CHAPTER 2

SCIENTIFIC INVESTIGATION

Instructional Goals

1. To help participants comprehend that scientific research offers assurance to the manager that the results of a study can be relied upon and further action can be taken at low risk.
2. To impress on the students that business research, however rigorously conducted, cannot produce 100 percent scientific results in terms of precise solutions.
3. To sensitize participants to being watchful about observing the different cues in the environment which offer some idea of a gap in the desired and actual state of affairs.
4. To help students *understand* that applied research, though limited in generalizability, still has to be "scientific".

Discussion Questions

The first two questions are straightforward and the answers may be extracted from the text.

3. One hears the word research being mentioned by several groups such as research organizations, college and university professors, doctoral students, graduate assistants working for faculty, graduate and undergraduate students doing their term papers, research departments in industries, newspaper reporters, journalists, lawyers, doctors, and several other professionals and nonprofessionals. In the light of what you have learned in this unit, how would you rank the aforementioned groups of people in terms of the extent to which they might be doing "scientific" investigations? Why?

To the extent that any of the above groups conforms to the hallmarks of science, they would be doing scientific investigation. It is quite possible that poor research is done by research agencies, and excellent research is conducted by a graduate assistant. The ultimate test is the rigor of the research which would lend itself to testability, replicability, accuracy and precision, generalizability, objectivity, and

parsimony.

Research organizations and research departments in industries engage themselves in both basic and applied research and usually have the resources required to conduct scientific investigations using rigorous data collection methods, sampling designs, and data analysis. Most professors in colleges and universities are well trained to conduct scientific investigations, though their resources may not, in most cases, be as plentiful as that made available in research organizations and research departments. Because of restricted resources, professors may have to compromise somewhat on methodological rigor (e.g. use a small sample) which might restrict the generalizability of their findings. However, their research might otherwise be scientific. Applied researchers doing action-oriented research, are somewhat restricted in even disseminating information about their findings due to the localized nature of their inquiry which may not pass many of the criteria of the hallmarks of science. Doctoral dissertations conducted under able guidance and supervision quite frequently make valuable contributions to the body of existing knowledge. Much of this research is later published as journal articles, and some get published as books because of their contributions to knowledge.

Students' term papers are meant to be exercises in skill development for integrating materials and communicating ideas in written form. Exceptional research papers, when refined and published, could qualify for being termed as scientific investigations. Newspaper reporters and journalists may obtain extensive primary and secondary data but their investigations are confined to a narrow range of current incidents, events, or individuals, which are of passing interest with little generalizability to other times, events or individuals. Hence, they cannot ordinarily be termed scientific investigations. Some newspaper articles, however – as for instance, economic and environmental investigations – provide data, analysis of data, and valid conclusions drawn there from, which might later be used as secondary data by other researchers. These would be categorized as more scientific in contrast to articles or editorials in the paper.

Academic journals usually publish articles that are scientific and some of the practitioner-oriented articles are probably somewhat less scientific than the academic articles in terms of rigor and generalizability. To the extent that lawyers, doctors, professionals and nonprofessionals present their findings that have wide testability, replicability, generalizability, accuracy and precision, objectivity, and parsimony, they will be scientific. However, if these investigations are confined to single cases, incidents, or individuals, they cannot be called scientific investigations despite the fact that they may be found useful.

4. Explain the processes of deduction and induction, giving an example of each.

The hypothetico-deductive method of research helps the researcher to deduce or infer from the results of data analysis and hence is the deductive process. For example, if as a result of analysis of data collected, one infers that the problem of

turnover can be minimized by three important factors: (i) flexible work hours; (ii) recognition of superior performance of workers through suitable merit pay raises; and (iii) enriching certain types of jobs, this is the deductive approach.

Induction is a process of drawing inferences from observed phenomena which may subsequently be put to the test through hypothetico-deductive method of research. For instance, if a manager observes that people residing at distances beyond 50 miles from the workplace remain absent more frequently than those he knows to reside close by, and infers thereby that distance is a factor in absenteeism, this is an inductive process.

5. If research in the management area cannot be 100 percent scientific, why bother to do it at all? Comment on this statement.

Research in the management area dealing with human behavior cannot be 100 percent scientific. However, such research is necessary and useful for detecting problems and coming up with solutions to ensure that problems do not get out of control. Management research makes a valuable contribution inasmuch that it can help organizations function smoothly and effectively and help managers and individuals at all levels in organizations experience and enjoy a better quality of life.

6. Critique the following research done in a service industry as to the extent to which it meets the hallmarks of scientific investigation discussed in this chapter.

> **The Friendly Telephone Company**
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> Customer complaints were mounting, and letters of complaint regarding the problems they experienced with the residential telephone lines were constantly pouring in at the Friendly Telephone Company. The company wanted to pinpoint the specific problems and take corrective action.
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> Researchers were called in, and they spoke to a number of customers, noting down the nature of the specific problems they faced. Since the problem had to be attended to very quickly, they developed a theoretical base, collected relevant detailed information from a sample of 100 customers, and analyzed the data. The results are expected to be fairly accurate with at least an 85% chance of success in problem solving. The researchers will make recommendations to the company based on the results of data analysis.

The hallmarks of science are purposiveness, rigor, testability, replicability, precision and confidence, objectivity, generalizability, and parsimony. This study meets the basic criterion of purposiveness. It cannot be called a rigorous study inasmuch as a theoretical framework seems to have been formulated merely on the basis of conversation with a number of customers and no scientific data seems to have been collected thereafter. For this reason, the replicability and generalizability criteria also suffer. With customer complaints mounting, an 85% confidence level may not suffice. Unless we know the theoretical base, we cannot be sure that the

criterion of parsimony is met. All in all, this is a good example of a non-scientific investigation.

7. Strictly speaking, would case studies be considered as scientific research? Why or why not?

Case studies cannot be considered scientific since they do not subscribe to most of the hallmarks of scientific research. Though they may be purposive and parsimonious, they are not rigorous. Testability and replicability are difficult and generalizability is virtually non-existent since each case situation is unique.

8. What is Action Research? Describe a specific situation where action research will be warranted.

Action research is undertaken when incremental planned changes are contemplated in a system. It is a process of trial and error where tentative solutions are generated to test out how well they work. Modifications are undertaken as each step in the change process and its consequences are evaluated.

An example would portray that of an organization wanting to attain a certain goal (shooting for a star) and taking incremental steps to reach the goal, one step at a time. Specifically, a company could be aiming for near zero turnover of its staff. It could try increasing the perks by first offering day care facilities and watch its effects. Then it might give more vacation time, and then enhance pay, and so on.

The Dilemmas of Dorothy Dunning

Dorothy Dunning, Chief Production Manager, was on top of the world just two years ago. In her nontraditional job, she was cited to be the real backbone of the company, and her performance was in no small measure responsible for the mergers the institution was contemplating with other well-known global corporations.

Of late though, the products of the company had to be recalled several times owing to safety concerns. Quality glitches and production delays also plagued the company.

To project a good image to consumers, Dunning developed a very reassuring web site and made sweeping changes in the manufacturing processes to enhance the quality of the product, minimize defects, and enhance the efficiency of the workers.

A year after all these changes, the company continues to recall defective products!

Creating a web site and making sweeping changes has not produced the desired results. The real problem is undetected and can only be identified through research. Maybe, the problem is not in the manufacturing processes, but the low motivation of employees! A scientific research of the problem situation will help to pinpoint the problem and solve it.