CHAPTER 4

RESEARCH METHODOLOGY

Methodology refers to a body of knowledge that enables researchers to describe and evaluate methods, identifying their presuppositions and consequences, and relating their potentialities to research advances (Miller 1983). This chapter discusses the research approach and design adopted for the study. A research design is a blueprint of the structure of an enquiry to ensure that the evidences collected enable us to answer questions or test theories as unambiguously as possible (Vaus 2001). It is the conceptual structure within which research is conducted. The research design, when properly framed helps to minimize the bias and maximize the reliability of data collected (Kothari 2004). The chapter also describes the operationalization of model constructs which is an important step before data collection and analysis. The operational, sample, observational and statistical designs of the study are explained in detail.

4.1 RESEARCH APPROACH

A researcher has to understand the philosophical issues before undertaking the research in order to ensure satisfactory outcomes. Such an understanding ensures clarity while framing research design, in terms of what has to be found, how it has to be found and how it has to be interpreted to answer the research questions. It helps to recognise which research design will work and which will fail, and it helps the researcher even create new designs that maybe outside his experience (Acumen-Insights 2009). The nature of the present study is found to be relevant to social science research, especially management research, within the scope of textile industry. The study investigates the relationships between the socio-psychological factors that influences innovation adoption and business performance in the context of Tirupur knitwear manufacturing cluster.

In any social science research, there are two prevailing as well as contradicting approaches: positivism and social constructionism. While positivism is

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

deductive, social constructionism is inductive in logic. Positivists believe that reality is stable and can be observed and described from an objective viewpoint i.e. without interfering with the phenomena being studied. This involves manipulation of reality with variations in only a single independent variable so as to identify regularities in, and to form relationships between, some of the constituent elements of the social world (Panuwatwanich 2008). Social constructionism, on the other hand, is a perspective which believes that a great deal of human life exists as it does due to social and interpersonal influences. It proceeds from a systematic analysis of socially meaningful actions, through observations made in the natural setting, to arrive at general principles or laws on how and what aspects of the social world (Creswell 2003).

The research approaches may be broadly classified into qualitative and quantitative approaches (Kothari 2004). Quantitative approach involves generation of data in quantitative form representing explicitly defined variables that will be subjected to rigorous quantitative analysis. This approach may be inferential, experimental or simulation based. This approach has been associated with positivism as it employs statistical procedures to draw inferences from the sample to confirm to predictable patterns in the larger population. Qualitative approach is concerned with the subjective assessment of the attitudes, opinions and behaviour. It also relies on explicitly defined variables, but draws data in qualitative form which are not subjected to rigorous quantitative analysis (Mitchell and Bernauer 1998). Hence this approach is relevant to social constructionism belief. Though theoretically, there is clear distinction between positivism and social constructionism approaches, when it comes to practical situations, the distinction gets blurred. In practice, a researcher cannot stick to any one of these approaches; rather it is argued that one should attempt to mix both the methods to some extent, since it provides more meaning to the phenomena and variables being investigated (Panuwatwanich 2008).

The present study adopts positivism as the primary research approach as the study relies on well established theories and research works on innovation and develops a conceptual model with a set of hypotheses that links the various construct

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

in the model in a logical fashion. The model has been assessed using quantitative data collection and statistical applications to understand its relevance at the Tirupur knitwear cluster. However, the researcher also collected qualitative information from selected respondents by way of unstructured interviews for a better understanding of the relevance of the research problem in the actual business scenario. This social constructionist approach, though at a lesser degree, complements the findings of the empirical analysis.

4.2 RESEARCH DESIGN

A research design is an arrangement of conditions for collection and analysis of data that has relevance to research purpose (Kothari 2004). It acts as a scheme for meeting the already established research goals. A research design contains a clear statement of the research problem, techniques employed for data collection, the population studied and the tools and techniques employed for data processing and analysis. Hence the research design involves such plans as sampling design, observational design, statistical design as well as operational design.

The researcher has proposed a conceptual model based on the literature review as well as discussion with experts in the academics as well as industry. The model developed and the hypotheses framed are proposed to be tested and validated by conducting a survey. In this case, the researcher has no control over the variables and can only describe the state of affairs as they exist at the present. Hence the research design is descriptive in nature. The descriptive study aims to describe or define a subject through collection of data. Such studies not only report the frequencies of observations but also attempts to measure the patterns of relationships existing even when variables cannot be controlled (Cooper and Schindler 2003). As descriptive research does not fit totally into a quantitative or qualitative research methodology, it can utilize elements of both, often within the same study. Descriptive research often calls upon quasi-experimental research design employing data collection methods like surveys, interviews, observations, and portfolios (AECT).

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

4.2.1 Type of Investigation

In the present research, the researcher attempts to establish a cause-effect relationship between certain variables of interest. The antecedent-consequence approach or the variance approach to innovation adoption is the primary focus of the researcher. Causal paths are developed in the conceptual model, and the significance of these paths is verified using correlation, regression analyses. The causes (independent variables) and effect (mediating and dependent variables) are delineated. Further, the hypothesized causal relationships are evaluated against evidences collected empirically and the sequential paths are tested and validated. The entire model is also tested using SEM that again investigates this linkage. Hence the investigation is causal in nature.

4.2.2 Research Setting

The research setting for any study can be either natural or controlled. An uncontrolled or non-contrived setting is the natural environment in which events occur normally. Field studies and field experiments are examples of non-contrived settings. Such studies are conducted with very limited interventions on the part of the researcher. The contrived or controlled setting involves the creation of an artificial environment in which the events are strictly controlled. The respondents or participants will be carefully chosen and the stimuli will be manipulated according to the research requirements of the researcher. The present research was carried out in the natural setting of the knitwear cluster of Tirupur district. Researcher had no control over the variables and hence the research setting is non-contrived.

4.2.3 Time Horizon

With respect to the time frame involved, the present study is one-shot or cross-sectional in nature. The primary data were gathered once, during a period of 6 months, from the respondents who constituted the sample. The objective was to look at how things were at a specific point in time, without consideration of the history or trend at work.

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

4.2.4 Operational Definition of Model Constructs

The constructs or variables of interest in the research have to be properly understood in order to define the scope of the study. An operational definition describes exactly what the variables are and how they are measured within the context of a study. It establishes the rules and procedures to measure and give meaning to variables and terms. The definition establishes categories for variables that are mutually exclusive and totally inclusive. Operational definitions also establish the standard of comparison the investigator will use to either accept or reject a hypothesis. The operational definitions of the variables of the study are presented in the Table 4.1.

Table 4.1 Operational definition of the variables under the study

S.No.	Variable	Operational Definition
1	Innovation	Generation , development and/or adaptation of an idea/ behaviour/ or practice, new to the adopting organization
2	Innovation adoption	Status of the organization in the adoption of innovations
3	Innovation implementation	Extent of gaining targeted employees' appropriate and committed use of an innovation
4	Technological innovation	Extent of adoption of technologically new products and processes and/ or significant technological improvements in products and processes.
5	Administrative innovation	Extent of adoption of new and/ or improved business processes and practices within the firm
6	Marketing innovation	Extent of adoption of new and/ or improved marketing methods involving significant changes in product design or packaging, product placement, product promotion or pricing
7	Innovation objectives	Extent to which an organization makes operational its definition of 'what our business should be'
8	Leadership	Extent to which the behaviour of the leader stimulates and supports innovation in the organization
9	Market orientation	Extent of an organization's disposition to continuously deliver superior value to customers

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

Table 4.1 (Continued..)

S.No.	Variable	Operational Definition
10	Organizational structure	Extent to which authority and responsibility for decision making and communication are distributed in the entity
11	Innovation climate	Extent of obvious manifestation of a pro-innovation culture in the organization that has a positive impact on innovation
12	Collaboration	Extent to which the organization works jointly with others especially in a joint endeavour
13	Competition	Extent of rivalry in which every seller tries to get what other sellers are seeking at the same time
14	Turbulence	Extent of unpredictable and swift changes in the organization's external environment that affects its business
15	Research and development	Extent of investigating activities of the organization in developing and/or improving products and/or processes
16	Barriers to innovation	Degree of presence of potential obstacles that hinders organizations to successfully adopt innovations
17	Business performance	Concerned with organization's financial and market performance in comparison with competitors
18	Financial performance	Concerned with organization's level of profitability and turnover growth in comparison with competitors
19	Market performance	Concerned with organization's level of business competitiveness and client satisfaction in comparison with competitors

4.3 SAMPLING DESIGN

The next step in the research design is to identify the target population and select the sample out of it, if a census is not desired. A sample is a part of the population or universe, carefully selected to represent that population. Sampling is the process of determining who and how many people to interview, what and how many events to observe, or what and how many records to inspect.

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

When researchers undertake sampling studies, they are interested in estimating one or more population values and/or testing one or more statistical hypotheses (Cooper and Schindler 2003). The sampling design is the technique or procedure the researcher would adopt in selecting items for the sample from the population identified for the study for the purpose of drawing inferences and arriving at conclusions about the population at large (Kothari 2004).

4.3.1 Population

As the study is proposed to be conducted in the knitwear cluster of Tirupur district, all the Small and Medium Enterprises operating in the knitwear value chain of the cluster constitute the population for the study. To understand the depth and breadth of the population, it was felt necessary to first observe the Tirupur Knitwear cluster eco system and then arrive at source list from which sample can be picked up. The eco system comprises of knitwear manufacturers engaged in various stages of knitwear production, customers, suppliers of machineries and accessories, Governmental agencies, trade associations, financial institutions and educational and research institutions. Though, there are seven segments identified in knitwear manufacturing, these seven can be effectively combined to form six major segments well integrated with each other from end to end such as knitting of yarn into fabric, wet processing the fabric to add colours, compacting the fabric to make them ready for cutting and stitching, garmenting that involves manufacturing knitwear from the fabric, printing/embroidery as per the buyer's requirements as well as necessary accessories' support in the form of elastics, tapes, yarn, button supply and the like. Hence, specifically, a total of six segments can be identified in the cluster such as

1. Knitting
2. Wet processing
3. Compacting
4. Garmenting
5. Printing/ embroidery

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

6. Others

As per the official statistics available with the District Industries Centre, Tirupur, and that available with the District Office (Collectorate), Tirupur, and Tirupur Knitwear Association (TEA), the cluster houses approximately 6250 business units involved in the various manufacturing activities in the knitwear value stream. The number of units operating in the knitwear value chain is given in Table 4.2.

Table 4.2 Number of units in the knitwear cluster of Tirupur

Operations	No. of units
Knitting Units	1500
Dyeing and Bleaching	700
Fabric Printing	500
Garment Making	2500
Embroidery	250
Other Ancillary Units	500
Compacting and Calendaring	300
Total	**6250**

Source: www.tiruppur.tn.nic.in 2011

Hence, it can be concluded that the population for the present study is 6250 SMEs operating in the Tirupur knitwear cluster.

4.3.2 Sampling Framework

The primary unit of data collection and analysis for the purpose of the present study is individual firm. The source lists available with Tirupur Exporters Association (TEA) and Apparel Export Promotion Council (AEPC) were collected. TEA is an association of the exporters of cotton knitwear from Tirupur. The association that was established in the year 1990 has 846 members (691 Life members and 155 Associate members) today (TEA 2011). AEPC is established by the Government of India, Ministry of Textiles in the year 1978, for supporting the export of knitwear. Among the registered members, the address list of active

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

members was received from the council in 2011. Hence the combined address lists received from TEA and AEPC formed the sampling framework for the study.

4.3.3 Sample Size

Sample size is one of the most important aspects of a research design that can influence the detection of major differences, relationships or interactions (Peers 1996). The sample size has to be determined based on the size of the treatment effects the researcher has in mind and the variability of the observational units. In addition to the purpose of the study and population size, three important criteria need to be specified to determine the appropriate sample size: the level of precision, the level of confidence or risk, and the degree of variability in the attributes being measured.

The study proposes to adopt structural equation modelling (SEM) technique to measure the causal relationship between the latent variables. It is important to determine the minimum sample size required in order to achieve a desired level of statistical power with a given model prior to data collection. According to Bentler and Chou (1987), the ratio of sample size to the number of free parameters can be as low as 5:1 under normal and elliptical theory, especially when we have many indicators for the latent variables and the associated factor loadings are large. A ratio of 10:1 will be more appropriate for arbitrary distributions. Although there is little consensus on the recommended sample size for SEM, as a rule of thumb, any number above 200 is understood to provide sufficient statistical power for data analysis (Hoe 2008).

There are several strategies for determining the sample size. These include using a census for small populations, imitating a sample size of similar studies, using published tables and applying formulas to calculate a sample size (Israel 1992). While using published sample size determination tables, we need to understand that these sample sizes reflect the number of obtained responses, and not necessarily the number of surveys mailed or interviews planned, and hence needs to be increased to compensate for the non response. It is also assumed that the attributes being measured are distributed normally or nearly so. The sample size for

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

the purpose of the present study has been derived after considering the sample size determination table as given in Table 4.3.

Table 4.3 Sample size determination table

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

*Where, “N” is population size; and “S” is sample size

Source: Krejcie, Morgan and Daryle 1970

As the population of the Tirupur knitwear cluster is 6250 units as per the official statistics, it was decided to arrive at the sample size for conducting a primary survey in this cluster based on the Table 4.3. Table 4.3 reveals that for a population size of 6000, a sample size of 361 will be appropriate and for a population size of 7000, a sample size of 364 will be appropriate to capture the relevant patterns and relationships in the population. Hence, it was found necessary to determine a sample

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

size of 362, on the nearest end as the minimum sample size for the purpose of the present study.

4.3.4 Sampling Method

Researcher proposes to adopt stratified random sampling method for the purpose of the present study. When sub-populations within an overall population vary or tend to show different patterns, the best method is to sample each subpopulation (stratum) independently. Stratification refers to the process of dividing members of the population into homogeneous subgroups before sampling. The strata should be mutually exclusive and collectively exhaustive. Every element in the population is assigned to only one stratum and no population elements are excluded. After stratification, simple random sampling or systematic sampling can be applied within each stratum to choose the units for the purpose of survey. Such a method improves the representativeness of the sample by reducing sampling errors (Kothari 2004).

Stratified sampling can be done using proportionate or disproportionate allocation method. Proportionate allocation involves consideration of sampling fraction in each of the strata that is proportional to that of the total population. Such a method ensures that there is proportionate representation of each stratum of the population in the sample. After deciding the proportionate size of each stratum identified in the present study, the items are decided to be chosen randomly to ensure the satisfaction of rules of probability. Every item assigned in each stratum is given equal probability of selection into the final sample. Accordingly, the researcher has adopted probability based stratified random sampling using proportionate allocation method as the sampling design in the present study.

As mentioned earlier, the researcher divided the total population (the knitwear cluster of Tirupur) into six relevant strata (segments of knitwear manufacturing) to collect responses from each of them proportionately so that the results derived will truly represent the patterns available in the population. This design has been adopted to capture a balanced view of the relationship among various constructs in different segments so that an overall understanding on the

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

innovativeness in the cluster can be derived. The proportion of strata in the sample will therefore be as follows:

Stratum 1: Knitting – 1500/6250*362 = 87

Stratum 2: Wet processing- 700/6250*362 = 41

Stratum 3: Compacting- 300/6250*362 = 17

Stratum 4: Garmenting- 2500/6250*362 = 145

Stratum 5: Printing/Embroidery- 750/6250*362 = 43

Stratum 6: Others- 500/6250*362 = 29

It was decided that out of the minimum total sample size of 362, 87 responses will be collected from knitting units; 41 responses will be collected from wet processing units; 17 responses will be collected from compacting units; 145 responses from garmenting units; 43 from printing and embroidery units and the balance 29 responses from accessories and other supporting units. However, it is worth mentioning at this juncture, the recent closure of various wet processing units due to violation of the pollution control norms [Appendix 1]. The State Government has intervened in the matter and has sanctioned an amount worth Rs.200 crores as interest-free loan to 20 wet processing units (Rs.10 crores each), followed by release Rs.127.40 crores as credit. The amount will be utilised for equipping common effluent treatment plants that collects effluents from the attached wet processing units and treat them to adopt zero discharge as per the high court ruling [Appendix 2]. Therefore, though the official statistics show the number of wet processing units to be 750, nearly half of them only are functioning today as others are yet to reopen due to the non availability of zero effluent discharge facility.

4.4 OBSERVATIONAL DESIGN

Observational design refers to the conditions under which observations are to be made. Under a descriptive study, information can be collected from the respondents using several techniques. The observational design specifies how data are to be collected, and while doing so how to safeguard against bias and ensure

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

reliability. As the present study intends to collect opinions, attitudes and experiences from the respondents, survey and/ or interview methods will be suitable. Surveys enable the researcher to obtain data about practices, situations or views at one point in time through questionnaires or interviews.The important aspects to be considered when designing a survey or questionnaire are respondents' attitude, the nature of the items in the survey, the cost of conducting the survey, and the suitability of the survey to the research questions. A key weakness is that it is very difficult to realize insights relating to the causes of or processes involved in the phenomena measured. There may also be several sources of bias such as the possibly self-selecting nature of respondents, the point in time when the survey is conducted and in the researcher him/herself through the design of the survey itself.

A self administered questionnaire was designed to be distributed among the sample to collect information in a cost effective manner while maintaining anonymity in responses. The questionnaire designed was pre tested to determine its strengths and weaknesses in terms of question form, wording and order. Participating pilot study was conducted on 35 respondents to detect the weaknesses, flow, order, skip patterns, timing, and overall respondents' comfort while answering the questionnaire. It was decided to distribute questionnaires through enumerators appointed for the purpose, who in turn were educated on the research purpose and the dimensions being measured. Apart from the questionnaire, the researcher personally visited several entrepreneurs and conducted interviews in order to support quantitative data with qualitative information.

4.4.1 Questionnaire Development

A questionnaire is a formalized set of questions for obtaining information from respondents. The overriding objective is to translate the researcher's information needs into a set of specific questions that respondents are willing and able to answer (Malhotra 2004). The primary research instrument for the current research is a validated questionnaire that was developed after considerable literature review as well as consultation with experts in the academics and the industry. The initial design considerations were based on the guidelines provided by Dillman (2000). The survey instrument addressed each of the following issues:

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

- The major purpose of the survey
- Definition of primary, secondary and tertiary topics
- Definition of concepts for which information is sought
- The scope in terms of content to be covered
- Logical ordering and simplified wording of questions
- Determination of survey length and format
- Response categories in terms of scaling and appropriate grouping
- Careful choice and wording of questions to avoid sensitivity and bias
- Minimizing respondents' apprehension in terms of confidentiality and value of their responses

Hence the design of the survey instrument is driven by the goal of the research, respondents' visual perception of the concepts and respondents' comprehension (Dillman 2000). The questionnaire was primarily designed with 4 parts - Part 1 measuring the objectives, drivers and barriers of innovations (the pre innovation adoption variables); Part 2 measuring organization's adoption and implementation of various types of innovations (technological, administrative and marketing); Part 3 measuring the business performance of the firms in financial and market aspects (consequences of innovation); and Part 4 soliciting background information of the respondent companies (demographics). The validated final questionnaire had 10 pages with 4 sections.

The survey instrument was developed based upon validated questions and scales measuring each construct involved in the model. To provide quantitative measures for abstract concepts, 5 point Likert's Scale were adopted for all the items in the questionnaire, except for section 4 soliciting the back ground information of the responding companies and certain questions in section 3 measuring turnover and R&D related information.

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

Table 4.4 Measurement constructs - scale and source

Construct	Dimensions	No. of items	Measurement scale	Source
Innovation objectives	Product, process, Market and environment related	10	Likert's 5 point agreeableness scale	Community Innovation Survey (2008)
Internal facilitators	Leadership	9	Likert's 5 point agreeableness scale	Kriengsak Panuwatwanich (2008)
	Market orientation	9	Likert's 5 point agreeableness scale	MKTOR- Farrell and Oczkowski (1997); Sabri Erdil et al (2004)
	Innovation climate	9	Likert's 5 point agreeableness scale	Situational Outlook Questionnaire -Ekvall (1996)
	Organization structure	5	Likert's 5 point agreeableness scale	Hage and Aiken (1967)
External facilitators of innovation	Competition and turbulence	3	Likert's 5 point agreeableness scale	Tsai (2001); Atuahene-Gima and Li (2004)
	Collaboration purpose	6	Likert's 5 point agreeableness scale	Atuahene-Gima and Li (2004)
	Collaboration status	9	Likert's 5 point agreeableness scale	Atuahene-Gima and Li (2004)
Innovation adoption	Technological innovations	9	Likert's 5 point scale	Wang and Ahmed (2004)
	Administrative innovations	6	Likert's 5 point scale	Popadiuk and Choo (2006)
	Marketing innovations	3	Likert's 5 point scale	Gunday et al (2011)
Barriers to innovation adoption	Internal and external barriers	12	Likert's 5 point scale	Community Innovation Survey (2004); National Knowledge Commission (2007)
Business performance	Financial and market performance	11	Likert's 5 point scale	Kriengsak Panuwatwanich, (2008); Gunday et al (2011)

Apart from the major measurement constructs discussed in Table 4.4, appropriate items to collect information regarding the sources of innovation information, investment in external and /or internal R&D, turnover etc., were

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

designed and scales developed accordingly. The items to measure background information included nature of business ownership, segment of operation, size of the business, age of the business, education and experience of the respondents, source of business inheritance and export orientation. These items were scaled based upon the criteria to be achieved through collection of information. The scale options were provided as radio buttons that will allow the respondents to tick their response of agreeableness against each item. Apart from the close ended questions mentioned so far, open ended questions were also included in the questionnaire to collect qualitative information relevant to the research. These questions included details sought with respect to agencies/ bodies best supporting the business of respondents, problems faced while doing innovations and suggestions if any to the Government and other entrepreneurs.

4.4.2 Questionnaire Validation

The objective of questionnaire validation is to ensure that the contents of the questionnaire match the content domain of the constructs being measured. The validation process involves discussion on the subject with experts drawn from the industry as well as academics who evaluate test items against test specifications. Content validity is a non-statistical type of validity that involves "the systematic examination of the test content to determine whether it covers a representative sample of the behavior domain to be measured" (Anastasi and Urbina 1997). By using a panel of experts to review the test specifications and the selection of items, the content validity of a test can be improved. The experts will be able to review the items and comment on whether the items cover a representative sample of the behaviour domain.

The questionnaire for the present study was developed after an exhaustive study of pertinent literature related to the concept 'innovation'. There are two methods of pre testing and validating the contents of a questionnaire - panel of experts' judgement and a pilot study. The panel judgement ensures content validity of the questionnaire and the pilot study helps in capturing the respondents' view on the clarity and understanding on the questions being asked. It also helps to check whether the collected data is in accordance with the objective of the researcher.

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

The questionnaire validation for the present study was done in stages. Initially, the detailed list of questions drawn from the literature measuring the variables of interest was discussed with three experts from the industry. The questions were classified into important, useful but not important and not important and discussed in depth with the experts. The non-important questions were removed as per the advice of the experts. The initial survey instrument comprised a total of 13 pages with 29 questions and 140 items. This was reduced to 10 pages with 23 questions and 133 items in total. At the next stage, the revised questionnaire was developed and validated with two academicians for assessing the relevance of the questions to the theoretical concepts and appropriateness of language.

The revised version of the questionnaire was pre tested on a sample of 5 respondents to ensure that the respondents understood the questions and that the wordings were appropriate. The exercise was personally observed to identify the time the respondents took to complete the questionnaire, the doubts they raised, the fatigue involved and the like. The questions that were not clear were marked and improved at the final stage for enhancing clarity. Minor modifications were made with respect to the placement of questions. For eg., the construct 'barriers to innovation adoption' was initially placed after the construct 'innovation objectives'. As 'barriers' is a construct having negative influence on innovation, the respondents were confused on the scale. Hence, after the questions related to the construct 'innovation objectives', questions related to 'internal' and 'external drivers of innovations' were placed. 'Barriers' were placed after that so that response bias and confusions are avoided. At the final stage, a pilot study was conducted on a sample of 35 respondents randomly selected from the source list available. The results were encouraging. The results of the pilot study revealed that the responses showed patterns that reflected the hypothesized model developed by the researcher.

4.4.3 Survey Implementation

The questionnaire for conducting the data collection was designed keeping in mind the instructions proposed by Dillman (2000) for non-booklet format. The total questionnaire had 10 pages, printed on one side (8 ½ *11), stapled in the upper left corner with vertical orientation. The questionnaire format followed the principles of

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

having a cover page, directions, grouping of questions, ordering of questions and survey length as proposed by Dillman (2000). The cover page detailed the purpose of the survey, instructions to the respondents, definition of important terms for clarity and a note on confidentiality. The background information of the respondents was asked in the last page. The respondents were also thanked at the end of the questionnaire for the support provided by them in the survey.

The validated final questionnaire was distributed to 500 respondents selected at random from the source list available. Four enumerators were appointed and 100 questionnaires were given to each of them for distribution and data collection. The researcher herself distributed 100 questionnaires to the selected respondents. The respondents were approached in person by the researcher and her enumerators, the purpose of the survey was explained and the questionnaires were given to them. The respondents were given a week's time to fill up the questionnaire. During the following week, the researcher and her enumerators collected back the filled in questionnaire. Nearly 87 respondents did not cooperate after repeated visits and hence had to be dropped from further enquiry. Due to resource constraint, incentive element was not used in the survey.

The data collection process took place during a period of 4 months. Towards the end of the period, the questionnaires were checked for missing data. Out of the 413 filled up questionnaires, nearly 29 questionnaires had missing data. This led to a final sample size of 384 valid responses received after extensive data collection. A low response rate can give rise to sampling bias if the non response is unequal among the participants regarding exposure and/or outcome. The response rate for the present study is 76.8% (384 out of 500) which can be considered to be highly acceptable. This response rate is well above the minimum sample size decided for the study. There were enough representations from all the major segments of the industry, due to which the principles of stratified random sampling were satisfied.

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

4.4.4 Data Preparation

The questionnaire developed for the study has maximum number of close ended questions and a very few open ended questions. The marking of the respondents were checked to see whether they were clear. The responses were coded and data were entered in an excel sheet for the purpose of ease of export to the SPSS for further analysis. The 5 point Likert's agreeableness scale was coded as:

1 - Strongly disagree

2 - Disagree

3 - Neutral

4 - Agree and

5 - Strongly agree

Yet another 5 point scale was coded as below:

1 - Never

2 - Rarely

3 - Sometimes

4 - Often

5 - Always

There were certain questions that measured responses in ranges such as age, turnover, size, investment in R&D etc. The ranges were coded sequentially starting from 1 and progressing by 1 for the next range. For the questions with dichotomous options, yes was coded as 1, no was coded as 0. For the question that had three options as yes, don't know and no, coding was done as 3, 2 and 1 respectively.

The data were manually typed and entered into the computer. Initially, data were entered in Microsoft excel and later imported to SPSS. The rows in the excel sheet represented cases and columns represented variables. Once the data were

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

entered, the variables that measured a single construct were grouped and aggregated into a new variable. Through these processes, the raw data were prepared for analysis.

4.5 STATISTICAL DESIGN

Multivariate statistical analyses were adopted to analyze the data collected through questionnaire survey quantitatively. The present study has a complicated data set as there are a number of independent, mediating and dependent variables. The practical implementation of multivariate statistics involves several types of univariate and multivariate analysis in order to understand the relationships between variables and their relevance to the actual problem being studied. The analyses were performed to understand the data through descriptive statistics, testing the goodness of measurement scale by measuring reliability and validity and finally testing the structural model for proving or disproving hypotheses framed (Panuwatwanich 2008).

Descriptive statistical analysis for the present research was performed using SPSS (Version 18). Descriptive statistics are important in data cleaning. It helps in summarizing large volume of data in simpler and meaningful forms. SPSS descriptive statistics assist in offering information about the distributions of variables under study. SPSS allows completing a number of statistical procedures including: measures of central tendency, measures of variability around the mean, measures of deviation from normality, and information concerning the spread of the distribution and frequencies. SPSS also facilitates reliability analysis, factor analysis, factor loadings, inter correlations and hierarchical multiple regression process by determining the R-Square Change, F-Change and Standard Coefficient Beta for each step (Bryman and Bell 2003).

The descriptive analysis included examination of data for frequencies, data screening for normality through mean, standard deviation, skewness and kurtosis. Mean is the number that best summarizes the entire data set. Standard deviation is a useful measure of spread or variability used in statistics that shows how much the score in the data set cluster around the mean. Skewness is a measure of asymmetry

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

of the probability distribution of a real valued random variable. Skewness can range from -3 to +3. Acceptable range of skewness for normality is from -1 to +1. Kurtosis is a measure of whether the data are peaked or flat relative to a normal distribution. Similar to skewness, acceptable range of kurtosis for normality is between -1 to +1.

Following data summarization, the measurement scales used in the questionnaire to measure each and every dimension of the constructs involved in the hypothesized model were assessed for reliability and validity. The purpose of reliability test is to ensure equivalence, stability and internal consistency (homogeneity). Validity refers to the extent to which the instrument measures what it desires to measure (Kothari 2004). To measure scale reliability, Cronbach's alpha was employed. Cronbach's alpha provides indication of how consistent the responses are across the items within a scale. It is the average value of the reliability coefficients one would obtained for all possible combinations of items when split into two half-tests (Gliem and Gliem 2003). To improve reliability and enhance the alpha score, certain items measuring certain constructs were dropped.

After ensuring statistically required reliability, validity of measurement scale was assessed through confirmatory factor analysis (CFA). In a CFA, the pattern of loadings of the measurement items on the latent constructs is specified explicitly in the model. Then, the fit of this pre-specified model (construct validity) is examined to determine its convergent and discriminant validities. Discriminant validity ensures that each construct is different from other constructs. It can be assessed through correlation analysis among pairs of variables. Significant values of correlation coefficients indicate that variables represent the same concept. Convergent validity measures the extent to which the scores on one measure are related to scores collected from a similar or different measure. Convergent validity focuses on the magnitude of standardised factor loading and their level of significance. Apart from significant factor loadings, factors should also have reliability with R-Squared values greater than 0.50. This factorial validity deals with whether the pattern of loadings of the measurement items corresponds to the theoretically anticipated factors (Gefen and Straub 2005). CFA is theory dependent, and is a preferred tool to assess construct validity and unidimensionality because it

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

provides stricter interpretations when compared to Exploratory Factor Analysis (Anderson and Gerbing 1988).

Once the reliability and validity of the measurement scales were established, inferential analyses were performed and the conceptual model was tested. Inferential statistics refers to that part of statistics which helps in drawing conclusions and, in some cases, making predictions about the properties of a population based on information obtained from a sample. The model was tested for the causal relationships between the model constructs. A causal relationship refers to a dependence relationship between two or more sufficiently correlated variables.

The present study employs Structural Equation Modelling (SEM) technique to explore this sequential relationship. In the model developed in this research, there are independent variables and dependent variable, mediated by innovation adoption. A mediating variable represents an intervening variable through which the independent variables can influence the dependent variable (Baron and Kenny 1986). The effect of the mediating variable can be investigated through path analysis and SEM strategies. Path analysis refers to a series of regression equations that estimate the direct and indirect pathways between independent and dependent variables. SEM strategies are based on maximum likelihood analysis and are necessary if the model includes unobserved variables or if the model includes reciprocal effects or has correlated residuals (Kim, Kaye and Wright 2001). There may be direct relationship between the independent and dependent variables. However, the existence of such direct relationship is outside the scope of this study. In other words, the model developed here is a complete mediation model that measures the indirect influence of independent variables on the dependent variable through a mediating variable.

Structural Equation Models have two parts: a measurement model and a structural model. The measurement model measures the relationships between measured variables and latent variables. The structural model deals with the relationships between latent variables only. The abilities of SEM to distinguish between indirect and direct relationships between variables and to analyze

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

relationships between latent variables without random error differentiate SEM from other simpler, relational modelling processes (Fox 2002).

When it comes to modelling relationships between latent variables, mainly two different methodological approaches can be distinguished: Covariance structure analysis on the one hand and PLS path modelling on the other. It is argued that for theory testing or development, the ML or GLS approach is preferable; whereas for predictions, PLS approach has relative strength (Anderson and Gerbing 1988). The SEM is used in the study using Partial Least Squares (PLS) method. PLS path modelling is a component-based procedure for estimating a sequence of latent variables (Wold 1985). In a PLS path modelling approach, the structural model depicts the relationship among latent variables as multiple regressions. The measurement model describes the relationship between latent and manifest variables in two different ways: mode A and mode B. In mode A or in reflective relationships, manifest and latent variables relationships are described by ordinary least square regressions. In mode B or in formative relationships, unobserved variables are generated by their own manifest variables as a linear function of them and a residual (Wold 1985). PLS is a variance based approach that focuses on maximizing the variance of the dependent variables explained by the independent ones instead of reproducing the empirical covariance matrix. Like any SEM, a PLS model consists of a structural part, which reflects the relationships between the latent variables, and a measurement component, which shows how the latent variables and their indicators are related; but it also has a third component, the weight relations, which are used to estimate case values for the latent variables (Haenlein and Kaplan 2004).

Researcher has used Visual PLS software which is a Graphic-User-Interface program for Latent Variables Path Analysis with Partial Least Squares Version 1.8. In addition, to path modelling, jack-knifing and blindfolding, bootstrapping has been integrated and support for moderating effect and second order factors is offered in Visual PLS which is an open ware. The path model is specified by drawing the latent variables and by assigning the indicators in a pop-up window. Based on the

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

graphical model, the program produces a separate LVPLS input file, which is run by LVPLSX (pls.exe).

Using PLS method, the validity of the measurement model was examined. The factor loading and cross loading were checked for ensuring uni-dimensionality for the constructs being measured. Later the fitting of the structural model was evaluated. The coefficient values of causal and correlation links were estimated for significance. The total model was run for test of mediation and the significance of causal relationships was calculated. At the second level, the moderating effect of the construct 'innovation implementation' on the causal path between the constructs 'innovation adoption' and 'business performance' was tested for significance.

The correlation coefficients of all the constructs in the hypothesized model were calculated and discussed. Later, the regression paths between each of the independent variables to the mediating variable and between the mediating and dependent variables were estimated to investigate the quantitative effect of the causal relationship between them. The significance of relationships was estimated. Chi-square tests were performed to test the association between specific variables of interest and the constructs 'innovation adoption' and 'business performance'. Chi-square test is a non-parametric test to determine whether two or more categorical variables are independent or associated. However, the limitation of the test is that, it cannot find out the direction of such association. In other words, it cannot give information about the strength of association or its substantive significance in the population. The strength of such associations has been determined by calculating Cramer's V test statistic. Cramer's V is a statistic that measures the strength of association or dependency between categorical variables in a contingency table, with no restriction on the number of categories. It is the most popular chi-square-based measure of nominal association ranging from 0 to 1 regardless of table size, when row margins equal column margins.

4.6 CHAPTER SUMMARY

This chapter discusses the details of the methodology followed by the researcher during her investigation. The research approach adopted comprises of

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.

higher degree of positivism and lesser degree of social constructivism incorporating both quantitative and qualitative approaches. The research design is descriptive. The type of investigation is causal and the researcher adopted a onetime non contrived field study using a questionnaire survey. The researcher has employed stratified random sampling for the purpose of primary data collection. Responses were collected from 384 respondents which constituted the primary data. In addition to quantitative primary data, qualitative primary data were collected by way of unstructured interviews with a few selected respondents. Secondary data were collected from available published literature from various sources such as newspapers, magazines, journals, published research works, websites and other relevant sources. Data were analysed using SPSS for descriptive and inferential statistical analyses. The hypothesized model was tested using SEM. Visual PLS software (version 1.8) was used to test the significance of hypothesized model within the scope of the study.

Please purchase PDF Split-Merge on www.verypdf.com to remove this watermark.