Chapter – 3 RESEARCH METHODOLOGY

This section presents methodology employed for examining framework developed, during the literature review, for the purpose of present study. The study adopts a deductive approach which involves four steps viz. (i) review of the existing theories (ii) deduction of hypotheses from the literature (iii) testing of the proposed theory (iv) confirming / modifying / rejecting theory in the light of hypotheses testing (Sampe, 2012).

Research Design & Method

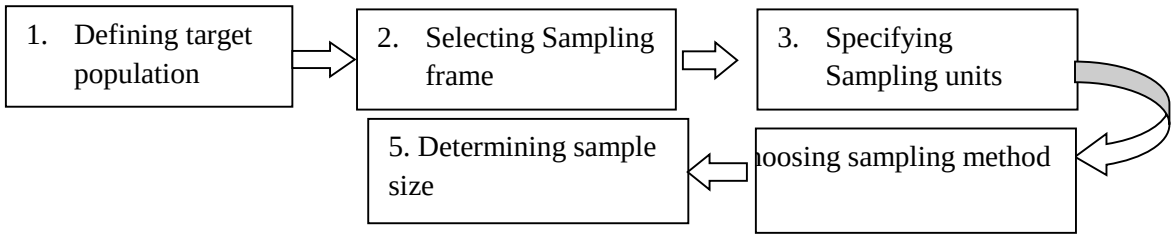
The research design used in the present study is descriptive as well as exploratory in nature. It is descriptive as it describes the characteristics of the phenomenon that is being studied and exploratory as it explores various associations and significant differences between dependent and independent variables. In case of research method, both Quantitative and Qualitative research is applied in the study. Quantitative method is applied with the objective to generate numerical data and hard facts about study variables, by employing statistical technique. Qualitative method is applied to take expert views on the topic and analysis of current literature available on the topic.

Sampling Design

According to Zikmund *et.al.,* 2010, the sampling design incorporates five steps given below: -

Figure – 10

Sampling design process



(Source: Based on Zikmund et al., 2010)

Defining target Population of the study

Identifying right population of the study acts as important part of research activities as right sample size is determined on right population. The target population in this study comprises of all Chemical, Petrochemical and Pharmaceutical manufacturing units operating in the state of Gujarat, India. Researcher has used different sources to identify right population which is shown below at table 2.

Table - 2

Sources referred by researcher to identify population of the study.

No.	Sources used	Published by
1	Directory of Chemical (Large and Medium scale) units, 2017-18	Govt. of India, New Delhi,
2	Directory of Petrochemical (Large and Medium scale) units, 2017-18	Govt. of India, New Delhi,
3	Vibrant Gujarat, 7th Global Summit Report, 2015 (includes detail on chemical, petrochemical and pharmaceuticals sector)	Govt. of Gujarat
4	Vibrant Gujarat report on Pharmaceuticals sector profile, 2018-19	Govt. of Gujarat
5	Vibrant Gujarat report on Chemicals and Petrochemicals Sector Profile, 2018-19	Govt. of Gujarat

As per FICCI, Department of Chemicals & Petrochemicals – Govt. of Gujarat and GPCB, 2015, Gujarat is the hub of chemical & petrochemical industry in India, accounts for 62% of India's petrochemical production, 53% of other chemicals production and 18% of India's chemical exports. Gujarat's chemical & petrochemicals industry comprises of about 500 large and medium scale industrial units, about 16,000 of small scale industrial units and other factory units and providing 16% of employment in the state. (Vibrant Gujarat, 7th Global Summit Report, 2015).

According to source - Annual Survey of Industries 2014-15; Chemicals & Petrochemicals Statistics at a glance: 2017, Ministry of Chemicals & Fertilizers, Department of Chemicals & Petrochemicals, Government of India specified Vibrant Gujarat – chemical and petrochemical sector profile report, 2018-19, there are presence of more than 4,400 industrial units that manufacture chemicals and petrochemical chemical products

In Pharmaceutical industry, Gujarat acts manufacturing base for bulk drugs and formulations, and speedily moving towards Global manufacturing hub. The government has created several pharma products based clusters, located in the districts of Baroda, Ankleshwar, Ahmedabad, Bharuch, Vapi and Valsad.

According to DNA, FDCA Gujarat, IBEF, ASI, Pharmexcil source, specified in Vibrant Gujarat report, 2018-19 report, Gujarat is currently home to 3099 allopathic, 698 ayurvedic

and 556 cosmetic manufacturing pharma units (Vibrant Gujarat - Pharmaceuticals sector profile report, 2018-19).

Sampling Unit and Frame Identification

Thus after peeping into multiple sources, the researcher has used following data source to identify true population. In case of Pharma companies, researcher has considered all three categories of pharma products i.e. allopathic, ayurvedic and cosmetic products. Thus the population of the study is shown at below table

Table – 3

Sources used by researcher to get population of the study

No	Type of companies as population of the study	No. of companies operating in Gujarat as per 2018 -19	Source of Data used
1	No. of chemical and petrochemical units in Gujarat. (large, medium and small)	4400 Chemical and petrochemical Manufacturing units in Gujarat	Source - Annual Survey of Industries 2014-15; Chemicals & Petrochemicals Statistics at a glance: 2017, Ministry of Chemicals & Fertilizers, Department of Chemicals & Petrochemicals, Government of India published in Vibrant Gujarat chemical and petrochemical sector profile report, 2018-19)
2	Pharma licensed mfg. units in Gujarat • Allopathy • Ayurvedic • Cosmetic	 3099 698 556	Source - DNA, FDCA Gujarat, IBEF, ASI, Pharmexcil specified in Vibrant Gujarat Pharmaceuticals sector profile report, 2018-19)
Total population		Approx. 8753	Units in Gujarat

Thus, it can be inferred from the above table 3, that there are total 8,753 Chemical, Petrochemical and Pharma units operating in the state of Gujarat which are treated as population of the study.

Sampling Method

Stratified convenience sampling has been used as sampling methodology to collect data for the present study. For the purpose of sampling, the population has been divided into two mutually- exclusive and exhaustive strata i.e. listed and unlisted companies; large scale, medium & small scale units so as to minimize the within-stratum variation and maximize the between-stratum variation. Thereafter, convenience sampling is used to include the foregoing characteristics in the sample companies. Subsequently, proportionate allocation is adopted to avoid under-sampling or over-sampling of any sub-

group and to ensure that the size of the sample in each of the stratum is proportional to the size of the stratum as it improves the efficiency of sampling by increasing homogeneity of the units within strata as well as heterogeneity between the stratum. Second, it reduces variance and thus increases the precision of survey estimates. Third, the method facilitates comparison between stratums and fourth it ensures coverage of elements from each unit

Sample size determination

To determine right sample size to be adequate enough to represent all the characteristics of the population, a formula could be used. However, getting data from industries in large number had a time limitation. Sample size was determined by pooled data to do in-depth analysis. Hence the sample size was finalized as 100 companies but response was received from 58 companies, out of which 08 companies were dropped during the stage of analysis due to missing values, incompleteness of questionnaire and lack of financial data of unlisted companies. Therefore, the present study analyzes the response of 50 respondent companies, out of which 25 are listed companies and rest 25 are unlisted companies, the data (primary and secondary) of which were complete in all aspects. Therefore, the response rate was 50%. A detailed list of sample organizations has been attached as annexure 2. Moreover, care was taken that all three sectors Chemical, Pharmaceuticals and Petrochemicals are represented adequately to come to the rational conclusion of the study.

Data collection

Data Source

The data was collected from both primary and secondary sources. Primary source was used to elicit first-hand information collected from Unit head, EHS head and HR head belonging to Chemical, Petrochemical and Pharmaceutical Industry. The necessary Secondary data was ferreted from Journals, Newspapers articles, Annual Reports of Companies, Government reports, committee reports established by Government and Non-Government agencies and various websites related to the concerned topic like Shodhganga, INFLIBNET etc…Websites were explored to identify the research studies conducted on related topics within India. Financial data of the Unlisted sample companies were searched from CMIE, Prowess and Capital line plus software subscribed by Hansa Mehta Library, M.S University and IIM – A.

Data collection tools

Since the research was survey based, structured questionnaire was administered to the target population. Hard copy of data collection tools was distributed among target population. Further, structured expert interviews for qualitative data were being carried out to get more insights into Responsible Business Behaviour. Researcher administering the instrument had an opportunity to establish rapport, explain the purpose under study, and as well explain the meanings of items that were not clear to the respondents. Apart from hardcopy, data was collected through e-mails on the request of the companies.

Data collection Instrument Development

The data collection instrument was developed to find out Responsible Business Behaviour of chemical /petrochemicals and pharmaceutical companies operating in the state of Gujarat. Literature was explored in-depth to construct data collection instrument. Inclusion of all the items related to the study was assured through content validity. Research instrument used in the study includes both measurement scales, continuous (Summated Rating Scale) and categorical (Binary, MCQ's and Rank order scale) data. Questionnaire covers four main variables segregated section wise i.e. CSR and other legal compliance, Corporate Governance, Business ethics and Sustainable development. The researcher has used a closed questionnaire for this research.

Demographic section – This section includes necessary demographic information. Information like Respondent's profile, (Representative of the company who gave response was kept as optional to protect respondent company privacy), name of the company, type of industry, sector to which company belongs, No. of years spent in chemical /petrochemicals and pharmaceutical business, establishment year of plant where response was elicited, legal status of the firm, size of the firm, avg. revenue of the firm, avg. PAT of the firm and avg. Reserves of the firm during the study period, employee size of the unit

Questionnaire section – Questionnaire was developed by considering various published research papers and articles reviewed under literature review section. Below Table 4 shows question nos., Dimensions of characteristics that the question covered, measures and scale used. Questionnaire contains five different consisting of demographic information of companies, CSR & legal compliances in section 1, Corporate Governance in section 2, Business Ethics in section 3 and Sustainable Development in Section 4. There are total 10 questions in general section and 55 questions in other four sections.

Table 4

Various Dimensions Covered in Questionnaire, their Measures and Scales Used

Section No.	Question. Nos. & Dimensions	Measures	Scale
General section	i-x Demographic information	Used for descriptive analysis and hypothesis testing	Independent Variables
Section - I	1 - 5 CSR & Legal compliance	Q.1. Company's Engagement in CSR (total 25 statements)	Reflective summated scale
		Q.2. Attitude of companies towards CSR (total 11 statements) Applied Factor Analysis	Reflective summated scale Statement 7 Dropped after Factor Analysis: Five point ordinal Scale
		Q. 3. Types of legal issues faced. Q. 4. Legal compliance managed by	Multiple choice Ques.
		Q. 5. Response to legal compliance	Dichotomous
Section - II	4-19 Corporate Governance	Q. 6. Economic & Political reforms impacting business	Reflective summated scale
		Q.7. Steps taken by company to overcome reforms	Multiple choice Ques.
		Q.8. Respondent Awareness on RI Q.9. Does Organization practice RI while taking investment decision	Dichotomous
		Q.10. Reason/s for not investing in RI Q.11. Reasons for investing in RI Q.12. Types of Investment done by companies	Multiple choice Ques
		Q.13. ESG Investment behavior statements (total 11 statements) Applied Factor Analysis	Reflective summated scale
		Q.14. factors that helped the company to deal with ESG investments	Multiple choice Ques
		Q.15. Familiar with the term 'Stakeholder / Shareholder Activism'	Five point ordinal Scale
		Q.16. Understanding of term Stakeholders / Shareholders activism' by company	Multiple choice Ques

		Q.17. 1. Stakeholders' Activism confronted by company due to environmental issues Q.17. 2. Stakeholders' Activism confronted by company due to environmental issues	Dichotomous
		Q. 17.3. Aspects of sustainability (envt. and social) related issues that has been confronted by your firm through stakeholders / shareholders activism	Multiple choice Ques
		Q.18. Stakeholders' Activism influencing Responsible Behaviour of companies (5 statements)	Reflective summated scale
		Q.19. Company's Response towards Stakeholders' Activism	Dichotomous
Section III	20 -43 Business Ethics	Q.20. Business Ethics of companies are guided by which aspect	Preference: Rank order
		Q.21. Company's membership with which Industrial Association	Multiple choice Ques
		Q.22. whether companies regularly follow rules or code of conduct given by Industry associations Q.23. Does association impose any penalty for non-compliance	Dichotomous
		Q.24. Value addition to stakeholders' (5 statements)	Reflective summated scale
		Q.25. Kinds of social problems are addressed by the company Q.26. Steps are taken by your organization in terms of addressing environmental problems Q.27. Reasons for not investing in Green Technology	Multiple choice Ques
		Q.28. type of green technology – indegenious, imported or both	Dichotomous
		Q. 29. Benefits that company has reaped from green technology	Multiple choice Ques
		Q.30. Company's behavior towards its Business functions (overall 35 statements)	Reflective summated scale
		Q.31. How often customer base gets fluctuated?	Five point ordinal Scale
		Q.32. How company ensures Long term economic sustainability of company	Multiple choice Ques
		Q.33. Customer Responsiveness Behaviour (5 statements)	Reflective summated scale
		Q.34. Any product / services for poor / low - income communities	Dichotomous
		Q.35. Reasons for not worked on Inclusive Business Models till now	Multiple choice Ques

		Q.36. Stakeholders of low-income communities covered by companies Q.37. Objective/s with which the company has addressed lower – income groups Q.38. constrained faced during implementation of inclusive business model Q.39. steps taken by company to overcome constraints faced Q.40. Benefits reaped by low income stakeholders and company after implementation of inclusive business model	
		Q.41. Has company implemented Product stewardship concept in the company	Dichotomous
		Q.42. What factor has helped company to achieve Product Stewardship?	Multiple choice Ques
		Q.43. Product Stewardship behavior of companies (8 statements)	Reflective summated scale
Section IV	44-55 Sustainable Development	Q.44. Challenges faced by companies in past or currently with its supply chain partners Q.45. Reasons that drove companies towards SCI Q.46. Benefits reaped by companies due to SCI	Multiple choice Ques
		Q.47. Companies behavioral practices towards SCI (R) (total 16 statements) Applied Factor Analysis	Reflective summated scale
		Q.48. Business Function wise green initiatives taken by the company (total 16 statements)	Reflective summated scale
		Q.49. Has company faced any crisis events in past or presently facing?	Dichotomous
		Q.50. Forms of crisis events faced by the company Q.51. stakeholders affected due to crisis events Q.52. type of immediate and long term consequences observed due to crisis events	Multiple choice Ques
		Q.53. company's crisis response behavioural practices	Reflective summated scale
		Q.54. Company's Risk Management Behaviour practices	Reflective summated scale
		Q.55. Types of Risk faced by the companies	Multiple choice Ques
		Q.56. Suggestions by companies to improve Business and societal sustainability	Open ended

Note: (R): Reverse Coding done for data analysis

Instrument Validation Procedure

Pilot Testing of the questionnaire was carried out by the researcher with the objective to know - a). Whether the questions enlisted in the questionnaire were relevant with the objective of the study. b) Understanding of the questionnaire items by the respondents. c). whether respondents are willing to share information. d). Time taken by the respondents to respond to the questionnaire.

- **Validity**

Validity states the *accuracy* of measurement. It is the extent to which Research Instrument measures what it is supposed to measure. Basically, there are four types of Validity - Face validity is the extent to which a tool appears to measure what it is supposed to measure. Construct validity is the extent to which a tool measures an underlying construct.

Table 5

Experts name, designation and their company approached for content validity

No.	Name of Expert	Designation & Name of the company
1	Shri Pradip Keshwani	EHS – Head, GNFC, Bharuch
2	Shri Tapan Shah	EHS – Assistant Manager, OPAL, Dahej, Bharuch
3	Shri Bhadresh Patel	EHS – Head, Jay Chemicals, for Dahej & Khambhat plant,
4	Mr. Nikunj Bhatnagar	EHS – Head, GAIL

Content validity is the extent to which items are relevant to the content being measured. Criterion-Related Validity correlates results of assessment with another criterion of assessment. Factor analysis was used and checked for construct validity. To Validate the Research Instrument, expert opinion in addition to guiding teacher and departmental research committee has been sought. Because this study is about Responsible Business Behaviour for Sustainable Development of Business and Society, experts from Chemical, Petrochemicals and Pharmaceuticals Industry have been consulted. Following experts from Industry have been consulted for validation of instrument

- **Reliability**

Reliability of instrument demonstrates whether instrument *consistently* measures what it is supposed to measure. It denotes stability and consistency with which the instrument measures the concept and helps to assess the "goodness" of a measure (Shekharan U, Bougie R., 2010; Zigmund, 2003). Stability determines the ability of a

measure to remain the same over time which is measured through - test-retest reliability and parallel-form reliability. The internal consistency indicates the homogeneity of the items in the measure that tap the construct which is examined through Inter-Item Consistency and split-half reliability.

Table 6

Internal consistency of constructs

Section	Q. No.	Construct	No. of Variables	Instrument	Cronbach's Alpha α	
					Pilot data	Complete data
1	2	Attitude of company towards CSR	11	Likert Summated Rating scale	0.841	0.892
2	19	Stakeholder / shareholder activism	5	Likert Summated Rating scale	0.977	0.850
3	33	Customer Responsiveness	5	Likert Summated Rating scale	0.948	0.837
3	43	Product stewardship	8	Likert Summated Rating scale	0.896	0.913
4	47	Supply Chain Integration	16	Likert Summated Rating scale	0.921	0.938
4	54	Crisis management response	9	Likert Summated Rating scale	0.911	0.923

Cronbach's alpha (α) is a coefficient of internal consistency and widely used in social sciences research. Cronbach (1951) stated, "A reliability coefficient demonstrates whether the test designer was correct in expecting a certain collection of items to yield interpretable statements about individual differences" (p. 297). In this study, Cronbach Alpha has been carried with the help of received responses as a pilot test. Responses were selected randomly from bunch to find out internal consistency. For conducting such test, SPSS software version 22 is used. Cronbach α normally ranges between 0 and 1. George and Mallery (2003) provide the following rules of thumb: "if $\alpha > 0.9$ – Excellent, $\alpha > 0.8$ – Good, $\alpha > 0.7$ – Acceptable, $\alpha > 0.6$ – Questionable, $\alpha > 0.5$ – Poor, and $\alpha < 0.5$ – Unacceptable" (p. 231).

Thus from above table 6, it can be inferred that as Cronbach Alpha α value for the constructs - Attitude of company towards CSR, Product stewardship, SCI, Crisis Management response had increased in complete data i.e. 50 samples. However, Alpha α value for the constructs – stakeholder activism and customer responsiveness had decreased in complete data compared to pilot study data. The Cronbach Alpha α values greater than

0.9 shows 'Excellent' internal consistency and values greater than 0.8 shows 'Good' internal consistency amongst the scale items.

Statistical Tools and Techniques

Researcher used both descriptive and inferential statistics for data analysis. While carrying out data analysis, descriptive statistics has been used to reveal respondent companies profile and inferential statistics has been used to analyze data. Scales like nominal, ordinal, interval and ratios were used to get response from respondents. Though according to Donaldson, (1968) Normality can be assumed if sample size > 30, still researcher has checked the normality of data (50 sample size in this research) using Shapiro Wilk test and graphical method using Histogram, Whisker Box Plot and Q-Q Plot method.

Table 7

Statistics used for Data Analysis

Types of Data Analysis	**Analysis Type**	**Parametric**	**Non-Parametric**
Hypothesis test	Bivariate	Two Independent sample t – test	Mann Whitney U test Chi-square test,
Factor Analysis	Exploratory Factor Analysis (EFA) Extraction method: Principal Component Analysis (PCA)		
Descriptive	Frequency, Percentage, Mean & SD		

Thus, Parametric test and Non-parametric test were applied based on normality assumptions. Parametric test like Independent sample t – test, Non-parametric test like $\chi 2$ test, Mann-Whitney U test, and Factor Analysis were conducted. Cross tabulations were done in almost all questions to draw out better inferences.

Delimitation of the study

This study is limited to analyze the Responsible Business Behaviour of Chemical, Petrochemicals and Pharmaceutical Industries operating in Gujarat State. Thus, this study does not cover other states of our country. The internal employees having roles ranging from Unit Heads, HR Heads, General Managers, EHS heads from Chemical Petrochemicals & Pharmaceutical companies forms part of the study.

Limitations of the study

The topic of research is as new as it is old but due to the sensitivity of data, not many companies participated in this study. Therefore, when the topic gets little more

matured by mandatory disclosures, this study can be repeated one more time. Another reason for less participation by companies was data collection started during Covid period, where industry faced lockdown and Work from Home situation. From demographic point of view, since we have small sample size the data were segregated into two divisions. However, for an in-depth study, a large sample size can be taken for better division of companies. In the present study, Governance section was understood through stakeholders' activism, business ethics only. In future corporate governance mechanisms can also be studied with respect to the topic of this thesis. Further, in-depth is required in the arena of Inclusive Business Model as sufficient data was not available to find out association and differences.

Future scope of study

This study discusses different aspects of Responsible Business Behaviour. Such studies can be conducted in other states in same categories of industry. Further, similar studies can be carried out for other types of Industries within Gujarat or outside Gujarat. The hypothetical model of Business – Society Coexistence developed during this study was tested with the data to some extend however, further research can be exclusively taken for empirical study using SEM Model.