**Question 1**

Survey is among the convenient ways of collecting information or data to represent the views of a whole group about a variable one is interested in. Populations are often used in this case while conducting a study in order to collect data or information from all members of the population or when the research questions requires responses from every member or in cases where you have total access to the whole population. Populations are the distinct group of individuals comprising people with a common characteristic or a pool of individuals from which a sample can be withdrawn for a study, and they can be small in size or large and definite typically rather than vaguely (Stratton, 2021). These are of key use to observe patterns, behaviours and trends in the way persons in a cluster react allowing researchers to draw inferences about the subject of study. In our study scenario, the population would be all the fellow colleagues who exhibit a characteristic of possibility of extending the work day and working hours.

There are four distinct types of a population namely; finite, existent, infinite and hypothetical populations (Stratton, 2021). Finite populations contain characteristics of countable individuals or objects of study. For statistical purposes, finite populations tend to be more advantageous. This may include number of births annually in a particular state, number of vehicles passing through a toll gate among other countable characteristics. The infinite population is directly the opposite of the finite population. This population contains individuals who cannot be counted, such as the number of germs in a patient's body. Existent population, on the other hand, is made up of concrete individuals; in this case, the units are available in solid form. Lastly, hypothetical population whereby the units are not available in a solid form, this consists of outcomes of rolling out a dice or tossing a coin (Downing, 2018). While conducting our survey, the population to be considered would be a finite and existent population of fellow colleagues.

A study population determines the eligibility of individuals within a study. However, it is rare for a researcher in large populations to be able to conduct a survey over an entire population owing to various restraints such as time, accessibility and resources among others. As a result, most researchers use inferential statistics to research a small subset of the population often referred to as population sample and still observe tangible results. The rationale for sampling rather than total population enumeration is lower costs and increased efficacy even though sampling often enables for more accurate measurements of each sampled entity than total evaluation (Stratton, 2021). The samples focus on providing measurements of individuals that inform scientists about corresponding population measurements, that can then be repeated and tested with previous statistical samples to more adequately represent the entire population (Berndt, 2020).

There are various sampling techniques to be used to draw a sample data from a population. Almost all surveys carried out do rely on sampling to dentify a segment of the population that meets the survey's criteria. To obtain a truly archetypal sample, the researcher must ensure that each member of the group exhibiting the characteristics of interest has an equal chance of being included in the sample, and the sample must be relatively large. It is critical to ensure that the sample size chosen is sufficiently accurate and not exceedingly large or small (Hutchison, 2020). Very large samples would lead to an impossibility of surveying every individual effectively and within budget, on the other hand, too small samples would lead to credibility issues. According to researchers, the greater the sample size, the more precise and reliable a representation of the whole it will be (Mooney & Garber, 2019).

Different sample techniques can aid in attempting to deal with sub - populations and are predicated on a specific type of sample, known as a simple random sample, being drawn from the population. One of the most important factors determining the accuracy of your research/survey results is sampling. If something turns out badly with your random selection, it will be directly reflected in the final result. Depending on the need and situation, we could use a variety of techniques to collect samples (Goga, 2018).

Sampling essentially contains two types of majorly, probability and non-probability sampling. In probability sampling, the units in a population cannot be chosen at the prerogative of the researcher. This can be handled by following specific policies and procedures to ensure that every element of the population has one fixed likelihood of including it in the sample (Goga, 2018). This sampling method employs a simple random sampling technique in which every component has an equal probability of being chosen as a component of the sample, as well as a stratified sampling technique which involves division of the elements of the population into small subgroups often referred to as strata. Cluster sampling technique in which the entire population is divided into clusters or sections and then the clusters are randomly selected based on similarity in such a way that the elements within the group are homogeneous and heterogeneous among the other subgroups formed. The cluster's elements are all used for sampling. Lastly, Multistage sampling is a technique in which the population is split into different groupings, which are then further split and grouped into various subgroups known as strata based on similarity. Each stratum can have one or more clusters chosen at random. This process is repeated until the cluster can no longer be divided (McEwan, 2020).

The population units in non-probability sampling can be chosen at the researcher's prerogative. Those samples will use sentient way of selecting units and have no hypothetical framework for evaluating representative samples (Goga, 2018). This sampling method involves the following techniques, purposive sampling is based on the presumption or goal of the study. Just those components from the population that are most appropriate for the purposes of the survey study will be chosen. Convenience sampling is when samples are determined based on their presence. This technique is used when sample availability is limited and expensive. As a result, samples are chosen based on their convenience. Quota sampling based on a predetermined standard It draws a representative sample from the entire population. The proportion of characteristics in the sample should be the same as in the population. Elements are chosen until exact proportions of certain types of data are obtained or enough data in various categories is collected. Snowball sampling, which is used when the population is totally unknown and rare. As a result, the assistance provided by the first element chosen for the population is used to recommend other elements who will fit the description of the sample required. As a result of this referral technique, the population grows like a snowball (Robertson & Sibley, 2018).

Because samples are feasible, cost-effective, efficient, and controllable, they are easier to collect data from. Sampling produces significant research findings. However, sample errors can occur due to the differences that can exist between a population and a sample. As a result, it is critical to employ the most meaningful and effective sampling method. There is a possibility of common sampling errors. It is possible that your sample does not accurately reflect the characteristics of your population. When you find a difference between the results of the sample and the population, you have a chance of having systematic errors. The best way to administer our survey and collect data from colleagues would be the use of probability sampling technique specifically cluster sampling.

**Question 2**

Primary data is data that was collected or produced by the researcher himself using various data collection methods from a sample collection, such as surveys, interviews, and experiments, that were specifically designed to understand and solve the research problem at hand. An initial source is gathered as a primary source directly. It is not tainted by the opinions or judgments of others. It is also known as raw information or first-hand knowledge. The data collection method is costly because it necessitates the use of human resources and funds to have an agency or outside organization conduct the study. The investigator is in charge of direct supervision and management of the data collection process. Primary sources are those that are closest to the source of the information. They need to be interpreted by academics because they are raw data. It is typically gathered especially for research projects and may be made publicly available for use in other studies (Hox & Boeije, 2005).

Secondary data, on the other hand, is the use of existing data generated by organizations as component of corporate record keeping. The information is extracted from a wider range of file systems. Secondary data is information that has already been accumulated and catalogued by some scholars for purposes other than the current research question. Data from a wide range of sources, which would include government reports, census records, internal organizational records, booklets, scientific journals, internet sites, and articles. This method of data collection is cheap, convenient, and both time and money efficient. The data was gathered for another purpose, so it may not be reliable or appropriate for the existing research goal, which is the only disadvantage (Hox & Boeije, 2005).

The main differences between secondary and primary data include the following six major differences; originality - Primary data is unique since it is collected for the first time by the investigator. Secondary data, but from the other hand, are not unique because they were gathered by someone else for their own specific purpose (Clark, 2013). The nature of data that is secondary is that secondary data are in finished form while primary data are in the arrangement of raw materials. Primary data are gathered with a specific goal in mind, making them more trustworthy and appropriate for the investigation while, secondary data are less trustworthy and more inappropriate because the data were gathered by someone else and may not completely serve our purposes. Collection of secondary data cost less money and time, hence it is economical (Clark, 2013), primary data on the other hand, is quite expensive both in the terms of time and money. With primary data, since the primary data were gathered for a specific purpose, no special editing or precautions are needed while using them, while, secondary data seeing as secondary facts were gathered for someone else's benefit, prudence and editing are both essential (Hox & Boeije, 2005). Secondary data involves past or historical data that has been collected within varied timeline while primary data is real time and is structured to the specific needs of the researcher. The collection time for primary data takes a long duration of time since administration of surveys and questionnaires as some of the forms of collecting primary data may involve various preparations that may take time while collection of secondary data is short since it involves selection of data from an already made up source of data. It is noteworthy that collection of primary data is infrequent due to the high operational cost (Clark, 2013).

Primary data has various advantages and disadvantages. The requirements of the scholar during collection of data are unique to primary data. The researcher can control the type of data collected. Primary data is usually up to date because it is collected in real time and not from old sources (Hox & Boeije, 2005). It is accurate when compared to secondary data. Because the data is free of personal bias, its legitimacy can be trusted. Individuals who dedicated special attention to each of the questions they wished to survey conduct primary data research and development. People tend to depend on their own judgment more than they do on the data of others. Additionally, those who are working on it could do assessments. hence improving the validity and accuracy of data (Hox & Boeije, 2005). Primary data gives the researcher more control over data - the person conducting the survey has control over the entire process because he has the ability to manage the data whether he uses questions or another design. To make the questionnaire more insightful, he can alter it or make specific additions. Primary data, on the other hand, is better understood because the data gathered through various designs and methods is made plain and simple to comprehend so that the person who is interested in it can quickly comprehend it (Rahman, 2020).

The disadvantages of primary data are that it is a time-consuming process. The survey's creator and the methodology utilized may need a long time to gather the data from primary sources. We compile information for secondary data from different sources. As a result, it goes faster. Because it sometimes takes time, addressing the issue in the immediate area is delayed (Hox & Boeije, 2005). Primary data collection is costly – researchers must travel and use potentially expensive equipment in order to collect data. Additionally, after receiving comments, proper documentation is essential, which again requires attention and is expensive. Due to its complexity and time cost, collecting original data might not always be practical (Rahman, 2020).

By contrast, secondary data has the advantage of being more easily accessible than primary data. Secondary data is available on various platforms that the researcher can access. It is possible to conduct longitudinal research with secondary data without needing to wait a long time to get a result. Secondary data is relatively inexpensive. Because they are freely distributed, they can occasionally be obtained for little to no cost. Secondary data collection takes less time than primary data collection, and it also helps to generate new insights into existing primary data (Brewer, 2012).

The disadvantages of using secondary data are that secondary data might not be reliable and authentic. The information gathered from the available sources may need to be further verified by the researcher. In most cases, there may not always be new data available to update secondary data sources. Before discovering the necessary data, researchers might have to deal with irrelevant data that may involve missing observations. Some secondary sources of data are exacerbated as a result of the data source's personal prejudice (Brewer, 2012).

Because the method of collection has no bearing on how the data are used, both secondary and primary data can be used to conduct similar research. For example, whether gathered directly or through an existing database, the demography of a specific target market can be used to guide comparable business decisions. In order to ensure that the appropriate type of data is used to draw a conclusion on feasibility, it is crucial to consider the available data options when doing research. To do this, though, one must have a solid grasp of the various data kinds' commonalities and distinctions. Both primary data and secondary data have uses in both commercial and academic research. However, how they are gathered, put to use, and examined may vary from one another.

**Question 3**

For consideration, we used a secondary data source for analysis obtained from the Kaggle online database. The data set consists of the company's profit data and their spending in various states. The Dataset consist of five variables of study; R&D Spend – the amount spends on research and development, administration – the amount spend on admin works, marketing spends – the amount spends on of company's product, state – the company has branches in New York, California and Florida, and profits – the profit of the company (Kaggle, 2022). The data contains 50 observations.

(a) Calculation of the mean

Mean is the most used measure of central tendency. A dataset's mean is calculated by dividing the total number of values by all of the values. We will do a mean computation of all the quantitative variables of study in the data set. To compute the mean we will use the following formulae:

Mean = ; Where is the observation in each start-up and *N* is the total number of observations.

Mean of R&D spend = = $ 73,721.62.

Mean of administration = = $ 121,344.64

Mean of marketing spends = = $ 211,025.10

Mean of profits = = $ 112,012.64

(b) The mode is the most common value in a set of data values. If X is a discrete random variable, the mode is the x value at which the probability mass function maximizes. There were no modal values in our data set because there was no specific value in all of the variables that appeared most frequently in the set of data values.

(d) The standard deviation is a measurement of how much a group of values vary or are dispersed. While a high standard deviation implies that the values are dispersed over a wider range, a low standard deviation shows that the values tend to be close to the mean of the collection. The formula for computing the standard deviation was as follows;

Standard deviation = ;

Standard deviation of R&D spends = $ 45, 440.92

Standard deviation of administration = $ 27,736.21

Standard deviation of marketing spends = $ 121,061.23

Standard deviation of profits = $ 39,901.08

From the computations above, the average amount spent on administration is $ 121,344.64 (SD $ 27,736.21). The same is true for other variables. There is a lot of variation between the amount spent on marketing having an average of $ 211,025.10 with a standard deviation of $ 121,061.23 showing data points are distributed away from the mean value.

**Question 4**

Regardless of your profession, department, or business, having the ability to pass solid judgment and make wise decisions is a skill that is useful to everyone. Whether you are an online networking intern or an emergency department doctor, your capacity to gather data, assess its applicability, draw conclusions, and choose a plan of action has an impact on many people in addition to just yourself. As a result, improving your abilities in this field is essential to your success. Making better and more insightful decisions requires taking the time to thoroughly consider all of the possibilities and consequences that are available, including debates and other people's perspectives. Leaders evaluate the problem, look for pertinent information, weigh possibilities, form opinions, and take necessary action to get a desirable result within ineluctable time limits (Lunenburg, 2010).

There are numerous circumstances that, whether we are conscious of them or not, can either degrade or improve our capacity for judgment or decision-making (Jago & Deery, 2005). Some of these factors include; experience – an individual’s capacity to judge or make decisions will become more established the more time and engagement you have to various events, people, and perspectives. Although it is undoubtedly not the only teacher of judgment and decision-making, experience is a wonderful resource. Environment (Jago & Deery, 2005) – your environment can refer to both your physical and psychological surroundings. Consider being in a dire emergency where there is mayhem all around you. Others may need to leave or remove themselves from the situation in order to think clearly and decide, while some people are born with or have developed the ability to reduce the mayhem around them. Your capacity to make wise decisions is significantly influenced by your environment. Emotions (Jago & Deery, 2005) – regretfully, when it comes to making decisions, emotions often have a negative name in the corporate world. In actuality, our feelings can reveal a lot to us about a circumstance or choice. It is valid for a feeling or emotion to enter your consideration set even though it may not be appropriate to base a conclusion purely on them. Preference - Although preferences are challenging to explain or rationalize, they have a significant impact on how an individual makes decisions. It is up to us to what extent they influence our judgements and choices, but they are a part of who we are (Al-Tarawneh, 2012).

In an organization, the above-named factors may not be at play. The traditional way of decision-making process would involve 4 methods whereby either the decision-making process was made by one person in management referred to as command method. Here, one individual makes the choice. It might be the principal decision-maker, or that person might transfer that responsibility to a different particular person. Consultation method whereby before making a choice, a person with decision-making authority seeks out numerous opinions. It is not a must to use someone else's perspective when you listen to their viewpoint in this method. The consensus method where individuals endeavour to reach an understanding on a stance. This can take a while and result in numerous concessions being made on the chosen course of action. The voting method is often looked as the fairer method where individuals vote and the majority have their way and the minority have their say (Liu et al., 2020).

However, with the growth of data-driven decision making, most corporations opt to use information systems to aid with the decision-making process. The most important asset for any business organization to make sound and informed business decisions is its information system. Management information systems make the data needed to make sound business decisions available to the owner and other decision-makers. A management information system provides background knowledge, up-to-date statistics, and trend analysis so you may quickly access information on any business-related topics. This in-depth information on the business environment and finances can be used to boost both long-term and short-term business performance (Stamevska, Dimitrieska & Stankovska, 2019). Management information systems can help you make sound decisions by providing accurate and up-to-date information and performing analytical tasks (Duan, Edwards & Dwivedi, 2019). To ensure that the management information system you choose has the capabilities you need and can work with the multiple formats used by your company. Appropriate management information systems can organize critical data from your business operations and records into reports to assist you in making decisions. Information regarding the organization's relative position and the fundamental factors at play is provided through management information systems. It delivers the pertinent data required for decision-making and aids in the efficient execution of an organization's operational, planning, and control tasks (Alhawamdeh & Alsmairat, 2019).

Subsequently, an individual’s decisions when based on data from management information systems, they will reflect information from your company's activities. Management information systems organize data generated at the working level into useful formats. Sales data, spending information, investment data, and labour information are frequently included in management information systems. Management information systems can produce precise reports with the data you need to make decisions, such as how much profit your firm has produced annually for the last five years. The ability to run scenarios is a critical decision-making tool. Some management information systems include this capability, while others can provide the data required to run scenarios on various programs, such as spreadsheets. What happens if you make a particular choice influences your decision. What-if scenarios demonstrate how certain parameters change as a result of your choice. Management information systems play an important role in making genuine circumstances probable (Esch, Schulze & Wald, 2019).

Any choices an individual makes affect the expected results of a company and can need fine-tuning the business plan and long-term objectives. The ability to perform trend analysis is either built into management information systems or is available through the provision of information. Every basic operating result is projected in typical company strategy. You may demonstrate these results in the current situation and how they will alter once you have put your decisions into practice using a trend analysis. The fresh ideals will form the foundation of your future strategic approach. Whereas the you must evaluate company performance to ensure that things go as planned, even if you make these decisions with respect to sustainable development and have evidence from management information systems and trend analysis to back up your expectations. The data provided by management information systems allows you to determine for certain if your actions had the desired affect or whether you need to make changes to reach your objectives. You can use management information systems to assess the problem and decide if to take positive action if some results do not meet expectations (Stamevska, Dimitrieska & Stankovska, 2019).

In conclusion, Management information systems offer a very important help to the management team while making data driven decision from informed insights which is a better way to make decisions compared to the traditional methods. Management information systems helps in managing business data, analysis of business trends, examination of scenarios and strategies, and informing business decisions by reducing system errors that would lead to decision making that is influenced by the following factors; emotions, experience, environment and preferences.

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