We can point out one more example. The researcher wants to describe the increasing political participation of women in India. He collects information about the number of women candidates elected in 13 Lok Sabha elections from 1952 to 1999. He finds that out of 499-543 seats (varying in different elections), women got 22 seats in 1952, 27 in 1957, 34 in 1962, 31 in 1967, 22 in 1971, 19 in 1977, 28 in 1980, 44 in 1984, 27 in 1989, 39 in 1991, 40 in 1996, 43 in 1998 and 46 in 1999 (*India Today*, September 13, 1999:24) He thus describes the increase in women's political participation from 1984 onwards. However, comparing women's rank in India in four different areas with those of six other countries, he finds that women's ranking in India is not high.

Country	*Seats in Parliament*	*Administrators and Managers*	*Professional and Technical Workers*	*Central Ministers (in 1998)*
India	8.8	2.3	20.5	9.0
U.S.	11.2	42.0	52.0	21.1
Japan	7.7	8.5	41.8	6.7
Sweden	40.4	38.9	64.4	47.8
Iran	4.0	3.5	32.6	0.0
Bangladesh	9.1	5.1	23.1	5.0
Pakistan	3.4	3.4	20.1	4.0

Source: *India Today*, July 27, 1998.

Another example of descriptive study is the census in India. The census data describe accurately and precisely a wide variety of characteristics of the population as well as the population of different states and different communities. The 2001 census, started from February 8, 2001 also aims at this description.

The voting forecast given on the basis of survey conducted by different organisations/TV channels before and after the parliamentary elections (including the exit poll in the 13th Lok Sabha elections) described the voting pattern of the electorate. The productive marketing survey also describes people who use or would use a particular product. Social anthropologists give details of particular culture of some tribal society.

Explanatory or causal research

This research explains the causes of social phenomena. Describing the magnitude and nature of crimes committed by females in India is one aspect of female crime but why do they commit crime is its explanatory aspect. Similarly, why is rural poverty not being eliminated, why do some states (like Rajasthan, Gujarat, Andhra Pradesh, etc.) face frequent droughts, why and how communal riots take place, why do students agitate—all these are the explanatory studies. In simple terms, explanatory research aims at establishing a relationship between variables, i.e., how one is the cause of other or how when one variable occurs the other will also occur. Explaining relationship between broken families and juvenile delinquency, or between drug abuse and lack of family control or between students' strike in the college and apathy to solving students' grievances are some examples of explanatory or causal research.

Although it is useful to distinguish between the three types or three purposes of research, it must be stated that some studies may have all the three elements.

Pure research

This research, also called basic research, is concerned with quest for knowledge and knowing more about the phenomenon without concern for its practical use and also with developing and testing hypotheses and theories. It is said, there is nothing so practical as a good theory. For example, developing a theory pertaining to the functioning of group mind (collective behaviour) or group dynamics. This type of research is also used to reject or support the existing theories about social phenomena.

Applied research

This research is concerned with search for ways of using scientific knowledge to solve practical problems. It focuses on analysing and solving social and real-life problems. The findings become basis of framing programmes and policies, based on principles of pure research. According to Horton and Hunt (op. cit.: 37), this research is an investigation for ways of using scientific knowledge to solve practical problems. Because this research is generally conducted on large-scale basis, it is expensive. As such, it is often conducted with the

support of some financing agency like government, public corporation, World Bank, UNICEF, UGC, ICSSR, etc. Many a time, this type of research is conducted on interdisciplinary basis also.

A sociologist who seeks to find out why crime is committed or how a person becomes a criminal is working for a *pure* research. If this sociologist then tries to find out how a criminal can be rehabilitated and his deviant behaviour can be controlled is doing *applied* research. A sociologist making a study of nature and extent of drug abuse among truck and auto-rikshaw drivers or among industrial workers is working for pure research. If this is followed by a study of how to reduce drug abuse among these people, it will be applied research. Thus, practical application of sociological knowledge is becoming common as it is believed that on many social questions, there is considerable scientific knowledge within the social sciences.

Research can also be of following types:

- *Experimental research*: which is conducted by controlling one or more variables and comparing control and experimental groups.
- *Evaluation research*: which is a study measuring the effectiveness of an action programme, e.g., research conducted by this author in 1988-89 on the evaluation of the working of voluntary organisations in Rajasthan getting financial assistance from the Ministry of Welfare, Government of India for the rehabilitation of physically handicapped persons.

In past one or two decades, many organisations, industrial corporations and even government bodies have started employing sociologists in evaluation research. Some recent examples are associating sociologists with studies of evaluating rural poverty for sustainable development (in Rajasthan by World Bank), for studying management of canal water for irrigation, purposes through people's associations (in Rajasthan by the World Bank), for studying impact of cyclones and rehabitation of affected people in coastal areas (in Andhra Pradesh and Orissa by the World Bank), drug abuse, slums, alcoholism, slum areas, inter-caste and inter-communal conflicts and evaluation of organisations getting funds from the government.

Quantitative research

This research employs quantitative measurement and the use of statistical analysis. For example, what percentage of medical engineering, law, arts, science and commerce students take drugs or use alcohol?

What percentage of prisoners reject prison norms and internalise norms of the inmate world? What percentage of women leading unhappy marital life take initiative to divorce their husband? What was the cost of poll violence (in crores) in Lok Sabha elections in last seven elections (between 1980 and 1999) in India? How many mandays have been lost due to strikes and lockouts in industries in India in last two decades? This type of research is based on the methodological principles of positivism and adheres to the standards of strict sampling and research design.

Qualitative research

This research presents non-quantitative type of analysis. It describes reality as experienced by the groups, communities, individuals etc. For example, how does the structure and organisation of wall-less prisons (or minimum security jails) differ from that of the central or district jails (or maximum security jails) and contribute to the reformation and resocialisation of criminals? What has been the partywise stand on women's reservation in parliament and state assemblies?

Comparative research

In this research, the similarities and differences between different units or cultural or social groups are studied. For example, comparing marriage system of Hindus with Muslims, art and culture of tribals with non-tribals, customs and social practices of rural people with urban people, the difference between Indian family and American family, nature and causes of crimes committed by females in India with those of females in America, England, Canada, etc.

Longitudinal research

This involves the study of the problem or the same body of phenomenon over a period of time. For example, prevalence of AIDS among males and females in India in 1979, 1989 and 1999. Such studies indicate the trend.

The research can also be *cross-sectional*. This study covers a broad range of phenomena at a single-point in time, e.g., study of 410 households conducted by I.P. Desai in Gujarat.

We may add two more types of research to these types, i.e. *prospective research* which is a research that follows the same body of

phenomena forward through a period of time, beginning with the present and the *retrospective research*, which studies a body of phenomena, working backward from the present over a period of time.

METHODS OF SCIENTIFIC RESEARCH

Before analysing methods, it is necessary to understand difference between 'scientific method' and 'scientific methodology'. *Method* is a tool or a technique used to collect data. It is procedure for obtaining knowledge based on empirical observations and logical reasoning. *Methodology* is a logic of scientific investigation. *Methodology* means description, explanation and justification of methods and not the methods themselves. When we talk of methodology of any social science, say of sociology, we refer to the method(s) used by sociologists, e.g., survey method, experimental method, case-study method, statistical method and so on. The word 'technique' is also used in the contexts of inquiry in any science, e.g., techniques in a mass opinion survey, for conducting interviews, for observation, and so on. There is a right way and a wrong way or a good way and a bad way to do anything in science as in any other work. The techniques of a science are the ways of doing the work of that science. Methodology is concerned with techniques in this sense. It (methodology) inquires into the potentialities and limitations of some technique or other. It is a plan and procedure for carrying out the research. It refers to research techniques and strategies for obtaining valid information. It is an approach to understanding phenomenon. It is a procedure of empirical investigation. It is not concerned with building knowledge but how knowledge is built, i.e., how facts are collected, classified and analysed.

The approach of a social scientist is different from that of a natural scientist. A natural scientist (i) does not participate in the phenomenon he studies, (ii) does not interview elements, (iii) has a laboratory for conducting experiments, (iv) uses instruments and chemicals, and (v) can control many variables in his experiment. Against this, a social scientist (i) participates in the phenomenon under study, (ii) interviews elements from whom collects data, (iii) has no laboratory, (iv) does not use any instruments for measuring etc., like barometers and so on, and (v) cannot control many variables.

Thus, the difference in the approach of two scientists is of *methodology* and not *method*. Methodology refers to *philosophy* on which

research is based. This philosophy includes assumptions and values that serve as basis (rationale) for research and are used for interviewing data and reaching conclusions. It is said that the methodology used in natural sciences is more rigorous than that of social sciences.

One view expressed is that research techniques used in physical sciences cannot be used in social sciences. Thus, sciences which do not use methods of physical sciences are not really scientific. Here science is presented as an ideology, embodying the highest *values*. This is called *scienticism*. It is used as a term of criticism directed towards the view that science can provide mankind with an all-embracing philosophy of life and the solution to all problems. However, the view that social sciences are not scientific because they do not use techniques of physical sciences is a very old view which represents only a type of traditionalism. Techniques and methods used in empirical phenomena in social sciences are crucial in scientific work and thought.

Methods of Research

Field study method	in which subjects are observed under their usual environmental conditions of life rather than under laboratory conditions. The subjects may or may not be aware of being observed. Often interviews are used in this method
Experimental method	in which variables being studied are controlled by the investigator. In other words, the effect of one variable is observed while other relevant variables are held constant.
Survey method	in which a systematic study of a particular community or a group or an institution is made for analysing the problem/issue/ event.
Case study method	in which phenomenon is studied through thorough/intensive/ in-depth analysis of the cases, i.e. an individual, group, community, episode or any other unit of social life. Variety of facts are related to a single case.
Statistical method	in which data is collected quantitatively or by statistics. A statistics may be a measure of central tendency of dispersion of correlation of a difference between two samples
Historical method	in which information is collected about the past from written records of all types, reports, documents, newspapers, diaries, travelers' accounts, etc.
Evolutionary method	in which change is studied in stages through time from earlier and generally simpler forms through a long series of small changes. Each change results in minor modification but the cumulative effect of many changes over a long period of time in the emergence of more complex forms

With above difference in method and methodology, we can now take up methods of scientific research. Broadly speaking, there are several methods of conducting a scientific research in sociology. These are: (1) field study method, (2) experimental method, (3) survey method, (4) case study method, (5) statistical method, (6) historical method, and (7) evolutionary method.

Field study method

This is the method which involves direct study of field situations. Though this method has broken down the narrow walls of the traditional experimental laboratory in research on complex problems of human relationships but it permits the introduction of controls into the data collection. There is difference between the field study method and survey method. Survey has a greater scope while field study has greater depth. While survey always attempts to be representative of some known universe, a field study may or may not involve sampling. The field study is concerned with a thorough account of the processes under investigation (say, study of poverty and unemployment in the village) than with their typicality in a larger universe. In survey, we always ask about the distribution of social variables in the larger group with which we are concerned. For example, in a survey of unemployment in the whole country, the country is so sampled that all subgroups are properly represented and the relative weightage of factors, as they contribute to the total outcome, is ascertained. Other difference between survey and field study method is that in field investigation, we study a single community or a single group in terms of its social structure, i.e., the interrelations of the parts of the structure. Thus, a field study provides a more detailed and a more natural picture of the social interrelationships of the group than does the survey.

We can take one example to understand the difference in the two methods—that of attitudes towards family planning. In survey method, the whole nation or whole state or whole city may be covered. The cross-section survey would seek to get account of the distribution of these attitudes among the subgroups in the population. The sub-groups may be rural and urban people, males and females, educated and illiterate, poor and rich, Hindus and Muslims, and so forth. A field study concerned with the same problem might deal with a single village. Obviously, the field study and national/state survey

are not so much alternative ways of studying problems but they are supplementary procedures which can be used most effectively in combination. The two major advantages, according to Festinger and Katz (1953:58) are: (i) we can assess as to what extent the degree of generality from the findings of the field study of specific situation fits into the national pattern. This will help in interpreting the findings more wisely; (ii) both the survey and the field study produce findings for hypotheses which can be more adequately tested by use of other approach.

Field study method is used more by social anthropologists for functional analysis of simple societies while the sociologists find survey method more useful. Malinowsky, M.N. Srinivas, Andre Beteille, S.C. Dube, and a few others used field studies in their researches while R.K. Mukerjee, I.P. Desai, M.S. Gore, K.M. Kapadia, Aileen Ross, Sachchidanand, A.M. Shah, etc., used survey method in the study of family in India.

Festinger and Katz (1953:65) have described following six steps in the conduct of a field study:

- *Preliminary planning:* deciding scope and objectives of study and the time-table of stages.
- *The scouting expedition:* by either living in the group or making frequent trips, the researcher explores the significant variables in the situation and the types of instruments to be constructed. In this phase, the fieldworker makes unlimited contacts with wider segments of informants, seeks informants who have a wide range of contacts, locates formal and informal leaders, spends considerable time in participant observation and studies available records and secondary sources of information.
- *Formation of the research design:* the design for final study is marked out. These designs are usually exploratory and hypotheses-testing.
- *Presenting of research instruments and procedure*: like interview schedules, questionnaires, behavioural scales and other methods of getting information.
- *Full-scale field operation:* sometimes the actual fieldwork may require new instruments and new hypotheses. The personnel and skill of a field worker differ from the requirements of a large-scale survey.
- *The analysis materials*: obtains frequency distribution on all measures, uses correlational analysis, and interprets findings.

Experimental method

This method includes field experiment as well as laboratory experimentation. In field experiment, the study is conducted by comparing experimental group with the control group. In laboratory experiment, the investigator creates a situation with the exact conditions he wants to have and in which he controls some and manipulates other variables. He then observes and measures the effect of the manipulation of the independent variables on the dependent variables in a situation in which the operation of other relevant factors is held to a minimum. For example, field experiment can be conducted in an industry. By providing several facilities (like housing, loan, educational, recreational, profit-sharing, etc.) its impact can be seen on increase in productivity. One example of laboratory experiment is Festinger's study of voting behaviour in 1947. In this experiment (quoted by Festinger and Katz, 1953: 138-139) an attempt was made to vary a single factor, namely, whether or not the subjects knew the religious affiliation of other members of the group. Groups were first set up in which every member of the group was initially a stranger to every other member. Exactly comparable conditions were created for each group. The nominees for whom the subjects voted were participants whose behaviour was standardised. These same participants identified themselves as having different religions in different experimental groups, thus controlling personality factors and first impressions. The results obtained showed direct relationship with the variable manipulated (i.e., religion).

Techniques of manipulation or control of variables can be introduced at almost any stage in the laboratory experiment, say, decision about the subjects, composition or size of the group, duration of existence, variable to be manipulated, and so forth. However, laboratory experiments do not represent an easy road to the collection of data for the resolution of theoretical problems.

Before-after experiment is a type of controlled experiment in which both the experimental group and the control group are measured with respect to the dependent variable (the factor that is expected to change) before as well as after the exposure to the independent variable (the experimental treatment). The before-after type of experiment sometimes is conducted without a separate control group. In this case, the same group is compared before and after the experimental treatment, the group before the treatment serving in effect as the control

group. We can take the example of studying the voting behaviour of people in four *dhanis* (areas) A, B, C and D in a village. People in all the four *dhanis* in the village are approached by a group of people for voting a particular candidate in the state legislature election. Selected information is given to the villagers in all the four *dhanis* about this candidate. A poll is conducted in the four *dhanis* to find out the percentage of people who will vote for this candidate. In coming week, the villagers in two *dhanis* A and B are given new information about the candidate that he has a criminal record, that he has association with anti-social elements, that he owns a 'sena' who members possess weapons and coerce people for a particular action, that he is a womaniser and a corrupt person and so on. The poll is once again conducted in all the four *dhanis* after supplying this information regarding the possibility of percentage of people voting for this candidate.

After this second poll, yet more information is supplied to villagers in the two earlier *dhanis* A and B about the candidate that he is very close to the chief minister of the state, that he has contacts with important state and central leaders, that he has the possibility of being appointed as a minister after the election, that he will arrange for canal irrigation facility for the village cultivators, that he will get all roads *pakka* linked with near-by town and so on. The third poll is then taken in all the four *dhanis* to find out change in the possibility of getting vote percentage by this candidate. In this experiment, different information was supplied to the villagers in two *dhanis* A and B on three different occasions and then the poll was conducted and effect of good and bad information about the candidate on the voting possibility of the villagers was studied. This explains before-after experiment. Here, the dependent variable is voting behaviour, the control groups are C and D *dhanis* and the experimental groups are A and B *dhanis*. By comparing the percentage of people who are likely to vote in favour of the candidate in C and D *dhanis* (controlled groups) with those in A and B *dhanis* (experimental groups), we can measure change in the percentage of voters.

Survey method

This method involves a systematic and comprehensive study of a particular community, organisation, group, etc., with a view to the analysis of a social problem and the presentation of recommendations