

5. Measurement in Social Sciences

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5.1 Introduction:

In conclusion, whereas reliability is necessary in research, reliability alone is not sufficient. If data is valid, it must be reliable. When a research produces very different scores on a test whenever it is conducted, the test is not likely to predict anything. On the other hand, if a test is reliable, that does not mean that it is valid. For a test to be reliable, it must also be valid. Reliability and validity are conceptualized as trustworthiness, rigor and quality in a qualitative paradigm. It is also through this association that the processes to achieve validity and reliability in research get affected from the qualitative Social Science research studies society in various frames hence it cannot be accurately measured in objective terms therefore it adopts various methods which can be applied for gathering and analysing data. Measurement is important in research. Measurement is important because it gives us a picture of what is going on. Measurement aims to assist researchers in testing the questions which are in their mind regarding behavior of people. For checking significance or insignificance of social science researches it is essential to apply quantitative and qualitative methods. Statistical tools make it possible to accept or reject the hypothesis.

Without this replication of statistically significant results, the experiment and research have not fulfilled all of the requirements of testability. This prerequisite is essential to a hypothesis for establishing itself as an accepted scientific truth. Through rational observation the researchers may be able to study the variables, their quantity or sample size for predicting about population, and also reveal about the degree to which behavior may be ascertained in all these steps what is significant is the use of various aspects of measurement like accuracy, validity, replicability and reliability. In research methodology Measurement may be defined as the research process of observing and recording the observations that are collected from social environment (Trochim: 2020). He has explained the four levels of measurement, that is nominal, ordinal, interval and ratio. Next he has also explained the different approaches to measurement in social researches, of which the prominent approaches include:

Survey method for designing questionnaire to be used while interviewing subjects for data collection. Scaling which involves assessing subjects' views about various social issues through rating method. First developing the tool and then using it for questioning the people, accumulating their views and then analysing them. Qualitative research which tries to assess non-numerical aspects of the population to be studied and then make categories to study them rationally. Observation from outside or Unobtrusive measurement which includes checking reactions or behaviors of people from distance so that they are not conscious that they are being watched, hence they perform naturally.

Measurement usually starts with observation which has been the main instrument in the hands of social scientists to predict future aspects of various phenomena studied and then using various quantitative or qualitative measures to prove what they have assumed. According to Maxim (1999), measurement implies empirical study of phenomena to be studied using numerical range for giving interpretations which are more accurate and may be quoted in numerical terms. Without measurement, researchers can't interpret the data accurately and systematically.

Thus, measurement is a way to explain your study to others in a very clear terms, making it explainable. Next, we can make a comparison of various variables using measures. For example we can compare two groups; such as conducting a study to see if urban men are better at solving Mathematics than rural men. It could also be a comparison of changes over time between varied occurrences. Measurement is often employed in quantitative research more than qualitative research. Quantitative measurement enables researchers to make accurate judgement regarding features, characteristics and giving comparative view about matter to be studied.

For example if height of different persons in a family varies than research using past records of family may help in genetically proving why this has occurred. Past records of many generations of that family may help in analysing why the heights are varying.

If nature of persons of the same family may be studied than difference in nature may be attributed to heredity and environmental factors. This has only surfaced through researches going on since past. Measurement is the means to assess the various aspects of social systems studied but it is not itself a system, it is a means for comparison and analysis for comparing various segments of the system. Measurement in research can be categorized into four different levels: nominal, ordinal, interval, and ratio measurements. According to McClendon (2004), Nominal measurement is a process of assigning numbers to number of cases which are to be considered for any purpose. It is used for counting purpose only hence is the lowest form of measurement. In essence percentages are used in this level of measurement, for e.g. percentage of UP students vs. percentage of Maharashtra student vs. Punjab students in a class. Next level of measurement is ordinal measurement, in this systematic placement of population in terms of rank or position is applied. Adi Bhat () has defined Ordinal measurement as "the second level of measurement that reports the ranking and ordering of the data without actually establishing the degree of variation between them." Ordinal level of measurement is the second of the four measurement scales. "Ordinal" indicates "order". Ordinal data is quantitative data which have naturally occurring orders and the difference between is unknown. It can be placed in order like 1st, 2nd, 3rd etc till the whole population is provided rank. This positioning is used in ranking engineering aspirants from first to the last to decide cutoffs for IIT, NITs, etc. The ranks are given but the difference between ranks cannot be clarified by ordinal measurement. Next is interval measurement. The Encyclopedia of Social Research Methods (2004) published by Sage defines Interval Measurement as one where the distance between the attributes, or response options, has an actual meaning and is of equal interval. Differences in the values represent differences in the attribute. Interval measures have fixed measurement units, but they do not have a fixed, or absolute, zero point. For instance when rating students to assign grades the scores of all students are put from top to bottom in interval scales, which may be of an interval of 5, 6 or whatever has been decided by the grading committee.

If a student gets a score of 53 he is placed in the interval which includes that number in its interval, e.g. in the range of 5 scores in one interval from 40 till 100 the score of 53 will fall in interval including scores from 50-55. This is the method of applying interval. Interval measures are now common in social research because the attributes that are measured are usually converted into interval scales as given by Likert () for explaining the degree to which the attribute is present in persons.

Ratio scale is the fourth level of measurement and possesses a zero point or character of origin. Bhatt has defined Ratio scale as a type of variable measurement scale which is quantitative in nature. Ratio scale allows any researcher to compare the intervals or differences in absolute terms magnifying differences to the most molecular levels. Bhat explains that a ratio scale is the most informative scale as it tends to elaborate about the order and number of the objects between the values of the scale. The most common examples of ratio scale are height, money, age, weight, etc. Cutoff is usually decided on ratio basis to determine pass or fail, distinction or not, etc.

An important part of social science research is the conversion of human behavior study in quantitative terms. Descriptive views are transformed into numbers through categorization as specified by Likert. This view has also been highlighted by Drost () Who states that observed behavior are quantified using measurement instrument. The measurement of human behaviour using statistical methods has made it a widely applied empirical approach for analysing the data collected. This is proving to be a positive approach with significant findings proving the set predictions. (Smallbone and Quinton, 2004). Measuring variables in the collection of data for social research has become a possibility through ranking of attributes from lowest to the highest level. No human being holds attributes in absolute terms, they hold the attribute in degrees from low to high or from negative to positive, and hence tools are made keeping the degree of attributes in consideration. And subsequently used. The attributes have to be checked for accuracy, validity, replicability and reliability. All these four very substantial checking steps must be present for all items of the measure to be used. If any of the checking step is missed then we cannot rely on the data collected, rating measures used should be accurate, they must be valid, i.e. repeatable in such situations whenever applied, they must be able to be replicated in another research and they must be reliable, i.e. it must be a standard measure. A brief description of these four standardizing methods are given below.

5.2 Accuracy:

Without analysis data collection will not be proved significant or insignificant. For this step one has to be sure that the information collected in the procedure of the data collection is rightly gathered, is giving the fairest rating to describe the issue. Data should be as honestly collected and subjects should give true views because otherwise data analysis will not give the correct picture and subsequently interpretation of data will also be questionable. And will lead to wrong conclusions. To apply accuracy source of data should be verified, edit the responses given by subjects. So that biases of any sort may be avoided. An analytical review published by the Colorado State University (1993-2016) defines Accuracy as a terminology used in survey research to refer to the match between the target population and the sample that is the parameters to be studied in the population is present in the sample taken from the population.

The findings are measured so rightly that they may be used for generalized views about attributes studied in the universe. By checking your data with other reliable sources from various angles one can become very sure about his data's accuracy. Accuracy refers to highest compatibility between measured data with standard view regarding the issue.

5.3 Validity:

A test measures what it says it is measuring. This is validity. This applies to equipment like thermometer, oximeter, and blood pressure machine. They measure the accurate level to depict if body is functioning normally or not. If it is not normal as indicated by your instrument than medical help may be taken to bring the levels of persons to the normal level. It is important because it gives the required information. Data collected using invalid instruments may not give similar results again, such instruments cannot be dependable, as there may be ambiguity. If used one may not be able to claim that results from the invalid instrument may not give results as predicted. Validity explains how well the collected data covers the actual area of investigation (Ghauri and Gronhaug, 2005). Validity basically means "measure what is intended to be measured" (Field, 2005). There are four main methods of assessing validity. These are face validity, content validity, construct validity, criterion validity. Meaning of these methods of validity are as follows. Face validity measures the appearance of the content of the test, looking at the items in the tool the experts may judge them to be right representation of the concept being measured, i.e. if attitude tool is made then the items of the tool must appear right for measuring Attitude.

Content validity measures the extent to which the tool contents are right for measuring the concept for which it is made, e.g. the attitude test must contain items which measure aspects of attitude only, and not something else. Construct validity mean the test measures the concept for which it is made, e.g. if it is an attitude measuring tool than it should measure attitude only.

Criterion validity method is used to judge if the new tool constructed is matching similar standard tool from the past. This is assessed by applying the new tool together with an old similar tool to the same group of subjects, if the scores of the two tools are correlating significantly, than the new tool is as valid as the old tool. In general, validity indicates how sound the research of the researcher is. More specifically, validity applies to construction of tool, to its application on the sample, proper analysis and proper interpretation.

5.4 Replicability:

A new researcher may want to use the previous research on some other sample somewhere else, than the new researcher should be able to get similar findings in new surroundings on a new population. This is replicable research, that is proof that the original research was valid. If so then the validity of the initial research is established. To replicate something lexically means to repeat it. The integrity and viability of a Research is in its capacity to be replicated. For example, if someone conducts first experiment and get finding significant at .01, than conducting the same study other person should also get significant finding as previously found, nor the validity will not be observed. Replicability has been interpreted by Lewis-Beck et al (2004).

The Author identified three key aspects to the concept of replicability: a finding being repeated in another research and giving similar findings, the second researcher working autonomously on the similar line of previous work and the use of valid, but different, methods for different aspects being studied in the new research. as replicability will refer to only the concept which has been repeated, not to other concepts studied in the same research. The Author(s) further explain that to be considered valid, the group of researchers replicating the study need to be independent of the original researchers. "Independent" means that they have no reason not to be dispassionately objective in their attempts to replicate the findings. Those replicating the study should not be known to each other, professionally or socially.

The Authors most importantly assert that in order to take a scientific study or experiment seriously, the results need to be able to be proven multiple times by independent researchers. Research that has been shown to be replicable affords greater confidence in the results.

5.5 Reliability:

Reliability of the measurement tools should give consistent results on giving similar tests, or equivalent forms of test or same test again and again. i.e. it refers to the repeatability of findings. If the study were to be done a second time, it would it give similar findings. If so, the data depicts reliability. If more than one person observe an event or occurrence than all should observe similar findings. This will be proof about reliability of the study. Reliability may also be applicable to individual being measured more than once on any test. If he gets good scores on comprehension once than again on the test being repeated he should yield almost the same score on the test. Than the test is reliable. To be reliable, a tool being used for measuring some attribute should give similar score when administered twice on the same person after a short gap this will reinforce the findings and ensure that the wider scientific community will accept the hypothesis. Without this replication of statistically significant results, the experiment and research have not fulfilled all of the requirements of testability. This prerequisite is required to test any hypotheses and proving it to be true essential to a hypothesis establishing itself as an accepted scientific truth. Reliability is therefore the degree to which an assessment tool produces stable and consistent results and this can be further broken down into subdivisions (Sankale et al: 2015).

In conclusion, whereas reliability is necessary in research, reliability alone is not sufficient. If data is valid, it must be reliable. When a research produces very different scores on a test whenever it is conducted, the test is not likely to predict anything. On the other hand, if a test is reliable, that does not mean that it is valid. For a test to be reliable, it must also be valid. Reliability and validity are conceptualized as trustworthiness, rigor and quality in a qualitative paradigm. It is also through this association that the processes to achieve validity and reliability in research get affected from the qualitative.

Without measurement research is not fruitful, we cannot confirm our research findings with confidence. This highlights the role of measurement in all social science studies, and it is useful to prove that the various selections made in organizations on the basis of selection tools are worthwhile and are claiming to prove useful in all spheres where appropriate selection of employees have to be made, where decisions have to be made, and one cannot rely only on common sense.

5.6 References:

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