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CONTRIBUTIONS AND CRITICISMS OF DIFFUSION RESEARCH

> Innovation has emerged over the last decade as possibly the most fashionable of social science areas.
> George W. Downs and Lawrence B. Mohr, “Conceptual Issues in the Study of Innovations” (1976), p. 700.

This chapter reviews the main critiques of diffusion research and points out directions for possible amelioration of current weaknesses. What are the assumptions and biases of diffusion research? How has acceptance of the classical diffusion model limited the originality and appropriateness of diffusion researches? Starting in the 1970s, certain observers began to raise criticisms of diffusion theory. These criticisms should be taken seriously, for they offer directions for future improvement of this well-established field. Despite these criticisms, we should not forget that diffusion research has reached a point at which its contributions are highly regarded, both in providing theoretical understanding of human behavior change and in bringing about more effective programs of social change around the world.

The Status of Diffusion Research Today

The contributions of diffusion research today are impressive. For recent decades the results of diffusion research have been incorporated into basic textbooks in social psychology, communication, public relations, advertising, marketing, consumer behavior, public health, rural sociology, and other fields. Articles reporting diffusion research have appeared in the top journals of every discipline. Both practitioners (like change agents) and theoreticians regard the diffusion of innovations as a useful field of social science knowledge. Several U.S. government agencies have a division devoted to diffusing technological innovations to the public or to local governments. These federal agencies also sponsor research on diffusion, as do private foundations. Federal R&D laboratories in the United States are required by law to transfer their technologies to private companies, which commercialize these technological innovations into new products that are then sold in the marketplace. Most commercial companies have a marketing department that is responsible for diffusing new products and a market research arm that conducts diffusion investigations to aid the company’s marketing efforts. Because innovation occurs so frequently in modern society, the applications of diffusion theory and research are found on all sides.

Diffusion research has achieved a prominent position today. But such was not always the case. Almost four decades in the past, two members of the diffusion research fraternity, Frederick Fliegel and Joseph Kivlin (1966b), complained that “Diffusion of innovation has the status of a bastard child with respect to the parent interests in social and cultural change: Too big to ignore but unlikely to be given full recognition.” The status of diffusion research has improved considerably in the eyes of academic scholars since the Fliegel and Kivlin assessment. “Innovation has emerged over the last decade as possibly the most fashionable of social science areas,” said Downs and Mohr (1976), as quoted at the beginning of this chapter. They continued, “This popularity is not surprising. The investigations by innovation research of the salient behavior of individuals, organizations, and political parties can have significant social consequences. [These studies] imbue even the most obscure piece of research with generalizability that has become rare as social science becomes increasingly specialized.”

What is the appeal of diffusion research to scholars, to sponsors of such research, and to students, practitioners, and policy makers who use the results of diffusion research? Why has so much diffusion literature

been produced?

1. The diffusion model is a conceptual paradigm with relevance for many disciplines. The multidisciplinary nature of diffusion research cuts across various scientific fields. A diffusion approach provides a common conceptual ground that bridges these divergent disciplines and methodologies. There are few disciplinary limits as to who studies innovation, as we saw in Chapter 2. Most social scientists are interested in social change, and diffusion research offers a particularly useful means of gaining an understanding of change because innovations are a type of communication message whose effects are relatively easy to isolate. Diffusion study thus is something like the use of radioactive tracers in studying the process of plant growth: it helps illuminate processes.

   One can understand social change processes more accurately if the spread of a new idea is followed over time as it courses through the structure of a social system. Because of their salience, innovations usually leave deep etchings in individuals' minds, thus aiding their recall. The process of behavior change is identified in a distinctive way by the diffusion research approach, especially in terms of concepts such as information and uncertainty (see Chapter 1). The focus of diffusion research on tracing the spread of an innovation through a system over time and/or across space has the unique quality of giving "life" to a behavioral change process. Conceptual and analytical strength is gained by incorporating time as an essential element in the analysis of human behavior change.

   Diffusion research offers something of value to each of the social science disciplines. Economists are centrally interested in growth, and technological innovation is an important variable for increasing the rate of economic growth in a society. Students of organization are concerned with processes of change within formal institutions, and in how an organizational structure is altered by the introduction of a new technology. Social psychologists try to understand the process of human behavior change, especially as such individual change is influenced by groups and networks to which the individual belongs. Sociologists and anthropologists share an academic interest in social change, although they use different methodological tools. Political scientists study policy changes, such as how no-smoking ordinances or other policies are accepted and implemented by city councils. The exchange of information in order to reduce uncertainty is central to communication study. So the diffusion of innovations is of note to each of the social sciences.
2. Diffusion research has a pragmatic appeal in getting research results utilized. The diffusion approach promises a means to provide solutions (1) to individuals and/or organizations who have invested in research on some topic and seek to get the scientific findings utilized and/or (2) those who desire to use the research results of others to solve a particular social problem or to fulfill a need. The diffusion approach helps connect research-based innovations with the potential users of such innovations in a knowledge-utilization process (Rogers et al., in press).
3. The diffusion paradigm allows scholars to repackage their empirical findings in the form of higher-level generalizations of a more theoretical nature, as Downs and Mohr (1976), quoted previously, implied. Such an orderly procedure in the growth of the diffusion research field allowed it to gradually accumulate empirical evidence. Were it not for the general directions for research provided by the diffusion paradigm, the impressive amount of research attention given to studying diffusion would amount to much less by way of distilled understandings. Without the diffusion model, this huge body of completed research might just be "a mile wide and an inch deep." The diffusion paradigm provided a basis for creating a coherent body of generalizations, which can be applied to specific cases. In fact, numerous studies were completed prior to the Ryan and Gross (1943) hybrid seed corn study, but they did not add up to much, due to lack of a paradigm.
4. The research methodology implied by the classical diffusion model is clear cut and relatively facile. The data are not especially difficult to gather, and the methods of data analysis are well laid out. Diffusion scholars have focused especially on characteristics related to individual innovativeness through cross-sectional analysis of survey data. Although the methodological straighforwardness of such diffusion studies encouraged many scholars to undertake such investigation, it may also have restricted their theoretical advance.

Criticisms of Diffusion Research

Although diffusion research has made numerous important contributions to our understanding of human behavior change, its potential would be even greater were it not for certain shortcomings and biases. If the 1940s marked the original formulation of the diffusion paradigm, the 1950s were a time of proliferation of diffusion studies in the United States, the 1960s involved the expansion of such research into developing nations (see Chapter 2), and the 1970s were the beginnings of introspective criticism of diffusion research. Until the 1970s, almost nothing of a critical nature was written about the diffusion field. Such absence of critical viewpoints may have indeed been the greatest weakness of diffusion research.

Every scientific field makes certain simplifying assumptions about the complex reality that it studies. Such assumptions are built into the intellectual paradigm that guides a scientific field. Often these assumptions are not recognized, even though they affect such important matters as what is studied and what ignored, and which research methods are favored and which rejected. So when a scientist follows a theoretical paradigm, a set of intellectual blinders prevents him or her from seeing certain aspects of reality. "The prejudice of [research] training is always a certain 'trained incapacity': The more we know about how to do something, the harder it is to learn how to do it differently" (Kaplan, 1964, p. 31). Such trained incapacity is, to a certain extent, necessary. Without it, a scientist could not cope with the vast uncertainties of the research process in a chosen field of study. Every research worker, and every field of science, has blind spots. They necessarily accompany a dominant paradigm.

The growth and development of a research field are a gradual puzzle-solving process by which important research questions are identified and eventually answered. The progress of a scientific field is helped by realization of its own assumptions, biases, and weaknesses. Such self-assessment is greatly assisted by intellectual criticism. That is why it is a healthy matter for the diffusion field to face the criticisms that have been raised.

The Pro-Innovation Bias of Diffusion Research

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One of the most serious shortcomings of diffusion research is its pro-innovation bias. This problem was one of the first biases to be recognized (Rogers with Shoemaker, 1971), but not enough has been done to remedy the problem. What is the pro-innovation bias? Why does it exist in diffusion research? What could be done about it?

The *pro-innovation bias* is the implication in diffusion research that an innovation should be diffused and adopted by all members of a social system, that it should be diffused more rapidly, and that the innovation should be neither re-invented nor rejected. Seldom is the pro-innovation bias straightforwardly stated in diffusion publications; rather, the bias is assumed and implied. This lack of recognition of the pro-innovation bias makes it especially troublesome and potentially dangerous in an intellectual sense. The bias leads diffusion researchers to ignore the study of ignorance about innovations, to underemphasize the rejection or discontinuance of innovations, to overlook re-invention (although much research on the subject has been done in recent years), and to fail to study antidiffusion programs designed to prevent the spread of "bad" innovations (crack cocaine or cigarettes, for example). The result of the pro-innovation bias in diffusion research is a failure to learn about certain very important aspects of diffusion. As a result, what we do know about diffusion is unnecessarily limited.

*Pure Drinking Water in Egyptian Villages**

When villagers in Third World countries are asked in surveys, "What is the most important problem in your daily life?" they consistently respond, "Water." The water problem is particularly severe for Egyptian villagers living in the Nile River delta. Here, water is conveniently available in the small canals that bisect this densely populated farming area. But the stagnant canal water is a serious health threat because the canals are used by villagers for washing clothes and dishes and for urinating and defecating, as well as a source of drinking water. A green scum of algae often covers the stagnant canals, especially in the hot summer months.

The canals are also breeding grounds for the snails that are hosts for the tiny parasites that cause schistosomiasis, a

terrible disease endemic in the Nile delta. Village children infested with schistosomiasis act like "walking zombies," sapped of their energy by the parasites in their liver, lungs, brain, and other vital organs. Many children die of schistosomiasis (also called "snail fever" or "bilharzia"). The canal water is also loaded with bacteria that cause infectious diarrhea among village babies, who can die within hours due to dehydration and the loss of body liquids (see Chapter 9).

Given these unhealthy conditions associated with consuming canal water, it might seem surprising that the canals are the main source of drinking water for villagers in the Egyptian delta. A diffusion scholar, David Belasco (1989), sought to find out why. On one occasion, he observed a village woman gathering water for her family's consumption from a stagnant canal. Someone was urinating nearby. A dead donkey, its body bloated by the hot sun, floated in the canal. Why would anyone drink such obviously polluted water?

In an effort to improve the public health conditions of villages, the government ministry of health, with funding from the U.S. Agency for International Development (USAID), constructed a system of pumps and pipes that deliver pure, chlorinated water to public spigots in many villages in the Nile delta. But more than half of the villagers served by this piped water system preferred the unhealthy canal water, and almost no one drank *only* the pure water. Even though most villagers knew from a government health campaign on television and radio that canal water was contaminated with "microbes" that caused disease and death, they still drank the canal water.

Belasco conducted survey interviews with female water gatherers in three villages; he supplemented these data with observations and ethnographic analysis of water-related behavior (this investigation is unique among diffusion studies in using both quantitative and qualitative data). Belasco found that the technological innovation of piped, chlorinated water was actually not such an appropriate technology for Egyptian villagers as health experts and sanitation engineers had claimed. *Thus he overcame the pro-innovation bias that characterizes many diffusion studies.*

Egyptian politicians had promised pure water to all villagers in the Nile delta. This popular goal severely overextended the water system that could be constructed with available resources. Further, much pure water was wasted. Each spigot was originally equipped with a spring-loaded shut-off valve, so that the flow of water would stop when the valve was not held open. However, the constant use of this valve often broke the spring. Many of the springs were intentionally broken by villagers, who preferred constantly running water. So pure water ran out of the spigot day and night, creating a filthy mudhole around the spigot. The water pressure throughout the piped water system was lowered.

Obviously, the technology for providing pure water supplies in villages of the Nile delta was poorly planned, without an adequate consideration of human behavior and of Egyptian village culture. As in many technological systems, the context of users' behavior was not fully taken into account by the hydraulic engineers who planned the pure water system. So the technological innovation did not match villagers' needs. The innovation lacked compatability.

Belasco's respondents preferred canal water because they perceived that the chlorinated water from the spigot tasted "chemical" or "medicinal." Many believed that it weakened their sex drive. A rumor circulated that the government's unpopular family-planning program had added chemicals to the piped water in order to decrease the rate of population growth in Egypt.

Most village water gatherers stored the canal water in a *zir,* an earthen vase whose evaporation cooled the water. The dirt and other solids in the canal water settled to the bottom of the *zir,* so that the resulting clear water appeared to be pure. The bacteria were still present, as were the microscopic schistosomiasis parasites. But villagers *perceived* that the *zir* purified their drinking water. Most *zir*s do not have lids, so the dust and flies in the air further contaminated the water.

Social reasons also explain why canal water was preferred by most female water gatherers. The women congregated on the canal banks to wash their clothes and dishes and to gather water, providing a social setting for the exchange of news and gossip. In comparison, standing in line at a water spigot was unpleasant. The long lines of female water gatherers congregated at each spigot in the very early morning, and these queues lengthened as the day wore on. Only a tiny stream of water emerged from the spigot. Pushing frequently occurred and fighting often broke out, sometimes spreading to the male relatives of the water gatherers. Worse, during the hot summer, when demand for the piped water was greatest, the government-installed water system was totally inadequate. The water supply was shut off completely for several hours each day, and often for days at a time. These highly unreliable conditions forced even those individuals who preferred piped water to drink canal water. Some women poured their inadequate supply of pure water into their *zir* of polluted canal water, thus negating the health effects of the piped water.

Belasco's respondents, who were devout Muslims, washed their hands and feet prior to praying five times each day at the village mosque. Islamic belief calls for washing with pure water. Incredibly, Belasco found that villagers often cleaned their hands and feet with pure tap water from a spigot but then drank the polluted canal water. Village religious leaders, who are highly respected opinion leaders, could have played an important role in promoting pure drinking water, but this strategy was not pursued by government change agents.

The Egyptian villagers who reject the chlorinated, piped water and who drink polluted canal water are not actually as irrational as they might at first appear to be. One of the important contributions of diffusion studies such as David

Belasco's study in Egypt is to illuminate the complex nature of individuals' perceptions of an innovation. Understanding such perceptions can provides useful lessons to technological experts. After all, perceptions count. Taking into account the people's perceptions of an innovation, rather than the technologists', is essential in overcoming the pro-innovation bias.

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*This present case illustration is based on Belasco (1989).

REASONS FOR THE PRO-INNOVATION BIAS How did the pro-innovation bias become part of diffusion research? One reason is historical: hybrid corn was very profitable for each of the Iowa farmers in the Ryan and Gross (1943) study. Most other innovations that have been studied do not have this extremely high degree of relative advantage. Many individuals, for their own good, should *not* adopt many of the innovations that are diffused to them. Perhaps if the field of diffusion research had not begun with a highly profitable agricultural innovation in the 1940s, the pro-innovation bias would have been avoided or at least recognized and dealt with properly.

During the 1970s, several critics of diffusion research recognized the pro-innovation bias. For example, Downs and Mohr (1976) stated: "The act of innovating is still heavily laden with positive value. Innovativeness, like efficiency, is a characteristic we want organisms to possess. Unlike the ideas of progress and growth, which have long since been casualties of a new consciousness, innovation, especially when seen as more than purely technological change, is still associated with improvement." So innovation is a good word in modern society, similar to "motherhood" and "patriotism."

What causes the pro-innovation bias in diffusion research?

由变革机构资助的

1. Much diffusion research is funded by change agencies: *They* have a pro-innovation bias (understandably so, since their very purpose is to promote innovations), and this viewpoint has often been accepted by the diffusion researchers whose work they sponsor, whom they call upon for consultation about their diffusion problems, and whose students they hire as employees.

不成功的案例
学习不了啊也

2. "Successful" diffusion leaves a rate of adoption that can be retrospectively investigated by diffusion researchers, while an unsuccessful diffusion effort does not leave visible traces that can easily be reconstructed. A rejected and/or a discontinued innovation is thus less likely to be investigated by a diffusion researcher. For somewhat similar reasons, the variety of forms taken by the re-invention of an innovation makes it more difficult to study, posing methodological problems of classifying just what "adoption" means (see Chapter 5). The conventional methodologies used by diffusion researchers led to a focus on investigating successful diffusion. Thus, a pro-innovation bias came into diffusion research.

One of the important ways in which the pro-innovation bias creeps into much diffusion research is through the selection of the innovations that are studied. This aspect of the pro-innovation bias may be especially dangerous because it is implicit, latent, and largely unintentional. How are innovations of study usually selected in diffusion research?

First, the sponsor of an investigation may approach a diffusion researcher with a particular innovation (or class of innovations) already in mind. For example, a manufacturer of cellular telephones or handheld personal digital assistants may request a diffusion researcher to study how this product is diffusing and, on the basis of the ensuing research findings, make recommendations for speeding up the diffusion process. Or a federal government agency may provide funds to a university-based diffusion researcher for a research project on the diffusion of a technological innovation to the public, a new idea that government experts feel the public should adopt. For example, federal government agencies have funded research by the present author on "five-a-day" (eating five servings of fruits and vegetables per day) nutrition for cancer prevention, the Internet and World Wide Web, and no-smoking ordinances enacted by cities. These innovations would seem to be of unquestionable benefit, although closer analysis might identify certain disadvantages that accompany the advantages for some adopters. For instance, once people adopt the Internet, they may have to deal with their children's access to pornographic material.

In many other cases, a diffusion researcher selects an innovation of study (with little influence from a research sponsor) on the basis of which new ideas look intellectually interesting to the investigator. The researcher often chooses to study an innovation with a relatively rapid rate of adoption. Such innovations are

often perceived as particularly noteworthy and dynamic. They are more likely to have policy implications. But one unintended result is that a pro-innovation bias is again injected into the diffusion study.

Because of the pro-innovation bias, we know much more about (1) the diffusion of rapidly spreading innovations than about the diffusion of slowly diffusing innovations, (2) adoption than about rejection, and (3) continued use rather than about discontinuance. The pro-innovation bias in diffusion research is understandable from the viewpoint of financial, logistical, methodological, and policy considerations. The problem is that we know too much about innovation successes and not enough about innovation failures. The later might be more valuable in an intellectual sense.

创新的失败理解不够

In the future, we need a different kind of diffusion study from those of the past, so that we shed the pro-innovation bias. For balance, we need a number of diffusion researches with an "anti-innovation bias" in order to correct past tendencies.

OVERCOMING THE PRO-INNOVATION BIAS How might the pro-innovation bias be overcome?

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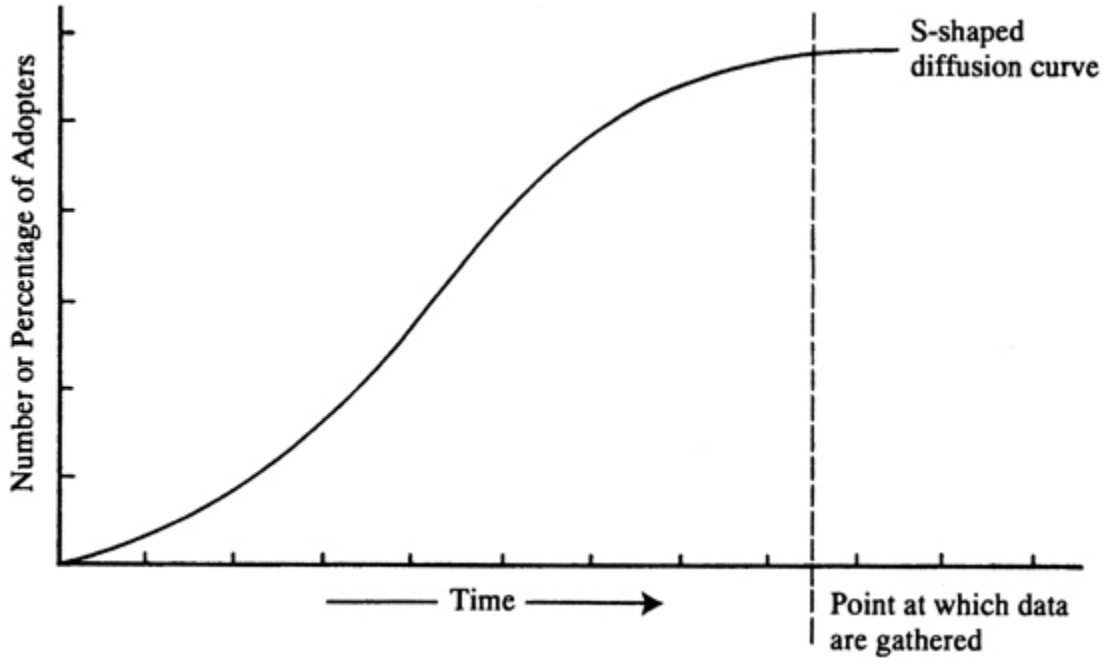
1. Alternative research approaches to post hoc data gathering about how an innovation has diffused should be explored. Diffusion research does not necessarily have to be conducted *after* an innovation has diffused completely to the members of a system (Figure 3–1). Such a rearward orientation to most diffusion studies leads them to concentrate on successful innovations.

   It is possible to investigate the diffusion of an innovation while the diffusion process is still under way (Figure 3–2). Data can be gathered at two or more points during the diffusion process, rather than only after the diffusion process is completed (as is the usual case). This type of research design might be a field experiment in which data are gathered before and after an intervention, as in the Berleson and Freedman (1964) study of family planning diffusion in Taiwan (see Chapter 2) and the Tanzania Project on family planning and HIV prevention (Rogers et al., 1999; Vaughan and Rogers, 2000), discussed in Chapter 5. Also possible are experiments in which the opinion leadership strategy is evaluated (see Chapter 8). An experiment or some other type of in-process diffusion research design allows a scholar to investigate less successful, as well as more successful, cases of innovation diffusion, and therefore to avoid the pro-innovation bias.

在创新中就要开始记录和数据

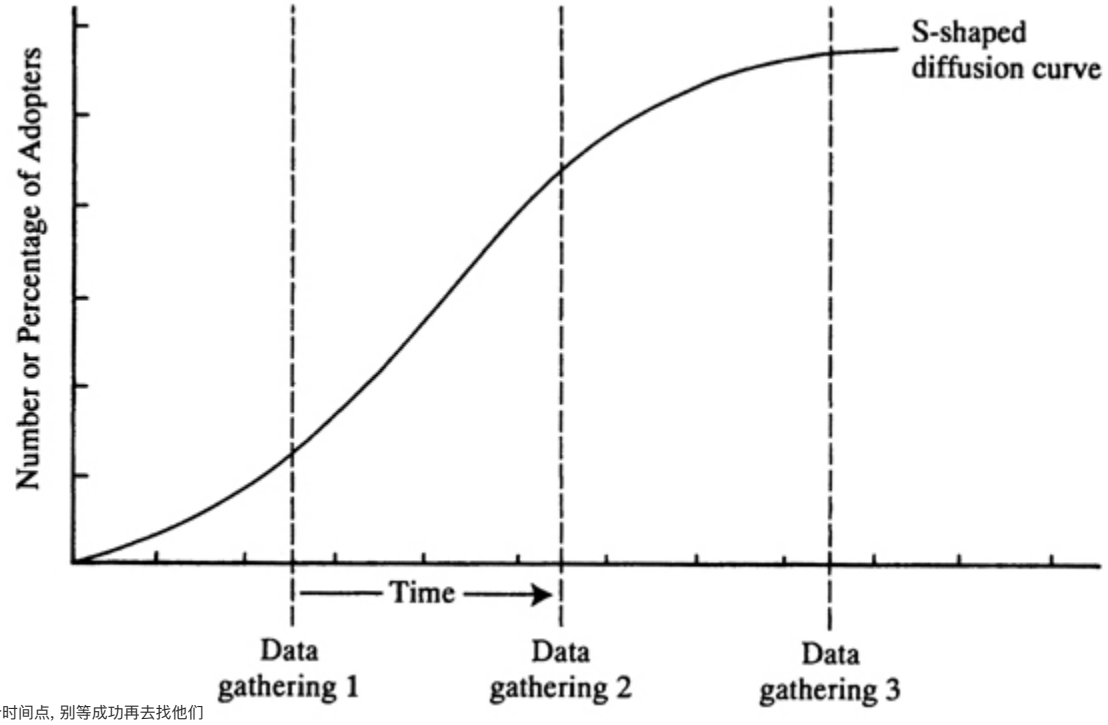
Figure 3-1. Methods of Gathering Data



The usual diffusion study gathers data from adopters after the innovation has diffused widely by asking respondents to look backward in time. Because cases of successful diffusion are usually selected for study, a pro-innovation bias is introduced into much diffusion research.

幸存者误差

Figure 3-2. Alternative Research Design



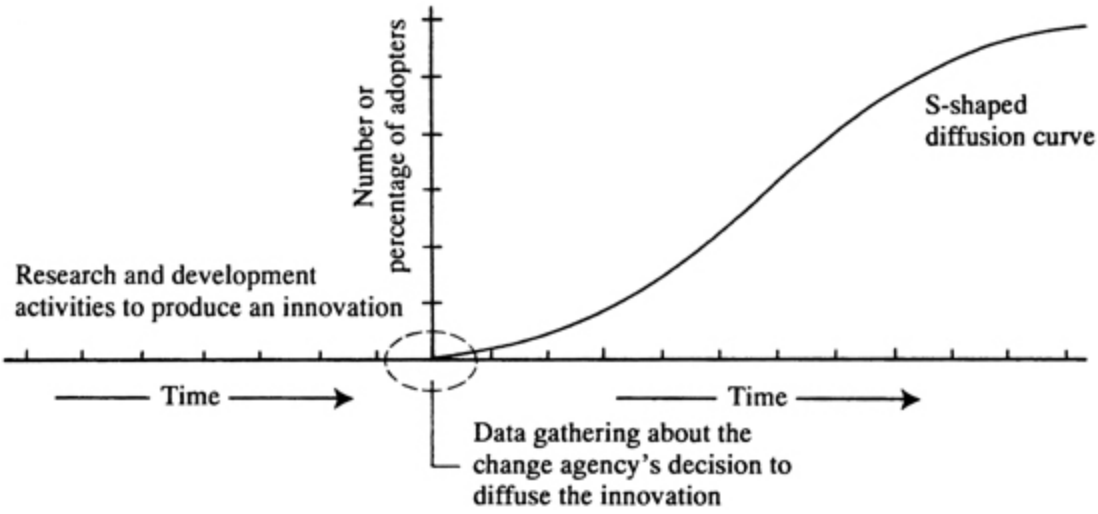
卡一个时间点, 别等成功再去找他们

An alternative research design for a diffusion study is to gather data from adopters at several points in time during the diffusion process. When data are gathered from respondents at several points in the diffusion process, they do not have to recall information about their date of adoption of the innovation over such a long time period.

2. Diffusion researchers should become much more questioning of, and careful about, how they select their innovations of study. Even if a successful innovation is selected for investigation, a diffusion scholar might also investigate an unsuccessful innovation that failed to diffuse widely among members of the same system during the same time frame. Such a comparative analysis would help illuminate the seriousness of the pro-innovation bias. In general, a much wider range of innovations should be studied in diffusion research to overcome the pro-innovation bias.

Figure 3-3. Avoiding the Pro-Innovation Bias

还是 多一些质疑和严谨



One means of avoiding the pro-innovation bias might be to investigate the broader context of diffusion, such as the decision by a change agency to diffuse the innovation. A diffusion scholar might also study how the decision was made to begin R&D work to create the innovation, and how the innovation was shaped into its final form.

拒绝中断重新发明都是正常的

3. It should be acknowledged that rejection, discontinuance, and re-invention frequently occur during the diffusion of an innovation and that such behavior may be rational and appropriate from the individual's point of view, if only the diffusion scholar could adequately understand the individual's perceptions of the innovation and of the individual's situation. For instance, adopters often feel that they know relevant information about their local situation that a professional change agent may not know or understand. Indigenous knowledge systems, like the hot-cold complex in the Peruvian village of Los Molinas (see Chapter 1), may affect the diffusion of a new idea. Until recent years, agricultural change agents in Mexico recommended that *campesinos* cease interplanting corn and beans in the same field, which was the traditional method of farming. Later, agricultural research showed that such interplanting actually led to higher crop yields and to other benefits (such as when either the corn or the bean crop failed). In this case, Mexican villagers knew more about farming than did Ph.D. agronomists.

   Re-invention is an important way in which an innovation is changed to fit the adopting unit's situation. For the first several decades of diffusion research, we did not recognize that re-invention existed. An innovation was regarded by diffusion scholars as an invariant during its diffusion process. Now it is realized, belatedly, that an innovation may be perceived somewhat differently by each adopter and modified to suit the individual's particular situation. Thus, diffusion scholars no longer assume that an innovation is "perfect" for all potential adopters in solving their problems and meeting their needs.

调查更广泛的背景

4. Researchers should investigate the broader context in which an innovation diffuses, such as how the initial policy decision is made that the innovation should be diffused to members of a system, how the innovation of study is related to other innovations and to the existing practice(s) that it replaces, and how it was decided to conduct the R&D that led to the innovation in the first place (Figure 3–3). This wider scope of diffusion studies helps illuminate the broader system in which the diffusion process occurs, and aids in illuminating possible pro-innovation biases.

理解采用创新的动机

5. We should increase our understanding of motivations for adopting an innovation. Such "why" questions about adoption have seldom been probed effectively by diffusion researchers. Undoubtedly, motivations for adoption are a difficult topic to investigate. Some adopters may not be able to tell a researcher why they decided to use a new idea, and other adopters may be unwilling to do so. Seldom are simple, direct questions in a survey interview adequate to uncover an adopter's reasons for using an innovation. But we should not give up on trying to find out the "why" of adoption just because valid data about adoption motivations are difficult to obtain by the usual methods of survey data gathering. We should also study why individuals reject or discontinue a new idea, as in David Belasco's investigation of why Egyptian villagers did not drink piped water.

An economic motivation is often assumed to be the main thrust for an individual's adoption of an innovation, especially if the new idea is expensive. Economic factors are undoubtedly very important for certain types of innovations. But the prestige from adopting an innovation prior to most of one's peers may also be important. For instance, Becker (1970a; 1970b) found that prestige motives were very important for city and county health departments in deciding to adopt new health programs. Mohr (1969) explained: "A great deal of innovation in [health] organizations, especially large or successful ones, is 'slack' innovation. After solution of immediate problems, the quest for prestige rather than the quest for organizational effectiveness or corporate profit motivates the adoption of most new programs and technologies." Perhaps prestige motivations are less important and profit considerations paramount in private organizations, unlike in the public organizations studied by Becker and Mohr. The desire for prestige is probably very important in decisions to adopt certain innovations, such as new clothing fashions, new-model cars (such as "hybrid" autos), and very thin laptop computers. We do not really know because so few diffusion researchers have tried to assess motivations for adoption.

If diffusion scholars could more adequately see an innovation through the eyes of their respondents, including why the innovation was adopted or rejected, diffusion research would be in a better position to shed the pro-innovation bias of the past. A pro-innovation tilt is dangerous in that it may cloud adopters' perceptions of an innovation.

An astute observer of diffusion research, J. D. Eveland (1979), stated: "There is nothing inherently wrong with . . . a pro-innovation value system. Many innovations currently on the market are good ideas in terms of almost any value system, and encouraging their spread can be viewed as virtually a public duty." But even in the case of an overwhelmingly advantageous innovation, potential adopters may perceive it very differently than change agents or researchers. Simply to regard the adoption of the innovation as *rational* (defined as use of the most effective means to reach a given end) and to classify rejection as stupid is to fail to understand that individual innovation-decisions are idiosyncratic. They are based on an *individual's* perceptions of the innovation. Whether considered right or wrong by a scientific expert who seeks to evaluate an innovation objectively, adoption or rejection is always "right" in the eyes of the individual who made the innovation-decision (at least at the time the decision is made). Diffusion scholars would do well to remember that individuals' own perceptions count in determining their innovation behavior.

In the past, we diffusion researchers placed an overreliance upon models of diffusion that are too rationalistic. The unfortunate consequence is that we often assumed that all adopters perceive an innovation in a positive light, as we ourselves may perceive it. We need to question this assumption of the innovation's advantage for all adopters and to gather data about how individuals actually perceive the innovation, much as David Belasco (1989) did in his study of the rejection of piped water in Egypt.

Certainly the first and most important step in shedding a pro-innovation bias in diffusion research is to recognize that it may exist. 认识到偏见的存在

*Preference for Sons in India and China**

Most diffusion activities in *most* countries have beneficial consequences for *most* people who adopt the innovations that are promoted. Thus the pro-innovation bias of past diffusion research is at least partially justified. But in some cases, an innovation that is *generally* beneficial can be disastrous for *certain* adopters and for society. And in a few cases, a widely diffused innovation has disastrous consequences for society.

One example is the diffusion of sex determination medical technology, especially ultrasound tests, to rural areas in India and China. Parents in both nations have a strong preference for sons, which in the past was expressed in terms of various folk theories to explain the sex of an unborn fetus (such as that if the unborn baby hangs low on the mother's body, it will be a boy), female infanticide, and neglect of girl children through inadequate nutrition (Luthra, 1984). Boy children carry on the family name, and sons, not daughters, care for the parents when they grow old. There is no government social security system in India or China. Furthermore, a family must pay a dowry when a daughter marries. As one advertisement for ultrasound tests in India proclaimed, "Better to pay the cost of sex determination plus abortion now, than to pay a dowry later" (Luthra, 1984, p. 265). The preference for boys is so strong in India that when parents are asked how many children they have, they often mention only the number of their sons.

Sex determination equipment became available in Indian cities in the 1980s and was outlawed in 1984, but this law has not been enforced. Compact ultrasound machines soon diffused to small towns and rural villages in India, where

preference for sons is strongest. The results of an ultrasound test in a rural clinic may be conveyed subtly, such as by a doctor frowning to indicate a girl fetus and signifying a boy fetus with a smile. The test costs about $11 (U.S.), and the demand is greatest in the better-off north Indian states such as the Punjab. Here the ratio of the number of boy children to girl children at birth changed from 114 boys to 100 girls in 1991 to 126 to 100 in 2001. In the United States and throughout most of the world, the sex ratio at birth has remained for years at 105 to 107 boys to 100 girls (Dugger, 2001).

In China, where the government's one-child family policy since 1979 has inadvertently served to emphasize preference for sons, the sex ratio at birth changed from 108 to 100 in 1982, to 113 to 100 in 1990, to 117 to 100 in 2000 (Wiseman, 2002). The highest ratio in China is found in Hubei Province: 130 boys to 100 girls. It is estimated that by 2020, due to the lower number of girls being born, 30 to 40 million young Chinese men will not be able to marry. There simply will not be enough wives to go around. In China, unmarried males are called *guang guan* ("bare branches"). They are the losers in a societal competition for increasingly scarce females. Rural, uneducated young men without a stable job are least likely to find a wife.

Professor Rashmi Luthra (1984), who helped call the problems of ultrasound diffusion and the resulting lopsided sex ratios to public attention, concludes that it is important to study the diffusion of harmful technologies, as well as to investigate the diffusion of beneficial innovations.

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*This case illustration is based on various sources, including Luthra (1994), Dugger(2001), and Wiseman (2002).

The Individual-Blame Bias in Diffusion Research

源偏差是指扩散研究倾向于站在促进创新的变革机构一边而不是站在潜在的采用者个人一边

A source bias is a tendency for diffusion research to side with the change agencies that promote innovations rather than with the individuals who are potential adopters. This source bias is perhaps suggested by the words that we use to describe this field of research: "diffusion" research might have been called something like "problem solving," "innovation seeking," or "evaluation of innovations" had the audience originally been a stronger influence on this research. One cannot help but wonder how the diffusion research approach might have been different if the Ryan and Gross (1943) hybrid corn study had been sponsored by the Iowa Farm Bureau Federation (a farmers' organization) rather than by the Iowa Agricultural Experiment Station. What if the Columbia University drug study had been sponsored by the American Medical Association rather than by the Pfizer Drug Company? The source sponsorship of early diffusion studies may have given these investigations not only a pro-innovation bias but also structured the nature of diffusion research in other important ways.

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INDIVIDUAL-BLAME VERSUS SYSTEM-BLAME As a result of who sponsors diffusion research, along with other pro-source factors, one can detect individual-blame, rather than system-blame, in diffusion research. *Individual-blame* is the tendency to hold an individual responsible for his or her problems, rather than the system of which the individual is a part. An individual-blame orientation implies that "If the shoe doesn't fit, there's something wrong with your foot." An opposite point of view would blame the system, not the individual. It might imply that the shoe manufacturer or the marketing system could be at fault for a shoe that does not fit.

Some factors underlying a particular social problem may indeed be individual in nature, and any effective solution to the problem may have to change these individual factors. In many other cases the causes of a social problem lie in the larger context or system of which the individual is a part. Ameliorative social policies that are limited to individual interventions cannot be very effective in solving system-level problems. How a social problem is defined is an important determinant of how we go about solving it, and ultimately of the effectiveness of the attempted solution. A frequent error is to overstress individual-blame in defining a social problem, and to underestimate system-blame. *System-blame* is the tendency to hold a system responsible for the problems of individual members of the system.

Consider the following cases, in which a social problem was defined initially in terms of individual blame.

1. Posters were captioned: "LEAD PAINT CAN KILL!" Such posters placed the blame on low-income parents for allowing their children to eat paint peeling off the walls of older housing. The posters blamed the parents, not the paint manufacturers or the landlords. In the mid-1990s, federal legislation was enacted to require homeowners to disclose that a residence is lead-free when a housing unit is rented or sold.
2. Motor vehicle accidents are the leading cause of death of individuals in the United States under thirty-five

years of age. Until the mid-1960s, highway safety problems were defined in terms of speeding, reckless driving, and drunk drinking (see Chapter 4). Public communication campaigns were aimed at the individual driver, urging "Don't drink and drive," "Buckle up for safety," and "Slow down and live." Unfortunately, the highway accident rate continued to climb. Ralph Nader's (1965) book *Unsafe at Any Speed* helped to redefine the problem from mainly one of blaming "the nut behind the wheel" to a system-blame of unsafely designed automobiles and highways. Once the problem was redefined as one of system-blame as well as individual-blame, federal legislative mandates for safer cars and highways followed, and the traffic fatality rate decreased (Walker, 1976, 1977). For instance, safety laws required more padding on auto dashboards and stronger car bumpers, as well as impact absorbers placed in front of the concrete columns supporting highway viaducts. This redefinition of the traffic safety problem did not deny that individual drivers' behavior could also contribute to safer driving. MADD (Mothers Against Drunk Driving) helped secure tougher penalties for drunk driving in the 1980s and 1990s, leading to decreased highway deaths.

3. A large training program in Chicago sought to improve the employability of black inner-city men. The training course stressed the importance of punctuality in holding a job. But such an individual-blame approach did not achieve much results. An investigation found that only one fourth of the trainees had alarm clocks or wristwatches, so most had to rely on someone else to wake them up in the morning. Furthermore, the retrained workers had to depend upon unreliable means of public transportation and to cope with traffic congestion in traveling from their inner-city homes to suburban workplaces (Caplan and Nelson, 1974). However, the training program refused to spend even a few dollars for alarm clocks.

In each of these illustrations, a social problem was initially defined in terms of individual-blame. The resulting diffusion program to change human behavior was not successful until system-blame factors were also recognized.

INDIVIDUAL-BLAME AND THE DIFFUSION OF INNOVATIONS "The variables used in diffusion models [to predict innovativeness], then, are conceptualized so as to indicate the success or failure of the individual *within the system* rather than as indications of success or failure *of the system*" (Havens, 1975, p. 107, emphasis in original). Examples of such individual-blame variables that have been correlated with individual innovativeness in past diffusion investigations include formal education, size of operation, income, cosmopoliteness, and mass media exposure (see Chapter 7). In addition, these past studies of individual innovativeness included predictor variables that might be considered system-blame factors, such as change agent contact with clients and the degree to which a change agency provides financial assistance (such as in the form of credit to purchase an innovation). But seldom is it implied in diffusion research publications that the source or the channel of innovations might be at fault for not providing more adequate information, for promoting inappropriate innovations, or for failing to contact less educated members of the audience who may especially need a change agent's help.

Late adopters and laggards are often individually blamed for not adopting an innovation and/or for being much later in adopting than the other members of their system. Change agents feel that such later adopters are not dutifully following the experts' recommendations to use an innovation. These individuals are considered "traditionally resistant to change" and/or "irrational." A more careful analysis might show that the innovation is not as appropriate for these later adopters, perhaps because of their smaller-sized operations and more limited resources. In fact, for them, *not* adopting may be extremely rational. A system-blame approach might question whether the R&D source of innovations was properly tuned to the actual needs of the later adopters in the system and whether the change agency, in recommending the innovation, was fully informed about the actual life situation of the later adopters. One thinks of the piped water program in Egypt, as described earlier in this chapter, and whether it was really designed with the needs of the intended users in mind.

A stereotype of later adopters by change agents and others as traditional, uneducated, and/or resistant to change can become a self-fulfilling prophecy. Change agents do not contact the later adopters in their system because they feel, on the basis of their stereotypic image, that such contact will not be fruitful in leading to adoption. Without information inputs and other assistance from change agents, later adopters are even less likely to adopt. Thus, the individual-blame image of later adopters thus fulfills itself. Individual-blame interpretations are often in everybody's interest—except those who are subjected to individual blame.

Evidence of how an individual-blame bias can limit understanding of the diffusion process is provided by a study of recycling behavior in Edmonton and Calgary, Canada. In the early 1990s, when the data were gathered, the environmental issue was very high on the public agenda. Yet Derksen and Gartell (1993) found that individual attitudes toward the environment were related to the recycling of cans, bottles, and newspapers *only* for people who had access to a curbside recycling program. Edmonton, a city with a recycling program, had much more widespread adoption of recycling than did Calgary, which did not have a city program of curbside pickup. "Recycling has been conceptualized as an issue of individual behavior" (Derksen and Gartell, 1993). Such an individual-blame perception on the part of city officials was a mistake. Before individual attitudes toward the environment could be crystallized into recycling actions, a community-level decision had to made to provide a recycling program. Diffusion research on recycling should have focused on how cities such as Calgary and Edmonton had adopted recycling programs, rather than how individuals in these cities had adopted recycling. Here we see how a system-blame perspective would have shifted the unit of analysis from the individual to the city (or at least the city and the individuals in cities, with recycling adoption seen as a contingent innovation-decision).

REASONS FOR ASSIGNING INDIVIDUAL-BLAME It may be understandable (although regrettable) that professional change agents fall into individual-blame thinking about why their clients do not adopt an innovation. But why and how does diffusion research also reflect such an individual-blame orientation?

1. As implied previously, diffusion researchers sometimes accept a definition of the problem that they are to study from the sponsors of their research. If the research sponsor is a change agency with an individual-blame bias, the diffusion scholar may accept an individual-blame orientation. Ensuing research may then contribute, in turn, toward change agency policies of an individual-blame nature. "Such research frequently plays an integral role in a chain of events that results in *blaming people in difficult situations for their own predicament*" (Caplan and Nelson, 1973, emphasis in original).

   The essential error on the part of some diffusion researchers in the past is that they may have inadvertently equated the *cause* of an event or a condition, a matter to be theoretically and empirically ascertained, with the *blame* for an event or condition, which may be a matter of opinion and interpretation, based upon an observer's values and beliefs (Caplan and Nelson, 1973). Cause and blame are two different matters. The individual-blame bias in past diffusion research sometimes occurred when researchers uncritically accepted others' definitions of blame as a scientific cause. The investigators should have attributed cause among their variables of study only on the basis of empirical evidence, not on the basis of others' beliefs and judgments. Social scientists are not value-free when choosing or framing a research problem, although the conduct of the research should be objective.

   Defining a problem correctly and understanding individuals' perceptions of the problem are important first steps in planning an intervention. For example, accident prevention experts produced a training video on home gun safety for children, which emphasized not playing with handguns. In a pretest evaluation of the video in an inner-city school in Chicago, the researchers showed the video and then asked schoolchildren to react to a drawing of an open dresser drawer containing a revolver. The children, in unison, said, "Don't pick up the gun." "Why?" asked the evaluators. "Fingerprints," said the children. This surprising response sent the researchers back to the drawing board to rethink how they had initially defined the problem of gun safety.

   A health communication scholar from Johns Hopkins University traveled to the Ivory Coast in West Africa as a consultant to a diffusion campaign intended to decrease the high rate of teenage pregnancy. Prior research had suggested that teenagers did not possess adequate knowledge about contraceptives and had difficulty in obtaining condoms from drugstores and health clinics. The intervention campaign was centered on drama plays created by high school students and their teachers. At a theater workshop in drama production, teenagers told the Johns Hopkins University consultant that the *real* cause of teenage pregnancy in the Ivory Coast was "sugar daddies" (older, powerful men who rewarded teenage girls with food, money, or jewelry in exchange for sexual favors). The sugar daddies included schoolteachers and principals, as well as Ministry of Education officials who visited the schools. The university consultant then encouraged the Ivorian students to include this redefinition of the teenage sexuality problem in the plays they were designing. The resulting play about sugar daddies won the national theater contest and was

broadcast on national television in the Ivory Coast and throughout Africa. In this case, a redefinition of the problem as one of system-blame led to an effective diffusion intervention.

A similar point is made by the redesign of a Swedish tractor. The manufacturer was troubled by falling sales of the tractor and engaged market researchers to conduct research on what farmers wanted in a tractor. Design engineers were thinking about revving up the tractor's horsepower or reconfiguring the controls for operating the tractor. Instead, the formative evaluation showed that most farmers wanted an improved sound system (most tractors today have a radio). Accordingly, the tractor's cab was soundproofed and a relatively expensive CD player was installed. When the new model went on the market, sales shot up. Once the problem was defined (or redefined) by the potential adopters, the tractor designers gained a whole new vision of why their product was not being purchased. The farmers were saying, "You are not selling just traction power, you are selling operator comfort."

2. Another possible reason for the individual-blame bias in some diffusion research is that the researcher may feel that while it is difficult or impossible to change system-blame factors, individual-blame variables may be more amenable to change. System-level variables, especially if they involve changing the social structure of a system, may indeed be difficult to alter. But a first step toward system change is to define (or redefine) a social problem more accurately. Then an effective means of changing the system can usually be identified, as several of the previous examples suggest.
3. Individuals are often more accessible to diffusion researchers as objects of study than are systems, and the research tools of most diffusion investigators lead them to focus on individuals as units of analysis. The diffusion paradigm headed diffusion scholars in the direction of conducting surveys of individual adopters. For example. Ryan and Gross (1943) studied individual Iowa farmers. Gathering data from the change agencies diffusing the innovations (such as the seed corn salespeople and extension service agents) and/or the R&D organizations that produced the innovations (such as the Iowa Agricultural Experiment Station) was not part of this diffusion study. Officials in such systems may be at least equally as much to "blame" for certain diffusion problems as the potential adopters (who are the usual objects of diffusion study). In a later chapter, we describe how a tomato-harvesting machine in California was designed to be large and expensive. Not surprisingly, the farmers who adopted the machine were large operators, and the small farmers were forced out of tomato growing.

   Most social scientists who conduct diffusion research are specialists in gathering data from potential adopters by means of surveys. This particular research skill helps channel the researchers into an individual-blame definition of diffusion problems and away from a system-blame viewpoint. The anthropological diffusion research tradition, which conducts qualitative research instead of surveys, has been least accepting of an individual-blame point of view and most likely to point to system-blame aspects of diffusion problems (see Chapter 11).

   The overwhelming focus on the individual as the unit of analysis in diffusion research, while largely ignoring the importance of the individual's network relationships, is often due to the assumption that if the individual is the unit of *response,* he or she must consequently be the unit of *analysis.* The use of survey methods in diffusion research tends to "destructure" human behavior: "Using random sampling of individuals, the survey is a sociological meat-grinder, tearing the individual from his social context and guaranteeing that nobody in the study interacts with anyone else in it. It is a little like a biologist putting his experimental animals through a hamburger machine and looking at every hundredth cell through a microscope; anatomy and physiology get lost; structure and function disappear, and one is left with cell biology" (Barton, 1968).

   Even when the individual is the unit of response in a diffusion study, network relationships can be the unit of analysis in some type of network analysis. *Communication network analysis* is defined as a method of research for identifying the communication structure in a system, in which relational data about communication flows are analyzed by using some type of interpersonal relationship as the unit of analysis (see Chapter 8). Network analysis permits understanding communication structure as it channels the process of an innovation's diffusion.

   The influential Ryan and Gross (1943) study did not obtain data about diffusion networks. The refocusing of diffusion researches had to wait for later investigations, especially the drug study of medical doctors by Coleman and colleagues (1966). Today, diffusion scholars commonly ask their respondents sociometric questions such as: "From whom in this system did you obtain information that led you to adopt

this innovation?" Now the network link, rather than the individual, becomes the unit of analysis, and the diffusion scholar may have taken a first step away from assigning individual-blame.

OVERCOMING THE INDIVIDUAL-BLAME BIAS How can the individual-blame bias, where inappropriate in diffusion research, be overcome?

1. Diffusion scholars should seek alternatives to using individuals as their sole units of analysis, as discussed above.
2. Researchers should keep an open mind about the causes of a social problem, at least until exploratory data are gathered, and they should guard against accepting change agencies' definitions of diffusion problems, which tend to be in terms of individual-blame.
3. All the participants, including potential adopters and rejectors, should be involved in the definition of the diffusion problem, rather than just those persons who are seeking amelioration of a problem (such as change agents).
4. Social and communication structural variables, as well as intraindividual variables, should be incorporated in diffusion research. Past diffusion studies largely consisted of audience research, while seriously neglecting source research. The broader issues of (1) who owns and controls the R&D system that produces the innovations, (2) which change agency diffuses them, and (3) for whose benefit, also need attention in future diffusion investigations.

As in the case of the pro-innovation bias in diffusion research, perhaps one of the first and most important ways to guard against the individual-blame bias is to be aware that it may exist. An individual-blame orientation is not always inappropriate. Perhaps individual-level variables *are* the most appropriate to investigate in a particular diffusion study. But in almost all cases such a psychological approach, centering on individual-level variables, is not a complete explanation of the diffusion behavior being investigated.

The Recall Problem in Diffusion Research

Time is an important methodological enemy in studying a process such as diffusion. By definition, an innovation diffuses in a process through time. It might seem a simple enough matter to obtain data from respondents about the time at which they decided to adopt an innovation, but this is not always so.

PROBLEMS IN MEASURING THE TIME OF ADOPTION Diffusion differs from most other social science research in the fact that the time variable is not ignored. Time is one of the four essential elements of diffusion (see Chapter 1). Diffusion is a process that occurs over time, so there is no way to avoid including time when one studies diffusion. Although there are blessings that accrue from the inclusion of the time variable in diffusion studies (for example, the tracerlike qualities of innovations), there are also methodological curses.

One weakness of diffusion research is a dependence upon self-reported *recall data* from respondents as to their date of adoption of a new idea. Essentially, respondents are asked to look back in time in order to reconstruct their past history of innovation experiences. But hindsight is not completely accurate, with the degree of accuracy varying on the basis of the innovation's salience to the individual, the length of time over which recall is requested, and on the basis of individual differences in education, memory, and the like. In Chapter 2, we discussed the firehouse nature of research on news event diffusion in which data are obtained from members of the public about the news event within a few days of its occurrence. Scholars are concerned that unless they move quickly to gather the data, respondents will forget how they first learned about the news event, how they gathered further information, and what they did as a result. To the contrary, Mayer and colleagues (1990) found that individuals could accurately recall data about the *Challenger* disaster for at least several weeks after the event. This finding is reassuring, although the general problem of the accuracy of respondents' recall remains a concern of diffusion scholars.

Diffusion research designs consist mainly of correlational analyses of cross-sectional data gathered in one-shot surveys of respondents (usually the adopters and/or potential adopters of an innovation), thus following the methods pioneered by Ryan and Gross (1943) in their hybrid corn study. Diffusion studies ideally should rely on "moving pictures" of behavior, rather than "snapshots," because of the need to trace the sequential flow of an innovation as it spreads through a social system. Diffusion researchers have mainly relied,

however, upon one-shot surveys of their respondents, a methodology that amounts to making the diffusion process almost "timeless" through its stop-action effect of freezing a continuous process over time. Survey research on the diffusion process is a convenient methodology for the researcher, but it is intellectually destructive of the "process" aspects of the diffusion of innovations. If data about a diffusion process are only gathered at one point in time, the investigator can only measure time through respondents' recall, a possibly weak reed on which to base the measurement of such an important variable. 如果数据在一个时间点收集, 只能通过回忆测量时间 离谱

Alternative research designs for gathering data about the time dimension in diffusion are (1) field experiments, (2) longitudinal panel studies, (3) use of archival records, and (4) case studies of the innovation process with data from multiple respondents (each of whom provides a validity check on the others' data). These methodologies can reflect the time dimension of the diffusion process more accurately. Unfortunately, alternatives to the one-shot survey have not been widely used in past diffusion research (although greater use of experiments and case studies has occurred in recent years). The research designs predominantly used in diffusion research do not tell us much about the process of diffusion over time, other than what can be reconstituted from respondents' recall data.

PROBLEMS IN DETERMINING CAUSALITY Cross-sectional survey data are unable to answer many of the "why" questions about diffusion. "Such factors [as wealth, size, cosmopoliteness, etc.] may be causes of innovations, or effects of innovativeness, or they may be involved with innovation in cycles of reciprocal causality through time, or both they and the adoption of new ideas may be caused by an outside factor not considered in a given study" (Mohr, 1966, p. 20). One-shot surveys cannot tell us much about time order, or about the broader issue of causality. 一次性调查不能告诉我们时间顺序, 也不能告诉我们更广泛的因果关系

The pro-innovation bias in diffusion research, and the overwhelming reliance on correlational analysis of survey data, often led in the past to avoiding or ignoring the issue of causality among the variables of study. We often speak of "independent" and "dependent" variables in diffusion research. A dependent variable is the main variable in which the investigator is interested. In about 60 percent of all diffusion research, this dependent variable is innovativeness (see Table 2–2). Diffusion research usually implies that the independent variables "lead to" innovativeness, although it is often unstated or unclear whether this really means that an independent variable *causes* innovativeness. In order for variable *X* to be the *cause* of variable *Y*, (1) *X* must precede *Y* in time-order, (2) the two variables must be related, or co-vary, and (3) *X* must have a "forcing quality" on *Y* (meaning that *X* must have a theoretical basis for affecting *Y*).

Again, we see the importance of research designs that allow clearer understanding of the aspects of diffusion over time. Field experiments are ideally suited for assessing the effect of various independent variables (the interventions or treatments) on a dependent variable (like the adoption of innovations). A *field experiment* is an experiment conducted under realistic conditions in which preintervention and postintervention measurements are usually obtained by surveys. In a typical diffusion field experiment, the intervention is some communication strategy to speed up the diffusion of an innovation. For example, the diffusion intervention may be an entertainment-education soap opera about family planning or HIV/AIDS prevention that is broadcast in one area and not in another (Rogers et al., 1999). Or the diffusion strategy being tested might be using opinion leaders to introduce an innovation in one set of systems, while opinion leaders are not used in another set of systems (see Chapter 8). We recommend that *much greater use should be made of field experiments in diffusion research so as to help avoid the respondent recall problem and to evaluate alternative diffusion strategies.*

ALTERNATIVES TO DIFFUSION SURVEYS Social science data-gathering techniques such as personal interviews do not work very well when the researcher is asking the respondent to recall his or her previous mind states over a long time period. For example, consider questioning a respondent as to his or her sources or channels of communication for an innovation that he or she adopted ten years or more ago. Obviously, one could not put complete faith in such recall data, even if they were provided by a cooperative respondent who was sincerely trying to offer valid data.

In addition to field experiments, another solution to the respondent recall problem in diffusion studies is to gather data at multiple points in the diffusion process. Instead of waiting until the innovation is widely diffused to gather data via respondents' recall, a diffusion researcher might gather data at several points during the diffusion process (Figure 3–2). At each data point, respondents are asked whether or not they have adopted, and for the details about their innovation-decision. In essence, establishing multiple data points amounts to dividing

the total length of the recall period into smaller segments for the average respondent. Thus, more accurate recall is facilitated.

Another alternative solution to the respondent recall problem is a "point of adoption" study in which respondents are asked to provide details about their adoption of an innovation at the time that they adopt, such as when they go to a clinic (in the case of adopting a family-planning innovation or AIDS prevention), a dealer or a warehouse (such as for an agricultural innovation), or a store (to purchase a consumer innovation, for example). This data-gathering strategy solves the recall problem by gathering data at the time of adoption. For example, data about family planning adoption were gathered at seventy-nine health clinics in Tanzania as a check on the recall data obtained from respondents in survey interviews about the role of an entertainment-education radio soap opera in convincing them to adopt (Rogers et al., 1999).

Various research strategies may be used to minimize the seriousness of the respondent recall problem in diffusion surveys:

1. Innovations for study that have recently diffused rapidly and that are salient to the adopters (unfortunately, this strategy may increase the possibility of a pro-innovation bias) can be selected.
2. Data about respondents' recall of their time of adoption can be gathered from alternative sources, such as at point of adoption or from archival records. An example is the Coleman and others (1966) drug study in which doctors' recall data were checked against drugstore prescription records (in this case, the two sets of data generally agreed, although medical doctors tended to report adopting tetracycline slightly earlier than the prescription records indicated). 第三方核实
3. Careful pretesting of the survey questions and high-quality interviewing by well-trained interviewers should be emphasized, so as to maximize the likelihood of obtaining recall data that are as valid as possible. 仔细预测, 高质量访谈, 最大限度获得有效召回数据
4. Certain innovative products and services are now marketed through the Internet, and computer records may provide an indication of the time of individuals' adoption. 计算机 记录时间

The Issue of Equality in the Diffusion of Innovations

As will be detailed in Chapter 11, diffusion researchers have not paid much attention to the consequences of innovation. More specifically, they have been particularly inattentive to the issue of how the socioeconomic benefits of innovation are distributed among individuals in a social system. 贫富差距越来越明显 When the issue of equality has been investigated, it has been shown that the diffusion of innovations often widens the socioeconomic gap between the higher- and lower-socioeconomic status segments in a system. This tendency for the diffusion of innovations to increase socioeconomic inequality can occur in any system, but it has especially been noted in developing nations. We therefore begin our discussion of equality issues with an examination of diffusion research in Latin America, Africa, and Asia.

DEVELOPMENT As shown in Chapter 2, research on the diffusion of innovations began in the United States. Then, during the 1960s, diffusion research caught on in the developing nations of Latin America, Africa, and Asia. The diffusion paradigm was followed closely. Many of these diffusion studies were conducted by sojourning scholars from the United States or Europe, or else by Latin American, African, or Asian scholars who had learned the diffusion approach during graduate study in the United States. A strong stamp of "made in America" characterized these diffusion researches. At first, during the 1960s, it seemed that most diffusion research methods and theoretical generalizations were cross-culturally valid; that is, the diffusion process in developing nations seemed to be generally similar to that in the richer, industrialized nations of Euro-America (Rogers with Shoemaker, 1971). Even though a peasant village was characterized by very limited financial resources, lower levels of formal education, and a paucity of mass media, innovations seemed to diffuse in approximately the same way as in the United States. For example, the rate of adoption followed the familiar S-shaped curve over time. As in the United States, innovators were characterized by higher social status, greater cosmopoliteness, and greater tolerance for uncertainty than were other adopter categories in villages in Colombia (Deutschmann and Fals Borda, 1962a, 1962b) and Bangladesh (Rahim, 1961).

But during the 1970s, questions were raised about the cultural importation of the diffusion paradigm to developing nations. Some critics were Americans or Europeans who had conducted diffusion studies in developing nations. Other critics were local social scientists (especially in Latin America) who raised troubling

questions about the conduct and the results of diffusion research as it was carried out in their nations. The key intellectual issue here is the cultural appropriateness of social science research as it originally grew to strength in the United States, and was then applied under very different sociocultural conditions in developing nations. One reason that diffusion research is particularly subject to criticism in developing nations is because, compared to any other field of behavioral science, it received so much more attention in Latin America, Africa, and Asia. Approximately 16 percent of all diffusion studies have been conducted in Latin America, Africa, and Asia.

During the 1970s, an intellectual shift occurred in the basic conception of development. Four main elements in the dominant paradigm of development (Rogers, 1976) were:

1. *Economic growth* through industrialization and urbanization.
2. Capital-intensive, laborsaving *technology,* mainly transferred from industrialized nations.
3. *Centralized planning,* mainly by government economists and bankers, in order to speed up the process of development.
4. *The causes of underdevelopment,* which lay mainly within the developing nation, rather than in their trade or other external relationships with industrialized countries (this perspective was an example of individual-nation blame, rather than world-system blame).

The classical diffusion model fit this dominant paradigm of development. The paradigm of development implied that the transfer of technological innovations from development agencies to their clients lay at the heart of the development process. Diffusion studies proliferated in Latin America, Africa, and Asia in the 1960s and early 1970s. Then a major shift occurred in the conceptualization of development. Today, *development* is defined as a widely participatory process of social change in a society intended to bring about both social and material advancement (including greater equality, freedom, and other valued qualities) for the majority of people through their gaining greater control over their environment (Singhal and Rogers, 2001).

A greater concern with equality of the benefits of development after the 1970s pointed toward the priority of villagers, urban poor, and women as the main target audiences for development programs in developing nations. The empowerment of women gained attention, as it was realized that they were often subordinated to men in patriarchal societies and that the technological innovations being introduced made them more so (Davis, 1998; Shefner-Rogers et al., 1998).

APPROPRIATENESS OF THE DIFFUSION PARADIGM TO DEVELOPING NATIONS An eminent Latin American communication scholar who conducted diffusion research on his continent, Juan Diaz Bordenave (1976), argued that the diffusion research questions asked by Latin American researchers do not really get to the main issues affecting development. The typical research issues in past diffusion studies have been:

1. How are technological innovations diffused in a social system?
2. What are the characteristics of innovators, early adopters, and other adopter categories?
3. What is the role of opinion leaders in the interpersonal networks through which a new idea diffuses in a system like a peasant village?

Bordenave (1976) suggested that the following research questions would be more appropriate if one were planning for a more just social structure as the result of development programs:

1. What criteria guide the choice of innovations that are to be diffused: (1) promoting the public welfare, (2) increasing production of goods for export, (3) maintaining low prices for urban consumers, or (4) increasing profits for society's elites, such as large landowners and industrialists?
2. What influence does society's social structure have on individual innovation-decisions?
3. Are the technological innovations that are being diffused appropriate, well proven, and adequate for the stage of socioeconomic development of the nation?
4. What are the likely consequences of the technological innovation in terms of employment and unemployment, migration of rural people to already overcrowded cities, and a more equitable distribution of individual incomes?
5. Will the innovation widen or narrow socioeconomic gaps?

Considering these important issues will help diffusion research to overcome its pro-innovation bias and individual-blame assumptions. The most important single way in which diffusion research in developing nations should be different from the past is in regard to the equity issue. In Latin America, Africa, and Asia, the social structure of a nation or of a local community is often in sharp contrast to that in Euro-America. For example, the author studied the diffusion of innovations in a Colombian village in which one landowner possessed half of all the land in the village. He was also the most innovative farmer (Rogers with Svenning, 1969). Power, economic wealth, and information are highly concentrated in a few hands in most developing nations, and this aspect of social structure affects not only the nature of an innovation's diffusion but also who reaps the main advantages and disadvantages of such technological change. The classical diffusion model was conceived in sociocultural conditions that were substantially different from those in Latin America, Africa, and Asia. Bordenave (1976) argued that when the diffusion model was used uncritically, it did not touch such basic issues as changing the social structure in developing countries.

SOCIOECONOMIC GAPS AND DIFFUSION The social structure in developing nations is a powerful determinant of individuals' access to technological innovations. Development agencies tend to provide assistance especially to their more innovative, wealthier, more highly educated, information-seeking clients. Following this diffusion strategy leads to a lower degree of equality in the consequences of technological innovations. For example, more progressive farmers are eager to adopt new ideas and have the economic means to do so. They can also more easily obtain credit if they need it to adopt the innovation. Because they have larger-sized farms, the direct effect of their adoption on total agricultural production is relatively important. Change agents cannot contact all of their clients, so they concentrate on their most responsive clients, with whom they are most homophilous. The result is a widening of the socioeconomic benefits gap among the change agent's client audience.

Does the diffusion of innovations necessarily have to widen socioeconomic gaps in a social system? Some reason for optimism about this issue was provided by two field experiments in developing nations. Shingi and Mody (1976) in India and Röling and colleagues (1976) in Kenya designed and evaluated diffusion approaches that narrowed, rather than widened, socioeconomic gaps. Essentially, these approaches sought, with some success, to overcome the inequity bias of the usual diffusion program. They introduced appropriate innovations to lower-socioeconomic clients through a special development program. These studies (discussed in Chapter 11) suggest that if communication strategies are used effectively in narrowing the socioeconomic benefits gap, then the socioeconomic structure is no longer a major barrier to the diffusion of innovations to the most disadvantaged segment of the population. Thus it may be possible to bring about *greater* equality through appropriate diffusion strategies.

Summary

We reviewed four major shortcomings of diffusion research in this chapter. We conclude that the beginnings of diffusion research left an indelible stamp on the approaches, concepts, methods, and assumptions of the field. The biases that we inherited from our research ancestors have been inappropriate for certain important diffusion research tasks of today. It is ironic that the study of innovation has itself been so traditional.

The four major criticisms of diffusion research discussed in this chapter are:

1. The *pro-innovation bias*, the implication of most diffusion research that an innovation should be diffused to and adopted by all members of a social system, that it should be diffused rapidly, and that the innovation should be neither re-invented nor rejected.
2. The *individual-blame bias*, the tendency to hold an individual responsible for his or her problems, rather than the system of which the individual is a part. 个体归咎容易让人忽略背后更大的结构性问题, 而系统归咎则可以帮助我们找到更有效的, 从根本上解决问题的方法
3. The *recall problem* in diffusion research, which may lead to inaccuracies when respondents are asked to remember the time at which they adopted a new idea.
4. The *issue of equality* in the diffusion of innovations, as socioeconomic gaps among the members of a social system are often widened as a result of the spread of new ideas. 如果gap太大 就揭竿而起了

Alternatives to the usual diffusion research approaches were proposed for overcoming each of these four criticisms of diffusion research.