

*MODULE-1*  
*INTRODUCTION TO RM*

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## 1.1 Research: Meaning

Research is a way of searching new idea or supporting the existing facts that gives meaningful information to the society.

Research helps to search information carefully and investigate various facts on a specific topic to understand the hidden contents that will upgrade the existing knowledge.

A research is meaningless if it doesn't follow:

- (i) a systematic learning process
- (ii) a well-defined purpose of the research
- (iii) a proper tool to validate the solution of a problem and
- (iv) communicate the usability of the findings.

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## 1.2 Reasons or Significance for Research

A reason for research is not similar for every subject but the objective behind such research is same that are as follows:

- Reviewing the past knowledge
- Detecting the existing issues
- Quantifying the issue
- Constructing new methods to gather information
- Developing a new process for every problems
- Identifying the solution of the problems
- Analysing the best solution that is beneficiary to a large mass
- Improving the present knowledge

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### **Business research methods that help in decision making**

- Possibility of the business to survive and succeed in a new geographical region
- Assessment about competitors
- Adopting a suitable market approach for a product

## **Scope of Business Research**

- **General Management**
- **Finance Management**
- **Personnel Management**
- **Material Management**
- **Production Management**
- **Marketing Management**
- **Banking**
- **Government**

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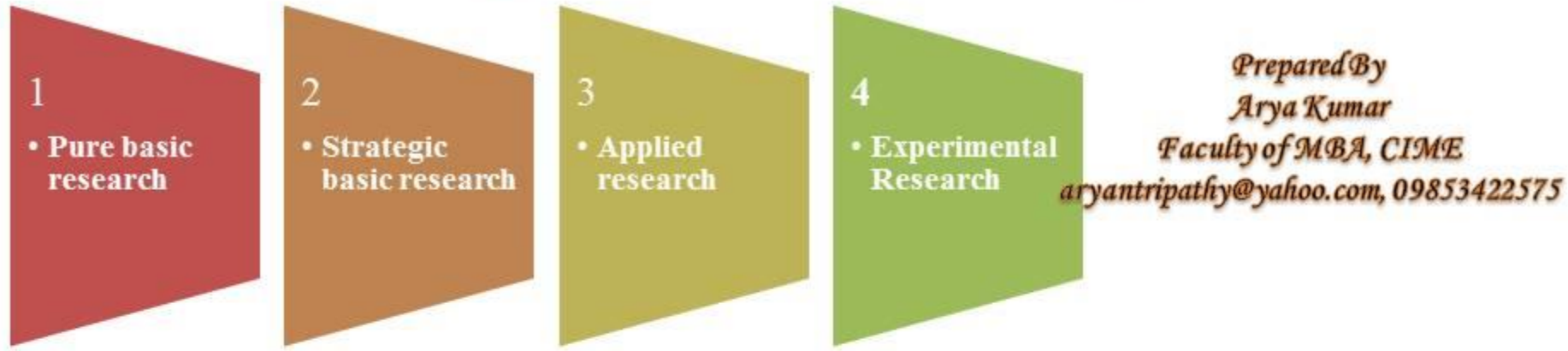
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## **Methods to achieve their business goals:**

- 1. Case Studies**
- 2. Conducting Surveys**
- 3. Interviews**
- 4. Focus Groups**

# 1.4 Types of Research Activity



**1.4.1 Pure basic research:** it is a kind of research that emphasize purely on experiments and theoretical work without considering its usability in long run. This type of research is least concern about its consequences as it simply essential in upgrading the knowledge.

**1.4.2 Strategic basic research:** It is an experimental and theoretical research carried on to enhance the knowledge with an intention to solve a recognized practical problem. The objective of this research is to identify a practical application without any time constraints or nature of application.

**1.4.3 Applied research:** It is a theoretical and experimental research to generate new knowledge with an expectation of useful result or discovering new methods of achieving certain definite or predetermined objectives. Applied research is more practical in nature so dependency on industry most likely to occur.

**1.4.4 Experimental Research:** a research work carried upon the exiting knowledge collected from past literatures or practical experiences with an objective of delivering new ideas, methods or advancing the existing services, system and processes.

# 1.5 Classification of Research

## Purpose

- Exploratory
- Explanatory
- Descriptive

## Uses

- Fundamental
- Applied

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## Time Frame

- Longitudinal
- Cross sectional

## Techniques

- Qualitative
- Quantitative

## Content

- Conceptual
- Empirical

## Setting

- Field
- Laboratory

# Primary Stage of Research Process

## 1. Observation

*a) controlled*

*b) non-controlled*

*c) participant*

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## 2. Interest

## 3. Crystallization

## 4. Formulation of Hypothesis

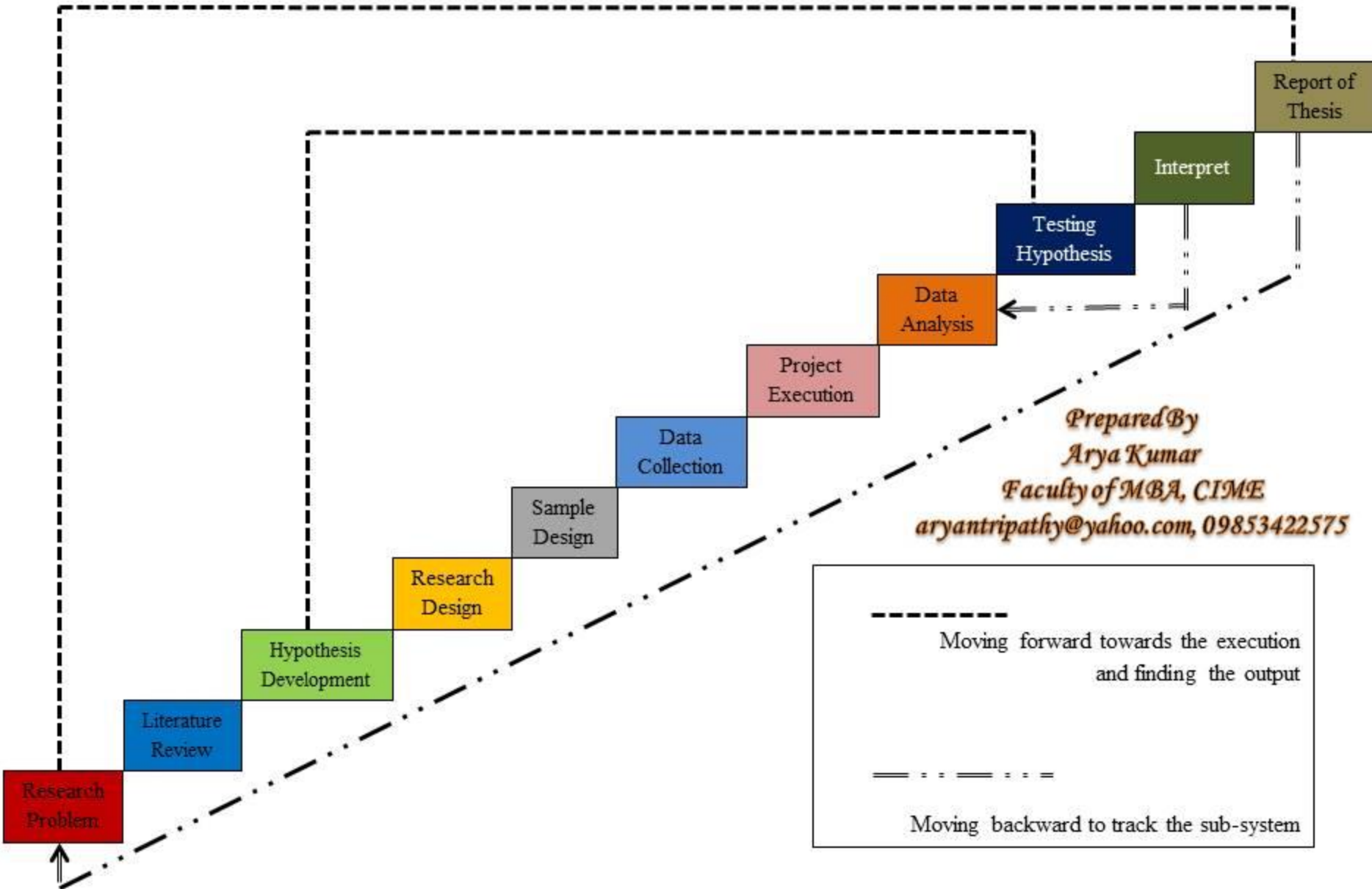
## 5. Primary Synopsis

## 6. Conceptual clarification

## 7. Documentation

## 8. Bibliography

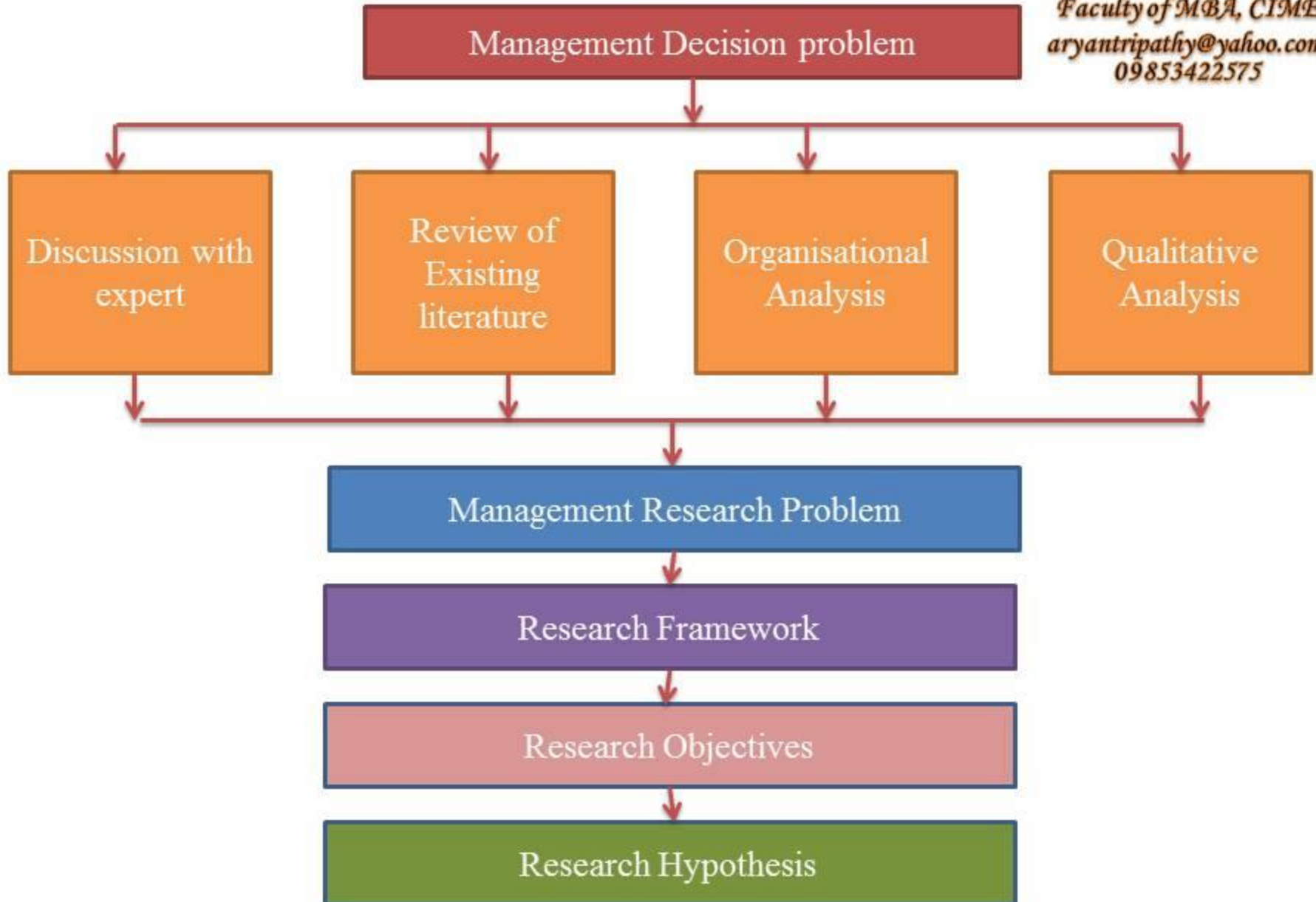
# Stages in Research Process





# Problem Identification Process

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# Research Design

Explorative

Conclusive

Secondary

Case Method

Expert Opinion

Focused Group

Descriptive

Causal

Cross Sectional

Longitudinal

Quasi

True

Single

Multiple

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# Comparative analysis between Research Methodology and Research Method

Basis of Comparison	Research Methodology	Research Method
<b>Meaning</b>	It signifies the procedure of solving a research problem efficiently.	It tells about the tools or techniques employed to solve a particular research.
<b>Objective</b>	To incorporate correct process to find a solution of defined problem	To identify the solution of a problem.
<b>Purpose</b>	Understand the logic behind incorporating a particular tool.	Imparting a particular instrument and performing the analysis.
<b>Activities</b>	Analysing all possible methods and techniques that is best suitable for the test	Carrying survey, test, experiments on the subject itself.
<b>Comprise of</b>	All the strategies with an intention to achieve the objective	Investigating different methods or techniques only.

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## **Hypothesis**

Hypothesis is a term used to define an uncertain explanation for any behavioural event or situation that will arise or has aroused.

## **Role of Hypothesis**

- investigation
- providing a direction
- identifying kind of research design
- provides a statement which can be consider for test directly
- provides a layout
- precise estimation
- tool used to generalised the output
- helps in generating suggestions
- a guess that can be tested
- acts as a mediator between theory to observation

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## Types of Hypothesis

- **Descriptive Hypothesis-** A hypothesis proposal that defines size, purpose, form of distribution of certain variables.

For examples: The manager usually works more than a worker.

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- **Relational Hypothesis-** A hypothesis that is formulated or designed to establish a relationship between two variables i.e. causal relationship/ explanatory or correlation.

- Correlational Hypothesis
- Causal/ Explanatory Hypothesis

# Research Hypothesis and Null Hypothesis

## Null Hypothesis

It is a statement generated from the research problem which the researcher wishes to reject.

The hypothesis is represented as  $H_0$

## Alternative Hypothesis

It is a statement formulated just the opposite of null hypothesis with an intention of accepting hypothesis.

It is represented as  $H_1$

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## Formulation of Hypothesis

Formulation of a hypothesis is dependent on proper research question by following the below mentioned points:

- Prepare the list of operational use of every variables
- Research hypothesis formulation depending upon:
  - ❖ Differences or expected relationship
  - ❖ Operational definitions.
- Classifying the hypothesis in respect to its derivation i.e.
  - ❖ Inductive hypothesis- derived from generalized observation
  - ❖ Deductive hypothesis- derived from certain theories.
- Directional or non-directional hypothesis
- Establishing the null hypothesis or alternative hypothesis in respect to rejection or acceptance respectively.

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# Difference between Deductive and Inductive Hypothesis

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Basis for comparison	Deductive Hypothesis	Inductive Hypothesis
<b>Derived</b>	It is derived from the various theories or hypothesis.	It is derived by observing the respondents.
<b>Test</b>	This are tested with deductive reasoning i.e. one can find the result after implementing a controlled experiment.	Here, the data are collected and the hypothesis is designed. Lastly the process will be concluded by selecting best amongst the competitive hypothesis.
<b>Purpose</b>	Exploratory research can be developed from deductive hypothesis that will give a scientific confidence.	This is useful to make the result a generalized concept by implementing various empirical tools.



# ERRORS

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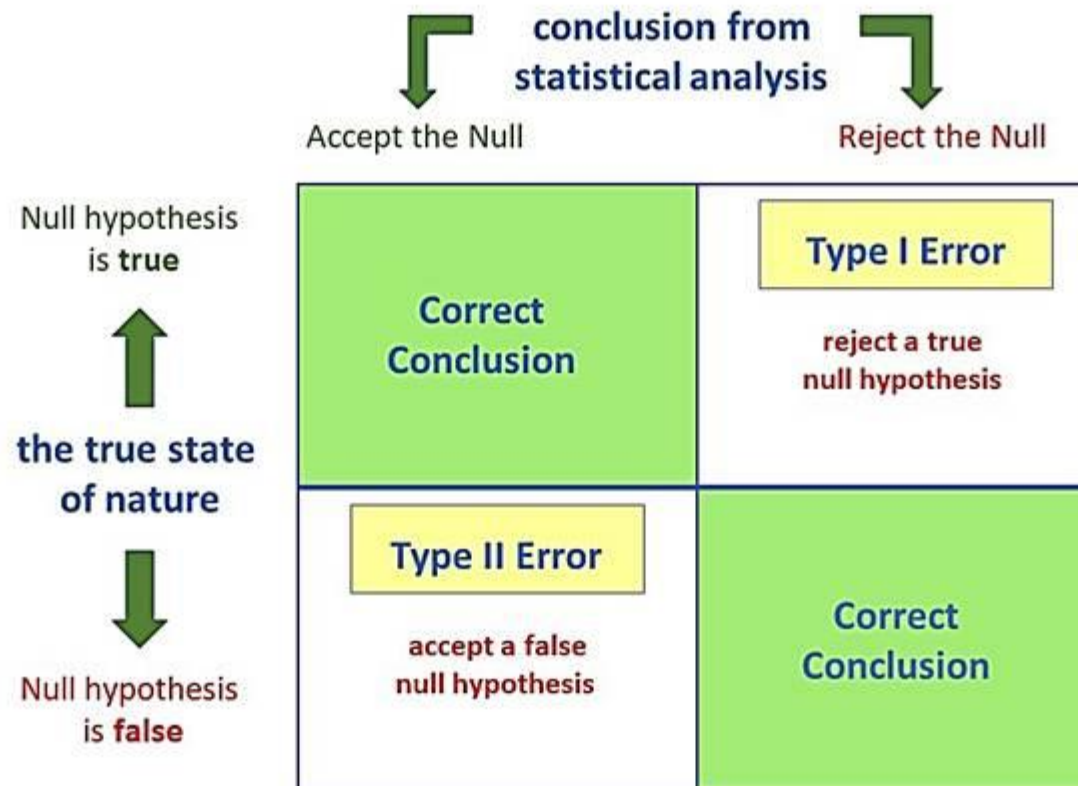
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## TYPE I –

- It occurs when researchers rejects true null hypothesis.
- The probability of committing type I errors is called as Significance level  $\alpha$



## TYPE II-

- It occurs when researchers accept false null hypothesis.
- The probability of committing type II errors is called as beta  $\beta$

## Research Data

"Research data is defined as recorded factual material commonly retained by and accepted in the scientific community as necessary to validate research findings; although the majority of such data is created in digital format, all research data is included irrespective of the format in which it is created."

In broad sense it states about

- Any raw or recent processed data that is prepared for research activity.
- Published database
- Catalogue
- Research ready data set that is fully combined, cleaned and calibrated.



## Data Collection

It is an activity of gathering different information as per the interest and measuring it that help in answering pre-defined questions. In research, data collection is an activity that collects information as per the requirement of research activity to solve the hypothesis and give a meaningful conclusion to the objective of research.

## Need for Data Collection

Answer the research question effectively

- Validation of study
- No Misleading findings
- Actual decision
- Real benefit to the society



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**Data**  
• Facts and figures pertinent to the problem

**Secondary data**  
• Facts and figures already recorded prior to the project

**Primary data**  
• Facts and figures newly collected for the project

**Internal data (inside the firm)**

- Financial statements, research reports, files, customer letters, sales call reports, and customer lists

**External data (outside the firm)**

- U.S. Census reports, trade association studies and magazines, business periodicals, and Internet-based reports

**Observational data (watching people)**

- Mechanical and electronic approaches
- Personal approaches

**Questionnaire data (asking people)**

- Idea generation through in-depth interviews and focus groups
- Idea evaluation by mail, online, telephone, and personal surveys

# Types of Data

## Primary Data-

- Any data that is collected originally for any particular purpose or an objective then it is called primary data.
- An individual, enumerator, investigator or an authorised organisation that collects the data for him for the first time with certain purpose then it is termed as Primary data

## Points to be considered during Primary Data Collection

- a) Identification
- b) Significance
- c) Types
  - i. Retrospective
  - ii. Interventional
  - iii. Observational
- d) Features
- e) Potential

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## *Advantages of Primary*

- No need for extra caution
- Degree of accuracy is more
- It gives a response in more detail
- A detail of tools and process of collection are mentioned in more detail
- Primary data in most of the experiment is necessary than secondary data



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## *Disadvantage of Primary Data*

- It needs huge finance
- In some cases primary data cannot be possible to collect
- It needs lot of time
- It requires a lot of labour for data collection

## Secondary Data

- In general, these are those data that are already collected or easily available from any other sources.
- Such data are easily available at a cheaper cost and quickly.
- This data are highly essential when the primary data collection is not feasible.



### *Advantage of Secondary Data*

- Economical in nature
- Time saving
- It helps in in paying more time in problem understanding
- A basis for data comparison that are collected before

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### *Disadvantage of Secondary Data*

- A less chance that secondary data fits to our requirement
- Data accuracy cannot be confirmed
- Data may be too old

Basis for Comparison	Primary Data	Secondary Data
<ul style="list-style-type: none"> <li>• <b>Meaning</b></li> </ul> <p><i>Prepared By Arya Kumar Faculty of MBA, CIME aryantripathy@yahoo.com, 09853422575</i></p>	It is a form of data that are collected for the first time for a particular purpose	This is a type of data that are already collected by some for another purpose and it is available at different source
<ul style="list-style-type: none"> <li>• <b>Data</b></li> </ul>	Data are based on real time	Data are dependent on past data
<ul style="list-style-type: none"> <li>• <b>Process</b></li> </ul>	The researchers are deeply involved.	The data collection are easy and quick
<ul style="list-style-type: none"> <li>• <b>Source</b></li> </ul>	Observations, questionnaire, personal interview, experiments, Surveys, etc.	internal records, Government publications, journal articles, websites, books, etc.
<ul style="list-style-type: none"> <li>• <b>Cost effectiveness</b></li> </ul>	This are highly expensive	This are very economical
<ul style="list-style-type: none"> <li>• <b>Collection time</b></li> </ul>	It requires lots of time as the researcher will collect data one after one	It needs less time as the data are available openly and easily
<ul style="list-style-type: none"> <li>• <b>Specific</b></li> </ul>	The data are collected by the researcher for a particular work so this are very specific	Less chance that the data will be specific as per the research objective
<ul style="list-style-type: none"> <li>• <b>Available in</b></li> </ul>	The data are available in crude and raw form	The data availability are in refine and in clear form
<ul style="list-style-type: none"> <li>• <b>Accuracy and Reliability</b></li> </ul>	This data are collected by the researcher so it has more accuracy	The data are relatively less accurate as it was collected by other for a different purpose.
<ul style="list-style-type: none"> <li>• <b>Precaution</b></li> </ul>	No extra precaution is required	A high precaution is required for its reliability and validity.
<ul style="list-style-type: none"> <li>• <b>Hypothesis</b></li> </ul>	The primary data applies a scientific test of hypothesis to identify its correctness	Secondary data need no test of hypothesis for the measurement of correctness of data.
<ul style="list-style-type: none"> <li>• <b>Type of science</b></li> </ul>	Primary data are mostly used in pure science like chemistry, biology, physics, agriculture and etc.	The secondary data are mostly used in humanities and social sciences to understand the pattern of relationship, dependency and etc.



**Primary sources:** The primary sources data are original works of research or raw data without analysis, interpretation or pronouncement.

*The primary data include*

- *Original material on which research is based.*
- *First formal appearance of results in the print or electronic literature*
- *Information in original form*
- *Earliest writings*
- *Original thinking, report on discoveries or share of new information.*

Examples

- Interview surveys
- Field work and experimentation.
- Scientific journal articles reporting experimental research.
- Proceeding of meetings, conferences and symposia
- Dissertation or thesis (may be secondary)
- Census data
- Diaries and biographies
- Letters and correspondences
- Speeches
- News paper / journal articles (may be secondary)
- Government documents / original documents
- Photographs
- Internet communication or e-mail.

**Secondary sources:**

These are works that interpret the primary data.

*Purpose of Secondary Data*

- *Describe, interpret, analyse and evaluate the primary sources.*
- *comment on and discuss the evidence provided by primary sources*
- *works which are one or more steps removed from the event or information they refer to being written after the fact with the benefit of hind sight.*

Examples:

- Bibliographies
- Biographical works
- Commentaries
- Dictionaries, encyclopaedias
- Hand books and data compilations
- History
- Journal articles (may also be primary)
- Monographs
- Newspaper and popular magazines
- Review articles and literature review
- Text books
- Treatises, works of criticism and interpretations

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# Methods of Data Collection (Primary)

INTERNAL DATA	Sector and Sources	Example
	Financial Data	<ul style="list-style-type: none"> <li>• Cost of Production</li> <li>• Cost of Marketing</li> <li>• Cost of storage</li> <li>• Cost of transportation</li> <li>• Cost for new product development</li> <li>• Cost of financing</li> <li>• Working capital management</li> </ul>
	Sales Data	<ul style="list-style-type: none"> <li>• Average sale (salesman)</li> <li>• Total sales (packets, Units or Packing type)</li> <li>• Average sales (geographical area, type of customer, size or order)</li> <li>• Sales price or discount allowed</li> <li>• Sales to customer</li> <li>• Total sales as per territory</li> </ul>
	Transportation Data	<ul style="list-style-type: none"> <li>• Transport operation activity</li> <li>• Transport inventory survey</li> <li>• Traffic counts (boarding, vehicle counts and etc.)</li> <li>• Profitable routs</li> <li>• Carriage cost</li> <li>• Choosing mode of transport (Hire or own)</li> </ul>
	Marketing Data	<ul style="list-style-type: none"> <li>• Preference of customer</li> <li>• Identifying buying habit of customer</li> <li>• Segmentation and targeting of marketing</li> <li>• Brand management</li> <li>• Internet marketing</li> <li>• Marketing planning and forecast</li> </ul>
	Storage Data	<ul style="list-style-type: none"> <li>• Stock turnover</li> <li>• Stock handling cost</li> <li>• Space management</li> </ul>

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## Methods of Data Collection (secondary)

Cont.

EXTERNAL DATA

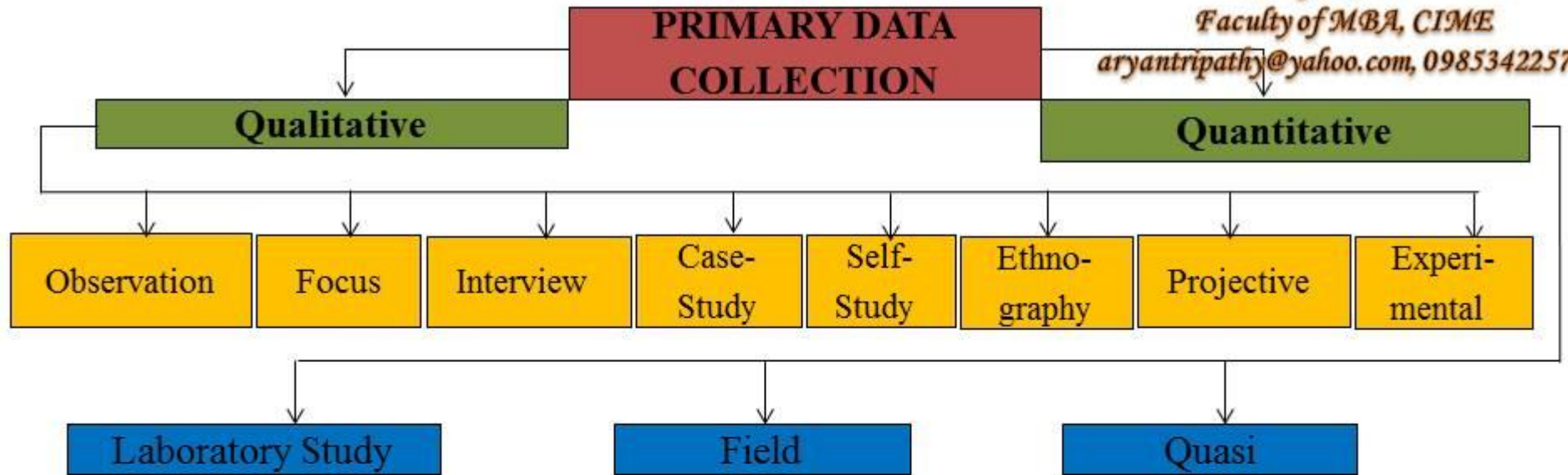
Sector and Sources	Example
Trade Associations	A trade association prepares a set of data that are not similar for all forms of business. However, the information published helps several dependent activities. The data can be collected from year book or trade directory.
Commercial Services	These are the commercial agencies that collect a huge data mainly of socio economic data and demographic data. This data are prepared for researches which are to be sold to the researcher. These are the published research report. For instance for marketing the information can be collected are customer keen towards media marketing or consumer weakness and etc.
Government Statistics	<ul style="list-style-type: none"> <li>● Population census</li> <li>● Production statistics</li> <li>● Agricultural statistics</li> <li>● Family expenditure</li> <li>● Import and export statistics</li> </ul> <p style="text-align: right;"><i>Prepared By Arya Kumar Faculty of MBA, CIME aryantripathy@yahoo.com, 09853422575</i></p>
National and International institutions	<ul style="list-style-type: none"> <li>● Bank reports</li> <li>● University research report</li> <li>● Journals and article</li> <li>● International agencies annual statistics like ILO, UNSECO, IMF, World Bank, ITC FAO an etc.</li> </ul>

## The primary data can be collected in two forms

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### *Features of Qualitative Research*

- The data is collected in an open ended questionnaire format so information is more in-depth.
- It is a field work
- The method of research is very flexible.
- It does not depend on hypothesis or probability on sampling
- Data collected by using less structured research instruments.

### *Features of Quantitative Research*

- It is a keeps a positive viewpoint.
- Technique for data collection is structured
- Quantified data
- Research objective definition that include hypothesis.
- Highly reliable and objective
- Analysis are done with statistical technique
- Research design are focused

Basis for Comparison	Qualitative Research	Quantitative Research
<b>Meaning</b> <i>Prepared By</i> <i>Arya Kumar</i> <i>Faculty of MBA, CIMÉ</i> <i>aryantripathy@yahoo.com,</i> <i>09853422575</i>	Qualitative research is a method of inquiry that develops understanding on human and social sciences, to find the way people think and feel.	Quantitative research is a research method that is used to generate numerical data and hard facts, by employing statistical, logical and mathematical technique.
<b>Nature</b>	Holistic (belief)	Particularistic (particular event)
<b>Approach</b>	Subjective	Objective
<b>Research type</b>	Exploratory	Conclusive
<b>Reasoning</b>	Inductive (by observing)	Deductive (by hypothesis)
<b>Sampling</b>	Purposive	Random
<b>Data</b>	Verbal	Measurable
<b>Inquiry</b>	Process-oriented	Result-oriented
<b>Hypothesis</b>	Generated	Tested
<b>Elements of analysis</b>	Words, pictures and objects	Numerical data
<b>Objective</b>	To explore and discover ideas used in the ongoing processes.	To examine cause and effect relationship between variables.
<b>Methods</b>	Non-structured techniques like In-depth interviews, group discussions etc.	Structured techniques such as surveys, questionnaires and observations.
<b>Result</b>	Develops initial understanding	Recommends final course of action

# Questionnaires

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- It is a **structured** for of data collection.
- This method is used mainly on **large population** about its attitudes, awareness, viewpoints, behaviours in present and past.
- Another term used in questionnaire is **Interview schedule** where the data is collected through personal interview.
- Here, systematic lists of questions are prepared where the interviewer will collect the data after consulting each sample unit.
- An interviewer may allow the sample to write or they will fill up on behalf of respondent.

# Questionnaire Design Process

## 1. Define the information required

## 2. Type of interview technique

- Personal Interview
- Mail Interview
- Telephonic Interview

## 3. Subject matter or content in individual questions

## 4. Overcome unwillingness of respondents to answer

- Lack of full information
- Sensitive information that affect their image
- Unable to express their viewpoints
- Uncomfortable to reveal the truth like: have they stolen any items from the shop
- Lack of seriousness and responsible towards the purpose.
- Respondent may not remember

### *Overcome tactics-*

- Declare the purpose of survey
- Declaration attached that responses should be kept secret
- Mention the entire sensible question at last
- Provide a carbon copy of the response
- Avoid questions that have dual meaning.
- Categorize or frame a range instead of asking a specific figure (annual income- 1, 50,000- 2, 50,000; 2, 50, 000- 5, 00, 000; 5, 00,000 and above).

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## **ELEMENTS in QUESTIONNAIRE**

- A. Structured questions-** It is a question set that holds the response and the alternatives format. These are generally expressed in terms of
- A. multiple choice questions (having multiple option for each question)
  - B. Scales (likert scale, semantic, staple and etc.)
  - C. Dichotomous (having only two questions i.e. yes or no)
- B. Unstructured question-** This are open ended question. It means there is no forced option for the respondents to limit their answer rather they are free to express their views openly.

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## Qualities of Good Questionnaire

Following are the qualities of a good questionnaire.

1. The answers should be relevant to the problem.
2. The questions should be arranged in a proper way.
3. The answers should be direct one.
4. The length of questionnaire should be proper one.
5. The questions should be in analytical form.
6. The questions should be described precisely and correctly
7. The term used are explained properly.
8. The options or scale should be accurate.
9. Complex questions should be broken into filter questions
10. The questions should be in logical manner.
11. The answers should be short and simple
12. The language used should avoid jargons.
13. The questionnaire should be constructed for a specific period of time.
14. The answers should be clear and understandable by the respondents.
15. The questions should be moving around the theme of the research objectives.

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### 3. Scaled Questions:

Responses are graded in a range.

### 4. Close ended Questions:

This is a form of structured questionnaire. Respondents are allowed to a fixed set of options to respond. This may be:

- multiple choice questions (having multiple option for each question)
- Dichotomous (having only two questions i.e. yes or no)

### 5. Open ended Questions:

This is a form of unstructured questionnaire. Here, the respondents are not assigned any kind of options or categories. The respondents are allowed free to submit their answers without any limited options.

#### Q4 How do you rate the following?

	<i>Very poor</i>	<i>Poor</i>	<i>OK</i>	<i>Good</i>	<i>Very good</i>
Q4a Service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q4b Cleanliness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q4c Parking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q4d Quality of Food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q4e Choice of Food	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### Multiple Choice

How was the presentation?  
(select one)

- Great
- Pretty Good
- OK
- Pretty Bad
- Terrible

Do you think the product will be useful?



Yes



No

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#### Open-Ended

How was the presentation?  
(in your own words)

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## **Sampling Meaning**

- It is a portion of the total population.
- A population may be an individual or group of element selected from the population.
- This is known as the subset of overall population which is prepared for the purpose of research as it is cost effective, time effective and convenience.
- This population is represented as 'n'.

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## **Steps in Sampling**

1. Defining Target Population
2. Identifying sampling frame
3. Identifying sampling unit
4. Selecting sampling method
5. Confirming of sample size
6. Identifying sampling plan
7. Selecting the sample.

## Principle and Laws behind sampling

- **Law of Statistical Regularity-** If the collection of data set is *random in nature*, and then the sample form the population should have a similar kind of characteristics.
- **Law of Inertia of large number-** it is a phenomenon of collecting a huge sample from the population as *higher the sample size higher will be the accuracy* of the result.

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## SAMPLING DISTRIBUTION

- Sampling distribution of mean
- Sampling distribution of proportion
- Students t-distribution
- Chi-square distribution
- F-distribution

# Types of Sampling

Probability Sampling

Non-Probability Sampling

Simple Random

Stratified Random

Cluster

Systematic

Convenience

Quota

Purposeful

Judgemental

Accidental

Incidental

Multi stage

Snow Ball

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## Probability Sampling-

It is a kind of sampling process where the entire samples considered are calculable and non-zero probability is considered in the sample then such sample is termed as probability sampling

*Simple Random-* any sample that follows certain basic properties like

- n numbers of population should be exist
- n number of sample should be present
- If n sample is found to be occur equally then it is termed as simple random sampling.

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*Stratified sampling-* it is just like a simple random sampling but it is made to make the selection process more diversified i.e. the whole sample will be divided into several groups and then the simple random sampling will be implemented this phenomenon is known as **strata**.

***Cluster sampling-*** here the whole member of the population will be assigned to one group. This each group is called as a cluster. A cluster sampling is selected by using probability method. Then one individual among the cluster is considered for survey.

***Convenience Sampling-*** Here the researcher uses a convenient approach to reach those respondents from whom it can be easy to collect the data.

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***Systematic random sampling-*** it is a process of sampling from the population where a list of all the members is prepared and a random selection is made out of it. For example, if the first element is R then the next element will be R<sup>th</sup> element from the list.

Skip Interval (k) = 
$$\frac{\text{Population size (PS)}}{\text{Sample Size (SS)}}$$



## **Non- Probability Sampling**

It is a process of selecting the units as per certain factors other than random. This sampling is completely purposive in nature.

### **Quota Sampling**

1. Classification of population in respect to properties known or expected to be relevant to the characteristics being studied.
2. The amount of the population falling into each group is confirmed on the basis of the known, assumed or pre-defined arrangement of the population.
3. Lastly, each observer or interviewer is assigned a quota of respondents. Then this people will take the charge for final selection

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### **Judgemental Sampling-**

When a selection of sampling is carried on the judgement of an experienced researcher then such is known as *Judgemental or purposive sampling*.

## **Accidental-**

Here the researcher selects a sample without any pre-defined process. It simply picks up those respondents that fall to hand. By this the researcher continues till it finds a desired level of sample size and responses.

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***Multi stage Sampling-*** this is a hybrid form of sampling where all the type of sampling is considered for the survey.

## **Snow Ball-**

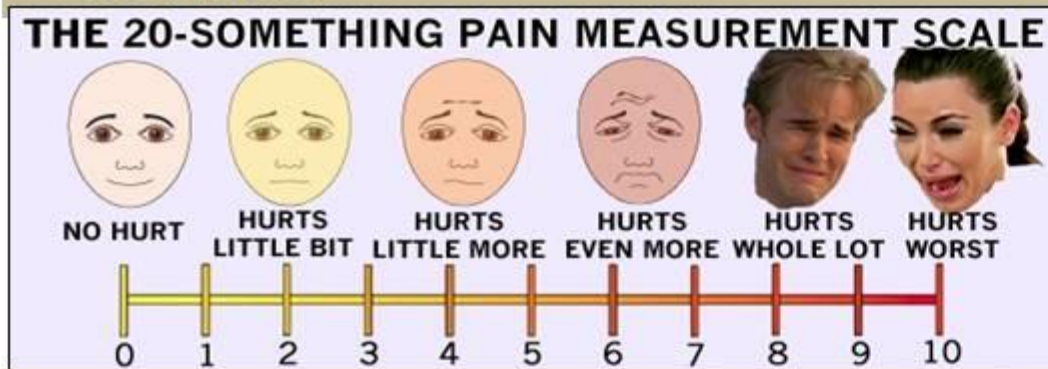
- It is a process of selecting additional respondents for research activities. This is useful for those populations that are rare and have fewer incidences.
- This is a method that reduces the costly affairs and saves time but the disadvantage of this method is biasness.

## Statistical Units

Uni-dimensional	Multidimensional	Unit of collection	Unit of analysis
<ul style="list-style-type: none"> <li>• It states about a construct that holds a single form of dimension to define.</li> <li>• For example the weight of a person, income of a family, person's weight, rainfall or more complex constructs i.e. self-esteem (an intangible element)</li> </ul>	<ul style="list-style-type: none"> <li>• It is a construct that carries more than two dimensions to define.</li> <li>• For example measuring the academic ability of a person then we can test through from its knowledge on mathematics, aptitude and subject contents.</li> </ul>	<ul style="list-style-type: none"> <li>• It states about certain units that relate to certain problem or issues that are estimated. Here the collection unit may be simple or composite. It is simple when there exist on condition and composite when there lies more than one qualification or phrase.</li> <li>• Ex- workers-hours, rice-kilogram</li> </ul>	<ul style="list-style-type: none"> <li>• The units or symbols basing on which the results are to be interpreted.</li> <li>• Ex- ratio, percentage, degree and etc.</li> </ul> <p style="text-align: right; color: #8B4513;"> <i>Prepared By</i>  <i>Arya Kumar</i>  <i>Faculty of MBA, CIME</i>  <i>aryantripathy@yahoo.com,</i>  <i>09853422575</i> </p>

## What is a scale?

- A scale suggests a systematic process of allocating the numbers or symbols such process is called **Scale of measurement**.
- A measurement scale may be represented from a highest point to lowest points. Such may also have the sub-points in between it. **The measuring instruments are scales.**



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## Types of measurement scales as per Data

- Order: Ordering of numbers
- Distance: stating about a range i.e. stating about two set of points
- Classification: Grouping or classifying the numbers
- Origin: The number should have unique origin. It may be zero.

## Classification of Scale

*a. Nominal Scale-* This is one of the least powerful, simple and common form of measurement of scale. The scales are just the numbers and restrictive among all the scales.

For Example:

### *Gender*

- Male
- Female

### *Investment decision*

- Saving Deposit
- Equity Share
- Mutual Fund
- Fixed Deposit

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*b. Ordinal Scale-* It is a simple measuring scale usually used in social science and humanities based research. However it is more powerful in comparison to nominal scale. The ordinal scale is useful in ranking the categories of similar variable.

Example- Rank the following attributes from 1 to 5, (stating 1 as the highest rank and 5 as the lowest rank) on the prospective of qualities required for a good team work.

- Leadership
- Communication
- Secrecy
- Positive attitude
- Loyalty

### *c. Interval Scale*

- The interval scale has a regular interval between the points that may also start from the point zero.
- Generally the ordinal and nominal scale consider the measurement of attitude but the interval scale provides them a range so as to make the data more appropriate for statistical operation.

Example:

A survey is conducted on the preference of buying a two wheeler (Put the tick mark, 1 as lowest rate and 5 as highest rate).

Company Name	1	2	3	4	5
Design	1	2	3	4	5
Availability of spare	1	2	3	4	5
Mileage	1	2	3	4	5
Engine Capacity	1	2	3	4	5

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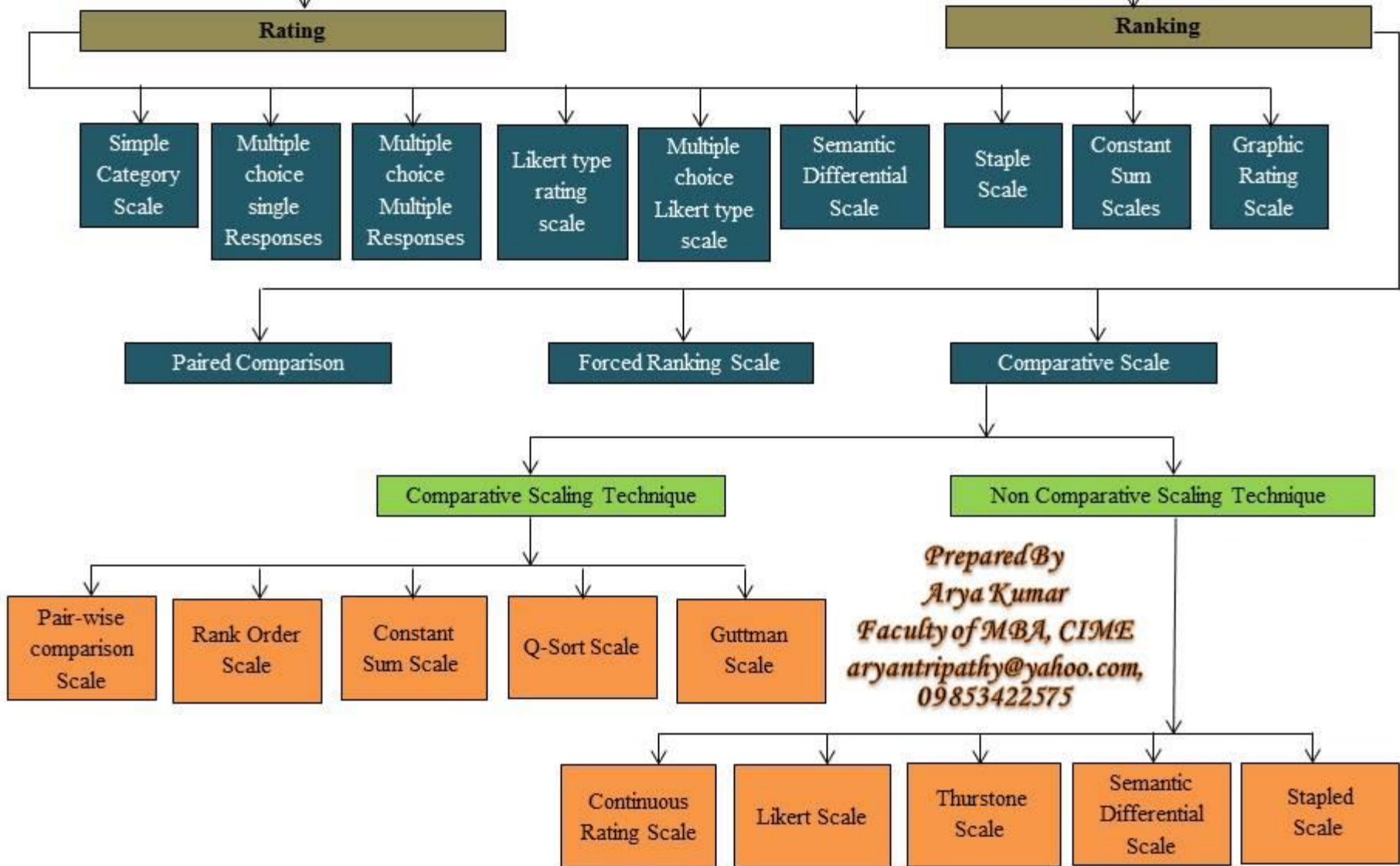
### *d. Ratio Scale-*

- This scale need a base item upon which the comparison can be made.
- For instance, in the Interval scale, a score 4 is not the twice of score 2 but in ratio scale it will be considered as score 4 is two times stronger than score 2.
- The ratio scales are used generally in physical scenarios like height, distance and etc.

For example:

- Which Cricket team is going to win the World Cup?
- In which company you would like to invest your savings?

# Classification of Measurement of Scales



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## Rating Scale- This is a scale used for the judging of properties of an object

### 1. Simple Category Scale- (Nominal Data)

It relates to questions based on dichotomous that states about two options for selection like yes/no, true or false, likes or dislikes.

For example, would you like to work after completion of your graduation? Yes/No.

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### 2. Multiple Choice Single Response- (Nominal Data) [select any one]

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For example: In which company you would like to invest money? [aryantripathy@yahoo.com](mailto:aryantripathy@yahoo.com), 09853422575

TATA	JINDAL	RELIANCE
SAIL	NALCO	

### 3. Multiple Choice multiple response- (Nominal Data)[select multiple option]

For Example- which toppings on pizza is your favourite?

Anchovies	Artichoke hearts	Mushroom
Pepperoni	Sausage	

### 4. The Likert Type rating Scale- (Interval Data)

A rating is done by a respondent that states about a well-structured space between the ranges. It can help to interpret the direction and intensity of attitudes.

For Example: I would like suggest my friends to join my college

Very likely	Likely	Neutral	Not likely	Very unlikely
-------------	--------	---------	------------	---------------



## Rating Scale- This is a scale used for the judging of properties of an object (Cont.)

**5. Multiple choice likert type scale- (Ordinal and Interval data)** A series of question with similar answer scale

For example- Your experience on our service centre

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
A well behaved Staffs					
Need not to wait for longer time					
Immediate response by the supervisor					
No additional charges charged for work					

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**6. Semantic Differential Scale- (Data Interval)** It is a rating scale that allows the respondents to rate a particular brand or products upon seven point rating scale.

Beauty	1	2	3	4	5	6	7	Ugly
Liberal	1	2	3	4	5	6	7	Rigid
Simple	1	2	3	4	5	6	7	Complicated
Stylish	1	2	3	4	5	6	7	Out Dated

**7. Staple Scale- (Ordinal and Interval Data)-** It is an another form of rating scale that allows the respondents to rate a brand/ product/ service on the basis of certain characteristics from -5 to 5.

Significant	-5	-4	-3	-2	-1	0	1	2	3	4	5	Insignificant
-------------	----	----	----	----	----	---	---	---	---	---	---	---------------

## Rating Scale- This is a scale used for the judging of properties of an object (Cont.)

**8. Constant Sum Scale- (Data Ratio)-** It is a scale useful during the ratio measurement data. It is most powerful among all measurement scales. This measurement scale includes an equal interval scale and zero point scale.

For example:

Out of 100 rate each attributes that motivates you to buy a new home

- Location
- Price
- Furnished home
- Distance from Hospital
- Distance from school

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The total sum of all the values allotted must be equal to 100%.

**9. Graphic Rating Scale-** It is a scale designed with certain graphical or pictorial representation that establishes a clear difference among all the scale.

For example: Did you like the taste of the chocolate milk shake?



## Ranking Scale

It is a scale that allows ratters to make a comparison between two or more objects and select the best amongst the all.

**1. Paired Comparison scale- (ordinal data)-** It is a scale of choosing the between two objects unambiguously.

**For example-** among the list of compared fruits select those fruits you want to buy.

Mangoes      {      }      Cherries  
Apples        {      }      Peers

Mangoes      {      }      Apples  
Cherries       {      }      Peers

Mangoes      {      }      Cherries  
Peers          {      }      Apples

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**2. Forced ranking Scale- (Ordinal data)-** This is a phenomenon of listing the attributes that are relatively related to each other. The process is faster in comparison to paired comparison scale, this scale motivates the respondents to response.

**For example:** Rank the list of books given below as per your preference. Jot rank 1 to the most preferred book and number 2 as your second preference and so on.

Twilight

Lord of rings

Harry Potter

The lion, the witch and the wardrobe

**3. Comparative Scale (Ordinal Data)-** It is a scaling technique where a benchmark is set prior to collection of responses, basing upon such benchmark upon such all the objects, brands, programs will be compared.

**For example:** Refined oil is better than Olive Oil

*Superior*

*Same*

*Inferior*

1

2

3

4

5

## A. Comparative Scaling Technique

### i. Paired Comparison Scaling:

- It is a scaling method where a respondent is asked to select an object/ items and choose one from the list of option.
- For example: Select which Bollywood film star is a better actor (Shahrukh Khan, Salman Khan, Amir Khan and Akshaya Kumar)

Salman Khan }  
Shahrukh Khan }

Amir Khan }  
Akshaya Kumar }

Salman Khan }  
Akshaya Kumar }

Amir Khan }  
Shahrukh Khan }

Akshaya Kumar }  
Shahrukh Khan }

Amir Khan }  
Salman Khan }

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### ii. Rank Order Scale-

It is a scaling method where the respondents are asked to rank the objects under certain criteria.

Sl. No.	Actors	Ranks
1.	Akshaya Kumar	
2	Amir Khan	
3	Ranveer Singh	
4	Salman Khan	
5	Shahrukh Khan	

## A. Comparative Scaling Technique (cont.)

### iii. Constant Sum Scaling-

- The respondents in these scaling techniques are asked to mention certain numbers against the objects whose sum total will be same for all the respondents which is fixed by the researcher.
- A respondent is also allowed to assign zero for any attributes they wish to.

For example: a group of three has respondent on the basis of preference regarding buying a shaving cream/ foam.

		Average Responses		
SLN	Attributes	Group-1	Group-2	Group-3
1	Price	20	18	29
2	Fragrance	35	26	22
3	Lather	10	33	15
4	Packing	5	18	9
5	Brand	30	5	25
	<b>Total</b>	100	100	100

### iv. Q-Sort Scaling-

- It is a scale that helps in discriminating a large number of **object's characteristics with certain attributes**.
- The objects are sorted with certain piles as per the similar criteria.

For example a respondent is provided 100 card containing various attribute/object/ characters. They were asked to pile or group them into 10 piles starting from higher preference to lower preference.

### v. Guttman Scaling-

- This scaling technique was founded by Louis Guttman during 1944 which is sometimes called as Cumulative scaling or scalogram analysis.
- The scaling technique is designed in such a way that the respondent **if agrees with item 3 it automatically means the person is agreed on item 1 and 2.**

## B. Non- Comparative Scaling Technique

### i. Continuous rating scale

- It is a scale that sometimes called as graphic rating scale.
- The respondents in this scale are asked to put a mark on the proper place on a given line.
- The extreme ends of the line contain certain variable that are completely opposite to each other.

For example: How much will you rate your present employer?

Highly Friendly	10	20	30	40	50	60	70	80	90	100	Less Friendly
-----------------	----	----	----	----	----	----	----	----	----	-----	---------------

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### ii. Likert Scale

- A likert scale is a scale of psychometric (attitude based).
- This scale is mostly found in researches based on questions that are related to social sciences or business research.
- This is a scale that sets several points for any particular objects from agree to disagree or like to dislike.

For example: Football can be considered as the most effective outdoor game

Strongly agree

Agree

Neutral

Disagree

Strongly disagree

### iii. Thurstone Scale-

This scale is different from likert scale. A likert scale ask the respondents to respond on the basis of the intensity of an agreement or disagreement while Thurstone scale provides a huge set of concepts or range that vary from **highly favourable to highly unfavourable** keeping a neutral respond in between.

#### iv. Semantic Differential scale:

- It is a scale that identifies the people's reaction to a stimulus words or concepts that is represented in bipolar scales.
- The bipolar scales are contrasting to each other

For example:

Sad	3	2	1	0	1	2	3	Happy
-----	---	---	---	---	---	---	---	-------

Note: 0 denotes neutral, 1 slightly, 2 quiet and 3 denotes extreme

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#### v. Stapel scale-

- It is a scale that called as unipolar rating scale with the scaling point of 10 which is numbered from -5 to 5 including 0 as a neutral point.
- The respondents are asked to rate an object from the numerical response category that may be presented horizontal or vertical.

For example: rating for the selection of an University for admission

	-5		-5		-5
	-4		-4		-4
	-3		-3		-3
	-2		-2		-2
	-1		-1		-1
Teaching	0	Price	0	Placement	0
	1		1		1
	2		2		2
	3		3		3
	4		4		4
	5		5		5