Conceptions, Construct, Attribute, Variables and Hypotheses

Conception

Steps in Research Question Formulation:

- Choice and formulation of concepts and constructs important for the problem
- Formulation of hypotheses
- Formulation of variables
- Formulation of constructs, hypotheses and variables is usually not sequentional process, but the steps that are done more or less simultaneously

1. CONCEPTS:

Concept is an abstract thinking to distinguish it from other elements

To understand and communicate information about objects and events, **there must be a common ground on which to do it. Concepts serve this purpose**.

A concept is a generally accepted collection of meanings or characteristics associated with certain events, objects, conditions, situations, and behaviours.

Classifying and categorizing objects or events that have common characteristics beyond any single observation creates concepts.

We abstract such meanings from our experiences and use words as labels to designate them. For example, we see a man passing and identify that he is running, walking, skipping, crawling, or hopping. These movements all represent concepts.

What for are concepts in research?

- We design hypotheses using concepts.
- We devise measurement concept by which to test these hypothetical statements.

- We gather data using these measurement concepts.
- The success of research hinges on

- how clearly we conceptualize and
- how well others understand the concepts we use.

- For example, when we survey people on the question of customer loyalty, the questions we use need to tap faithfully the attitudes of the participants. **Attitudes are abstract, yet we must attempt to measure them using carefully selected concepts.**
- The **challenge is to develop concepts that others will clearly understand. We might, for example, ask participants for an estimate of their family's total income. This may seem to be a simple, unambiguous concept, but we will receive varying and confusing answers** unless we restrict or narrow the concept by specifying:

• Time period, such as weekly, monthly, or annually.

• Before or after income taxes.

• For head of family only or for all family members.

• For salary and wages only or also for dividends, interest, and capital gains.

• Income in kind, such as free rent, employee discounts, or food stamps**.**

Sources of Concepts

- Everyday culture is filled with concepts, but **many of them have vague and unclear definitions.**
- Likewise, thevalues and experiences of people ina culture may limit everyday concepts.
- We **borrow concepts from everyday culture; though these to be refined.**
- **We create concepts from personalexperiences, creative thought**, or observation.

- The classical theorist
  originated many concepts like family system, **gender role, socialization, self-worth, frustration, and displaced aggression.**

- We also **borrow concepts from sister disciplines**

Constructs

- Theoretical definition of a concept; must be observable or measurable; linked to other concepts

- Constructs are broad concepts or topics for a study. Constructs can be conceptually defined in that they have meaning in theoretical terms. They can be abstract and do not necessarily need to be directly observable. Examples of constructs include intelligence or life satisfaction.

- Concepts have progressive levels of abstraction— that is, the degree to which the concept does or does not have something objective to refer to.

- Table is an objective concept. We can point to a table, and we have images of the characteristics of all tables in our mind. An abstraction like personality is much more difficult to visualize. **Such abstract concepts are often called constructs.**

- **A construct is an image or abstract idea specifically invented for a given research and/or theory-building purpose.**

The Role of Constructs:

- A construct is an abstract idea inferred from specific instances that are thought to be related.

- Typical marketing constructs are brand loyalty, satisfaction, preference, awareness, knowledge.

- Research objectives typically call for the measurement of constructs.

- There are customary methods for defining and measuring constructs

Variables

A characteristic, number, or quantity that increases or decreases over time, or takes different values in different situations.

Variables are created by developing the construct into a measurable form. Variables, by definition, correspond to any characteristic that varies (meaning they have at least two possible values). Examples of variables include height in inches, scores on a depression inventory, and ages of employees.

Concept of Variable

- Variable, to put in layman statement is **something that can change and or can have more than one value.**
- "A variable, as the name implies, is 1" something that varies". **It may be weight, height, anxiety levels, income, body temperature and so on**.
- Each of these **properties varies from one person to another and also has different values along a continuum**.
- It could be demographic, physical or social and include religion, income, occupation, temperature, humidity, language, food, fashion, etc. Some variables can be quite concrete and clear, such as gender, birth order, types of blood group etc while others can be considerably more abstract and vague.
- "Variable is a property that takes on different values". **It is also a logical grouping of attributes.**
- There is **no limit to the number of variables** that can be measured, although the more variables, the more complex the study and the more complex the statistical analysis.
- Moreover **the longer the list of variables, the longer the time required for data collection.**

- Variables can be defined in terms of measurable factors through a process of operationalization.

- It **will convert difficult concepts into easily understandable concepts** which then can be measured, empirically

- Variables and operational definitions go hand in hand. **Operational definitions specifically identify how the variables are measured for the purposes of the research.**

- There are **different types of variables and having their influence differently in a study viz. Independent & dependent variables, Active and attribute variables, Continuous, discrete and categorical variable, Extraneous variables and Demographic variables.**

Types of variables

1. **Independent & dependent variable:** The independent variable is the antecedent while the dependent variable is the consequent. If the independent variable is an active variable then we manipulate the values of the variable to study its affect on another variable. In the above example, we alter anxiety level to see if responsiveness to pain reduction medication is enhanced. Anxiety level is the active independent variable. Dependent variable is the variable that is affected by the independent variable. Responsiveness to pain reduction medication is the dependent variable in the above example. The dependent variable is dependent on the independent variable

2. **Active and attribute variables:** "Variables which cannot be manipulated are attribute variables and the variables that the researcher creates are the active variables". Active variables can also be independent variables. E.g. effectiveness of communication board in meeting the needs of the incubated patients. Communication board is an 'active independent variable' as it can be modified according to the needs of the patients or according to the requirement in the study and it is researcher's concept. It is also the cause i.e. independent variable. . Attribute variable is a variable where we do not alter the variable during the study. It can also be the independent variable, but it has limitations. Some attribute variables are age, gender, blood group, colour of eyes, etc. We might want to study the effect of age on

weight. We cannot change a person's age, but we can study people of different ages and weights.

3. **Continuous, discrete variables:** "A continuous variable can assume an infinite number of values between two points". If we consider the continuous variable weight: between 1 and 2 Kg, the number of values is limitless: 1.005, 1.7, 1.33333, and so on. On the other hand, a discrete variable is one that has a finite number of values between any two points, representing discrete quantities.

4. **Extraneous variables:** It happens sometimes that after completion of the study we wonder that the actual result is not what we expected. In spite of taking all the possible measures the outcome is unexpected. It is because of extraneous variables. Variables that may affect research outcomes but have not been adequately considered in the study are termed as extraneous variables. Extraneous variables exist in all studies and can affect the measurement of study variables and the relationship among these variables.

5. **Demographic variables:** "Demographic variables are characteristics or attributes of subjects that are collected to describe the sample". They are also called sample characteristics. It means these variables describe study sample and determine if samples are representative of the population of interest.

Attribute

An attribute refers to the quality of a characteristic. The theory of attributes deals with qualitative types of characteristics that are calculated by using quantitative measurements. Therefore, the attribute needs slightly different kinds of statistical treatments, which the variables do not get. Attributes refer to the characteristics of the item under study, like the habit of smoking, or drinking. So 'smoking' and 'drinking' both refer to the example of an attribute.

In science and research, an **attribute** is a characteristic of an object (person, thing, etc.). Attributes are closely related to variables. A **variable** is a logical set of attributes. Variables can "vary" - for example, be high or low. How high, or how low, is determined by the value of the attribute

Examples

Age is an attribute that can be operationalized in many ways. It can be dichotomized so that only two values - "old" and "young" - are allowed for further data processing. In this case the attribute "age" is operationalized as a binary variable. If more than two values are possible and they can be ordered, the attribute is represented by ordinal variable, such as "young", "middle age", and "old".

Theory of attributes:

- **In the theory of attributes, the researcher puts more emphasis on quality (rather than on quantity).** Since the statistical techniques deal with quantitative measurements, **qualitative data is converted into quantitative data in the theory of attributes.**

- There are **certain representations that are made in the theory of attributes. The population in the theory of attributes is divided into two classes, namely the negative class and the positive class.** The positive class signifies that the attribute is present in that particular item under study, and this class in the theory of attributes is represented as A, B, C, etc. The negative class signifies that the attribute is not present in that particular item under study, and this class in the theory of attributes is represented as α, β, etc.

- This assembling of the two attributes is termed dichotomous classification. The number of the observations that have been allocated in the attributes is known as the class frequencies. These class frequencies are symbolically denoted by bracketing the attribute terminologies. (B), for example, stands for the class frequency of the attribute B

Definitions of Hypothesis

"Any supposition which we make in order to endeavour to deduce conclusions in accordance with facts which are known to be real under the idea that if the conclusions to which the hypothesis leads are known truths, the hypothesis itself either must be or at least likely to be true."

- **J.S. Mill**

"A hypothesis is a tentative generalization the validity of which remains to be tested. In its most elementary stage the hypothesis may be any hunch, guess, imaginative idea which becomes basis for further investigation."

- **Lundberg**

"It is a shrewd guess or inference that is formulated and provisionally adopted to explain observed facts or conditions and to guide in further investigation**."**

- **John W. Best**

"A hypothesis is a statement temporarily accepted as true in the light of what is, at the time, known about a phenomenon, and it is employed as a basis for action in the search for new, truth, when the hypothesis is fully established, it may take the form of facts, principles and theories."

Nature of Hypothesis

(i) Conceptual: Some kind of conceptual elements in the framework are involved in a hypothesis.

(ii) Verbal statement in a declarative form: It is a verbal expression of ideas and concepts. It is not merely mental idea but in the verbal form, the idea is ready enough for empirical verification.

(iii) It represents the tentative relationship between two or more variables.

(iv) Forward or future oriented: A hypothesis is future-oriented. It relates to the future verification not the past facts and information.

(v) Pivot of a scientific research: All research activities are designed for verification of hypothesis.

Functions of Hypothesis

(i) It is a temporary solution of a problem concerning with some truth which enables an investigator to start his research works.

(ii) It offers a basis in establishing the specifics what to study for and may provide possible solutions to the problem.

(iii) It may lead to formulate another hypothesis.

(iv) A preliminary hypothesis may take the shape of final hypothesis.

(v) Each hypothesis provides the investigator with definite statement which may be objectively tested and accepted or rejected and leads for interpreting results and drawing conclusions that is related to original purpose.

(vi) It delimits field of the investigation.

(vii) It sensitizes the researcher so that he should work selectively, and have very realistic approach to the problem.

(viii) It offers the simple means for collecting evidences for verification.

Importance of a Hypothesis

(i) Investigator's eyes: Carter V. Good thinks that by guiding the investigator in further investigation hypothesis serves as the investigator's eyes in seeking answers to tentatively adopted generalization**.**

(ii) Focuses research: Without hypothesis, a research is unfocussed research and remains like a random empirical wandering. Hypothesis serves as necessary link between theory and the investigation.

(iii) Clear and specific goals: A well thought out set of hypothesis places clear and specific goals before the research worker and provides him with a basis for selecting sample and research procedure to meet these goals.

(iv) Links together: According to **Barr and Scates**, "It serves the important function of linking together related facts and information and organizing them into wholes."

(v) Prevents blind research: In the words of P.V. Young, ”The use of hypothesis prevents a blind search and indiscriminate gathering of masses of data which may later prove irrelevant to the problem under study."

(vi) Guiding Light: ”A hypothesis serves as powerful beacon that lights the way for the research work.”

(vii) It provides direction to research and prevent the review of irrelevant literature and the collection of useful or excess data.

(viii) It sensitizes the investigator certain aspects of situation which are irrelevant from the standpoint of problem at hand.

(ix) It enables the investigator to understand with greater clarity his problem and its ramification.

(x) It is an indispensible research instrument, for it builds a bridge between the problem and the location of empirical evidence that may solve the problem.

(xi) It provides the investigator with the most efficient instrument for exploring and explaining the unknown facts.

(xii) It provides a frame work for drawing conclusion.

(xiii) It stimulates the investigator for further research.

Forms of Hypothesis

(i) Question form:

A hypothesis stated as a question represents the simplest level of empirical observation. It fails to fit most definitions of hypothesis. It frequently appears in the list. There are cases of simple investigation which can be adequately implemented by raising a question, rather than dichotomizing the hypothesis forms into acceptable / reject able categories.

(ii) Declarative Statement :

A hypothesis developed as a declarative statement provides an anticipated relationship or difference between variables. Such a hypothesis developer has examined existing evidence which led him to believe that a difference may be anticipated as additional evidence. It is merely a declaration of the independent variables effect on the criterion variable.

(iii) Directional Hypothesis :

A directional hypothesis connotes an expected direction in the relationship or difference between variables. This type of hypothesis developer appears more certain of anticipated evidence. If seeking a tenable hypothesis is the general interest of the researcher, this hypothesis is less safe than the others because it reveals two possible conditions. First that the problem of seeking relationship between variables is so obvious that additional evidence is scarcely needed. Secondly, researcher has examined the variables very thoroughly and the available evidence supports the statement of a particular anticipated outcome.

(iv) Non –Directional Hypothesis or Null Hypothesis:

This hypothesis is stated in the null form which is an assertion that no relationship or no difference exists between or among the variables. Null hypothesis is a statistical hypothesis testable within the framework of probability theory. It is a non-directional form of hypothesis. There is a trend to employ or develop null hypothesis in research in most of the disciplines**.** A null hypothesis tentatively states that on the basis of evidence tested there is no difference. If the null hypothesis is rejected, there is a difference but we do not know the alternative or the differences. In this the researcher has not to anticipate or give the rational for the declaration or directional form. It does not make researcher biased or prejudiced. He may be objective about the expected outcomes of the research or findings. Actually this is a statistical hypothesis which is self- explanatory. Null hypothesis means zero hypotheses. A researcher has not to do anything in developing it. While research hypothesis is second step in the process of reflective thinking. A null hypothesis in an appropriate form is order to accommodate the object of inquiry for extracting this information. It does not necessarily reflect the expectations of the researcher so much as the utility of the null form as the best fitted to the logic of chance in statistical knowledge or science.

It is the no difference form, i.e. there is no difference or relationship between or among variables under certain conditions.

Statistical tests of significance are used to accept and reject the null hypothesis. If it is rejected, the general hypothesis is accepted.

Non-directional hypothesis is known as null hypothesis because it 'nullifies' the positive argument of the findings or non-directional statement of the generalization. It is also termed as statistical or zero hypothesis because it denies the existence of any systematic principles apart from the effect of chance. It assumes that none or zero difference exists between the two population means or the treatments.

Fundamental Basis of Hypothesis

The researcher deals with reality on two levels;

1. **The Operational Level**:

On the operational level researcher must define events in observable terms in order to operate with the reality necessary to do researches.

2. The Conceptual Level:

On the conceptual level the researcher must define events in terms of underlying communality with other events. Defining at a conceptual level, the researcher can abstract from single specific to general instance and begin to understand how phenomena operate and variables interrelate. The formulation of a hypothesis very frequently requires going from an operational or concrete level to the conceptual or abstract level. This movement to the conceptual level enables the result to be generalized beyond the specific conditions of a particular study and thus to be of wider applicability.

Research requires the ability to move from the operational to the conceptual level and vice–versa. This ability is required not only in constructing experiments but in applying their findings as well. The process of making conceptual contrasts between operational programme is called conceptualization or dimensionalization.

Difficulties in the Formulation of Useful Hypothesis

Moving from the operational to the conceptual level and vice –versa is a critical ingredient of the research to demonstration process. The following are the difficulties in the formulation of hypothesis:

1. Absence of knowledge of a clear theoretical framework.

2. Lack of ability to make use of the theoretical framework logically.

3. Lack of acquaintance with available research technique resulting in failure to be able to phrase the hypothesis properly