Quantitative Research Methods and Statistical Analysis

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Abstract:

This paper covers the scope of research methodology by discussing each method separately. There is also a discussion about the best method with its strengths and weaknesses. There is also the assessment of the regression analysis. Structural equation modeling and latent variables are also analyzed as the choice of researchers.

Introduction

“Research is at times mistaken for gathering information, documenting facts, and rummaging for information “(Leedy & Ormrod, 2001). “Research is the process of collecting, analyzing, and interpreting data to understand a phenomenon “(Leedy & Ormrod). There are two types of research: quantitative and qualitative. Quantitative research methods are methods that comprise anything that is quantifiable. After quantifiable, there can be an examination of phenomena with their associations. “It is used to answer questions on relationships within measurable variables with an intention to explain, predict and control phenomena” (Leedy, 1993). It follows the standard of stern research. Starting from the sample population, it ends with generalizations of the results. The first step of quantitative research is the selection of the topic by the researcher.

Types Of Quantitative Methods:

Quantitative research can be in the form of detailed studies (correlational research, evaluation, Meta-analysis), causal-comparative research, and experimental research (true experimental and quasi-experimental designs, single-subject experiment and ex-post facto experiment).

Descriptive Research:

For the given phenomenon, this method explores the characteristics of the particular system in detail and also explores the correlation between two or more variables. This research falls into three categories. “Observational research,” “Correlational research,” and “Survey research.” “Descriptive

studies are aimed at finding out, “what is” so observational, and survey methods are frequently used to collect descriptive data” (Borg & Gall, 1989).

Observational Research:

Observational research as quantifiable is not involved in qualitative research, but it often becomes part of quantitative research. When it is used in quantitative research, it quantifies the desired variable. Various strategies can be utilized for this. For instance, there can be the use of a rating scale. The rating scale approach involves the evaluation of the behavior regarding specific factors or reasons. The researcher can also use the clustering of the observation periods. The period may be owed with certain intermissions dependent on the study’s conditions.

Correlational Research:

The co-relational study investigates the likelihood of the relationship between two variables. It uses the correlation coefficient for this. A relationship exists when one variable increases or decreases compatible with the other variable.

Survey Research:

Survey research is the assembly of information about one or more groups of people about their characteristics, their thoughts as well as preceding actions. It gives the information about the particular population. It can be in the form of the census as well as the Gallop survey. There are two types of research studies. Cross-sectional and longitudinal studies. Cross-sectional studies involve the collection of information about the sample at one point in time. In longitudinal surveys, data collection is completed at different points in time to observe the fluctuations.

Exploratory Research:

Another quantitative study design is the exploratory design. There are two types of exploratory designs: Cohort Studies and Panel or Case-control Studies. The Cohort Studies continues from cause to effect. These start with “people exposed.” Then, the frequency of disease is tested in these studies. On its basis hypothesis is defined. For instance, taking alcohol as the cause of breast cancer, the researcher may ask the women to drink alcohol and then observe its effects after a few years on women. These studies are useful when you work on rare cases. Panel Studies involve the Inspection of the same sample at more than one time interval.

Advantages And Disadvantages Of Quantitative Research Methods:

The greatest advantage of this design is that it best establishes the cause-and-effect relationship. It has certain disadvantages also. It may not manipulate some variables. It may involve unethical practices.

Best Quantitative Method Design:

The best quantitative method is the experimental design. This design includes the experimental group and control group. This consists of six steps. The researchers first develop the hypothesis, design an experiment, collect the data, analyze the results and then draw the conclusion from the analysis. In causal-comparative research, investigators conclude the cause of differences that previously occurred among groups of individuals. It is also recognized as “ex post facto” research. In causal-comparative research, there are two types of designs. One is the retrospective causal-comparative research, and the other is the perspective causal-comparative research.

There are three experimental study designs. In true experimental designs, experimental groups get randomly assigned test units and treatments. The experimental group receives treatments, while the control group does not receive any treatments or controls. By controlling potential sources of variance, this design permits statements about cause and effect. It is one of the simplest experimental models.

Quasi-experimental designs involve the one-group pre-test or the post-test. These studies frequently are carried out when it is not possible to conduct randomized controlled trials. In quasi-experiments, the cause is obtained and comes about before the outcome is deliberated. The researcher goes for the calculation of alternative explanations one by one

Pre-Experimental design	Quasi-Experimental design	True experimental design
One group pre test post test design Manipulation of independent variables Limited control over the extraneous variables There is no randomization There is no control group	Block designs and non-randomized Time series designs Manipulation of independent variables There may be no randomization There may be no control group	Post-test only control design Pre-test post-test control group design Manipulation of independent variables There is randomization There is control group

Choice Of Regression Analysis Method

This choice considers certain ways. Regression analysis is an extrapolative modeling technique that examines the association between the dependent and independent variables. It is used for forecasting and finding the causal effect relationship. Deciding the correct linear regression model can be difficult. There is a variety of regression techniques available to make predictions. These are divided by some independent variables, the shape of the regression line and the type of the dependent variable. Those regression models that involve one explanatory variable are called simple regressions. At the same time, the multiple regression models include two or more explanatory variables. For the choice of the best model, different matrices are used like the statistical significance of parameters and R-square, etc.

Text Analysis Method:

It is a model for researchers to collect information about how other human beings perceive the world. The great reflections in textual analysis consist of the choice of the category of texts to be deliberate, obtain suitable texts and formative. This is a picky approach to be utilized in analyzing them.

Structural Equation Modeling And Latent Variable

Structural equation modeling (SEM) is a controlling and analytical technique. However, it as an intricate technique also. With this method, multiple equations can be predicted simultaneously. Also, correlations among disturbances are possible. This method is better than the regression analysis because it measures the contribution of each item in explaining the variance. For the SEM to work, two things are needed. Formal specification of the model and observed relationship between variables. It includes a set of covariances.

It is a variable although that is unmeasured but is hypothesized to exist. “For having executed our experiment and calculated the correlation, we must then remember that the latter does not represent the mathematical relation between the two sets of objects compared, but only between the two sets of measurements which we have derived from the former by more or less fallible processes” (Spearman, 1904).

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