# CHAPTER-3

# RESEARCH METHODOLOGY

## 3.0 Introduction

In the previous chapter, relevant previous literature to the research problem is discussed and research gaps are identified with a view to constitute research objectives of the present study. The present chapter discusses the methodology adopted for the purpose of this study with possible theoretical background.

## 3.1 Meaning of Research

C R Kothari (2009) defines that the research is an original contribution to the existing stock of knowledge making for its development. The systematic approach concerning generalizations and formulation of a theory is also research. As such the term 'research' refers to the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the data, analyzing the facts and reaching certain conclusions either in the form of solutions(s) towards the concerned problem or in certain generation for some theoretical formulation.

In the present study, research is conducted for perceptions on Selected Dimensions of Learning organization and Its Impact on TQM of Higher Education Sector with Special Context to MSU of Baroda.

## 3.2 Difference between Research Methods and Methodology

Research Methods and Research Methodology are two terms that are often confused as one and the same when strictly speaking they are not so as they have many differences between them. One of the primary differences between them is that research methods are the methods by which the research is conducted into a specific subject or a topic. On the other hand, research methodology explains the methods by which you may proceed with your research methods can be defined as the various ways and means of conducting a research that involve the conduct of experiments, tests, surveys and the like. It can be said that research methods aim at finding solutions to research problems. There are many types of research methods. For example, exploratory research which helps define and identifies a problem. Then, empirical research, which uses empirical evidence to test the feasibility of a solution. Constructive research aims at testing theories in turn, proposing solutions to a query. Research methods can be further broken down to four categories such as Descriptive research, which involves research vs analytical data; Applied research, which deals with research vs basic research; Quantitative research, which involves research vs quantitative; Conceptual research dealing with empirical research

Research methodology is the science of systematically solving a research problem. Often recognized as how a research is to be done scientifically, research methodology involves the learning of the various techniques we can use in the conduct of research such as the conduct of tests, experiments, surveys and critical studies. These methods have been

properly tested and utilized and, therefore, each one has logic behind them. Research methodology aims at the employment of the correct procedures to find out solutions and paves the way for research methods to be conducted properly. Research methodology is the guidebook of research and is a science in itself. In this study, the researchers tried to understand various methods of social science with a view to apply appropriate research method(s) for the purpose of this study and methodology adopted for the said purpose.

The methodology to be adopted for the purpose of examining objectives based on primary data source is as follows.

| | | |
|---|---|---|
| 1 | Type of Study | Mix Method |
| 2 | Universe/Population | University stakeholders ( Students, faculty, Non Teaching Staff and Policy Makers) |
| *3 | Target Population | MSU stakeholders Total = 10381 |
| 4 | Sampling Technique | Convenience sampling |
| 5 | Valid Sample Size | PG students N=6970, n= 426<br>Faculty: N = 1105, n= 305<br>Non-teaching staff N=1372 ,n= 318 |

| | | |
|---|---|---|
| | | Others N=150+, n= 63<br><br>Total =1112 |
| 6 | Source of Data | Primary and Secondary |
| 7 | Types of Data | Quantitative & qualitative |
| 8 | Questionnaire Factors<br><br>7 factors | For Primary Data:<br><br>MC,SAM,CS,EI,TRG,TW,CI |
| 9 | Items | Student Perspective=38<br><br>Faculty Perspective=67<br><br>Non Teaching Staff=44<br><br>Policy Makers=40 |
| 10 | Statistical Tests | Primary Data: Pearson correlations, scale reliability and other applicable |
| 11 | Statistical Tools | IBMSPSS.25 |

Table-3.1 Methodology for primary data analysis

## 3.3 Research Approaches

There are two basic research approaches popular in social science research. (1) Qualitative research approach and (2) Quantitative research approach. Qualitative Research is primarily exploratory research. It is used to gain an understanding of underlying reasons, opinions, and motivations. It provides insights into the problem or helps to develop ideas or hypotheses for potential quantitative research. Qualitative Research is also used to uncover trends in thought and opinions, and dive deeper into the problem. Qualitative data collection methods vary using unstructured or semi-structured techniques. Some common methods include focus groups (group discussions), individual interviews, and participation/observations. The sample size is typically small, and respondents are selected to fulfill a given quota. Quantitative Research is used to quantify the problem by way of generating numerical data or data that can be transformed into useable statistics. It is used to quantify attitudes, opinions, behaviors, and other defined variables – and generalize results from a larger sample population. Quantitative Research uses measurable data to formulate facts and uncover patterns in research. Quantitative data collection methods are much more structured than Qualitative data collection methods. Quantitative data collection methods include various forms of surveys – online surveys, paper surveys, mobile surveys and kiosk surveys, face-to-face interviews, telephone interviews, longitudinal studies, website interceptors, online polls, and systematic observations. Mixed methods research is a methodology for conducting

research that involves collecting, analyzing and integrating quantitative (e.g., experiments, surveys) and qualitative (e.g., focus groups, interviews) research These procedures developed in response to a need to clarify the intent of mixing quantitative and qualitative data in a single study (or a program of study). With the inclusion of multiple methods of data and multiple forms of analysis, the complexity of these design calls for more explicit procedures. These procedures also developed in part to meet the need to help researchers create understandable designs out of complex data analysis.

This study is mix method type of study which consists of mainly primary data collection, analysis and interpretation. The theoretical background on mix method approach of research is discussed later on in this chapter.

## 3.4 Essentials of Quality Research Process

It is necessary to study essentials of quality research before discussing research process because such a study may provide quality results of research. Good research must meet the validity and reliability that are most important in evaluating a measurement tool of a research. The following two terms are essential to understand in this regard.

### 3.4.1 Validity

It can be stated that a research has highly validity if the study only contains what one wants to study and nothing else. Validity refers to how well the data collection and data analysis of the research captures the reality being studied. In other words, the researcher must obtain the reality

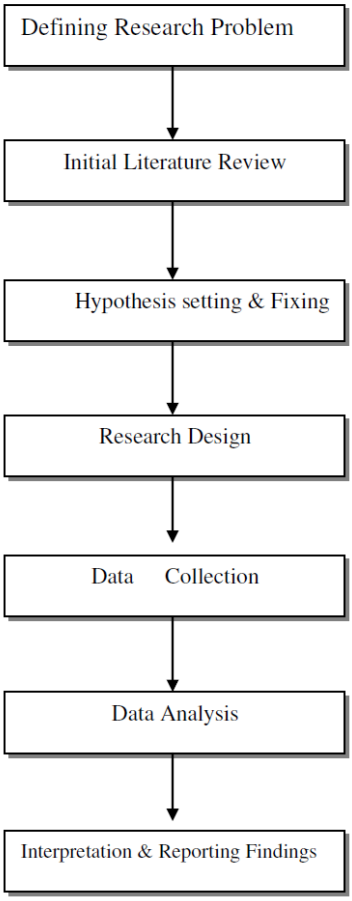
of responses of those people who are under the test through comparing their responses with such truth that in deed is truth. In this study, collected primary data are validated in the later part of this chapter and discussed in forthcoming chapter-4. Data validation tool is administered as IBMSPSS.25 in this study.

### 3.4.2 Reliability

Supposes that if other person were to repeat a specific research study, he should be able to capture the same results. Reliability demonstrates that the operation of a study, such as the data collection procedures, can be repeated with the same outcome. The objective is to ensure that if a later researcher followed exactly the same procedures as described by an earlier research and conducted the same case study all over again; the later researcher should arrive at the same.

## 3.5 Research Process

Under this headline the steps in which the researcher must to be taken are to be distinguished and demonstrated. It consists of a series of steps or actions that are necessary to execute a research in effective way. In the below chart, the steps in a research process are to be illustrated.




*3.1 Research Process (Source: self-prepared)*

### 3.5.1 Defining Research Problem

Research problem is a statement that wants to know what relation exist among some variables. The first step in a research after determining the area for research is defining the problem under the study, so the time period of research, unit of analysis, variables and estimation of relationship (to set up the next step that is formulating the problem or setting up the hypothesis) are to be facilitated.

In the present study, the statement of problem consists of mainly; inclusiveness of dimensions of learning organization and its impacts on TQM in context to MSU of Baroda. The research problem for this study is defined in the following manner. The research idea came into mind for the present study from existing dimensions of learning organization and its role in changing role in Indian higher education. TQM has a vital role to play in higher education in India. . The following steps are followed through necessary self-checklist criteria during formulating the research problem for the purpose of this study.

- Identification of Subject Area
- Problem Definition and Identification
- Literature Review
- Selection of Research Design, Subjects and Data Collection Technique(s)
- Data Gathering
- Data Processing and Analysis
- Implications, Conclusions and Recommendations
- Results Communication of Results

In this way, research problem formulation and research process as discussed above provide directions to the researchers for the further investigation in this study

A literature review goes beyond the search for information and includes the identification and articulation of relationships between the literature and current field of research. While the form of the literature review may

vary with different types of studies, the basic purposes remain constant: Review of literature provides and fulfils the following issues.

(1) Provide a context for the research (2) Justify the research (3) Ensure the research hasn't been done before (or that it is not just a "replication study") (4) Show where the research fits into the existing body of knowledge (5) Enable the researcher to learn from previous theory on the subject (6) Illustrate how the subject has been studied previously (7) Highlight flaws in previous research (8) Outline gaps in previous research (9) Show that the work is adding to the understanding and knowledge of the field (10) Help refine, refocus or even change the topic The study in details on review of literature is done and discussed in chater-2 of this study.

**3.5.2 Hypothesis** "Hypo" means less than or under, and "thesis" mean s idea or general opinion to be defended by a person and thus hypothesis means an idea form beforehand which has less value than the generally formed view. If we have to proceed towards some destination for which we don't know the way, we try to form an idea about the direction to proceed and by trial and error, we reach that goal. The primary idea is called a hypothesis

A hypothesis is a conjectural statement of the relation between two or more variables. It is a tentative answer to the research question or an educated guess of the research outcome. Hypothesis is always in a declarative sentence form and they relate either generally or specifically from variable to variable. The testable proposition is called hypothesis.

Specific the hypothesis should not be too vague or general. Conceptually clear: The hypothesis should be properly expressed. It leads to discovery of additions to knowledge by helping to confirm or disconfirm particular theories or propositions. The hypothesis should be capable of being verified. It must be simple and capable to empirical test. It provides the framework for drawing the conclusion of a research endeavor. In fact, conclusions are direct response to the hypothesis formulated for the study as confirmed or discontinued by data analysis.

Couper and Schindler (2003) described that hypothesis testing is a well-defined procedure which supports to decide objectively whether to reject or accept the hypothesis based on the available information from the sample. When a researcher establishes an assumption or hypothesis then the sample statistics will be close to the parameter of hypothesized population. A hypothesis is a formalized procedure that succeeds a standard series of performances. In this way the researcher has a standardized method for calculating the research studies outcomes. Other researchers will understand and identify exactly how the data were evaluated and how the conclusions were reached.

Dillman and Bowker (2000) in hypothesis testing two kinds of hypotheses are involved. The first kind is called null hypothesis which can be evaluated in terms of probabilities provided by the sample statistics. The second is research hypothesis which is intended to test the research prediction. The null hypothesis is the logical opposite to the research hypothesis. Thus, if the null hypothesis is rejected then the research

hypothesis is considered acceptable. In the present study, hypotheses are formulated with the help of research questions and research objectives as shown in chapter-1. The hypotheses are formulated and mentioned in 3.8 sub-topic of this chapter in form of null hypothesis ($H_0$)

## 3.6 Research Design

Kothari (2009) says, the research design is the conceptual structure within which the research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data. As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data. So the research design can be defined as a plan, structure and strategy of a research to find out alternative tools to solve the problems and to minimize the variances. The basic elements of research design are discussed as follows.

### 3.6.1 Parts of Research Design

- *Problem design* which deals with the problem under the study, need for the project and distinguish the variables.
- *Literature review design* that includes an initial review of previous literature related
- To the problem under the study.
- *Hypothesis design* which deals with the establishment a relationship between variables and set up a basis of measurement.
- *Tools design* which deals with the method of studying such observation, interview, etc.

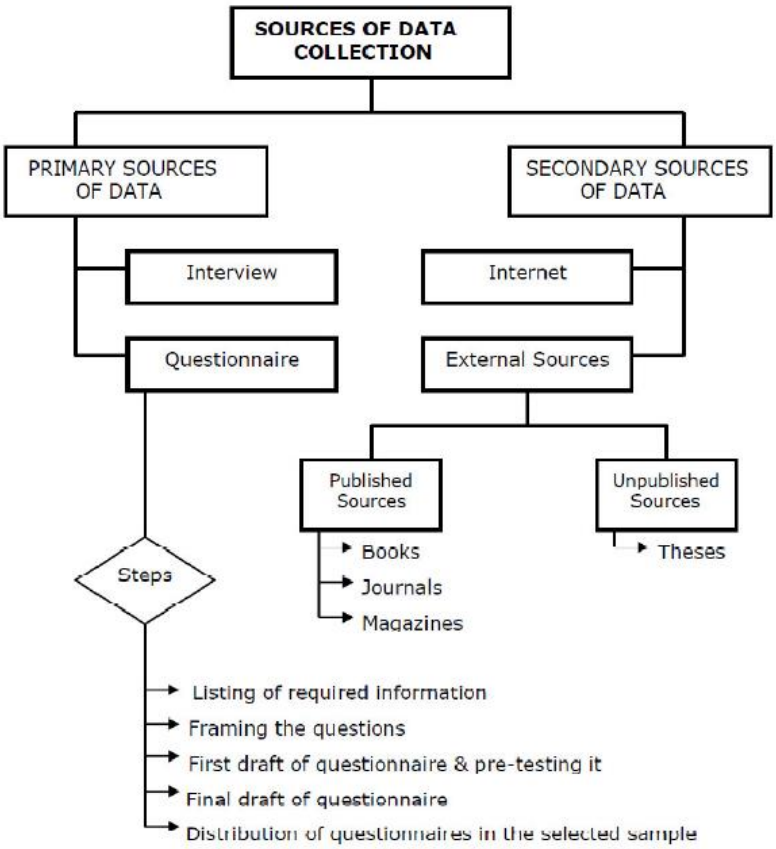
- *Sampling design* that deals with the decision about population or universe, sampling method, size, element, unit, etc.
- *Scaling design* that deals with selection of appropriate scale of measurement.
- *Statistical design* which deals the selection of appropriate statistical technique to
- Analyze the data such as ANOVA (Analysis of Variance), chi-square test, t-test, etc.

### 3.6.2 Type of research Design

Research design according to the nature of the problem and also type of research changes. In our case the purpose of the study is to test the hypothesis and so-called hypothesis-testing research. Kothari (2004) says, "Hypothesis-testing research studies (generally known as experimental studies) are those where the researcher tests the hypotheses of causal relationship between variables. Such studies require procedure that will not only reduce bias and increase reliability, but will permit drawing inferences about causality". On this basis the research design in such type of studies can be formed through informal experimental design and formal experimental design, so that the statistical design such as person correlation and crosstab to analyze the data could be utilized.

## 3.7 Data Collection Sources

The data collection source is demonstrated in the following figure-3.4 which justifies the usage of primary data collection method in this study with the following advantages.




**Advantages of primary data**

The data collection for the purpose of this study are as summarized as below in this study, primary data collection through structured questionnaire in person or email to the valid samples of target population. So that, essential notes are written in the following manner.

- Administration is comparatively inexpensive and easy even when gathering data from large numbers of people spread over wide geographic area Reduces chance of evaluator bias because the same questions are asked of all respondents
- Many people are familiar with surveys. Some people feel more comfortable responding to a survey than participating in an interview
- Tabulation of closed-ended responses is an easy and straightforward process
- The need for statistical tests in this study is justified with the following reasons and tests are conducted by using IBMSPSS.22 as a statistical tool for data analysis process.

### 3.8 Sample Design

A sample design is made up of two elements. (1) Sampling method. Sampling method refers to the rules and procedures by which some elements of the population are included in the sample. Some common sampling methods are simple, stratified sampling, and cluster sampling (2) Estimator. The estimation process for calculating sample statistics is called the estimator. Different sampling methods may use different estimators. The sample design adopted for the purpose of this investigation is discussed in the following manner. The following terms are necessary to discuss before moving forward for further in this chapter.

**Universe / Population :** It is a little alternative term used for population. In this study the universe is university stakeholders i.e. Students, Faculty, Non-teaching staff and Policy Makers (i.e Authorities of the University, Syndicate and Senate Members, Directors, IQAC members etc.

**Target Population:** Target population refers to the entire group of individuals or objects to which researchers are interested in generalizing the conclusions. The target population usually has varying characteristics and it is also known as the theoretical population. In this study, the target population is university stakeholders i.e. Students, faculty, Non-teaching staff and Policy Makers (i.e Authorities of the University, Syndicate and Senate Members, Directors, IQAC members etc of MSU of Baroda.

### 3.9 Sampling Techniques

Statistical sampling techniques are the strategies applied by researchers during the statistical sampling process. This process is done when the researchers aims to draw conclusions for the entire population after conducting a study on a sample taken from the same population. There must be representativeness during data collection process. The reason behind representativeness being the primary concern in statistical sampling is that it allows the researcher to draw conclusions for the entire population. If the sample is not representative of the population, conclusions cannot be drawn since the results that the researcher obtained from the sample will be different from the results if the entire is to be tested Practicability of statistical sampling techniques allows the researchers to estimate the possible number of subjects that can be

included in the sample, the type of sampling technique, the duration of the study, the number of materials, ethical concerns, availability of the subjects/samples, the need for the study and the amount of workforce that the study demands.

### 3.9.1a Probability Sampling

It involves the selection of elements from the target population using random in which each element of the population has an equal and independent chance of being chosen.

### 3.9.1b Simple Random Probability Sampling

A simple random sampling (SRS) is a sample of a given size in which all such subsets of the frame are given an equal probability to be chosen. In a simple random sample (SRS) of a given size, all such subsets of the frame are given an equal probability. Each element has an equal probability of selection any given *pair* of elements has the same chance of selection as any other pair. This bias and simplifies analysis of results. In particular, the variance between individual results within the sample is a good indicator of variance in the overall population, which makes it relatively easy to estimate the accuracy of results.

### 3.9.1c Systematic Probability Sampling

Systematic sampling relies on arranging the target population according to some ordering scheme, a random start, and then selecting elements at regular intervals through that list. Systematic sampling relies on arranging

the target population according to some ordering scheme, a random start, and then selecting elements at regular intervals through that ordered list. As long as the starting point is randomized, systematic sampling is a type of probability sampling. It is easy to implement and the stratification can make it efficient, if the variable by which the list is ordered is correlated with the variable of interest. However, if periodicity is present and the period is a multiple or factor of the interval used, the sample is especially likely to be *un*representative of the overall population, decreasing its accuracy. Another drawback of systematic sampling is that even in scenarios where it is more accurate than SRS, its theoretical properties make it difficult to *quantify* that accuracy. As described above, systematic sampling is an EPS method, because all elements have the same probability of selection.

### 3.9.1d Stratified Sampling

It is possible when it makes sense to partition the population into groups based on a factor that may influence the variable that is being measured. These groups are then called strata. An individual group is called a stratum. With stratified sampling one should: partition the population into groups (strata) obtain a simple random sample from each group (stratum) collect data on each sampling unit that was randomly sampled from each group (stratum) Stratified sampling works best when a heterogeneous population is split into fairly homogeneous groups. Under these conditions, stratification generally produces more precise estimates of the

population percent than estimates that would be found from a simple random sample.

### 3.9.1e Cluster Sampling

It is very different from Stratified Sampling. With cluster sampling one should

- Divide the population into groups (clusters).
- Obtain a simple random sample of so many clusters from all possible clusters.
- Obtain data on every sampling unit in each of the randomly selected clusters

It is important to note that, unlike with the strata in stratified sampling, the clusters should be microcosms, rather than subsections, of the population. Each cluster should be heterogeneous. Additionally, the statistical analysis used with cluster sampling is not only different, but also more complicated than that used with stratified sampling.

### 3.9.1f Multistage Probability Sampling

Multistage sampling can be a complex form of cluster sampling... Cluster because sampling is a type of sampling which involves dividing the population into (or clusters). Then, one or more clusters are chosen at random and everyone within the chosen cluster is sampled

### 3.9.2a Non-Probability Sampling

The following sampling methods that are listed in your text are types of no probability sampling that should be avoided:

### 3.9.2b Convenience Non-Probability Sampling

A sample or method of sampling in which cases are selected because of the convenience of accessing them and not because they are thought to be representative of the population. Unless some form of representative or random sampling has been employed, most samples are of this nature.( Duncan Cramer and Dennis Howitt,2004) Using this sampling method, a researcher is free to use anything that they could find in the research outline. The sample is selected based on preferences and ease of sampling respondents. This sampling is easier to conduct and less expensive. However, it has poor reliability due to its high incidence of bias. In ICT, convenience sampling seems to be dominant especially in cases of organizations that conduct web surveys, mail their responses to a survey questions and SMS their opinions to a question. Although convenience sampling can cater to a lot of data, it is not reliable in terms whether the sample represents the real population or not. In this study, convenience sampling technique is considered.

### 3.9.3 Quota Sampling Technique

Sometimes it is more cost-effective to select respondents in groups ("clusters"). Sampling is often clustered by geography or by time periods. Clustering can reduce travel and administrative costs. It also means that

one does not need a sampling frame listing all elements in the target population. Instead, clusters can be chosen from a cluster-level frame, with an element-level frame created only for the selected clusters. Cluster sampling generally increases the variability of sample estimates above that of simple random sampling, depending on how the clusters differ between themselves, as compared with the within-cluster variation.

### 3.9.4 Purposive Sampling Technique

Purposive sampling is using knowledge of the study and the population to choose participants**.** It is not a random sampling that looks at the whole population. Purposive sampling is also called judgmental sampling /selective sampling. In statistics and survey methodology, sampling is concerned with the selection of a subset of individuals from within a statistical population to estimate characteristics of the whole population. The three main advantages of sampling are that the cost is lower, data collection is faster, and the accuracy and quality of the data can be easily improved.

In this study, convenience non-probability sampling and cluster-probability sampling techniques are applied for the following reasons. In this study, convenience sampling and cluster sampling techniques are applied for the following reasons.

(1) Expedited Data Collection

Time constraint is working in this study because this is academic research and should have to finish within stipulated time frame.

(2) The target population has concentrated geographical area in the campus of MSU of Baroda. Therefore, primary data collection in form of in person is not difficult to the researcher(s).

(3) It is cost effective.

(4) It is readily available.

In conclusion, the sampling techniques are applied with a view to get at least confidence level at 95% i.e. p –value can be maintained less than 0.05.

### 3.10 Sample Size

The sample size of a statistical sample is the number of observations that constitute it. The size is typically denoted by n and it is always a positive integer. No exact sample size can be here it can vary in different research settings. However, all else being equal, large sized sample leads to increased precision in estimates of various properties of the population.

Determining the sample size to be selected is an important step in any research study. For example, let us suppose that some researcher wants to determine prevalence of eye problems in school children and wants to conduct a survey

The choosing of sample size depends on non-statistical considerations and statistical considerations. The non-statistical considerations may include availability of resources, manpower, budget, ethics and sampling.

Following three criteria need to be specified to determine the appropriate sample size: In the present study, the total valid sample size is 1112.

### 3.10.1 The Level of Precision

Also called sampling error, the level of precision, is the range in which the true value of the population is estimated to be. This is range is expressed in points.

### 3.10.2 The Confidence Level

The confidence interval is the statistical measure of the number of times out of 100 that results can be expected to be within a specified range. For example, a confidence interval of 90% means that results of an action will probably meet expectations 90% of the time.

The basic idea described in Central Limit Theorem is that when a population is repeatedly sampled, the average value of an attribute obtained is equal to the true population value. In other words, if a confidence interval is 95%, it means 95 out of 100 samples will have the true population value within range of precision.

### 3.10.3 Degree of Variability

Depending upon the target population and attributes under consideration, the degree of variability varies considerably. The more heterogeneous a population is, the larger the sample size is required to get an optimum level of precision. Note that a proportion of 55% indicates a high level of variability than either 10% or 80%. This is because 10% and 80% means

that a large majority does not or does, respectively, have the attribute under consideration.

There are number of approaches to determine the sample size including: using a census for smaller populations, using published tables, imitating a sample size of similar studies, and applying formulas to calculate a sample size. In this study, the target population is sufficient precise in MSU of Baroda.

In this case, 1112 valid respondents are considered for the purpose of primary source data analysis. Sample size in this present study is derived by considering Confidence Level, Confidence Interval, Total population and SD.

### 3.11 Data Analysis

Data analysis is a process and part of research. It is used to inspect, clean, transform, and remodel data with a view to reach certain conclusion for given situation. Data analysis is typically two types (1) Quantitative and (2) Qualitative. The analytical part with theoretical background is discussed in forthcoming chapter of this study. The statistical tools are applicable for data analysis process. Some of them are summarized in the following manner which proved as useful statistics during this study.

#### 3.11.1 Descriptive Statistics:

The term given to the data analysis that helps describing or summarizing data in a meaningful way. Descriptive statistics is important because it

converts the raw data into meaningful data which allows simpler interpretation of data. In this regards, the following two types of general statistics is applicable for this study.

(1) Statistical tests give accurate results and conclusion of analysis output which can lead to better recommendations of the research.

(2) Statistical tests provide scientific evidence(s) of the research conducted and can also be generalized to other relevant studies.

There are numerous statistical tests are available for testing hypothesis of any research but the following tests are conducted for the purpose of this investigation.

### 3.11.2 Measures of Central Tendency

It describes the central position of frequency distribution for a group of data. In this case, central position is described by including mean, median and mode, which is known as central tendency.

The arithmetic mean or average of a set of values is the ratio of the sum of these values to the number of elements in the set. In other words, we add together the given values in a data set, and then divide that total by the number of given values. The arithmetic mean formula is given below:

$$\bar{X} = \frac{X_1 + X_2 + X_3 \ldots X_N}{N}$$

**Where**
**$\bar{X}$ = the mean**
**$X_1$ = the first value**
**$X_2$ = the second value**
**$X_3$ = the third value**
**$X_N$ = the last value**
**N = the number of values**

Or

$$\bar{X} = \frac{\sum X_i}{n}$$

**Median:** The value in a set of ranked observations that divides the data into two parts of equal size. When there are an odd number of observations the median is the middle value. When there is an even number of observations the measure is calculated as the average of the two central values. Provides a measure of location of a sample that is suitable for asymmetric distributions and is also relatively insensitive to the presence of outliers

$$Median = l + \frac{h}{f}\left(\frac{N}{2} - c\right)$$

Where:

l = lower class boundary of the median class

$h$ = Size of the median class interval

$f$ = Frequency corresponding to the median class

$N$ = Total number of observations i.e. sum of the frequencies

$c$ = Cumulative frequency preceding median class.

**Mode** The mode of a set of data values is the value(s) that occurs most often

$$\text{Mode } = L + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

Where

- L is the lower class limit of the modal class
- $f_1$ is the frequency of the modal class
- $f_0$ is the frequency of the class before the modal class in the frequency table
- $f_2$ is the frequency of the class after the modal class in the frequency table
- h is the class interval of the modal class

The purpose of finding central tendency can be full filled in such a manner by putting relevant values in the aforesaid formulae. Further calculation and discussion is held in forthcoming chapter-4.

**Measures of spreads**

It refers that in which way (s) summarizing a group of data by describing how spread out the scores are. To describe numerous statistics are available including range, quarlties, deviation, variance and standard deviation.

**Range** The difference between the largest and smallest observations in a data set. Often used as an Easy-to-calculate measure of the dispersion in a set of observations but not recommended for this task because of its sensitivity to outliers and the fact that its value increases with sample size.

**Quartiles:** The values that divide a frequency distribution or probability distribution into four equal parts.

**Deviation:** A measure of the extent to which a particular model differs from the saturated model for a data set. Defined explicitly in terms of the likelihoods of the two models as

$$D = -2[\ln L_c - \ln L_s]$$

Where,

Lc and Ls are the likelihoods of the current model and the saturated model, respectively. Large values of d are encountered when Lc is small relative to Ls, indicating that the current model is a poor one. Small values of d are obtained in the reverse case. The deviance has asymptotically a chi-

squared distribution with degrees of freedom equal to the difference in the number of parameters in the two models when the current model is correct

**Variance:** In a population, the second moment about the mean. An unbiased estimator of the population value is provided by s2 given by

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$$

where $x_1, x_2, \ldots, x_n$ are the $n$ sample observations and $\bar{x}$ is the sample mean.

**Sample Standard Deviation**: The standard deviation is a numerical value used to indicate how widely individuals in a group vary. If individual observations vary greatly from the group mean, the standard deviation is big; and vice versa. It is important to distinguish between the standard deviation of a population and the standard deviation of a sample. They have different notation, and they are computed differently. The standard deviation of a population is denoted by σ and the standard deviation of a sample, by *s*.

$$s = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

**Population Standard Deviation**

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n}}$$

$\sigma$ = standard deviation

$\sum$ = sum of

$x$ = each value in the data set

$\bar{x}$ = mean of all values in the data set

$n$ = number of value in the data set

Smaller standard deviations reflect more clustered data. More clustered data means less extreme values. A data set with less extreme values has a more reliable mean. The standard deviation is therefore a good measure of the reliability of the mean value.

Thus, descriptive statistics is evaluated with the help of IBMSPSS.25 in this study. The results are discussed in the forthcoming chapter.

**Data Standardization :**

Part of the derivation process, standardization is the process by which similar data received in various formats is transformed to a common format that enhances the comparison process.

In the overall knowledge discovery process, before data mining itself, data preprocessing plays a crucial role. One of the first steps concerns the normalization of the data. This step is very important when dealing with parameters of different units and scales. For example, some data mining

techniques use the Euclidean distance. Therefore, all parameters should have the same scale for a fair comparison between them

In this study, the data standardization process is conducted with the help of IBMSPSS.22 as a statistical tool. The data of this study are standardized before conducting the process of data normalization. The data consisting of all the four groups of respondents i.e. stakeholders of the Maharaja Sayajirao University of Baroda. The results on data standardization are obtained for all the groups which are discussed in the forthcoming chapter.

Test for Normality

Normality test is not conducted because it is understood that the valid sample size is more than 1000 and data are normally distributed as a thumb of rule.

The test can be conducted for each mean and standard deviation combination a theoretical normal distribution can be determined. The theoretical normal distribution can be compared with actual distribution of data. Some common methods for assessing whether data are normally distributed or not which are in mainly two basic categories. They are graphical and statistical.

**Graphical :** Q-Q probability plots

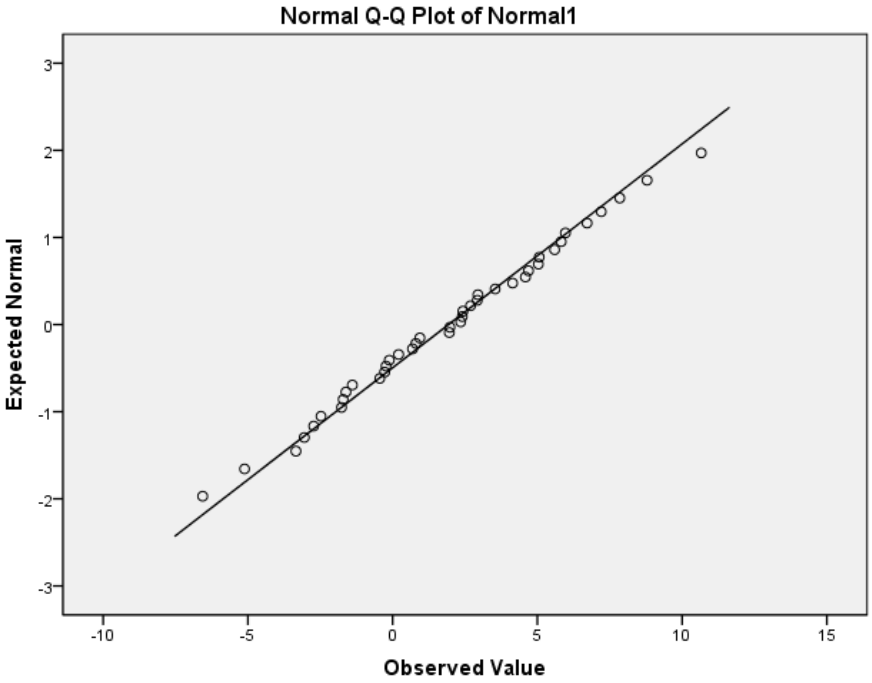



Figure-3.3Q-Q plot of normally distributed data

Histogram

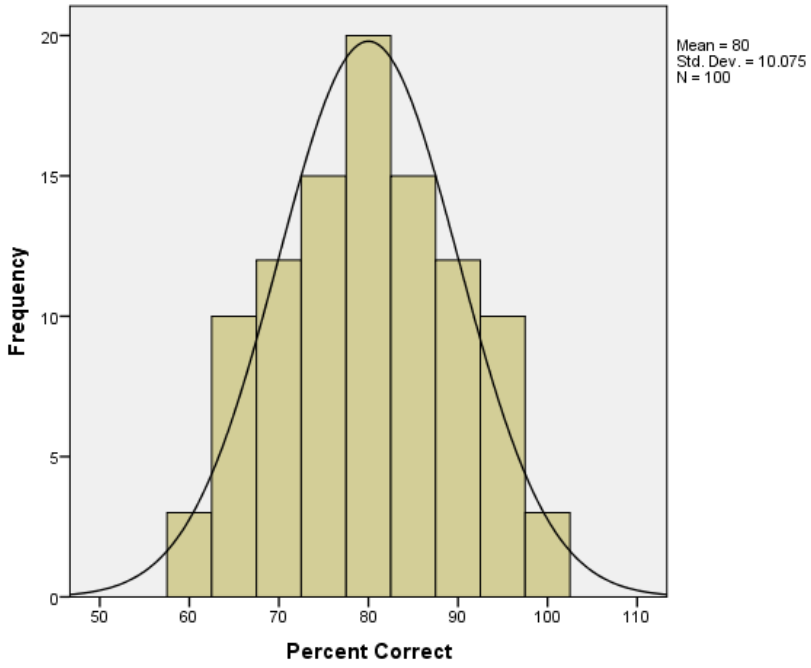


Figure-3.4 example of normal distribution

- Cumulative frequency(P-P plots)

In statistics, a P–P plot (probability–probability plot or percent–percent plot) is a probability plot for assessing how closely two data sets agree, which plots the two cumulative distribution functions against each other. P-P plots are vastly used to evaluate the skewness of a distribution.

**Statistical**

- Jarque-Bera test
- Shapiro-Wilks test
- Kolmogorov-Smirnov test
- D'Agostino test
- W/S test

The most commonly Kolmogorov-Smirnov test is conducted for normality test of data. The following table indicates on suitability of conducting normality test.

| Test | When to conduct |
|---|---|
| Kolmogorov-Smirnov | • Not sensitive to problems in the tails.<br>• For data sets > 50. |
| Shapiro-Wilks: | • Doesn't work well if several values in the data set are the same. |

| | |
|---|---|
| | • Works best for data sets with < 50, but can be used with larger data sets. |
| W/S | • Simple, but effective<br>• Not available in SPSS. |
| Jarque-Bera: | • Tests for skewness and kurtosis, very effective<br>• Not available in SPSS |
| D'Agostino | • Powerful omnibus (skewness, kurtosis, centrality) test.<br>• Not available in SPSS. |

Table-3.2 statistical tests for normal distribution

**Skewness**: Skewness is a measure of symmetry, or more precisely, the lack of symmetry. A distribution, or data set, is symmetric if it looks the same to the left and right of the center point. There are two types of skewness. (1) Positive skewness (2) Negative skewness

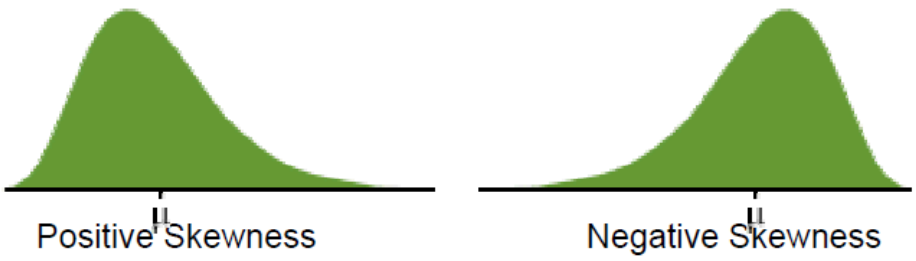



Figure 3.5 skewness

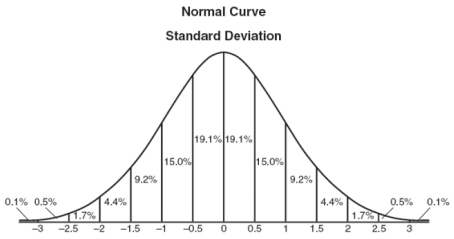



Figure-3.6 Normal curve

The normal curve can be seen in the foreshown manner. Thus, normally distributed data give accurate output on analysis.

The skewness of a random variable $X$ is denoted or $skew(X)$. It is defined as

$$skew(X) = \frac{E[(X-\mu)^3]}{\sigma^3}$$

Where and are the mean and standard deviation of $X$.

**Interpretation**:

1. If Sk = 0, then the frequency distribution is normal and symmetrical.(Figure-3.9)

2. If Sk 0, then the frequency distribution is positively skewed.(Figure-3.8)

3. If Sk 0, then the frequency distribution is negatively skewed.(Figure-3.8)

Another important statistical term is kurtosis related to this section of the discussion. The kurtosis of a random variable $X$ is denoted or $kurt(X)$. It is defined as

$$kurt(X) = \frac{E[(X - \mu)^4]}{\sigma^4}$$

In this study, normal distribution of collected primary data is tested and discussed in chapter-4 before moving forward to investigation by conducting formal statistical tests for both the sample groups. Such a theoretical background will be helpful to get the qualitative output of this investigation. Parametric and non-parametric tests can be conducted in this investigation. The main statistical tests are discussed in the following manner for hypothesis testing and further investigation.

**Scale Reliability test**

A test must be reliable, that is, it must have the ability to consistently yield the same results when repeated measurements are taken of the same individuals under the same conditions (Hair, 206). In other words, reliability is an indication of how consistent the findings are based on the method of data collection and analysis (Saunders, Lewis & Thornhil, 2007). Furthermore, reliability is more important when the questionnaire is a Likert-type because there are many variables testing the concept.

The term reliability has two closely related but somewhat different connotations in psychological testing. First, it refers to the extent to which

a test is internally consistent, that is, consistency of results obtained throughout the test when administered once. In other words, how accurately is the test measuring a particular item? Second, reliability refers to the extent to which a measuring device yields consistent results upon testing and retesting. That is, how dependable is it for predictive purposes?"

Cronbach's estimate of reliability is calculated using the variance of individual items and co-variances between the items. This estimate, however, can also be calculated using the correlations between the items. Given those items within a questionnaire use the same scale, both approaches give similar estimates but his later approach is easier to understand. The Cronbach alpha coefficient ranges from 0 to 1 with a minimum of 0.6 while other studies suggest that anything above 0.7 suggest high levels of internal reliability Nunaly (1978) suggested that an alpha value of 0.7 is acceptable. Many studies have used reliability to test their modified service quality scale that ranged from 0.6 to 0.96

For the purpose of this research the researcher had used Cronbach alpha coefficient (Cronbach, 1951), the most common method for testing reliability, and 0.6 will be used as the minimal accepted level. Using SPSS version 25.0, an internal consistency analysis was performed to assess the reliability aspect of the instrument. Internal reliabilities were computed for the factors contain in section-B namely; management commitment, system approach to management, customer satisfaction, employee involvement, training, teamwork and continuous improvement.

(3) Descriptive Statistics

Descriptive statistics are numbers that are used to summarize and describe data. The word “data” refers to the information that has been collected from an experiment, a survey, a historical record, etc. By the way, “data” is plural.

### 3.11.3 Pearson Correlations Test

Correlation is a statistical measure that indicates the extent to which two or more variables fluctuate together. A positive correlation indicates the extent to which those variables increase or decrease in parallel; a negative correlation indicates the extent to which one variable increases as the other decreases.

In statistics, the correlation coefficient r measures the strength and direction of a linear relationship between two variables on a scatter plot. The value of r is always between +1 and –1. ... A perfect downhill (negative) linear relationship. –0.70. A strong downhill (negative) linear relationship

Relationship between two variables can be related with three ways. (1) Positively related (2) not related (3) negatively related with each other. In this chapter, we will consider two measures for the study and they are variance, standard deviation, covariance and correlation coefficient

Covariance indicates how two variables are related. A positive covariance means the variables are positively related, while a negative covariance

means the variables are inversely related. The formula for calculating covariance of sample data is shown below

$$COV(x,y) = \frac{\sum_{i=1}^{n}(x_i - \overline{x})(y_i - \overline{y})}{n-1}$$

$x$ = the independent variable

$y$ = the dependent variable

$n$ = number of data points in the sample

$\overline{x}$ = the mean of the independent variable $x$

$\overline{y}$ = the mean of the dependent variable $y$

To calculate the correlation coefficient for two variables, you would use the correlation formula, shown below.

$$r_{(x,y)} = \frac{COV(x,y)}{s_x s_y}$$

$r_{(x,y)}$ = *correlation of the variables x and y*

*COV(x, y) = covariance of the variables x and y*

$s_x$ = *sample standard deviation of the random variable x*

$s_y$ = *sample standard deviation of the random variable y*

**Cross-tab**

Crosstab is a table which shows relationship between two or more variables. It also known as contingency table. It is also a summary of survey data. It provides similarity or differences of comparison of two or more groups. In the present study, cross tabulation is conducted for the reasons of comparing the groups to evaluate similarities and dissimilarities amongst survey data.

## 3.12 Design of Questionnaire

The questionnaire designed for the present study has certain theoretical background. Some of the theoretical background is narrated to justify the questionnaire for collecting primary data in this study. A questionnaire is a group or sequence of questions designed to elicit information from an informant or respondent when asked by an interviewer or completed unaided by the respondent. An unstructured questionnaire is an instrument or guide used by an interviewer who asks questions about a particular topic or issue. Although a question guide is provided for the interviewer to direct the interview, the specific questions and the sequence in which they are asked are not precisely determined in advance. A structured questionnaire**,** on the other hand, is one in which the questions asked are precisely decided in advance. When used as an interviewing method, the questions are asked exactly as they are written, in the same sequence, using the same style, for all interviews. Nonetheless, the structured questionnaire can sometimes be left a bit open for the interviewer to amend to suit a specific context. A semi structured questionnaire is a mix

of unstructured and structured questionnaires. Some of the questions and their sequence are determined in advance, while others evolve as the interview proceeds.

### 3.12.1 Questionnaire for this Study

The questionnaire for collecting primary data contains two main sections. Section A contains profile of respondents. Section B contains main questions on perception towards management commitment, system approach to management, customer satisfaction, employee involvement, training teamwork and continuous improvement for all the four group respondents.

Demographics are the quantifiable statistics of a given population. Demographics are also used to identify the study of quantifiable subsets within a given population which characterize that population at a specific point in time.

Demographic profiling is essentially an exercise in making generalizations about groups of people. As with all such generalizations many individuals within these groups will not conform to the profile - demographic information is aggregate and probabilistic information about groups, not about specific individuals. Critics of demographic profiling argue that such broad-brush generalizations can only offer such limited insight and that their practical usefulness is debatable.

In this study, demographic profile is labeled by section A and has all the information is not same in all the four groups. The questions are related to

gender, age, education, marital status, financial status, occupation, income and other related information.

The questionnaire of section B contains eight factors and each factor has different and unequal items. Each item has five point Likert scale rating from strongly disagrees to strongly agree.

A Likert scale is a summated rating scale used for measuring attitudes. The method was developed by Rensis Likert in 1932. The first stage in creating a Likert scale is the production of a series of statements expressing a favorable or an unfavorable attitude towards the concept of interest The basis for Likert measurement is narrated as bellow with a view to understand attitude and value of response received from respondents.

Rensis Likert was an American psychologist. (Unlike most of those who have used it since, he pronounced his name with a short 'i' sound, as in 'Lick-ert'.) What became known as the Likert method of attitude measurement was formulated in his doctoral thesis, and an abridged version appeared in a 1932 article in the Archives of Psychology. At the time, many psychologists believed that their work should be confined to the study of observable behavior, and rejected the notion that unobservable (or 'latent') phenomena like attitudes could be measured. Like his contemporary, Louis Thurstone, Likert disagreed. They argued that attitudes vary along a dimension from negative to positive, just as heights vary along a dimension from short to tall, or wealth varies from poor to rich. For Likert, the key to successful attitude measurement was to convey this underlying dimension to survey respondents, so that they could then

choose the response option that best reflects their position on that dimension. This straightforward notion is illustrated below for manual responding.

| Strongly Disagree | Disagree | . Neutral | Agree | Strongly |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |

A Likert scale is a composite, or ‘battery’, of multiple Likert items. (The terminology can be confusing because the list of answer categories is, as in this fact sheet, usually referred to as the ‘response scale’. But the precise term ‘Likert scale’ should always refer to a collection of items.).Likert scale rating for this study is also meeting the above norms..It is from strongly disagree to strongly agree.

Pre-testing of questionnaire is also can be called as pilot test or pilot study. Endeavoring the definite investigation straight path without approving the theory first on a constrained example would be very wasteftil if the outcomes were needless and mistaken. There was additionally a need to decide and approve the methodology for such a point by point study. A methodical methodology will take out any experimentation strategies and will save money on a ton of time, endeavors/vitality and cash. A pilot study, in this way, was intended to test check the suspicions made dependent on the investigation of a little example of organizations and their representatives at laborer, administrator

and administrative levels Pilot study was taken up additionally to structure the surveys, meeting and perception arranges, approve and conclude them.

In the present study total 110 sample sizes in determined from the all four groups for the purpose of pilot study. The pilot test is conducted for the purpose of getting results and trends in the study. Target population for the present study is 10,381. The sample size is determined as 110 as a rule of thumb (Teare.et.al, 2014) for the purpose of conducting pilot study (students: 40, faculty members: 30, Non-teaching staff members: 25, policy makers: 15) The structured questionnaire design for student perspectives is as under:

**Questionnaire (Student Perspectives)**

| Sr. No | Statement | SDA | DA | N | A | SA |
|---|---|---|---|---|---|---|
| | **Management Commitment (MC)** | | | | | |
| $MC_1$ | Management ensures everyone that university has student centric and clear performance measures. | 1 | 2 | 3 | 4 | 5 |
| $MC_2$ | The university has clear vision, mission and policy statements related to quality education. | 1 | 2 | 3 | 4 | 5 |
| $MC_3$ | Quality awareness programs are conducted periodically to create awareness regarding quality. | 1 | 2 | 3 | 4 | 5 |
| $MC_4$ | The university provides basic infrastructure facilities to the students according to the norms. | 1 | 2 | 3 | 4 | 5 |
| $MC_5$ | Physical education is given importance in the university | 1 | 2 | 3 | 4 | 5 |
| $MC_6$ | Knowledge distribution is carried out | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | through inter / intra symposiums / seminars / conferences held in the university. | | | | | |
| $MC_7$ | NSS, NCC and such club activities of the university motivate students to render service to the society. | 1 | 2 | 3 | 4 | 5 |
| $MC_8$ | Students benefited by the scholarship and fellowship | 1 | 2 | 3 | 4 | 5 |
| | **System Approach to Management (SAM)** | | | | | |
| $SAM_1$ | Regular meetings (Parent – Teacher –Industry People) are conducted to review the quality education. | 1 | 2 | 3 | 4 | 5 |
| $SAM_2$ | All academic documents related to the students are maintained well. | 1 | 2 | 3 | 4 | 5 |
| $SAM_3$ | There is a role and contribution of quality improvement team with respect to quality policy, new | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | curriculum development | | | | | |
| $SAM_4$ | University has Internal Quality Assessment Cell (IQAC) for maintaining quality in educational process. | 1 | 2 | 3 | 4 | 5 |
| $SAM_5$ | Quality management is practiced in the institution. | 1 | 2 | 3 | 4 | 5 |
| | **Customer Satisfaction (CS)** | | | | | |
| $CS_1$ | University fostering parent's involvement in educating the students | 1 | 2 | 3 | 4 | 5 |
| $CS_2$ | The Industry- Institution interaction programs are conducted periodically | 1 | 2 | 3 | 4 | 5 |
| $CS_3$ | Students' recognition through rewards for good performance is initiated in the university. | 1 | 2 | 3 | 4 | 5 |
| $CS_4$ | Better placement program for student placement is being provided through campus recruitment | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $CS_5$ | Canteen facility is provided to the students | 1 | 2 | 3 | 4 | 5 |
| $CS_6$ | There is network / internet facility to explore new avenues of knowledge | 1 | 2 | 3 | 4 | 5 |
| $CS_7$ | There is a well-established laboratory and library facility to facilitate realistic learning. | 1 | 2 | 3 | 4 | 5 |
| | **Employee Involvement (EI)** | | | | | |
| $EI_1$ | The staff have good attitude towards students | 1 | 2 | 3 | 4 | 5 |
| $EI_2$ | Problems are attended timely by the university authority | 1 | 2 | 3 | 4 | 5 |
| $EI_3$ | University conducts seminars / workshops /conferences regularly | 1 | 2 | 3 | 4 | 5 |
| $EI_4$ | Effective improvement of quality is seen in all departments | 1 | 2 | 3 | 4 | 5 |
| $EI_5$ | There is support and cooperation of the staff in implementing integrated quality | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $EI_6$ | Teaching faculty encourages in participating seminar and conferences to the students. | 1 | 2 | 3 | 4 | 5 |
| | **Training (TRG)** | | | | | |
| $TRG_1$ | Student Communication Skills (SCS) improvement programs are conducted in regular manner. | 1 | 2 | 3 | 4 | 5 |
| $TRG_2$ | Placement activities in the institution equip the students well-trained to face various tests such as Attitude, Aptitude and English comprehensive test | 1 | 2 | 3 | 4 | 5 |
| $TRG_3$ | Adequate training is given to the students through various methods | 1 | 2 | 3 | 4 | 5 |
| | **Team Work (TW)** | | | | | |
| $TW_1$ | Efforts are undertaken effectively to enable the students excel in their academic performance | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $TW_2$ | The management makes useful efforts for contribution of faculty skills in improving student results | 1 | 2 | 3 | 4 | 5 |
| $TW_3$ | There is participation in academic related decisions by management, faculty and students. | 1 | 2 | 3 | 4 | 5 |
| $TW_4$ | Quality programs are implemented to enhance academic performance | 1 | 2 | 3 | 4 | 5 |
| $CI_1$ | Suggestions are carried out based on students' feedback on academic affairs | 1 | 2 | 3 | 4 | 5 |
| $CI_2$ | Management encourages the student for development of skill and creativity | 1 | 2 | 3 | 4 | 5 |
| $CI_3$ | There are learning opportunities provided in the university. | 1 | 2 | 3 | 4 | 5 |
| $CI_4$ | The institution is striving to maintain high standards of quality in education through effective | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | utilization of resources. | | | | | |
| $CI_5$ | The complaints from students and stakeholders are immediately looked into. | 1 | 2 | 3 | 4 | 5 |

The above items are determined on the basis of previous literature studied. The items consists of mainly,role of management,performance measures,vision and mission of institution,quality awareness programs, system approach, student satisfaction,intfrastructural issues,involvekment of employees and faculty,training and teamwork issues and continous involvement of responsibles. The factors are same for all the four groups but the items or variables are different in each group.

**Questionnaire (Faculty Perspectives)**

The questionnaire to faculty perspectives is also related with the same factors as considered for the students but the questions are different by looking to the role of faculty in the process of Total Quality Management. The questionnaire is as follows.

| Sr. No | Statement | SDA | DA | N | A | SA |
|---|---|---|---|---|---|---|
| | **Management Commitment (MC)** | | | | | |
| $MC_1$ | Management ensured everyone in the university has a student focused and | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | clear performance measures. | | | | | |
| $MC_2$ | The university has clear vision, mission and policy statements related to quality education. | 1 | 2 | 3 | 4 | 5 |
| $MC_3$ | There is top management's recognition of contribution of teachers with respect to development, improvement and maintenance of quality | 1 | 2 | 3 | 4 | 5 |
| $MC_4$ | Employees are involved in programs/committees in the department. | 1 | 2 | 3 | 4 | 5 |
| $MC_5$ | Effective methods are used to gives recognition and reward to us. | 1 | 2 | 3 | 4 | 5 |
| $MC_6$ | Comprehensive goal-setting process for quality exists in the department | 1 | 2 | 3 | 4 | 5 |
| $MC_7$ | Management has clear objectives with respect to quality performance. | 1 | 2 | 3 | 4 | 5 |
| $MC_8$ | Opportunities are available for good academic experience | 1 | 2 | 3 | 4 | 5 |
| $MC_9$ | The top management is committed to implement quality in the institution | 1 | 2 | 3 | 4 | 5 |
| $MC_{10}$ | Management coordinates the quality system activity | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $MC_{11}$ | Quality awareness programs are conducted to communicate the quality aspects to the departments | 1 | 2 | 3 | 4 | 5 |
| $MC_{12}$ | Team building and group dynamics training are provided for employees in the department. | 1 | 2 | 3 | 4 | 5 |
| $MC_{13}$ | Performance Appraisal system for teaching staff needs review. | 1 | 2 | 3 | 4 | 5 |
| $MC_{14}$ | Faculty welfare measures are in need of periodical review. | 1 | 2 | 3 | 4 | 5 |
| | **System Approach to Management (SAM)** | | | | | |
| $SAM_1$ | Regular meetings are conducted to review the quality of education | 1 | 2 | 3 | 4 | 5 |
| $SAM_2$ | There is allocation of resources for individual faculty development | 1 | 2 | 3 | 4 | 5 |
| $SAM_3$ | Role of quality improvement team related to policy and new curriculum development is performing well | 1 | 2 | 3 | 4 | 5 |
| $SAM_4$ | There is documentary practice of quality maintenance in the department. | 1 | 2 | 3 | 4 | 5 |
| $SAM_5$ | A separate coordinator is looking after quality improvement system. | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $SAM_6$ | Quality management is practiced in the department | 1 | 2 | 3 | 4 | 5 |
| $SAM_7$ | University has Inter Quality Assessment Cell for maintaining quality in educational process | 1 | 2 | 3 | 4 | 5 |
| | **Customer Satisfaction (CS)** | | | | | |
| $CS_1$ | The university fosters parent's involvement in educating the students | 1 | 2 | 3 | 4 | 5 |
| $CS_2$ | The industry- academic interaction programs are conducted periodically | 1 | 2 | 3 | 4 | 5 |
| $CS_3$ | Rewards are given, recognizing good performance of faculty. | 1 | 2 | 3 | 4 | 5 |
| $CS_4$ | The benchmarking practice is being followed in the department. | 1 | 2 | 3 | 4 | 5 |
| $CS_5$ | Better placement programme for student placement are being provided through campus recruitment | 1 | 2 | 3 | 4 | 5 |
| $CS_6$ | Customer orientations are being conducted in such a way that everyone in the institution are involved and committed to the process of customer satisfaction | 1 | 2 | 3 | 4 | 5 |
| $CS_7$ | Staff is involved and committed | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | towards the common goal of the department. | | | | | |
| $CS_8$ | The goal of the department is to Provide quality education within congenial environment | 1 | 2 | 3 | 4 | 5 |
| $CS_9$ | There is continuous improvement of all processes and activity, leading to total student satisfaction and competitive advantages. | 1 | 2 | 3 | 4 | 5 |
| | **Employee Involvement (EI)** | | | | | |
| $EI_1$ | Faculties have good attitude towards improvement of quality in the departments / institutes | 1 | 2 | 3 | 4 | 5 |
| $EI_2$ | Problems are solved through qualitative approach | 1 | 2 | 3 | 4 | 5 |
| $EI_3$ | Department conducts seminars / workshops / conferences regularly | 1 | 2 | 3 | 4 | 5 |
| $EI_4$ | The employees are motivated with non-financial incentives | 1 | 2 | 3 | 4 | 5 |
| $EI_5$ | The employees are motivated with financial incentives | 1 | 2 | 3 | 4 | 5 |
| $EI_6$ | The efficiency and involvement of employee is evaluated regularly | 1 | 2 | 3 | 4 | 5 |
| $EI_7$ | Academic decisions are made by | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Consulting senior faculty members | | | | | |
| $EI_8$ | Training programs are often conducted. | 1 | 2 | 3 | 4 | 5 |
| $EI_9$ | There is an effective improvement of quality in the department | 1 | 2 | 3 | 4 | 5 |
| $EI_{10}$ | Salary and compensation are attractive and satisfactory | 1 | 2 | 3 | 4 | 5 |
| $EI_{11}$ | There is support and cooperation of the faculties in implementing integrated quality | 1 | 2 | 3 | 4 | 5 |
| $EI_{12}$ | There is trust and openness between employer and employees. | 1 | 2 | 3 | 4 | 5 |
| $EI_{13}$ | Faculties are committed to high quality work | 1 | 2 | 3 | 4 | 5 |
| $EI_{14}$ | Faculty is free to voice his/her views openly | 1 | 2 | 3 | 4 | 5 |
| $EI_{15}$ | Faculties express their problems freely to supervisors / authorities | 1 | 2 | 3 | 4 | 5 |
| | **Training (TRG)** | | | | | |
| $TRG_1$ | Training programs are conducted in the University. | 1 | 2 | 3 | 4 | 5 |
| $TRG_2$ | Management provides effective leadership for developing the skills | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | of the group members and allocating tasks for realizing quality objectives in a smooth manner. | | | | | |
| $TRG_3$ | There is coordination between the departments with respect to development and improvement of quality of students. | 1 | 2 | 3 | 4 | 5 |
| $TRG_4$ | Training is given with reference to quality improvement | 1 | 2 | 3 | 4 | 5 |
| $TRG_5$ | Internal quality audit is conducted in the institution | 1 | 2 | 3 | 4 | 5 |
| $TRG_6$ | Adequate training is given to the staff through short term programme / FDP/ Refresher course /Workshops. | 1 | 2 | 3 | 4 | 5 |
| | **Team Work (TW)** | | | | | |
| $TW_1$ | The IQAC co-coordinator performs efficiently in solving problems or issues related to quality. | 1 | 2 | 3 | 4 | 5 |
| $TW_2$ | Degree of participation in quality related decisions by management and faculty is high | 1 | 2 | 3 | 4 | 5 |
| $TW_3$ | Experts are used in solving quality related problems in the Institution | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $TW_4$ | The individuals are contributing their best to achieve excellence in the institution | 1 | 2 | 3 | 4 | 5 |
| $TW_5$ | The management takes useful efforts for contribution of faculty skill in improving results of the department | 1 | 2 | 3 | 4 | 5 |
| | **Continuous Improvement (CI)** | | | | | |
| $CI_1$ | Department has Internal Quality Assurance Cell or quality assurance cell for improvement in the institution | 1 | 2 | 3 | 4 | 5 |
| $CI_2$ | Suggestions are corrected based on feedback / audits on academic affairs. | 1 | 2 | 3 | 4 | 5 |
| $CI_3$ | Management encourages the staff for improvement of skill and creativity | 1 | 2 | 3 | 4 | 5 |
| $CI_4$ | Expectations of stakeholders are met with the effective Implementation of integrated quality management. | 1 | 2 | 3 | 4 | 5 |
| $CI_5$ | Management uses quality management methods to reduce the problems concerning academic performance improvement | 1 | 2 | 3 | 4 | 5 |
| $CI_6$ | The suggestions from stakeholders | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | are usually carried out in the department | | | | | |
| $CI_7$ | Continuous improvement strategies are adopted in the Department | 1 | 2 | 3 | 4 | 5 |
| $CI_8$ | Learning opportunities are provided in the university | 1 | 2 | 3 | 4 | 5 |
| $CI_9$ | There is elimination of nonvalue adding activities in the university. | 1 | 2 | 3 | 44 | 5 |
| $CI_{10}$ | The university is strived to maintain high standards of quality in education through effective utilization of resources. | 1 | 2 | 3 | 4 | 5 |
| $CI_{11}$ | Our complaints are immediately looked or rectified. | 1 | 2 | 3 | 4 | 5 |

**Questionnaire (Non-Teaching Staff Perspectives)**

The following structured questionnaire is designed for the purpose of circulating it to the Non-Teaching Staff of the target population.

| Sr. No | Statement | SDA | DA | N | A | SA |
|---|---|---|---|---|---|---|
| | **Management Commitment (MC)** | | | | | |
| $MC_1$ | Management ensures everyone in the university that it has a customer focused and clear performance | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | measures. | | | | | |
| $MC_2$ | Top management involves in defining, measuring and monitoring the academic performance which are critical in meeting customer requirements | 1 | 2 | 3 | 4 | 5 |
| $MC_3$ | Continuous quality improvement awareness programs are conducted among staff. | 1 | 2 | 3 | 4 | 5 |
| $MC_4$ | Top management recognizes the contributions of employees or supervisors with respect to development, improvement and maintenance of quality | 1 | 2 | 3 | 4 | 5 |
| $MC_5$ | University has clear vision, mission and policy statements related to quality | 1 | 2 | 3 | 4 | 5 |
| $MC_6$ | Knowledge distribution process is done through inter/intra college events held periodically in the university | 1 | 2 | 3 | 4 | 5 |
| $MC_7$ | Performance Appraisal system for non-teaching staff needs review | 1 | 2 | 3 | 4 | 5 |
| $MC_8$ | Non-teaching staff welfare measures | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | are in need of periodical review. | | | | | |
| | **System Approach to Management (SAM)** | | | | | |
| $SAM_1$ | Parent – Teacher / Institution – Industry meetings are conducted regularly to review the quality education | 1 | 2 | 3 | 4 | 5 |
| $SAM_2$ | The university has Internal Quality Assurance Cell (IQAC) to review and to maintain academic quality | 1 | 2 | 3 | 4 | 5 |
| $SAM_3$ | IQAC which consists of members from industry and academic is monitoring quality policy and new development of the present situation. | 1 | 2 | 3 | 4 | 5 |
| $SAM_4$ | Work related problems are solved by counselor / authority in the university | 1 | 2 | 3 | 4 | 5 |
| $SAM_5$ | Quality management system is followed in the university to improve academic standards | 1 | 2 | 3 | 4 | 5 |
| $SAM_6$ | The university can introduce integrated QM in overall management and governance framework. | 1 | 2 | 3 | 4 | 5 |

| | **Customer Satisfaction (CS)** | | | | | |
|---|---|---|---|---|---|---|
| $CS_1$ | University provides hygienic canteen / other amenities facility. | 1 | 2 | 3 | 4 | 5 |
| $CS_2$ | We have excellent facilities on basic amenities and requirements in our office. | 1 | 2 | 3 | 4 | 5 |
| $CS_3$ | Working environment is excellent in our office. | 1 | 2 | 3 | 4 | 5 |
| $CS_4$ | We are well equipped in terms of working facilities. | 1 | 2 | 3 | 4 | 5 |
| $CS_5$ | There is quality education provided through congenial environment | 1 | 2 | 3 | 4 | 5 |
| $CS_6$ | There is well-established laboratories, library and knowledge management process to facilitate realistic and quality learning | 1 | 2 | 3 | 4 | 5 |
| $CS_7$ | Rewards are given recognizing good performance of administrative staff. | 1 | 2 | 3 | 4 | 5 |
| | **Employee Involvement (EI)** | | | | | |
| $EI_1$ | The staff have positive attitude towards improvement of quality in the university. | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $EI_2$ | Problems are solved through quality programs or small group activities | 1 | 2 | 3 | 4 | 5 |
| $EI_3$ | The institution conducts seminars / workshops / conferences regularly for enhancing knowledge | 1 | 2 | 3 | 4 | 5 |
| $EI_4$ | There is support and cooperation of the staff in implementing quality concepts | 1 | 2 | 3 | 4 | 5 |
| $EI_5$ | I have good understanding on what management is trying to do. | 1 | 2 | 3 | 4 | 5 |
| $EI_6$ | Changing work culture and employee involvement are related with each other. | 1 | 2 | 3 | 4 | 5 |
| $EI_7$ | Our voice in administration is important in decision making process. | 1 | 2 | 3 | 4 | 5 |
| $EI_8$ | Level of autonomy at my work place is high. | 1 | 2 | 3 | 4 | 5 |
| $EI_9$ | We have excellent infrastructure on working conditions for us in the university. | 1 | 2 | 3 | 4 | 5 |
| | **Training (TRG)** | | | | | |
| $TRG_1$ | Training programs are conducted to improve the strategic skills of the | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | students through placement and career guidance cell | | | | | |
| $TRG_2$ | Adequate training is given to the students through quality programs and Seminars | 1 | 2 | 3 | 4 | 5 |
| $TRG_3$ | Adequate training is given to the faculty members through Refresher Course, FDP, Seminar and Workshop Programs | 1 | 2 | 3 | 4 | 5 |
| $TRG_4$ | Faculty members are sent to industries to know the required employability skills among students | 1 | 2 | 3 | 4 | 5 |
| | **Team Work (TW)** | | | | | |
| $TW_1$ | Quality improvement team works effectively to enable the students excel in their academic performance | 1 | 2 | 3 | 4 | 5 |
| $TW_2$ | The management takes effective steps to utilize the faculty skills in improving student performance | 1 | 2 | 3 | 4 | 5 |
| $TW_3$ | There is high degree of participation in academic | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | related decisions by management, parents, faculty and students | | | | | |
| $TW_4$ | Quality Circle Program (or) Small Group Activity is implemented to enhance the academic performance | 1 | 2 | 3 | 4 | 5 |
| | **Continuous Improvement (CI)** | | | | | |
| $CI_1$ | Suggestions based on stakeholders' feedback on academic affairs are carried out. | 1 | 2 | 3 | 4 | 5 |
| $CI_2$ | Fair expectations of stakeholders are complied with by the institution | 1 | 2 | 3 | 4 | 5 |
| $CI_3$ | There are learning opportunities provided in the Institution | 1 | 2 | 3 | 4 | 5 |
| $CI_4$ | Institution is practicing lean thinking and knowledge management concepts to maintain high standards of quality in education through effective utilization of resources. | 1 | 2 | 3 | 4 | 5 |
| $CI_5$ | The complaints from staff, students and stakeholders are immediately looked into or rectified | 1 | 2 | 3 | 4 | 5 |
| $CI_6$ | Alumini association plays an | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | important role in the upliftment of the faculty | | | | | |

**Questionnaire (Policy Makers' Perspectives)**

| (a) Sr. No | Statement | SDA | DA | N | A | SA |
|---|---|---|---|---|---|---|
| | **Management Commitment (MC)** | | | | | |
| $MC_1$ | Management ensures everyone in the university has a customer centric and clear performance measures. | 1 | 2 | 3 | 4 | 5 |
| $MC_2$ | Management involves in defining, measuring and monitoring the academic performance which are critical in meeting customer requirements | 1 | 2 | 3 | 4 | 5 |
| $MC_3$ | Continuous quality improvement awareness programs are conducted among staff. | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $MC_4$ | Management recognizes the contributions of workers or supervisors with respect to development, improvement and maintenance of quality | 1 | 2 | 3 | 4 | 5 |
| $MC_5$ | University has clear vision, mission and policy statements related to quality | 1 | 2 | 3 | 4 | 5 |
| $MC_6$ | Knowledge dissemination process is done through inter / intra college events held periodically in the university | 1 | 2 | 3 | 4 | 5 |
| | **System Approach to Management (SAM)** | | | | | |
| $SAM_1$ | Parent – Teacher / Institution – Industry meetings are conducted regularly to review the quality education | 1 | 2 | 3 | 4 | 5 |
| $SAM_2$ | The university has Internal Quality | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Assurance Cell (IQAC) to review and to maintain academic quality | | | | | |
| $SAM_3$ | Quality improvement team which consists of members from industry and academic is monitoring quality policy and new curriculum development of the present situation. | 1 | 2 | 3 | 4 | 5 |
| $SAM_4$ | Work related problems are solved by counsellor in the university | 1 | 2 | 3 | 4 | 5 |
| $SAM_5$ | Quality management system is followed in the university to improve academic standards | 1 | 2 | 3 | 4 | 5 |
| | **Customer Satisfaction (CS)** | | | | | |
| $CS_1$ | Curricula design for professional courses is excellent. | 1 | 2 | 3 | 4 | 5 |
| $CS_2$ | There is satisfactory Improvement of Quality of Education | 1 | 2 | 3 | 4 | 5 |
| $CS_3$ | The management decision making process is satisfactory | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $CS_4$ | I am Satisfied with the overall governance. | 1 | 2 | 3 | 4 | 5 |
| $CS_5$ | I am Satisfied with role of IQAC members | 1 | 2 | 3 | 4 | 5 |
| $CS_6$ | I am Satisfied with the role of government members appointed. | 1 | 2 | 3 | 4 | 5 |
| | **Employee Involvement (EI)** | | | | | |
| $EI_1$ | The staff have positive attitude towards improvement of quality in the university. | 1 | 2 | 3 | 4 | 5 |
| $EI_2$ | Problems are solved through quality circle programs or small group activities | 1 | 2 | 3 | 4 | 5 |
| $EI_3$ | The institution conducts seminars / workshops /conferences regularly for enhancing knowledge | 1 | 2 | 3 | 4 | 5 |
| $EI_4$ | There is support and cooperation of the staff in implementing quality concepts like ISO, Six-sigma | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | and Total Quality Management. | | | | | |
| $EI_5$ | I have good understanding on what management is trying to do. | 1 | 2 | 3 | 4 | 5 |
| $EI_6$ | Changing work culture and employee involvement are related with each other. | 1 | 2 | 3 | 4 | 5 |
| $EI_7$ | Our voice in administration is important in decision making process. | 1 | 2 | 3 | 4 | 5 |
| $EI_8$ | Level of autonomy at my work place is high. | 1 | 2 | 3 | 4 | 5 |
| $EI_9$ | We have excellent infrastructure on working conditions for us in the university. | 1 | 2 | 3 | 4 | 5 |
| | **Training (TRG)** | | | | | |
| $TRG_1$ | Training programs are conducted to improve the strategic skills of the students through placement and career guidance cell | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $TRG_2$ | Adequate training is given to the students through programs and seminars | 1 | 2 | 3 | 4 | 5 |
| $TRG_3$ | Adequate training is given to the faculty members through Refresher Course, FDP, Seminar and Workshop Programs | 1 | 2 | 3 | 4 | 5 |
| $TRG_4$ | Faculty members are sent to industries to know the required employability skills among students | 1 | 2 | 3 | 4 | 5 |
| | **Team Work (TW)** | | | | | |
| $TW_1$ | Quality improvement team works effectively to enable the students excel in their academic performance | 1 | 2 | 3 | 4 | 5 |
| $TW_2$ | The management takes effective steps to utilize the faculty skills in improving student performance | 1 | 2 | 3 | 4 | 5 |
| $TW_3$ | There is high degree of participation | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | in academic related decisions by management, parents, faculty and students | | | | | |
| $TW_4$ | Quality Program or Small Group Activity is implemented to enhance the academic performance | 1 | 2 | 3 | 4 | 5 |
| | **Continuous Improvement (CI)** | | | | | |
| $CI_1$ | Suggestions based on stakeholders' feedback on academic affairs are carried out. | 1 | 2 | 3 | 4 | 5 |
| $CI_2$ | Fair expectations of stakeholders are complied with by the institution | 1 | 2 | 3 | 4 | 5 |
| $CI_3$ | Learning opportunities are provided in the Institutions | 1 | 2 | 3 | 4 | 5 |
| $CI_4$ | University is practicing lean thinking and knowledge management concepts to maintain high standards of quality in education through effective utilization of resources. | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $CI_5$ | The complaints from staff, students and stakeholders are immediately looked into | 1 | 2 | 3 | 4 | 5 |
| $CI_6$ | Alumni association plays an important role in the upliftment of the college | 1 | 2 | 3 | 4 | 5 |

**Statistical Tools Applied**

The following key statistical tools are applied for the purpose of data analysis purpose.

- Data Standardization
- Descriptive statistics
- Scale Reliability test
- Pearson –correlations
- Cross –tabulation

**Software tool Used**

- IBMSPSS.25

**Microsoft Spreadsheet**

- Excel

### 3.13 Research Limitations

Every research has its limitations. The following limitations are observed during the present investigation.

(1) The study is sample base and undertaken in context to MSU of Baroda.

(2) It may be limitation of generalization to entire population.

(3) Some articulation error may be their on respondent's response.

(4) This is academic type of study and as a result, time constraint and funding issues on survey procedure.

## References

C. R. Kothari (2009), Research Methodology: Methods and Techniques, New Age publication

Mulholland and C R Jones (1968), Fundamentals of Statistics, Elsevier Publication