Other views on testing

According to Black and Champion (1976:141), "testing hypothesis is subjecting it to some sort of *empirical scrutiny* to determine if it is supported or refuted by what the researcher observes". They hold that what is needed for testing are: (i) real situation that will suffice as a reasonable testing ground for the hypothesis, e.g., managerial behaviour (good organisation), getting access to data, and (ii) researcher should make sure that his hypothesis is testable.

According to Goode and Hatt (1952:74), hypothesis has to be empirically demonstrated. It requires a logical proof. Basic designs for logical proof were formulated by John Stuart Mill and these still remain the foundation of experimental procedures (though some refinements have been made). His analysis provides two methods: (1) method of agreement which includes (a) method of logic, and (b) classical method; and (2) method of difference. According to method of *logic*, when two or more cases of a given phenomenon (say A and B factories) have only one condition (say, absenteeism of temporary staff) in common, then what condition is to be regarded as the cause of the phenomenon? This is explained diagrammatically below:

Logic Method in Testing Hypothesis

- Phenomenon: Loss in production
- Cases (two or more): A and B factories
- Common condition in two situations: Absenteeism of temporary workers
- Two situations:

Situation 'X' [A | B | C] : produce 'Z'

Situation 'Y' [C | D | E] : produce 'Z'

Therefore, 'C' produces 'Z'
or 'C' and 'Z' are causally related

(causes absenteeism) (affects loss)

The above method is based on logic than on accuracy. Though this method is weak, yet it is useful because: (i) it rules out role of various factors (i.e., irrelevant factors) in phenomenon, (ii) it points out common factor, and (iii) it allows us to point out that a certain specific factor always occurs in certain specific phenomena. The weaknesses in this method are: (i) it is common sense reasoning; (ii) some factors may not even be considered even though they may be of importance (as cause); (iii) it is possible that the pointed out specific factor may operate only when other factors are present; and (iv) phenomenon may be the result of one factor in one case and other factor in other case.

The method of *difference* may be explained through the following illustration:

'Difference' Method in Testing Hypothesis

- Two situations

Situation 'X' | A | B | C | (produce 'Z')

Situation 'Y' | A | B | Non C | (produce 'Z')

(i.e., not loss in production in above example but bad quality of production)

∴ C produces Z

- Two cases

In one case observation 'Z' is made
In other case, observation 'Z' cannot be made
i.e. 'C' occurs in 'Z'but 'C' does not occur
when observation 'Z' is not made
This shows that 'C' and 'Z' are related

- Two observations
- first observation indicates that 'C' could cause 'Z'
- second observation indicates that other factors could not cause 'Z'

Errors in testing hypotheses

Many a time it so happens that the hypothesis (research or null) is true but we reject it, or the hypothesis is not proved but we accept it. In both cases, we have committed an error. Rejecting a true hypothesis is referred to as type I error and failing to reject a false hypothesis is called type II error. The first is designated as alpha error and the second as beta error (Black and Champion, 1976:145-146). Eliminating both errors is not possible but minimising both errors is possible. The alpha error lies under the direct control of the researcher and it can be minimised by changing the significance level (say, from .01 to 0.5 or to 1.0). The beta error is indirectly controlled by the researcher and it can be reduced by controlling the sample.

Changing one type of error will always cause a change in the other type. If one is minimised, the other is increased, or if one is increased, the other will be decreased. We can give an illustration to explain this. Suppose our null hypothesis is that the mean income of a group of persons is Rs. 1,000 per month (H_0: $\overline{x}$ = 1000), whereas the alternative hypothesis is that the mean income is not Rs. 1,000 per month (H_1: $\overline{x}$ # 1000). We are making the hypothesis test at the 0.05 level of significance (i.e., there is a 5% chance that our hypothesis will be wrong). The decision is to reject H_0 in support of H_1, according to our data. We conclude that $\overline{x}$ # 1000. According to probability, five times in 100 we could be wrong in rejecting H_0, possibly a true hypothesis. Levels of significance, thus, assist us to be more objective about our observations and the interpretation.

The sampling is another important decision that preceeds tests of hypotheses. Suppose our sample is 10 students from a total population of 100 students and, we compute mean marks secured by this sample. Let us then replace this sample in its original population and draw another 10 students from the universe. We can compute the mean marks of the new sample. If we continue this until we have obtained all possible different samples that could be drawn theoretically, the new mean would differ from the previously computed sample. Each mean figure would be closer to or away from the true mean than the others. Because we have no way of determining the true figure of mean marks without getting marks of all the 100 students, each sample estimate is as good as another. If we arrange these means from smallest to largest, we could then calculate the average of these means which will be a true mean. All this points out that when statistical hypotheses are tested, the used sampling distributions will enable us to make probability statements about the accuracy with which sample statistics reflect population values of which they are estimates. The researcher is in a position to know from a probability standpoint, how much error is involved in any decision to reject or not to reject some hypothesis.

CRITICISM OF HYPOTHESES

Some scholars have argued that each study needs a hypothesis. N only exploratory and explanatory researches but even the descripti studies can benefit from the formulation of a hypothesis. But son other scholars have criticised this position. They argue that hypoth ses make no positive contribution to the research process. On tl contrary, they may bias the researchers in their data collection an data analysis. They may restrict their scope and limit their approacl They may even predetermine the outcome of the research study.

Qualitative researchers argue that although hypotheses are impo tant tools of social research, they must not precede the research bu rather result from an investigation.

Despite these two contradictory arguments, many investigato use hypotheses in their research implicitly or explicitly. The greate advantage is that they not only guide in goals of research but help i concentrating on the important aspects of the research topic by avoic ing less significant issues.

Further Readings

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