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Research Questions, Hypotheses and Research Designs

1- Research Questions

After formulating a research problem, the main question has to be broken into sub-questions. These sub-questions assist the researcher in viewing the sequence he/she will go through in answering the main question in his investigation as in the present example:

If we ask a builder how to build a house?

The builder, to answer this question, needs to answer the following questions:

1. How can we build a platform?
2. How do we build pillars?
3. How to build a roof and walls?

Thus, the sub-questions help in giving a sequential division of the main problem into steps.

2- Research Hypotheses

A hypothesis is a tentative and conjectural relationship between constructs that is stated in a declarative form. It is a precise, testable statement of what the researcher(s) predict will be the outcome of the study. The stated relationship determines the type of research design. There are many types of hypotheses:

Simple Hypothesis

It shows a relationship between one dependent variable and a single independent variable. For example – If you eat more vegetables, you will lose weight faster. Here, eating more vegetables is an independent variable, while losing weight is the dependent variable.

Complex Hypothesis

It shows the relationship between two or more dependent variables and two or more independent variables. Eating more vegetables and fruits leads to weight loss, glowing skin, reduces the risk of many diseases such as heart disease, high blood pressure and some cancers.

Directional Hypothesis

It shows how a researcher is committed to a particular outcome. The relationship between the variables can also predict its nature. For example- children aged four years eating proper food over a five-year period are having higher IQ levels than children not having a proper meal. This shows the effect and direction of effect.

Non-directional Hypothesis

It is used when there is no theory involved. It is a statement that a relationship exists between two variables, without predicting the exact nature (direction) of the relationship.

Null Hypothesis

It provides the statement which is contrary to the hypothesis. It's a negative statement, and there is no relationship between independent and dependent variables. The symbol is denoted by "HO".

Associative and Causal Hypothesis

Associative hypothesis occurs when there is a change in one variable resulting in a change in the other variable. Whereas, causal hypothesis proposes a cause and effect interaction between two or more variables.

Hypotheses can be strong or weak. "Students' IQ scores are related to their academic achievement" is an example of a weak hypothesis, since it indicates neither the directionality of the hypothesis (i.e., whether the relationship is positive or negative), nor its causality (i.e., whether intelligence causes academic achievement or academic achievement causes intelligence). A stronger hypothesis is "students' IQ scores are positively related to their academic achievement", which indicates the directionality but not the causality. A still better hypothesis is "students' IQ scores have positive effects on their academic achievement", which specifies both the directionality and the causality.

3-Research designs can be classified into two categories – positivist and interpretive – depending on how their goal in scientific research.

1. Positivist designs are meant for theory testing, they include laboratory experiments, field experiments, field surveys, secondary data analysis and case Research. Positivist designs seek generalized patterns based on an objective view of reality.
2. Interpretive designs are meant for theory building, interpretive designs seek subjective interpretations of social phenomena from the perspectives of the subjects involved. Examples of interpretive designs include case research, phenomenology, and ethnography.

Under these designs we can find:

a-Experimental studies: are those that are intended to test cause-effect relationships (hypotheses) in a tightly controlled setting by separating the cause from the effect in time, administering the cause to one group of subjects (the "treatment group") but not to another group ("control group"), and observing how the mean effects vary between subjects in these two groups.

In a true experimental design, subjects must be randomly assigned between each group. If random assignment is not followed, then the design becomes quasi-experimental. Experiments can be conducted in an artificial or laboratory setting such as at a university (laboratory experiments) or in field settings such as in an organization where the phenomenon of interest is actually occurring (field experiments). The primary strength of the experimental design is its strong internal validity due to its ability to isolate, control, and intensively examine a small number of variables, while its primary weakness is limited external generalizability since real life is often more complex than contrived lab settings.

b-Field surveys are non-experimental designs that do not control for or manipulate independent variables or treatments, but measure these variables and test their effects using statistical methods. Field surveys capture snapshots of practices, beliefs, or situations from a random sample of subjects in field settings through a survey questionnaire or less frequently, through a structured interview.

The strengths of field surveys are their external validity (since data is collected in field settings), their ability to capture and control for a large number of variables, and their ability to study a problem from multiple perspectives or using multiple theories

This is in contrast to most other research designs where collecting primary data for research is part of the researcher's job.

c-Secondary data analysis may be an effective means of research where primary data collection is too costly or infeasible, and secondary data is available at a level of analysis suitable for answering the researcher's questions. The limitations of this design are that the data might not have been collected in a systematic or scientific manner and hence unsuitable for scientific research, since the data was collected for a presumably different purpose, they may not adequately address the research questions of interest to the researcher, and interval validity is problematic if the temporal precedence between cause and effect is unclear.

d-Case research is an in-depth investigation of a problem in one or more real-life settings (case sites) over an extended period of time. Data may be collected using a combination of interviews, personal observations, and internal or external documents. Case studies can be positivist in nature (for hypotheses testing) or interpretive (for theory building).

The strength of this research method is its ability to discover a wide variety of social, cultural, and political factors potentially related to the phenomenon of interest that may not be known in advance.

Analysis tends to be qualitative in nature, but heavily contextualized and nuanced. However, interpretation of findings may depend on the observational and integrative ability of the researcher, lack of control may make it difficult to establish causality, and findings from a single case site may not be readily generalized to other case sites.

e-Focus group research is a type of research that involves bringing in a small group of subjects (typically 6 to 10 people) at one location, and having them discuss a phenomenon of interest for a period of 1.5 to 2 hours. The discussion is moderated and led by a trained facilitator, who sets the agenda and poses an initial set of questions for participants, makes sure that ideas and experiences of all participants are represented, and attempts to build a holistic understanding of the problem situation based on participants' comments and experiences.

This method is also suited for studying unique social problems that cannot be replicated outside that context, but it is also subject to researcher bias and subjectivity, and the generalizability of findings is often restricted to the context where the study was conducted.

f-Ethnography is an interpretive research design inspired by anthropology that emphasizes that research phenomenon must be studied within the context of its culture. The researcher is deeply immersed in a certain culture over an extended period of time (8 months to 2 years), and during that period, engages, observes, and records the daily life of the studied culture, and theorizes about the evolution and behaviors in that culture. Data is collected primarily via observational techniques, formal and informal interaction with participants in that culture, and personal field notes, while data analysis involves "sense-making". The researcher must narrate her experience in great detail so that readers may experience that same culture without necessarily being there. The advantages of this approach are its sensitiveness to the context, the rich and nuanced understanding it generates, and minimal respondent bias. However, this is also an extremely time and resource-intensive approach, and findings are specific to a given culture and less generalizable to other cultures.