to analyse the differences in means of the groups. Logarithmic regression analysis was used to understand the relation between the dependent and the independent variable.

Logistic Regression using Forward LR method was used to identify the factors that influence the adoption of B2B e-marketplace. Awareness level, benefits of adoption of B2B e-marketplace and barriers to adoption and use of B2B e-marketplace were analyzed using weighted means. Services of B2B e-
marketplaces used by the MSMEs were analysed as percentages (users and non-users). Reliability and validity of the various scales used in the study are tested by computing the Cronbach’s Alpha and by conducting exploratory factor analysis using Principal Component Analysis with Varimax Rotation respectively.

4.10 Summary

In the present research descriptive design is used. The study uses cross sectional design using survey method. Multistage sampling method was used to draw samples from three districts of Karnataka state. The respondents are owner/managers of the MSMEs. The research instrument used was a structured questionnaire. The research instrument was pilot tested using 30 MSMEs. Reliability and validity of the research instrument is ensured and techniques used are discussed in the chapter. Data collected from 122 MSMEs were analysed using SPSS 16 and the detailed discussion on the analysis and results are discussed in the next chapter.