Exam 3: CH6 – CH8

CH6 - Sampling: Theory and Methods

- **Sampling**
  - Involves selecting a relatively small number of elements from a larger defined group of elements
  - Expects that the information gathered from the small group will enable accurate judgments about the larger group
  - Used when it is impossibly/unreasonable to conduct a census

- **Census**
  - Primary data collected from very member in target population
  - More time consuming/costly than sampling
    - Ex) US Census conducted every 10 years

- **Population**
  - Identifiable group of elements of interest to the researcher/problem
    - (e.g. people, products, organizations)
      - Ex) Mazda Motor Corporation could hire J. D. Power to measure costumer satisfaction among automobile owners. The population of interest could be all people who own automobiles.
        - This would be a problem since there is a lack of specificity and the data collected would not be applicable to customer satisfaction w/ Mazda

- **Defined Target Population**
  - Consists of complete group of elements (people or objects) that are identified for investigation based on the objectives of the research project

- **Sampling Units**
  - Target population elements actually available to be used during the sampling process
    - Ex) New Mazda automobile purchasers

- **Sampling Frame**
  - List of all eligible sampling units during the sampling process
    - Ex) Lists of registered voters and customer lists from magazine publishers or credit card companies

- **Central Limit Theorem (CLT)**
  - Describes the theoretical characteristics of a sample population.
  - States that for almost all defined target populations, the sampling distribution of the mean (x) or the percentage value (p) derived from a simple random sample will be approximately normally distributed, provided the sample size is sufficiently large (when n is > or = 30).
  - In other words, there is a high probability that the mean of any sample taken from the target population will be a close approximation of the true target population mean, as one increases the size of the sample

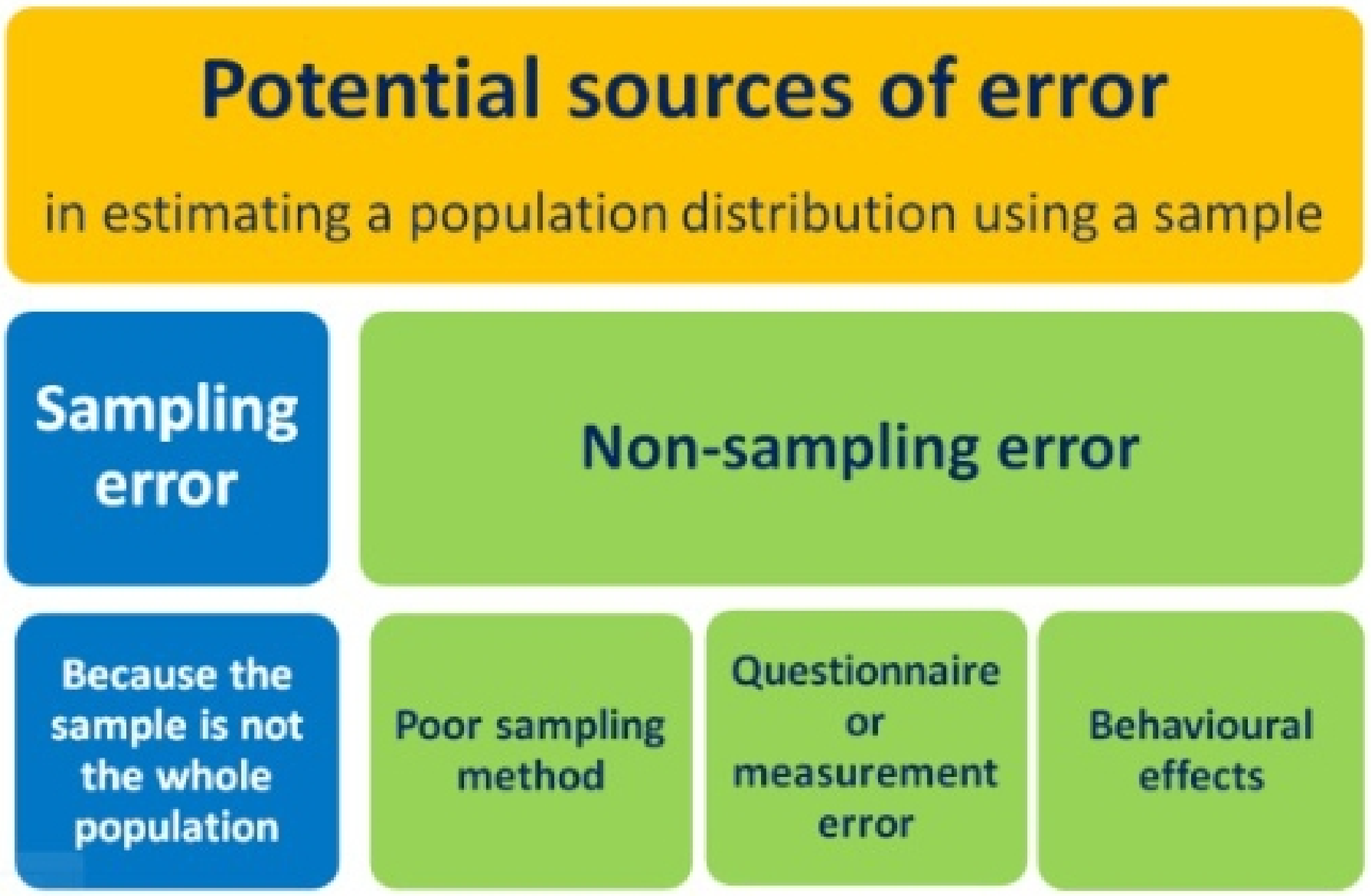
Examples of Elements, Sampling Units, and Time Frames

Mazda Automobiles	
Elements	Adult purchasers of automobiles
Sampling unit	New Mazda automobile purchasers
Time frame	January 1, 2012, to September 30, 2013
Nail Polish	
Elements	Females between the ages of 18 and 34 who purchased at least one brand of nail polish during the past 30 days
Sampling units	U.S. cities with populations between 100,000 and 1 million people
Time frame	June 1 to June 15, 2013
Retail Banking Services	
Elements	Households with checking accounts
Sampling units	Households located within a 10-mile radius of Bank of America's central location in Charlotte, North Carolina
Time frame	January 1 to April 30, 2013

- **Sampling Error**
  - Any bias that results from mistakes in either the selection process for prospective sampling units or in determining the sample size
  - Tends to occur because of chance variations in the selection of sampling units
  - When there is a discrepancy between the statistic estimated from the sample and actual value from the population, a sampling error has occurred.
  - Examples:
    - Population specific – occurs when the researcher does not understand who should be surveyed
      - Survey about breakfast cereal consumption
    - Sampling frame – wrong sub-population is used to select a sample
      - 1936 presidential election between Roosevelt and Landon
    - Selection – occurs when respondents self select their participation in the study

        - Only those that are interested respond
    - Non-response – occurs when respondents are different than those who do not respond

- **Non-sampling Error**
    - Occurs regardless of whether a sample or census is used
        - Ex) The target population may be inaccurately defined causing population frame error; inappropriate question/scale measurements can result in measurement error; a questionnaire may be poorly designed causing response error etc.
    - More Examples:
        - The wording of questions, the order in which they are asked and the number and type of options offered can influence survey results.
        - Answers given by respondents do not always reflect their true beliefs because they may feel under social pressure not to give an unpopular or socially undesirable answer.
        - Answers given by respondents may be influenced by the desire to impress an interviewer.



- **Probability Sampling**
    - Each sampling unit in the defined target population has a known probability of being selected for the sample