



WOX7001-RESEARCH METHODOLOGY

Topic 5 - Quantitative Research

Agenda

01

SAMPLE

02

RESEARCH
ETHICS

03

RESEARCH
DATA

04

RESEARCH
INSTRUMENT

05

CLASS
ACTIVITIES



Quantitative Research is...

- Quantitative research is the process of collecting and analyzing numerical data
- is a systematic investigation of phenomena by gathering quantifiable data and performing statistical, mathematical, or computational techniques
- collects information from existing and potential customers using sampling methods and sending out online surveys, online polls, and questionnaires
- can be used to find patterns and averages, make predictions, test causal relationships, and generalize results to wider populations.
- widely used in the natural and social sciences: biology, chemistry, psychology, economics, sociology, marketing, etc.



Characteristics of quantitative research ...

Structured tools:

- Structured tools such as surveys, polls, or questionnaires are used to gather quantitative data.
- Using such structured methods helps in collecting in-depth and actionable data from the survey respondents.

Sample size:

- conducted on a significant sample size that represents the target market.
- Appropriate sampling methods have to be used when deriving the sample to fortify the research objective

Close-ended questions:

- Closed-ended questions are created per the objective of the research.
- help collect quantitative data and hence, are extensively used in quantitative research.



Characteristics of quantitative research ...

Prior studies:

- Various factors related to the research topic are studied before collecting feedback from respondents.

Quantitative data:

- Usually, quantitative data is represented by tables, charts, graphs, or any other non-numerical form.
- This makes it easy to understand the data that has been collected as well as prove the validity of the market research.

Generalization of results:

- Results of this research method can be generalized to an entire population to take appropriate actions for improvement.



Advantages of quantitative research...

- Collect reliable and accurate data
- Quick data collection
- Wider scope of data analysis
- Eliminate bias



Population and Sample

- A population is a group of individuals that comprise the same characteristics
- A sample is a sub-group of the target population that the researcher plans to study for the purpose of making generalizations about the target population.
- Samples are only estimates
- The difference between the sample estimate and the true population is the “sampling error.”



Who Will You Study?

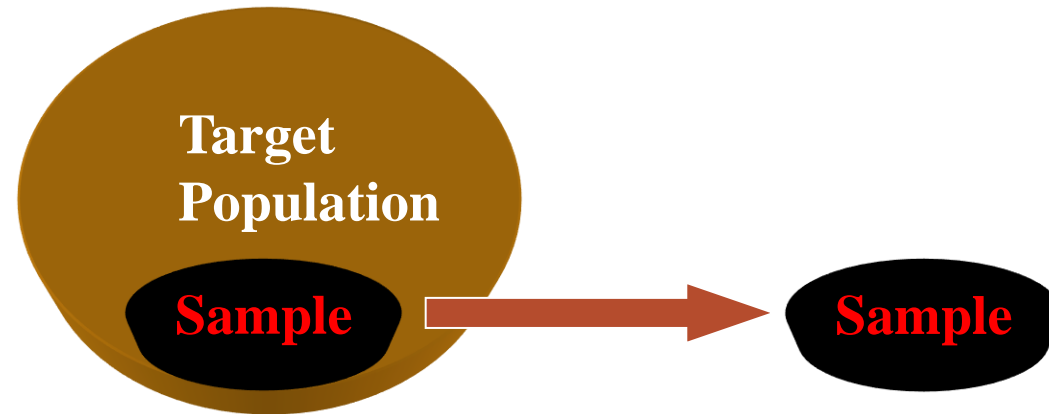
Identifying The Unit of Analysis

- Unit of analysis is the level (e.g. individual, family, school, school district) at which the data will be gathered.
- There may be different units of analysis
- one for the dependent variable
- one for the independent variable



Population and Samples

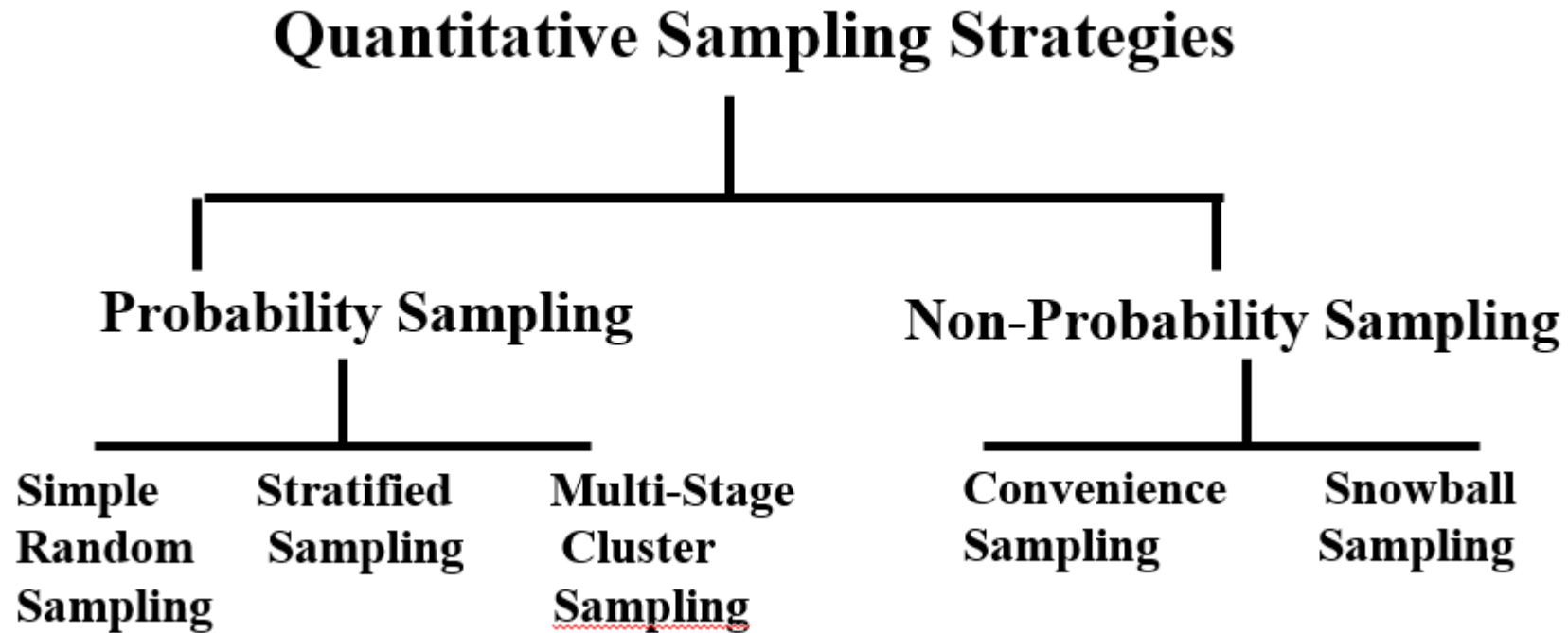
All teachers in high schools in one city
College students in all community colleges
Adult educators in all schools of education



All high school biology teachers
Students in one community college
Adult educators in 5 schools of education in the Midwest



Type of Quantitative Sampling





Types of Probability Samples

Simple Random:

selecting a sample from the population so all in the population have an equal chance of being selected

Systematic:

choosing every “nth” individual or site in the population until the desired sample size is achieved



Types of Probability Samples

Multi-Stage Cluster Sampling:

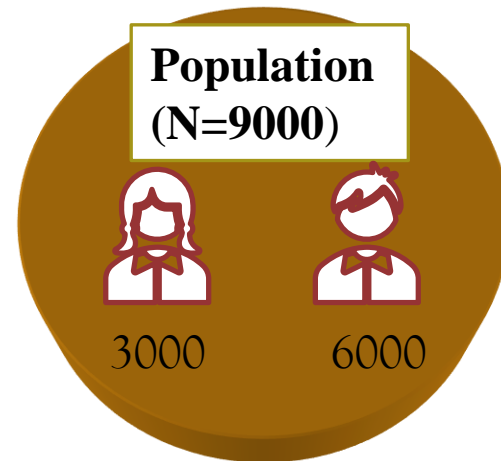
a sample chosen in one or two stages because the population is not easily identified or is large

Stratified sampling:

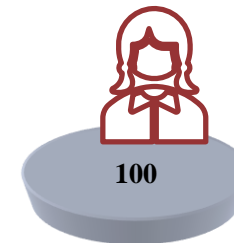
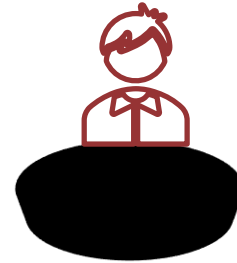
stratifying the population on a characteristic (e.g. gender) then sampling from each stratum.



Proportional Stratification Sampling Approach



Let's say from literature I have decided go for 3% from population



Sample = 300



Types of Non-Probability Samples

Convenience Sampling:

participants are selected because they are willing and available to be studied

Snowball Sampling:

the researcher asks participants to identify other participants to become members of the sample.

Research Ethics Application

Prepared by: HSM, NAG and SUH



What Permissions Will You Need? Obtaining Permission

Institutional or organizational (e.g. school district)

Site-specific (e.g. secondary school)

Individual participants or parents

Campus approval (e.g. university or college) and Institutional Review Board (IRB)

Research Data and Instrument

Prepared by: HSM, NAG and SUH



Research Instrument

An instrument is a tool for measuring, observing, or documenting quantitative data

Types of Instruments

Performance Measures (e.g. test performance)

Attitudinal Measures (measures feelings toward educational topics)

Behavioral Measures (observations of behavior)

Factual Measures (documents, records)



Linking data collection to variables and questions

Identify the variable



Operationally define the variable



Locate data (measures, observations, documents with questions and scales)



Collect data on instruments yielding numeric scores

Self-efficacy for learning from others



Level of confidence that an individual can learn something by being taught by others



13 items on a self-efficacy attitudinal scale from Bergin (1989)



Scores of each item ranged from 0-10 with 10 being "completely confident."



What Instruments Will You Use To Collect Data? Locating or Developing an Instrument

Look in published journal articles

Run an ERIC search and use the term “instruments” and the topic of the study

Go to ERIC web site for Evaluation and Assessment

Examine guides to commercially available tests

Develop your own instrument



Criteria for choosing a good instrument:

Reliability

Reliability: Scores from measuring variables that are stable and consistent

Example: Bathroom scale

Types of reliability

- Test-retest (scores are stable over time)

- Alternate forms (equivalence of two instruments)

- Alternate forms and test-retest

- Inter-rater reliability (similarity in observation of a behavior by two or more individuals)

- internal consistency (consistent scores across the instrument)



Criteria for choosing a good instrument: Validity

Validity: Scores from measuring variables that are meaningful

Types of validity

Content (representative of all possible questions that could be asked)

Criterion-referenced (scores are a predictor of an outcome or criterion they are expected to predict)

Construct (determination of the significance, meaning, purpose and use of the scores)



Criteria for choosing a good instrument: Scales of Measurement

Nominal (Categorical): categories that describe traits or characteristics participants can check

Ordinal (Categorical): participants rank order a characteristic, trait or attribute

Interval (Continuous): provides “continuous” response possibilities to questions with assumed equal distance

Ratio (Continuous): a scale with a true zero and equal distances among units



How Will You Administer the Data Collection? Procedures for Administering the Data Collection

Develop standard written procedures for administering an instrument

Train researchers to collect observational data

Obtain permission to collect and use public documents

Respect individuals and sites during data gathering (ethics)



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After experiment, compare the solution (Benchmarks)

Use existing benchmarks as much as possible

Facilitates the comparison of different solutions



Class Activity

Estimated time – 1 hour

Refer to the article given, answer the following questions

Structured Tool	
Population	
Sample	
Probability/Non Probability	
Types of sampling	
Prior studies	
Hypothesis	
Findings	

THANK YOU