Research Population and Sampling in Quantitative Study

Dalowar Hossan[1*], Zuraina Dato' Mansor[1] and Nor Siah Jaharuddin[1]

[1] School of Business & Economics, Universiti Putra Malaysia, 43400, Serdang, Selangor, Malaysia

_____

ABSTRACT

The study underscores the paramount importance of meticulous population selection and sampling strategy in research design. Providing researchers with a comprehensive overview of population considerations and sampling methods, it offers a valuable resource for enhancing the robustness and applicability of research outcomes across diverse disciplines. Researchers discuss the unit of analysis, unit of observation, population of interest, target population, sampling framework, and sampling methods in light of employee work engagement in Malaysia. Simple random sampling, stratified random sampling, systematic random sampling, cluster sampling (single-stage, double-stage, and multi-stage), phase sampling (two-phase and multiphase), convenience sampling, purposive sampling, quota sampling, snowball sampling, and volunteer sampling have been discussed for selecting the appropriate sampling method for the research titled Revisiting of JD-R Theory and the effect of leadership style and meaningful work on employee work engagement among the full-time operational employee in Malaysia. According to the discussion on population and sampling methods, researchers use non-probability sampling, specifically convenience sampling techniques, based on the accessibility and availability of the full-time operational employees of successful organisations in Malaysia. Researchers and practitioners alike can leverage the insights presented in this review to make informed decisions about population selection and sampling methods, ultimately contributing to the advancement of credible and impactful research.

1. INTRODUCTION

Beginner researchers find it even more confusing to define and describe populations and samples. This article aims to explain important types of samples used in research, give examples of how researchers talk about these types, and suggest a simple format for new researchers to describe the group of people they want to study and collect data from. In this article, the authors start by talking about the 'unit of analysis' which is the basic part of any population. With this information, authors study different subsets in the population and what makes them different. They also look at ways to choose a sample from the population and the reasons for and against each method. Finally, the authors suggest a basic plan to help new researchers explain the ways they studied different populations and how they chose who to include.

2. UNIT OF ANALYSIS

Social sciences study things like how people think, how they see things, and how they act. The data represent the concepts, ideas, and actions that come from a theory or model.

_____

Corresponding Author: dalowarhossan.bd@gmail.com

They are measured using tools or symbols. In social sciences, the given information is typically employed to explain the subject being investigated, often a human being. During research, the 'unit of analysis' is individuals who provide a conclusion to understand and resolve research questions. The person being studied is referred to as the 'unit of analysis' (Salkind, 2009). The factor we are studying and analysing based on the information we have collected is known as a 'unit of analysis'. That means the data is used to solve a research problem. It also sets limits on what is studied or not studied in the research (Ritella et al., 2020). One cannot overstate how crucial it is to comprehend and define 'unit of analysis'. The unit of analysis holds significant importance in research as it forms the foundation for the entire study and it is widely acknowledged that the unit of analysis is crucial for shaping the overall research (Khan, 2014), as the important factor in creating ideas, collecting evidence for ideas through observation, and analysing data (Neuman, 2013).

2.1 Work Engagement Example

For the research titled "Revisiting of JD-R Theory and the effect of leadership style and meaningful work on employee engagement," the researcher realised that data about employees from all over the world is needed. So, they explained how they collected this data. The exact description of the 'unit of analysis', which is the employee in the organisation, should come first. According to the research difficulty, data must be gathered on each employee specifically, and analysis must result in inferences about employees in organisations. The employee who works for a company is defined as the 'unit of analysis' by the researcher. From the examples given, it is obvious that recognising and explaining the thing being studied is one of the first things to do in any research. When researchers want to study something, they need to be clear about what specific things they are looking at. This helps researchers choose a group of examples that are most like the larger group we are interested in studying. Researchers need to think about where the data comes from because the unit being studied and described by the data is important.

3. UNIT OF OBSERVATION

Whereas 'unit of analysis' is the substance around which the information is detailed, 'unit of observation' is the substance that's the source of information approximately 'unit of analysis'. The 'unit of observation' could be the person who is sharing information about themselves. In this case, the 'unit of observation' is similar to the 'unit of analysis' (Kumar, 2018). However, there are occasions when this is not the case.

This means that the parent who collects information about their child (unit of analysis) can be considered the 'unit of observation', while the employee who reports information about their manager (unit of analysis) can also be the 'unit of observation'. The self-report instrument is a piece of equipment that adds up the sub-data (such as responses to each question on the instrument) and computes the construct by individual observations, assessments, and measurements. Thus, the member— the 'unit of observation' that details through the instrument nearly the 'unit of analysis', the substance about which the information is gathered—gives the judgment or measure. In this instance, the participant serves as both a 'unit of observation' and a 'unit of analysis'.

3.1 Work Engagement Example Continued

For the research titled "Revisiting of JD-R Theory and the effect of leadership style and meaningful work on employee engagement," the researcher uses a self-report instrument to calculate the

construct based on employee perception. Therefore, 'unit of analysis' and 'unit of observation' is employee in this study.

4. POPULATION OF INTEREST

The group of people or entities that the study is focusing on is called the 'population of interest'. This includes individuals, pairs, groups, organisations, or other similar entities. The study's findings can be applied to or used for this group, and they are the main group that the research is about. Populations help define the study's limits and give the reader clues about the surroundings and context as well as the opportunity to focus on specific areas within a predetermined scope. That means it is important to have a specific focus to avoid giving the same results to everyone. The meaning of boundaries helps the researcher identify different groups within a study, like the main group being studied, the group from which the sample is taken, and the actual sample itself. It also helps to make sure these groups in the study are well-connected and aligned with each other (Salkind, 2009). The boundaries established by society or politics can vary based on the specific geographic location (Bakibinga et al., 2019). These groups of people may be made up of different types, so more information is needed to understand and describe the group that will be studied.

Limits for the interested individuals may include where they live, their race/ethnicity, how old they are, their gender, their sexual preference, whether they are married or not, how educated they are, how much money they make, who is in their family, what kind of job they have, what industry they work in, how many people they employ, what school district they are in, the type of relationship they have with someone else, what the government says, and so on (Sudman, 1976). The establishment of boundaries facilitates the definition and measurement of the subjects of our interest. To make it easier to define the limits for the group of interested people, you should choose characteristics that are easy to notice and that are connected to the things that interest them. By doing this, some people or groups who don't have the desired traits may be included, while others who do have those traits may be excluded. But, in general, the population represents the people who are affected and important in this situation.

4.1 Work Engagement Example Continued

At the time of investigating the work engagement of employees, the researcher defines the borders of the 'population of interest' first to explain the meaning of employees. The initial description of the group the researcher is interested in begins by outlining its boundaries. This incorporates the task of defining the characteristics that define an employee and reflecting on other elements to aid in their recognition. By rapidly and carefully figuring out who the study is focused on, the reader knows who will be impacted by the results and which groups might care about the findings of the research. The description provides a precise identification of individuals who belong to the group being studied and those who do not. The research uses these descriptions to keep talking about the target population they are studying.

5. TARGET POPULATION

The 'target population' is the particular bunch of individuals that the researcher needs to study. This group is limited to those whom the researcher can reach and represents the main group of people that the researcher is interested in. To successfully determine the target population, one needs to carefully consider all the factors that define its boundaries. This process should be done repeatedly for the confirmation that the final description of the 'target population' is broad enough to provide enough data for the study. The 'target population' researchers are focusing on, should be specific and limited enough to prevent any unwanted inclusions. participants who are

not suitable for the study will give wrong information about the population we are interested in studying. Like the population of interest, researchers must explicitly identify and explain the targeted population they are examining. To accurately assess the group being examined, it is imperative for the researchers and other individuals involved to possess knowledge about its composition and scale. These ideas are important for making sure that the research works well, and also for planning how to use resources to study the research problem. A well-defined 'target population' is a specific group of people or entities that can take part in a study. The population is determined by certain conditions, which can either include or exclude individuals or entities from participating. The 'target population', researchers want to study, must be a sub-set that fits within the population we are interested in. It must also fit within the 'population of interest' boundaries. Furthermore, the 'target population' being studied is narrowed down even more so that the researcher can clearly define who can participate (Kalleberg et al., 1990). The 'sampling frame' is created from the 'target population'. To determine the 'target population', one must define the specific qualities or attributes of the group being studied based on specific factors or personal experiences so that the study output can exactly represent or apply to a larger 'population of interest' (Ackerman et al., 2019). When the characteristics are made explicit and easily comprehensible, it assists both the researcher and potential participants in determining the suitability of a person for the study.

5.1 Work Engagement Example Continued

The researcher limited the group of people they studied by setting specific criteria for the research. The researcher chose Malaysia as a boundary for the study. The largest public companies in the world were able to increase sales and profits in 2021 despite difficulties brought on by the pandemic, ongoing war between Russia and Ukraine, and unpredictable markets. 58 countries are represented on the Forbes list for 2022. The Forbes list considers a variety of factors, including sales, profits, assets, and market value. Each factor is assigned a weighted rank in terms of importance when determining the overall ranking. With 590 businesses, the United States has the most, followed by China and Hong Kong (351), Japan (196) and Malaysia (7). The industry of Malaysian companies listed in the 2022 Forbes 2000 ranking is shown in Table 1.

Table 1 List of Malaysian Successful Organisations Listed in the 2022 Forbes 2000 Ranking

Rank	Forbes 2000 rank	Name	Industry	No. of employee (Approx.)	Revenue (USD)	Assets (USD)	Profits (USD)
1	485	Maybank	Banking	42,000	9.2B	213.2B	2B
2	751	Public Bank Berhad	Banking	18,721	4.5B	111.1B	1.4B
3	837	Tenaga Nasional	Utilities	35,576	12.7B	43.8B	883.4M
4	895	CIMB Group Holdings	Finance	33,265	5.7B	149.3B	1B
5	1236	Petronas Chemicals	Oil and Gas	4,585	5.6B	11.5B	1.8B
6	1525	RHB Bank	Banking	14,000	2.6B	69.5B	631.7M
7	1641	Hong Leong Financial Group	Conglomerate	7,803	1.9B	66.7B	567.1M

Based on the number of employees, size of the business, revenue, asset and profit, this study has focused on the Malaysian successful organisations (Maybank, Public Bank Berhad, Tenaga Nasional, CIMB Group Holdings, Petronas Chemicals, RHB Bank, Hong Leong Financial Group) to revisit the JD-R Theory with the effect of leadership style and meaningful work on employee engagement. The researchers created a sample frame to collect data from the target population.

6. SAMPLING FRAMEWORK

The set of units from which the sample is drawn is known as the 'sampling frame', and it is an operationalised representation of the target population. The specific group of people or individuals who will be asked to take part in the study. Researchers determine the 'sampling frame' to identify individuals to participate in a study. The method used ultimately determines the selection of individuals (Prandner & Weichbold, 2019).

Although it would be undesirable, it is conceivable that the sample frame will go beyond the limits of the target population and the population of interest because units that might not properly fulfill the inclusion/exclusion criteria could accidentally be included. It is feasible for non-line employees (such as recent promotions or furloughed workers) to be included on the list if, for instance, the HR department emails all the employees asking them to participate. Outliers within the information may be caused by such varieties between the 'sampling frame' and the 'target population (and population of interest) (Tabachnick & Fidell, 2018).

'Sampling frame' must contain an adequate number of units to enable the collection of an entire information set, which could be a vital prerequisite. If the group of people being studied (sample frame) is too small, the researcher might not get enough information. This could result in studies that do not give a precise measure of affected size (Hackshaw, 2008) or, not coming to information immersion for qualitative studies (Fusch & Ness, 2015).

6.1 Work Engagement Example Continued

The sample frame was made by providing a detailed description of the employee and posting all known features of the employee inside the conceptual limits specified by the target population since the operational nature of the employee was unknown. The study titled "Revisiting of JD-R Theory and the effect of leadership style and meaningful work on employee engagement" only focuses on full-time operational employees.
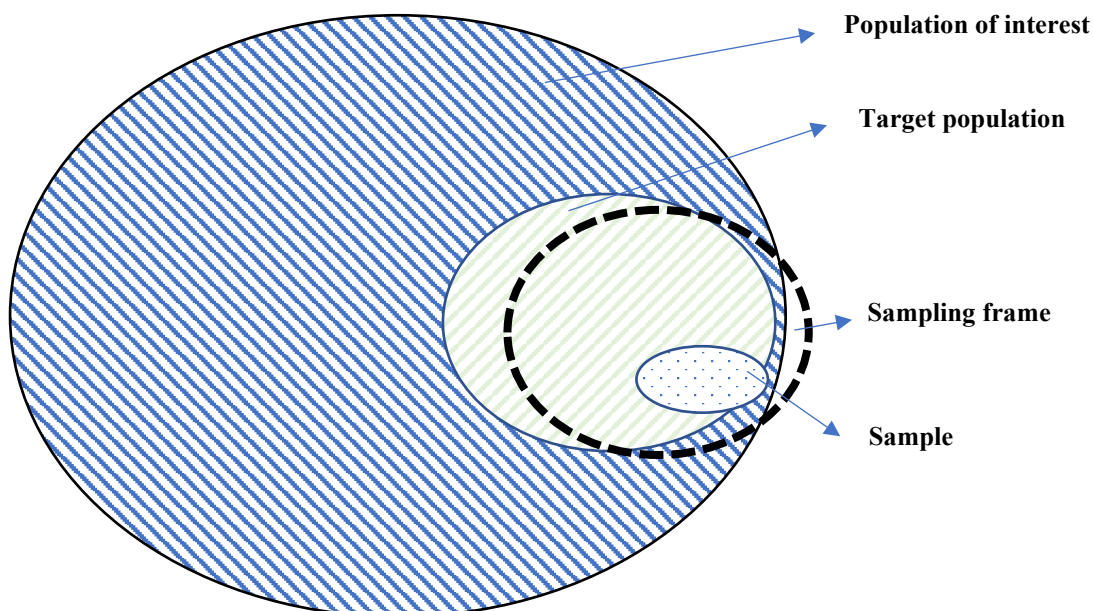

Figure 1. Relationship among Population of Interest, Target Population, Sampling Framework and Sample

7. SAMPLING METHODS

Researchers use sampling methods to select a smaller subset of individuals from a larger population for study purposes. Researchers typically aim to understand the collective results of a larger population when conducting research. Unfortunately, the number of people is generally too big to examine completely. To understand populations better, researchers analyse samples, which are smaller representative subsets of the population. When conducting a study, a population refers to the complete set of individuals or items under observation. When measuring, testing, or evaluating a larger group, a sample is a smaller group that is used to conclude from. The gathering of a sample involves utilising various techniques known as sampling methods. The way we choose who and what to study should be very strict to make sure we have as few mistakes and personal opinions as possible, and to make sure we include as many different kinds of people and situations as possible (Tyrer & Heyman, 2016).

There are two types of sampling methods: probability and non-probability (Omair, 2014; Tyrer & Heyman, 2016). To ensure equal chances of selection, probability sampling methods employ random selection to choose individuals or items from a group (Shorten & Moorley, 2014). There are different ways to measure probability, like simple random sampling, systematic sampling, stratified sampling, and cluster sampling. Instead of using random selection, non-probability sampling methods rely on the researcher's discretion in selecting the sample (Elfil & Negida, 2017). Convenience sampling, purposive sampling, snowball sampling, and volunteer sampling are examples of commonly employed non-probability sampling techniques.

Table 2 Sampling Methods

Probability	Non-Probability
Simple random sampling	Convenience sampling
Stratified random sampling	Purposive sampling
Systematic random sampling	Quota sampling
Cluster sampling	Snowball sampling
Multi-stage sampling	Volunteer sampling
Multi-phase sampling	

7.1 Simple Random Sampling (Unrestricted Random Sample)

A simple random sample means that every member of a group has the same chance of being chosen for a smaller group. A simple random sample seeks to achieve a fair and unbiased representation of a group. Simple random sampling without replacement of size n is a probability sampling design in which a fixed number of n units are picked without replacement from a population of N units, so that every potential sample of n units has an equal chance of being chosen. To carry out Simple random sampling without replacement, researchers will take a random sample of 100 people from a population of 1,000 people. After a student is selected as the sample, the student will be returned to the population. This means, in the next sampling, these students still have the opportunity to be re-elected.

A sampling procedure where a sampling unit is selected randomly from the population, its y-value recorded, and is then returned to the population. This method selects units randomly and puts them back each time that is done n times. Consequently, it is possible to be sampled for a sampling unit more than once times. A sample of n units selected by such a procedure is called a simple random sample with replacement. To carry out the Simple random sampling with replacement,

researchers will take a random sample of 500 people from a population of 5,000 people. However, once a child is selected as the sample, the child will not be returned to the population. This means, that in the next sampling, the population available to be selected as a sample is getting smaller.

7.2   Stratified Sampling

This type of sampling divides the population into subgroups or strata based on some characteristic (i.e., age, gender, income level). The researcher then selects a sample from each stratum in proportion to the size of the stratum in the population. When there are different groups of interest in the sampling frame, stratified sampling ensures the representation of each interested group fairly (Sudman, 1976). For example, if a class has 20 students, 18 male and 2 female, and a researcher wanted a sample of 10, the sample would consist of 9 randomly chosen males and 1 randomly chosen female, to represent this population.

7.3   Systematic Sampling

In this type of sampling, the researcher selects a starting point at random and then selects every nth member of the population to be included in the sample. By using this method, we can figure out the number of samples needed, which is called n, and the sampling frame, which is N. An ordered/ organised list (for example, names in a catalog) can be divided into groups of k participants. Here, k is equal to the sampling frame (N) divided by the sample size (n). Choosing a number at random between 1 and k helps to pick the first items for the sample. After that, every k item on the list is included in the sample.

For example, if N= 300 and n = 30, then k = 300/30= 10, meaning that there are 30 groups of k=10 members each. Selecting a random integer between 1 and k, where k= 10, may yield a value of 9. The 9th name on the list becomes the first member of the sample. The second selection is 9+k, or 19 numbers on the list. We are counting numbers starting from 9 and adding 10 each time, like 9, 19, 29, 39, 49........., 299 in which the sample has n= 30.

7.4   Cluster Sampling

Cluster sampling is a way to get a sample that represents a big group of people that researchers have split into smaller groups. A single group is like a small version of the entire population and is made up of various types of people. The different groups are similar to each other. Researchers do not have to get samples from every group because each group represents the whole population, and they are similar enough that they can be swapped out easily. This makes the process of choosing samples easier. Researchers utilise cluster sampling when number the population and required sample size are very large.

7.4.1 Single-stage Cluster Sampling

In this method of sampling each unit of selected clusters is picked as a sample. After dividing the total sample into predetermined number/ expected size of clusters, researchers select and sample from the clusters randomly to collect data from each unit in the selected clusters.

7.4.2 Double-stage Cluster Sampling

It is a type of cluster sampling where researchers collect data from a random subsample of individual units within each of the selected clusters to use as a sample. Double-stage cluster sampling is used at the time of testing the entire cluster is expensive and challenging. This method is not as accurate as single-stage sampling.

7.4.3 Multi-stage Cluster Sampling

Multi-stage sampling involves a few extra steps than double-stage sampling otherwise, both sampling techniques are almost similar. Researchers keep taking samples from the clusters randomly until they have enough samples to use.

7.5 Phase Sampling

7.5.1 Two-phase Sampling

Designs in which initially a sample of units is selected for obtaining auxiliary information only, and then a second sample is selected in which the variable of interest is observed in addition to the auxiliary information. Two-phase sampling is also called double sampling. It is useful in obtaining auxiliary variables for ratio and regression estimation (Cochran, 1977). Two-phase sampling is also useful for finding information for stratified sampling.

Ratio estimation with double sampling

y_i - variable of interest
x_i - auxiliary variable
n' - number of units in the first sample (which includes the second sample)
n - number of units in the second sample
Only in the second sample, both x_i and y_i values are observed. In the remaining units, (in the first but not the second sample), x_i but not y_i are observed. Note that observing y_i's is expensive whereas observing x_i's is not.

7.5.2 Multiphase Sampling

Multiphase sampling is a way to collect data that is similar to two-phase sampling or double sampling. This approach, developed by Neyman (1938), allows for the determination of the value of a variable by allocating a fixed budget for the survey while ensuring the desired level of accuracy. Imagine a situation where researchers do not have much information about the population they are studying. In this situation, there is data on an assisting variable that can be used to divide the population into groups or make predictions about certain characteristics of the population. Before selecting the sampling technique, the researcher should know the variable of interest is costly at the time of measurement, but there is another related assisting variable that can be measured at a lower cost. Studies of many renowned scholars, like, Cochran (1977), Hansen, Hurwitz and Madow (1953), Kish (1965), Lohr (1999), Sarndal, Swensson and Wretman (1992), and Tryfos (1996) had focused on this subject.

In this situation, we use a sampling method called double sampling. This method is done using two stages. At the beginning of the sampling process, a larger sample is chosen and then a sub-selection of sampling is chosen from that larger sample later on. Researchers measure the specific variable in the second stage in which they are interested in each unit in the smaller group (sub-sample), while, during the first phase, researchers measure an auxiliary variable from each unit in the sample. The auxiliary data may be used to stratify the first-phase sample such that stratified random sampling is employed in the second phase, or the techniques can be utilised in the regression analysis or ratio estimation to determine the estimated worth of the target variable.

A way to take samples in this situation is called double sampling. It involves two steps. In the first phase of the sampling design, a bigger group is chosen. Then, in the second phase, a smaller group is picked from the first phase. An assisting variable is measured from all units in the first phase sample, while the variable of interest is measured for each unit in the subsample selected in the second phase. The assisting data could be used in two ways. Firstly, it could help to stratify the sample that is collected in the first phase for using stratified random sampling (type of probability sampling) in the second phase. Secondly, to estimate the variable of interest assisting data could be used at the time of regression or ration estimation. The second phase of selecting participants in a two-phase sample is expected to have fewer people than if we used a simple random sample in the first phase because researchers used some of the survey resources for the first phase.

7.6 Convenience (or Accidental) Sampling

In this kind of sampling, the researcher pays attention to people who are most convenient to contact or coincidentally interact with during a specified time frame for their study. One problem with convenience sampling is that the people being studied are usually not a good representation of the 'population of interest' because the sample is not randomly chosen and does not include a variety of different types of people that exist within the 'population of interest'. Convenience samples are generally chosen from a specific vicinity and include individuals with analogous backgrounds in terms of their socio-economic and racial or ethnic characteristics (Emerson, 2015). Therefore, the findings and conclusions drawn from studying a small and easily accessible group may not apply to the entire population. However, scholars argue that the results of a study can only be applied to a larger group of people (target population) if that group has similar characteristics to the smaller group that is studied (study sample) (Campbell, 1986).

For example, the researcher engaged in the study of university students might visit the university canteen, library, some departments, and playgrounds, and interview a certain number of students. The selection of participants in convenience sampling is primarily driven by the researcher's convenience and accessibility to them. The researcher has limited information about the attributes of the subjects in convenience sampling before conducting the study.

7.7 Purposive Sampling (Judgmental or, Selective)

Purposive sampling is when someone is chosen on purpose because of their specific traits and qualities (Etikan et al., 2016). It is also called judgment sampling. Different reasons can be used to choose someone, like wanting to hear their story, having gone through the same thing, being part of a specific group, or being able to help create a theory (Creswell, 2013). The main reason why each person is chosen is because they have a specific trait that the investigator finds interesting. Because of how it is done, purposive sampling is commonly used in qualitative research designs (Patton, 2015). It is important to mention again that purposive sampling methods cannot be used to make general conclusions about the entire group of people researchers are interested in.

7.8 Quota Sampling

Quota sampling involves dividing a group of individuals according to criteria like age or geographical location. Then, we set goals for how many people we need from each group to answer our questions. One key distinction between quota sampling and stratified random sampling lies in the absence of a random sampling technique in quota sampling. Rather, it decides to use convenience sampling to select participants for each group. Quota sampling can be performed in two ways: proportional and non-proportional quota sampling.

For instance, when examiners want to compare different college majors, they divide them into categories called strata. These strata represent the various programs offered, such as economics, engineering, and education. They intend to examine the career objectives of both economics and education students and find similarities. To establish the number of students from each major, it is important to consider the relative percentage of economics and education students about the total number of students enrolled in these specific programs. To reflect the overall population, the sample should consist of 40% education students and 60% economics students, which corresponds to the proportions of a total of 2,000 university students, where 800 study education and 1,200 study economics. It is necessary to include 40 education students and 60 economics students in a sample of 100 students. In the group of 40 students studying education, the distribution between undergraduate and graduate students can be divided equally. For instance, the group of 40 students studying education could have both undergraduate and graduate students in equal numbers. If the ratio is equal, researchers would select 20 students who are studying for their bachelor's degree (undergraduates) and 20 students who are studying for their master's or doctorate (graduates). Researchers stop the data collection from the student's education majors once they receive the data from the quota of 40 education majors, and then they start data collection from the quota of 60 students whose majors are in economics.

7.9 Snowball Sampling

Snowball sampling (also known as chain sampling, chain-referral sampling, or network sampling) means that instead of randomly choosing participants for a study, people are asked to refer others they know to participate. Participants recruit future subjects from their circle of friends or acquaintances (Sharma, 2017). In the study of groups of individuals who are difficult to locate or engage in interviews, snowball sampling provides a valuable method. It allows members of these groups to help the researcher find more people to participate in the study. Snowball sampling is when you find one or more people who are representative of the group you are interested in studying. Afterward, these individuals are encouraged to seek out individuals who possess comparable qualities and encourage them to join in. The process of getting more people to join continues when the second-generation person asks another group of people who meet the requirements to join. This process goes on until we have gathered all the necessary information. However, there are difficulties when using snowball sampling. People who are part of a secret group may not feel at ease talking about the thing they are hiding in public. It could be risky for an individual to participate in a subject of study that is closely linked to their identity, which may discourage their involvement. Due to the lack of connection or relatability with the individuals under study, scientists could face difficulties in gathering information from those who have been referred to them (Waters, 2015). Snowball sampling, like other non-probability samples, faces potential risks that diminish the validity of its findings, thereby restricting its suitability for the overall target population. When evaluating snowball sampling, it is crucial to explore its motives and take into account the potential hurdles and complications that may arise during its application.

7.10 Volunteer Sampling

In volunteer sampling, individuals who willingly participate in a study are selected and data is gathered from them. Volunteer sampling is when a person chooses to participate in a research study on their own, while convenience sampling is when the researcher actively recruits people to participate (Fricker, 2016). Volunteer sampling is the only circumstance in which individuals choose to participate in a study. In this kind of sampling, individuals decide on their own whether or not they want to give their information for the study. This is usually done after seeing an advertisement or invitation that is open to a wide range of people. Most other ways of selecting people for a study involve choosing them first, and then they can choose not to take part either by not responding to the invitation or by choosing not to participate once they have been included in the study. Volunteer sampling is when people choose to participate in a study, and this can create problems with getting accurate results that can be applied to a larger group.

7.11 Work Engagement Example Continued

For the research titled "Revisiting of JD-R Theory and the effect of leadership style and meaningful work on employee engagement," the researcher intends to study the behaviour of employees all over the world. Since the study collects data only from Malaysian employees, there is no possibility that the sample (respondents) of other country employees. Thus, at the time of choosing the sampling method for the study titled "Revisiting of JD-R Theory and the effect of leadership style and meaningful work on work engagement among the full-time operational employees in Malaysia', the researcher should use non-probability sampling technique because, there is no possibility to be a sample from the entire population even entire Malaysian employees, except the full-time operational employees in Malaysian successful organisation. The employees who work in successful Malaysian organisations based on those listed in the 2022 Forbes 2000 ranking are the target population and the sample has been selected from here instead of entire organisations of Malaysia. The researcher collects information from the employees of successful Malaysian organisations based on their accessibility and availability using a convenience sampling technique.

8. CONCLUSION

The investigation of human behaviour, and the behaviour of organisations, groups, or interconnected individuals, is known as social science research where it is important to clearly and completely explain and define what is being investigated. The population and sample descriptions along with elements like the unit studied and observed, are important for designing the study. A comprehensive depiction and explanation of every component enables researchers to display their proficiency in understanding the relationship between research design, population, and samples.

REFERENCES

Ackerman, B., Schmid, I., Rudolph, K. E., Seamans, M. J., Susukida, R., Mojtabai, R., & Stuart, E. A. (2019). Implementing Statistical Methods for Generalising Randomised Trial Findings to a Target Population. *Addictive Behaviours, 94*, 124-132. https://doi.org/ 10.1016/j.addbeh.2018.10.033

Bakibinga, P., Kabaria, C., Kyobutungi, C., Manyara, A., Mbaya, N., Mohammed, S., ... & Yeboah, G. (2019). A Protocol for A Multi-Site, Spatially-Referenced Household Survey in Slum

Settings: Methods for Access, Sampling Frame Construction, Sampling, and Field Data Collection. *BMC Medical Research Methodology, 19*(1), 109. https://doi.org/10.1186/s12874-019-0732-x

Campbell, D. T. (1986). Relabeling Internal and External Validity for Applied Social Scientists. *New Directions for Program Evaluation, 1986*(31), 67-77. https://doi.org/10.1002/ev.1434

Cochran, W. G. (1977). *Sampling Techniques*. Wiley.

Creswell, J. A. (2013). *Qualitative Inquiry and Research Design: Choosing among Five Approaches (3rd edition)*. Sage.

Elfil, M., & Negida, A. (2017). Sampling Methods in Clinical Research: An Educational Review. *Emergency, 5*(1), 1–3.

Emerson, R. W. (2015). Convenience Sampling, Random Sampling, and Snowball Sampling: How Does Sampling Affect the Validity of Research? *Journal of Visual Impairment & Blindness, 109*(2), 164-168. https://doi.org/10.1177/0145482X1510900215

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics, 5*(1), 1-4. https://doi.org// 10.11648/j.ajtas.20160501.11

Fricker, R. D. (2016). *Sampling Methods for Online Surveys*. In N. G. Fielding, R. M. Lee, & G. Blank (Eds.), The SAGE handbook of online research methods (2nd edition, pp. 162-183). Sage.

Fusch, P., & Ness, L. (2015). Are We There Yet? Data Saturation in Qualitative Research. *The Qualitative Report, 20*(9), 1408-1416. https://doi.org/10.46743/2160-3715/2015.2281

Hackshaw, A. (2008). Small Studies: Strengths and Limitations. *European Respiratory Journal, 32*(5), 1141-1143. https://doi.org// 10.1183/09031936.00136408

Hansen, M. H., Hurwitz, W. N. & Madow, W. G. (1953). *Sample Survey Methods and Theory*. Wiley.

Kalleberg, A. L., Marsden, P. V., Aldrich, H. E., & Cassell, J. W. (1990). Comparing Organisational Sampling Frames. *Administrative Science Quarterly, 35*(4), 658–688. https://doi.org/10.2307/2393513

Khan, S. N. (2014). Qualitative Research Method: Grounded Theory. *International Journal of Business and Management, 9*(11), 224-233. https://doi.org/10.5539/ijbm.v9n11p224

Kish, L. (1965). *Survey Sampling*. Wiley.

Kumar, S. (2018). Understanding Different Issues of Unit of Analysis in A Business Research. *Journal of General Management Research, 5*(2), 70-82.

Lohr, S. L. (1999). *Sampling: Design and Analysis*. Brooks/Cole.

Neuman, W. L. (2013). *Social Research Methods: Qualitative and Quantitative Approaches*. Sage.

Neyman, J. (1938). Contribution to the Theory of Sampling Human Populations. *Journal of the American Statistical Association, 33*, 101–116. http://dx.doi.org/10.1080/01621459.1938.10503378

Omair, A. (2014). Sample Size Estimation and Sampling Techniques for Selecting a Representative Sample. *Journal of Health Specialties, 2*(4), 142–147.

Patton, M. Q. (2015). *Qualitative Research and Evaluation Methods (4th edition)*. Sage.

Prandner, D., & Weichbold, M. (2019). *Building a Sampling Frame for Migrant Populations Via an Onomastic Approach: Lesson Learned from The Austrian Immigrant Survey 2016. Survey Methods: Insights from The Field.* https://surveyinsights.org/?p=10641

Ritella, G., Rajala, A., & Renshaw, P. (2020). Using Chronotope to Research the Space-Time Relations of Learning and Education: Dimensions of The Unit of Analysis. *Learning, Culture and Social Interaction, 31*(B), Article 100381. https://doi.org/10.1016/j.lcsi.2020.100381

Salkind, N. J. (2009). *Exploring Research (7th edition).* New Jersey: Pearson Education.

Sarndal, C. E., Swensson, B., & Wretman, J. (1992). *Model Assisted Survey Sampling*. Springer Verlag.

Sharma, G. (2017). Pros and Cons of Different Sampling Techniques. *International Journal of Applied Research,* 3(7), 749-752.

Shorten, A., & Moorley, C. (2014). Selecting the Sample. *Evidence Based Nursing, 17*(2), 32–33. https://doi.org// 10.1136/eb-2014-101747

Sudman, S. (1976). *Applied Sampling*. Academic Press.

Tabachnick, B. G., & Fidell, L. S. (2018). *Using Multivariate Statistics (6th edition)*. Pearson.

Tryfos, P. (1996). *Sampling Methods for Applied Research*. Wiley.

Tyrer, S., & Heyman, B. (2016). Sampling in Epidemiological Research: Issues, Hazards and Pitfalls. *British Journal of Psychiatry Bulletin, 40*, 57–60. https://doi.org// 10.1192/pb.bp.114.050203\

Waters, J. (2015). Snowball Sampling: A Cautionary Tale Involving a Study of Older Drug Users. *International Journal of Social Research Methodology, 18*(4), 367-380. https://doi.org/10.1080/13645579.2014.953316